March 2002

24379-000-0000

JOINT APPLICATION

PA Water Obstruction & Encroachment Permit
and
U.S. Army Corps of Engineers Section 404 Permit

For
Bailey Central Mine Complex
Coal Refuse Disposal Areas No. 3 and No. 4
Greene County, Pennsylvania

Prepared for

Consol Pennsylvania Coal Company
Pittsburgh, Pennsylvania

Prepared by

Baker

Michael Baker Jr., Inc.
Coraopolis, Pennsylvania

CONSOL PENNSYLVANIA COAL COMPANY
BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4

JOINT APPLICATION FOR A
PA WATER OBSTRUCTION & ENCROACHMENT PERMIT
AND
U.S. ARMY CORPS OF ENGINEERS SECTION 404 PERMIT

CONTENTS

PERMIT APPLICATION – APPLICATION FOR US ARMY CORPS SECTION 404 GENERAL INFORMATION FORM

Attachment A - Project Description
Attachment B – Site Maps
Attachment C - Refuse Volume Calculations
Attachment D - Copies and Proof of Receipt Act 14 Notifications
Attachment E - Determination of Historic/Archaeological Sites
Attachment F - PNDI Form
Attachment G - Environmental Assessment Form

COAL REFUSE DISPOSAL PERMIT APPLICATION (Attached Under Separate Cover)

Note that technical information regarding the proposed project is provided in Modules 10, 11, 13, 20 and 21 of the attached Coal Refuse Disposal Permit Application. That application has been submitted to PADEP Bureau of Mining and Reclamation – McMurray District Mining Office, 3913 Washington Road, McMurray, PA 15317.

3930-PM-WM0036A 2/2001

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
and
DEPARTMENT OF ARMY CORPS OF ENGINEERS
(Baltimore, Philadelphia, and Pittsburgh Districts)

Coordination #

JOINT APPLICATION FOR
PENNSYLVANIA WATER OBSTRUCTION AND ENCROACHMENT PERMIT AND
U.S. ARMY CORPS OF ENGINEERS SECTION 404 PERMIT

Before completing this form, read the step-by-step instructions provided with this Joint Permit package.

	AGENCY USE ONLY	
Application ID# (Assigned by DEP) _____	RECEIVED DATE _____	CHECK NO. _____
Program Application No. _____	REQUIRED APP. FEE _____	AMOUNT $_____

SECTION A. APPLICATION TYPE: STANDARD ☒ SMALL PROJECTS ☐

SECTION B. APPLICANT IDENTIFIER

Applicant Name
Consol Pennsylvania Coal Company

SECTION C. PROJECT LOCATION DATA

Name of stream and/or body of water.
Unnamed tributaries of Enlow Fork

Corps District where project will occur.
☐ Baltimore ☐ Philadelphia ☒ Pittsburgh

Name of the U.S.G.S. 7 1/2 Minute Quadrangle Map where project is located: Wind Ridge, PA
Indicate location of project on this map by measuring (in inches) from the lower right corner:
North (up) 15.3 inches; West (to the left) 0.1 inches; Latitude 39°57'30" ; Longitude 80°22'46"

Project type, purpose and need: Consol Pennsylvania Coal Co. is proposing to construct a new slurry impoundment (Coal Refuse Disposal Area No. 3) and new coarse coal refuse disposal area (Coal Refuse Disposal Area No. 4) for disposal of coal refuse generated by the Bailey Central Mine Complex. Existing disposal areas that currently service the mine complex are nearing full capacity.

SECTION D. PROJECT STATUS

HAS ANY PORTION OF PROPOSED PROJECT BEEN COMPLETED? ☐ yes ☒ no _____date completed
If yes, attach description of those portions of the project that have been completed and identify dates of completion.

SECTION E. OTHER APPROVALS

LIST APPROVALS, CERTIFICATIONS, DENIALS OR NOTICES OF VIOLATION RECEIVED FROM FEDERAL, INTERSTATE, STATE OR LOCAL AGENCIES FOR STRUCTURES, CONSTRUCTION, DISCHARGES OR OTHER ACTIVITIES DESCRIBED IN THIS APPLICATION.

Other permit applications submitted for Bailey Mine Complex Coal Refuse Disposal Areas No. 3 and No. 4 are:

MSHA - Approval to construct & operate Coal Refuse Disposal Areas No. 3 and No. 4 and the sedimentation pond; Approval applied for; Approval pending

PADEP - Coal Refuse Disposal Permit Application; Applied for; Approval pending

PADEP - Dam Permit Application, Coal Refuse Disposal Area No. 3 Main Dam and Saddle Dams A, B, C, and D; Applied for; Approval pending

PADEP - Dam Permit Application, Sedimentation Pond; Applied for; Approval pending

SECTION F. APPLICATION COMPLETENESS CHECKLIST

(Applicant must place an entry - Y = Yes, N = No, N/A = Not Applicable - in each left side column space. See Section 105.13 for additional details. If you are applying under the Small Projects Application format, place an entry in only those comments prefixed by an asterisk (*).

REQUIREMENT	Applicant Entry	DEP Use Only
a. Permit application properly signed, sealed and witnessed	*Y	
b. Application Fee enclosed (see Section G.)	*Y	
c. Copies and proof of receipt - Act 14 notification *(see Attachment D)*	*Y	
d. Determination of historic/archeological sites *(see Attachment E)*	*Y	
e. Completed and approved Supplement No. 1 Form (PNDI search) *(see Attach F)*	*Y	
f. Site Plan (including cross sections) *(Attach B & Coal Refuse Displ Permit App)*	*Y	
g. Project description narrative *(see Attachment A & Coal Refuse Displ Permit App)*	*Y	
h. Color photographs with map showing location taken *(Coal Ref Displ Permit App)*	*Y	
i. Environmental Assessment form *(see Attachment G)*	*Y	
j. Erosion and Sedimentation Control Plan and approval letter	Y[1]	
k. Hydrologic and hydraulic analysis *(see Coal Refuse Disposal Permit App)*	Y	
l. Stormwater Management Analysis w/consistency letter	N/A	
m. Floodplain Management Analysis w/consistency letter	N/A	
n. Risk Assessment	N/A	
o. Professional engineer's seal and certification	Y	
p. Analysis of practicable alternatives	Y[1]	
q. Mitigation plan *(see Coal Refuse Disposal Permit App)*	Y	

SECTION G. DETERMINATION OF APPLICATION FEES (DEP FEES ONLY)

Types of Water Obstructions and Encroachments	Number of Units	Fee Per Unit	Subtotal Amount
Stream enclosures	1	$ 350.00	Fee included with Coal Refuse Disposal Permit App
Channel changes		$ 300.00	$
Commercial dredging		$ 300.00	$
Peat extraction		$ 750.00	$
Fills, levees, floodwalls		$ 350.00	$
Bridges and other water obstructions and encroachments		$ 200.00	$
Small projects		$ 100.00	$
		TOTAL FEE	$ 0

List each type and number of water obstructions and encroachments that are included in this application and indicate subtotal and total fee amounts.

FAILURE TO PROVIDE ALL OF THE REQUESTED INFORMATION WILL DELAY THE PROCESSING OF THE APPLICATION AND MAY RESULT IN THE APPLICATION BEING PLACED **ON HOLD** WITH **NO ACTION**, OR IT MAY BE CONSIDERED WITHDRAWN AND THE FILE CLOSED.

[1] E & S control plans are presented in Module 11 of the Coal Refuse Disposal Permit Application. Approval of the E&S Control Plan is to be provided by PADEP Bureau of Mining and Reclamation as part of the Coal Refuse Disposal Permit. The Alternatives Analysis was submitted to the Corps of Engineers and PADEP Mining and approved by PADEP Mining on August 1, 2001.

SECTION H. ADJOINING PROPERTY OWNERS

Please list the name and address of all property owners whose land adjoins the project property.

NAME	ADDRESS
Gerald L. Anderson	RD1, Box 110 Crouse Road, Graysville, PA 15337
Consol Pennsylvania Coal Company	1800 Washington Road, Pittsburgh, PA 15241
Charles & James Browell	RR 1 Graysville, PA 15337
Consolidated Rail Corp. C/O Norfolk	
Southern Corporation	99 Spring Street – Box 142, Atlanta, GA 30303

SECTION I. CERTIFICATION AND SIGNATURE

If Privately Owned, all owners (such as husband and wife) must sign. One or more members authorized to sign on behalf of an entire partnership must sign. For a Corporation, the president, vice president or other responsible official is required to sign. For Political Subdivision, signatures of the chief officer or other responsible official empowered to sign is required with the seal affixed and attested by the clerk. For Commonwealth departments, boards, commissions, receivers, trustees and authorities, a department head, bureau director, executive director, chairman, commissioner or other responsible official is required to sign. Signatures other than above must be accompanied by a power of attorney or other notarized legal documentation indicating authorization to sign on behalf of the applicant.

Application is hereby made for a permit to authorize the activities described herein. I certify I am familiar with the information contained in this application, and to the best of my knowledge and belief, such information is true, complete and accurate. I further certify I possess the authority to undertake the proposed activities.

I certify that the project proposed in this application complies with and will be conducted in a manner that is consistent with the approved Coastal Zone Management program of the Commonwealth of Pennsylvania. (Only portions of Erie, Bucks, Philadelphia, Delaware Counties are in the Coastal Zone).

I grant permission to the agencies responsible for authorization of this work, or their duly authorized representative, to enter the project site for inspection purposes during working hours. I will abide by the conditions of the permit or license if issued and will not begin work without the appropriate authorization.

By: Dan R. Baker
(PRINT NAME)

March 22, 2002
(SIGNATURE) (DATE)

SEAL

President
(TITLE)

WITNESS: Janice L. Davis

FORM

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PERMIT APPLICATION -- GENERAL INFORMATION FORM

Before completing this General Information Form (GIF), read the step-by-step instructions provided in this Permit Application Package. This version of the General Information Form (GIF) must be completed and returned with any program-specific application being submitted to the Department.

DEP USE ONLY	
Date Received	
Client ID#	
Site ID#	

PROJECT INFORMATION

Project Name

Bailey Central Mine Complex Coal Refuse Disposal Areas No. 3 and No. 4

Existing Use of Land Vacant Forestland, brushland and grassland accessed by wildlife

Total Project Acres 556.6 **Total Disturbed Acres** 505

Receiving Water/Watershed Name Unnamed tributary of Enlow Fork

Chapter 93 Receiving Water Classification WWF

Project Description

New Coal Refuse Disposal facility for the existing Bailey Mine Complex. See Attachment A.

Time Schedules	Project Milestone (Optional)
2004 & 2005	Site Preparation
3rd quarter 2005	Facility to begin receiving waste

1. Will your project involve the disturbance of any prime agricultural lands? If "yes", indicate the alternatives to this disturbance considered and the reasons they were not deemed feasible.

		Alternative Considered	Reason Not Feasible
☒	No	1.	
☐	Yes	2.	
		3.	

2. Will your project require any Commonwealth funds or Commonwealth-administered federal funds? If "yes", indicate the type, amount, and source of these funds.

		Type	Amount	Source
☒	No	1.	$	
☐	Yes	2.	$	
		3.	$	

3. Is this application for an authorization type on the list of authorizations affected by the land use policy?

☐ Yes ☒ No If "Yes", see Note below.

4. Will the project involve new land development, change the existing use of land, or change the 'footprint' of an existing facility?

☒ Yes ☐ No If "Yes", see Note below.

Note: If answers to both Questions 3. & 4. above are "Yes", you are required to complete the Land Use Information questions below. If answers to either Question 3. or 4. above is "No", skip the Land Use Information section below.

LAND USE INFORMATION

1. **Is this application for a project covered by Act 537 (The Sewage Facilities Act)?**
   ☐ Yes ☒ No If "Yes", skip all remaining Final Land Use Questions.
2. **Is there a municipal comprehensive plan?**
   ☐ Yes ☒ No
3. **Is there a county comprehensive plan?**
   ☒ Yes ☐ No
4. **Is there a multi-municipal or multi-county comprehensive plan?**
   ☐ Yes ☒ No
5. **Is the proposed project consistent with these plans?**
   ☒ Yes ☐ No
6. **Are there municipal zoning ordinances?**
   ☐ Yes ☒ No
7. **Are there joint municipal zoning ordinances?**
   ☐ Yes ☒ No
8. **Is the proposed project consistent with zoning ordinances?**
   ☐ Yes ☐ No Not applicable.
9. **Does the proposed project require a change or variance to an existing comprehensive plan or zoning ordinances?**
   ☐ Yes ☒ No
10. **Are any zoning ordinances that are applicable to this project currently subject to any type of legal proceeding?**
    ☐ Yes ☒ No
11. **Have you obtained all applicable local zoning and building approvals?**
    ☐ Yes ☐ No Not applicable.
12. **Will the project involve any of the following:**
    - 12.1 **a site under DEP's Land Recycling Program?** ☐ Yes ☒ No
    - 12.2 **reclamation or re-mining of a previously mined site?** ☐ Yes ☒ No
    - 12.3 **a Keystone Opportunity Zone, Select Site or Enterprise Development Area?** ☐ Yes ☒ No
    - 12.4 **a Designated Growth Area?** ☐ Yes ☒ No
13. **Have local municipal or county land use comments been submitted to the Department?**
    ☐ Yes ☒ No

Note: **Applicants are encouraged to submit copies of local land use approvals or other evidence of compliance with local comprehensive plans and zoning ordinances.**

APPLICANT INFORMATION

DEP Client ID#	Applicant Type / Code
	NPACO

Organization Name or Registered Fictitious Name	Employer ID# (EIN)	Dun & Bradstreet ID#
Consol Pennsylvania Coal Company	25-1402386	

Individual Last Name	First Name	MI	Suffix	SSN

Additional Individual Last Name	First Name	MI	Suffix	SSN

Mailing Address Line 1	Mailing Address Line 2
1800 Washington Road	

Address Last Line -- City	State	ZIP+4	Country
Pittsburgh	PA	15241-1424	United States

Applicant Contact Last Name	First Name	MI	Suffix	Phone	Ext
Pachter	Jonathan	M	Mr.	412-831-4000	

Applicant Contact Title	Email Address	FAX
Manager, Environmental Permits	jonathanpachter@consolenergy.com	412-831-4513

SITE INFORMATION

Estimated Number of Applicant Employees to be Present at Site

☐ 1-4 ☐ 5-9 ☐ 10-19 ☒ 20-49 ☐ 50-99 ☐ 100-249 ☐ 250-499 ☐ 500+

DEP Site ID#	Site Name
	Coal Refuse Disposal Areas No. 3 and No. 4

Site Location Line 1	Site Location Line 2
332 Enon Church Road	

Site Location Last Line -- City	State	ZIP+4	EPA ID#
West Finley	PA	15337	

Detailed Written Directions to Site

The proposed Bailey Coal Refuse Disposal Facility site is situated primarily in Richhill Township, Greene County, Pennsylvania. A small section of the proposed disposal site extends into Gray Township. The site is located approximately 3,300 feet south of the intersection of State Routes 4009 (Grinnage Road) and 4013 (Dog Town Road). The proposed disposal site is bordered on the west by the existing slurry impoundment for Consol's Bailey Central Mine Complex. See Attachment B.

Description of Site

The proposed project site is vacant land that will be developed as disposal areas for coarse and fine coal refuse generated by Bailey Central Mine Complex.

County Name	Municipality	City	Boro	Twp	State
Greene	Richhill	☐	☐	☒	

County Name	Municipality	City	Boro	Twp	State
Greene	Gray	☐	☐	☒	

Site Contact Last Name	First Name	MI	Suffix	Phone	Ext
Suter	Edward	F	Mr.	724-206-2034	

Site Contact Title	FAX
Environmental Engineer	724-206-2007

Site Contact Firm	Email Address
Consol Pennsylvania Coal Company	edsuter@consolenergy.com

Mailing Address Line 1	Mailing Address Line 2
P.O. Box 355	

Mailing Address Last Line – City	State	ZIP+4
Eighty - Four	PA	15330

Applicant to Site Relationship

OWNOP

NAICS Codes (Two- & Three-Digit Codes - List All That Apply)	(Optional: 6-Digit Code)
21 - 213	

PERMIT COORDINATION INFORMATION

1.1 Will the project involve construction activity that disturbs five or more acres of land? If "Yes", specify total disturbed acreage. (DEP Use/4x66)

Note: If acres are disturbed, it may be the applicant's responsibility to also notify the PA Historical and Museum Commission, Bureau of Historic Preservation, 400 North Street, Floor 2, Harrisburg, PA 17120-0093, (717) 787-3362. PHMC notification is required for 1) purposes of construction activities for Individual NPDES permits disturbing 10 or more acres; and 2) Erosion & Sediment Control permits. General NPDES permits disturbing 10 or more acres are exempt from PHMC notification. For additional information, see Cultural Resource Notice instructions to determine whether submission of information to PHMC is required for this permit application.

☒ Yes ☐ No Total Disturbed Acreage 505

1.2 Is a storm water collection and discharge system proposed for this project? (DEP Use/4x66)

☒ Yes ☐ No

1.3 Will any work associated with this project take place within 50 feet of a stream, waterway, or wetland; or is located in a FEMA delineated floodway? If "Yes", identify the stream, waterway, or wetland. (DEP Use/4x66)

☒ Yes ☐ No

Watershed _____
Stream Two unnamed tributaries to Enlow Fork
Waterway _____
Wetland Located along the unnamed tributaries to Enlow Fork

1.4 Does the project involve dredging or construction of any structure or placement of fill that encroaches on a stream, floodplain, or wetland? If "Yes", check the appropriate item(s). (DEP Use/4x66)

☒ Yes ☐ No

- ☐ Dredging
- ☐ Bridge or Culvert Construction
- ☐ Pier Construction
- ☒ Outfall Pipe Construction
- ☒ Other Dam construction

2.1 Will the project involve discharge of industrial wastewater or stormwater to a dry swale, surface water, ground water or an existing sanitary sewer system or storm water system? If "Yes", discuss in Project Description. (DEP Use/4x62)

☒ Yes ☐ No *(Discuss in Section A, Project Description.)*

2.2 Will the project involve the construction and operation of industrial waste treatment facilities? (DEP Use/4x62)

☐ Yes ☒ No

2.3 Will the project involve construction of sewage treatment facilities, sanitary sewers, or sewage pumping stations? If "Yes", indicate estimated proposed flow (gal/day).
Also, discuss the sanitary sewer pipe sizes and the number of pumping stations/treatment facilities/ name of downstream sewage facilities in the Project Description, where applicable. (DEP Use/4x62)

☐ Yes ☒ No Est Prop Flow (gal/day): _____
(Discuss in Section A, Project Description.)

3.1 Will land be subdivided for this project? (DEP Use/4x61)

☐ Yes ☒ No

3.2 Will the proposed generate sewage?
If "Yes", indicate estimated flow (gal/day).
If "Yes", indicate number of persons to be served.
If "Yes", attach Act 537 approval letter (Approval required prior to 105/NPDES approval).
If "Yes", sewage will be treated by (check appropriate item/box). (DEP Use/4x61)

☐ Yes ☒ No Est Flow (gal/day): _____
Persons Served: _____
Act 537 Approval Letter Attached ☐ Yes ☐ No
Treated by:
- ☐ On-Site Soils System
- ☐ On-Site Treatment Plant
- ☐ Conveyed to Off-Site Treatment Plant

3.3 If sewage planning was submitted and approved, indicate project name or code. (DEP Use/4x61)

☐ **Yes** ☒ **No** Proj Name/Code:

4.1 Does the project involve construction of a dam? If "Yes", identify the dam. (DEP Use/3140)

☒ Yes ☐ No Dam: Disposal Area No. 3 Main Dam and Saddle Dams A, B, C, and D and Sedimentation Pond Dam

4.2 Will the project interfere with the flow from, or otherwise impact, a dam? If "Yes", identify the dam. (DEP Use/3140)

☐ Yes ☒ No Dam:

5.1 Will the project involve operations, excluding during the construction period, that produce air emissions (i.e., NOX, VOC, etc.)? If "Yes", identify the type and amounts of emissions. (DEP Use/4x70)

☐ Yes ☒ No

Type	Amount

6.1 Is an on-site drinking water supply (well), other than individual house wells, proposed for your project? If "Yes", indicate total number of people served and/or the total number of connections served, if applicable. And check all proposed sub-facilities. (DEP Use/4x81)

☐ Yes ☒ No

Persons Served:
Emp/Guests:
Connections:
Sub-Facilities:

☐ Distribution System ☐ Entry Point
☐ Water Treatment Plant ☐ Transmission Main
☐ Source ☐ Storage Facility
☐ Pump Station

6.2 If purchasing your water in bulk, excluding during the construction period, name the provider. Also, indicate the daily number of employes or guests served. (DEP Use/4x81)

☐ Yes ☒ No Provider:
Emp/Guests:

6.3 If to be served by public water supply, indicate name of supplier and attach letter from supplier stating that it will serve the project. (DEP Use/4x81)

☐ Yes ☒ No Supplier:

6.4 Will this project involve a new or increased drinking water withdrawal from a stream or other water body? If "Yes", provide name of stream. (DEP Use/4x81)

☐ Yes ☒ No Stream:

7.1 Will the construction or operation of this project involve treatment, storage, reuse, or disposal of waste? If "Yes", indicate what type, (i.e., hazardous, municipal, residual, infectious & chemotherapeutic) and how much. What are the proposed means of treatment, storage, reuse and disposal? (DEP/Use4x32)

☒ Yes ☐ No

	Type	Amount	Means
☐ Treated			
☐ Stored			
☐ Reused			
☒ Disposed	Coarse Coal Refuse	Attach C	Stockpiled
	Fine Coal Refuse	Attach C	Water slurry techniques

8.1 Will your project involve the removal of coal, minerals, etc. as part of any earth disturbance activities? (DEP Use/48y1)

☐ Yes ☒ No

9.1 Will your project involve operations within 200 feet of an oil or gas well? If "Yes", indicate Oil and Gas API#. (DEP Use/4z41)

☒ Yes ☐ No O&G API#: 059-21147; 059-22048; 059-22065; 059-22090; 059-00513, three are plugged and the other two will be plugged prior to facility construction

10.1 Does your project involve installation of any of the following? If "Yes", list Substance & Capacity; may need a Storage Tank Site Specific Installation Permit. (DEP Use/3930)

			Substance	Capacity
☐ Yes	☒ No	Field constructed underground storage tank.		
☐ Yes	☒ No	Aboveground storage tank greater than 21,000 gallons capacity.		
☐ Yes	☒ No	Tank greater than 1,100 gallons which will contain a highly hazardous substance.		
☒ Yes	☐ No	Storage tank at a new facility.	fuel	15,000

FACILITY INFORMATION

Application Type of Attached Program-Specific Permit/Authorization Application

☐	AMAJ	Amendment, Major	☐	MODEO	Modification Exec Order	☐	REIS	Reissue
☐	AMEN	Amendment	☒	NEW	New	☐	REN	Renewal
☐	AMIN	Amendment, Minor	☐	NOT	Notification	☐	RESC	Rescission
☐	MOD	Modification	☐	ORD	Order	☐	SUCC	Succession
☐	MODAT	Modification Alt Timeline	☐	REG	Registration	☐	TRAN	Transfer

Modification of Existing Facility

		Yes	No
1.	**Will this project modify an existing facility, system, or activity?**	☐	☒
2.	**Will this project involve an addition to an existing facility, system, or activity?**	☒	☐

If "Yes", check all relevant facility types and provide DEP facility identification numbers below.

Facility Type	DEP Fac ID#	Facility Type	DEP Fac ID#
☐ Air Emission Source		☐ Public Water Supply System	
☐ Hazardous Waste Facility		☐ Water Resource (withdrawal point)	
☐ Municipal or Residual Waste Facility		☐ Oil & Gas Location	
☒ Mining Operation	????	☐ Oil & Gas Location / Coal Pillars	
☐ Dam		☐ Radiation Protection Facility	
☐ Water Obstruction or Encroachment		☐ Other:	
☐ Water Pollution Control Facility		☐ Other:	

Sub-Facility ID	Location of Lat/Long Point	Latitude			Longitude		
		Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
Coal Refuse Disposal Areas No. 3 and No.4	Wind Ridge, PA Quadrangle	39	57	30	80	22	46

CONSULTANT FOR THIS PROJECT

Last Name Stewart	**First Name** Michele	**MI**	**Suffix** Ms.
Title Engineering Manager	**Consulting Firm** Michael Baker Jr., Inc.		
Mailing Address Line 1 Airport Office Park, Bldg. 3	**Mailing Address Line 2** 420 Rouser Road		
Address Last Line – City Coraopolis	**State** PA	**ZIP+4** 15108	**Country** USA
Email Address mstewart@mbakercorp.com	**Phone** 412-269-6022	**Ext**	**FAX** 412-269-6100

CERTIFICATION

I certify that I have the authority to submit this Permit Application on behalf of the applicant named herein and that the information provided in this Application is true and correct to the best of my knowledge and information.

Michele Stewart — **Signature**

3-22-02 — **Date**

Type or Print Name Michele Stewart

CHECKLIST

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PERMIT APPLICATION -- GENERAL INFORMATION FORM

APPLICANT'S CHECKLIST

Please check the following list to make sure that you have included all the required information. Place a checkmark next to each item completed and/or provided.

Failure to provide all of the requested information will delay the processing of the application and may result in the application being placed on hold with no action, or will be considered withdrawn and the application file closed.

REQUIREMENT -- Check If Included

☒ 1. **ATTACHMENTS.** The completion of the GIF may require the submission of some or all of the following. Where appropriate, include the appropriate attachment(s) with the completed GIF.

- ☒ a) **Project Information** - Additional information attached - Lengthy Project Description
- ☒ b) **Project Information** - Additional information attached - Lengthy Time Schedules
- ☒ c) **Land Use Information** - Additional information attached – Local land use approvals or other evidence of compliance with local comprehensive plans and zoning ordinances, efforts to preserve farmland and open space, and locally designated growth areas.
- ☒ d) **Site Information** - Copy attached - 7.5 Minute Topographic Map (with drawn outline of site)
- ☒ e) **Site Information** - Additional information attached - Lengthy Detailed Written Directions to Site
- ☐ f) **Permit Coordination Information, Question 3.2** - Copy attached - Act 537 Approval Letter *(Not applicable)*
- ☐ g) **Permit Coordination Information, Question 6.3** - Copy attached - Public Water Supplier's Agreement Letter to Serve the Project *(Not applicable)*

☐ 2. **CONTACTS MADE.** According to information provided in the Permit Coordination Information section, the appropriate Regional/District Office has been contacted.

- ☐ a) **Question Series 1** - If Yes - Local County Conservation District Office ***or*** Regional Soils & Waterways Section *(Permits to conduct these activities are included in the Coal Refuse Disposal Permit. Application has been applied for through PADEP.)*
- ☐ b) **Question Series 2** - If Yes - Regional Water Quality Permitting Section *(Not applicable)*
- ☐ c) **Question Series 3** - If Yes - Regional Water Quality Planning Section *(Not applicable)*
- ☒ d) **Question Series 4** - If Yes - Central Office Dam Safety Division
- ☐ e) **Question Series 5** - If Yes - Regional Air Quality Program *(Not applicable)*
- ☐ f) **Question Series 6** - If Yes - Regional Water Supply Section ***and*** Community Health Office *(Not applicable)*
- ☐ g) **Question Series 7** - If Yes - Regional Waste Management Program *(Permits to conduct these activities are included in the Coal Refuse Disposal Permit. Application has been applied for through PADEP.)*
- ☒ h) **Question Series 8** - If Yes - District Mining Permitting Section
- ☐ i) **Question Series 9** - If Yes - Regional Oil & Gas Program *(Not applicable)*
- ☒ j) **Question Series 10** - If Yes – Division of Storage Tanks, Central Office

☒ 3. **BEFORE YOU DIG -- CONTACT.** Pennsylvania One Call System at 1-800-242-1776.

☒ 4. **APPLICATION MAILED.** Permit application has been completed and properly signed according to instructions and type codes; and will be mailed to the appropriate DEP office.

ATTACHMENT A
PROJECT DESCRIPTION

Consol Pennsylvania Coal Company (CPCC) plans to develop a new coal refuse disposal facility within the watershed of an unnamed tributary located east of the existing Bailey Central Mine Complex (Bailey) slurry impoundment. The new disposal facility will consist of two valley-fill areas - a slurry impoundment referred to as Coal Refuse Disposal Area No. 3 and a coarse coal refuse disposal area referred to as Coal Refuse Disposal Area No. 4. The slurry impoundment will be constructed within the valley of the site's main unnamed tributary. Coarse coal refuse will be used for dam construction. Excess coarse coal refuse will be placed in the valley of a secondary, contributing, tributary. Both disposal areas will receive coal refuse generated by the Bailey Central Mine Complex.

During facility operation, surface water will be managed by a system of drains, ditches, and sedimentation control structures. Storm runoff will be directed to the disposal impoundment, or will be collected by a ditch and conveyed through a sedimentation control structure prior to being discharged off-site. Runoff from most of the Disposal Area No. 3 site and all runoff from Disposal Area No. 4 will be directed to the site sedimentation pond. Runoff from temporary stockpile areas surrounding the site will pass through sediment traps before being discharged. Runoff from the western slope of Disposal Area No. 3 and a section of the final cap will be directed to the existing Bailey slurry impoundment (Coal Refuse Disposal Area No. 1). The existing slurry impoundment will be left open and will serve as a sedimentation pond until Disposal Area No. 3 cap areas draining to it are vegetated. When Disposal Area No. 1 is closed, drainage from Disposal Area No. 3 will either be channeled to the Disposal Area No. 1 sedimentation pond or will be discharged into the unnamed tributary bordering both slurry ponds.

A network of drains will be constructed within existing stream channels and at spring locations to carry base flow under both disposal areas. These underdrain systems will discharge into the sedimentation pond. Springs intercepted at the facility subgrade will be drained to a rock drain constructed along the center of the major valleys. A soil liner will be constructed over the rock/spring drainage system to reduce infiltration to the drains from above. Both disposal areas will be provided with a two-foot thick soil liner having a 6-inch protective soil cover.

The expected service life of the proposed coal refuse disposal facility is estimated to be approximately 15 years based on current coal refuse generation rates. Both disposal areas will be developed in stages. Initial development of both disposal areas is expected to begin simultaneously although different time frames will occur for individual stages in each of the two areas.

Coal Refuse Disposal Area No. 3 (Slurry Impoundment)

Coarse coal refuse will be used to construct embankments within the main stream valley at the downstream and upstream ends (eastern and western ends) of the proposed slurry impoundment site to form the reservoir area. Three additional small earthen saddle dams will be constructed to raise other low areas in the ridgeline to El.1495 feet. Fine coal refuse will be placed within the impoundment area by water slurry techniques. Slurry will be discharged along the upstream face of the eastern dam (main dam). Water levels within the impoundment will be controlled by a decant pipe that will discharge into the sedimentation pond in conjunction with a pumping system which will recycle pond supernatant to the preparation plant on an as-needed basis. The impoundment has been designed to safely store the entire runoff from design storm conditions, therefore, an emergency spillway has not been provided.

The earth saddle dams, Dams B, C, and D, will be provided with an upstream geomembrane liner to minimize seepage. A contingency internal drain will be installed in each dam for safety purposes. Seepage through the Main Dam and Saddle Dam A will be intercepted and controlled by internal blanket drain systems. The main dam internal drain will outlet to the sedimentation pond; the Saddle Dam A internal drain to the existing Bailey slurry impoundment (Coal Refuse Disposal Area No. 1). When the existing slurry impoundment is closed, Saddle Dam A internal drain flow will be redirected to a Disposal Area No. 1 sedimentation pond.

The Main Dam and Saddle Dam A will be comprised of coarse coal refuse and will be constructed in stages as indicated on the facility Construction Drawings as part of Module 21 (Volumes 3 and 4). Expansion of both dams from their initial stage will be accomplished following downstream construction practices, i.e., expanding the dam footprint in a direction away from the pool.

When the fine coal refuse disposal capacity has been exhausted (estimated life, 16 years), the impoundment area will be capped with coarse coal refuse. Coarse coal refuse surfaces will be covered with a two-foot thick soil cover and vegetated. The lower foot of soil cover material will exhibit a permeability of 5×10^{-5} cm/sec after compaction.

Development of the slurry impoundment will require maintaining operation of the dewatering borehole located within the main dam area. Manhole sections will be installed as needed to provide access to the borehole and pump.

Coal Refuse Disposal Area No. 4 (Coarse Coal Refuse Disposal Area)

A coarse coal refuse valley fill will be developed adjacent to and southeast of the slurry impoundment. This area, referred to as Coal Refuse Disposal Area No. 4, will accept coarse coal refuse generated during weather conditions unsuitable for placement in the slurry impoundment embankment and after the slurry impoundment embankments are fully developed. The area will receive coarse coal refuse until it is needed for the final slurry impoundment capping phase. When conditions are unsuitable for adequate compaction, typically two months per year, coarse coal refuse will not be placed within 250 feet of the intermediate and final embankment

outslopes. The site selected for disposal of unsuitable material will depend on which stage of the facility is being developed.

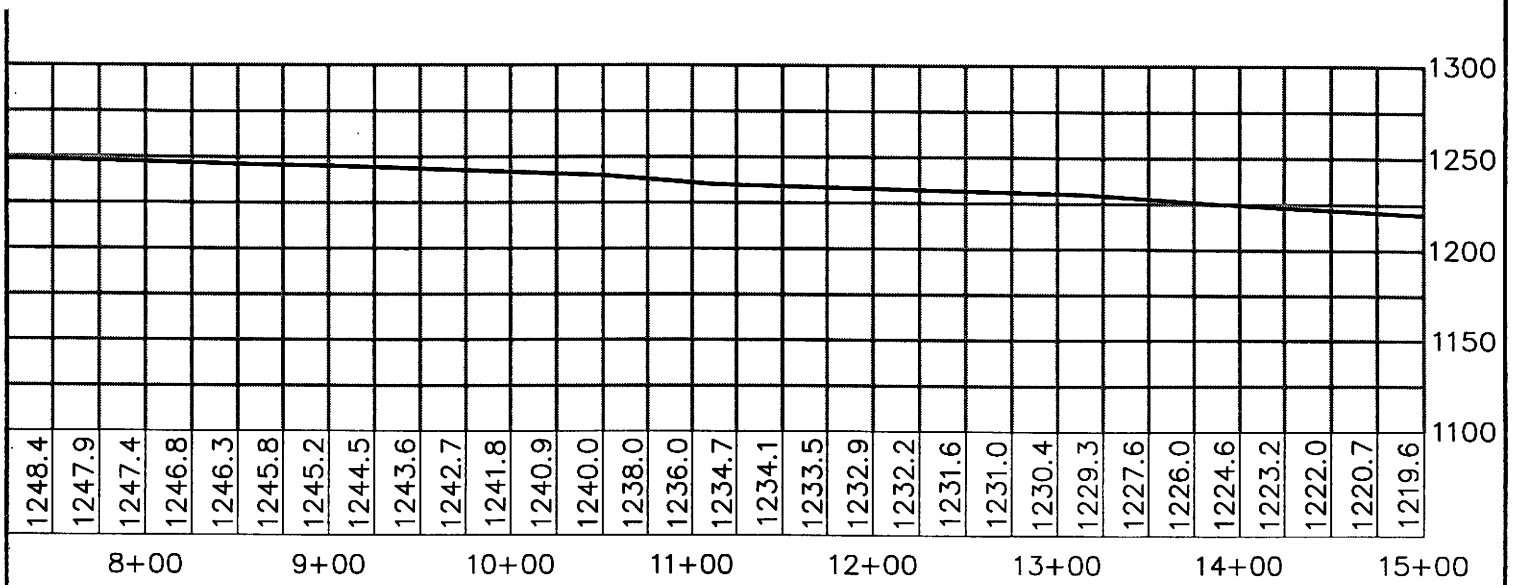
Coal Refuse Disposal Area No. 4 will be provided with an internal drain that will intercept and convey infiltration. This drain will be constructed above the soil liner and will outlet to the sedimentation pond.

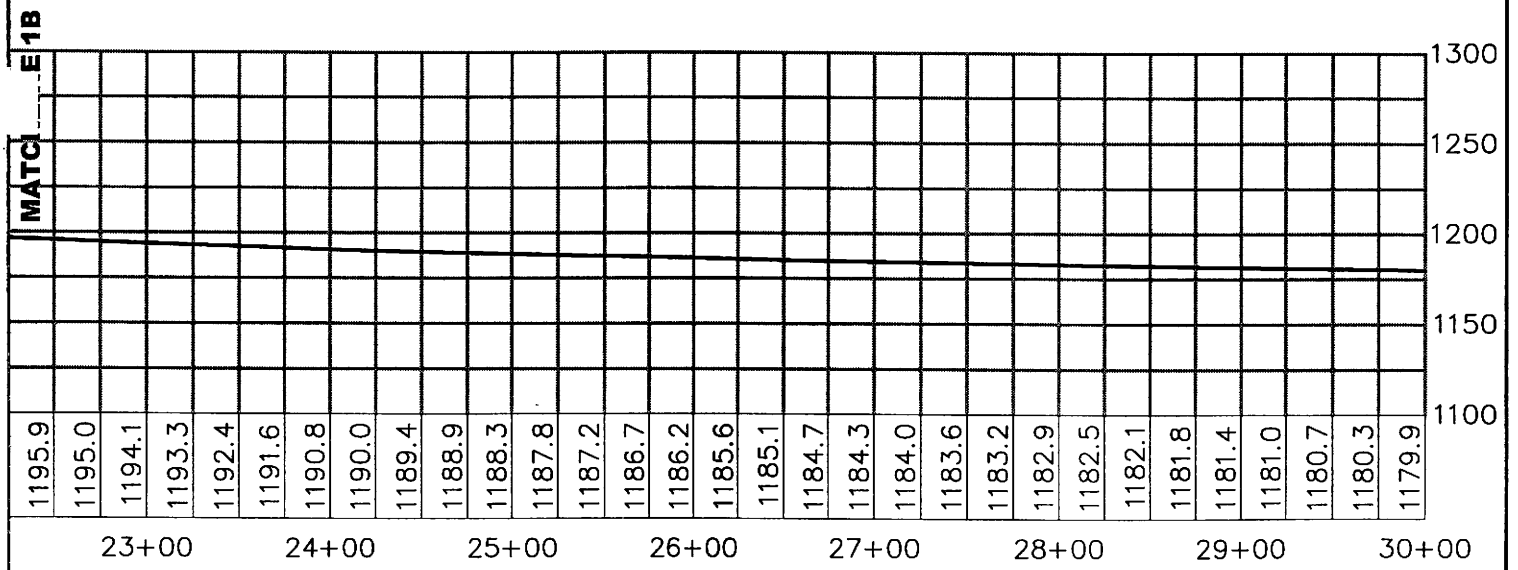
Sedimentation Pond

The sedimentation pond will be constructed at the beginning of Coal Refuse Disposal facility site development and will be used throughout the life of the disposal facility (estimated to be 15 years). It will receive runoff from both disposal areas (i.e., slurry pond and coarse coal refuse disposal area), as well as, discharge from the disposal facility decant pipe, underdrain system and internal drains. CPCC plans to recycle slurry pond supernatant to the preparation plant; therefore, little flow is expected to be discharged through the decant pipe. The maximum contributory drainage area for the sedimentation pond, 455 acres, will occur during initial site preparation. When the proposed disposal facility is completely developed and capped, runoff from a 116-acre section of the slurry pond cap will drain to the existing Bailey slurry impoundment. This flow will be redirected to an unnamed tributary bordering both slurry ponds when the existing Bailey slurry impoundment is closed.

The sedimentation pond embankment, decant system, and emergency spillway will be constructed to the heights and grades shown on the disposal facility Construction Drawings, and in accordance with the facility Technical Specifications. Erosion and sedimentation controls will be installed prior to construction in accordance with Section 4.8 of the disposal facility Design Report.

The pond will be split into two chambers by an interior earthen dike. An upstream chamber will provide initial sedimentation and will require more frequent clean-out than the larger downstream chamber. A pipe culvert will hydraulically connect the two chambers. Pond levels will be controlled by the principal and emergency spillways. Under normal conditions, the lower pool level will be at El. 1141.5 feet. When the water level rises above normal pool, water will be discharged automatically through the principal spillway. During extreme rainfall periods, when the lower pool level rises above El. 1157.5 feet, water will be discharged automatically through the emergency spillway.





COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
MICHELE STEWART
ENGINEER
PE-029157-E

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

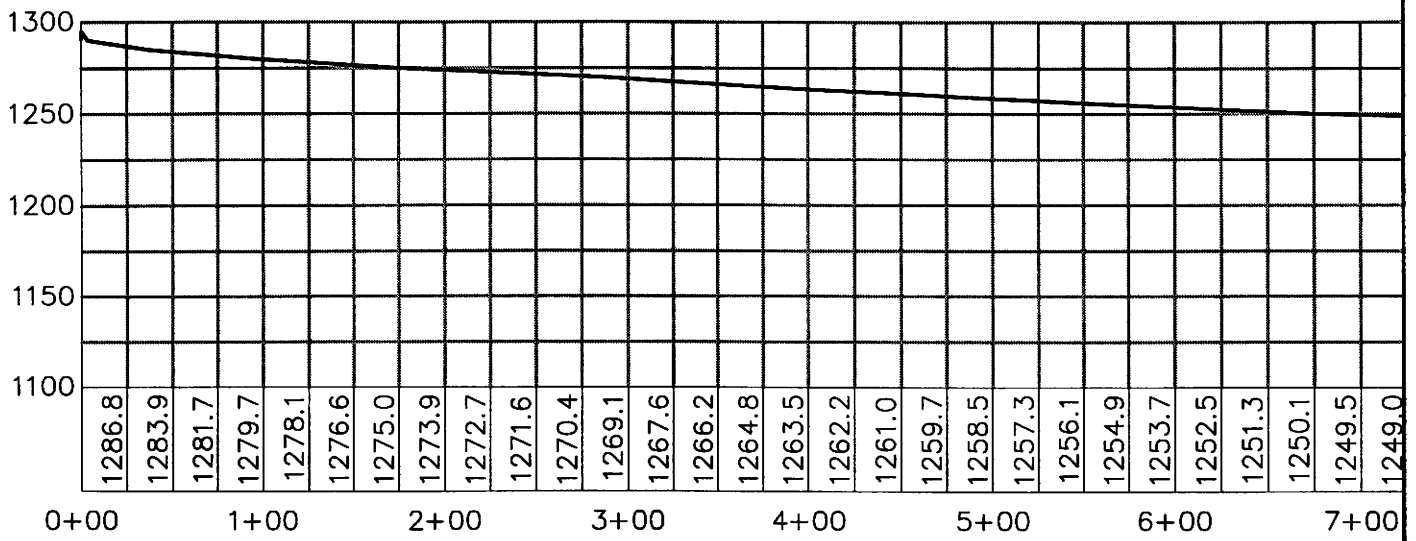
BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY
CONSOL PENNSYLVANIA COAL COMPANY

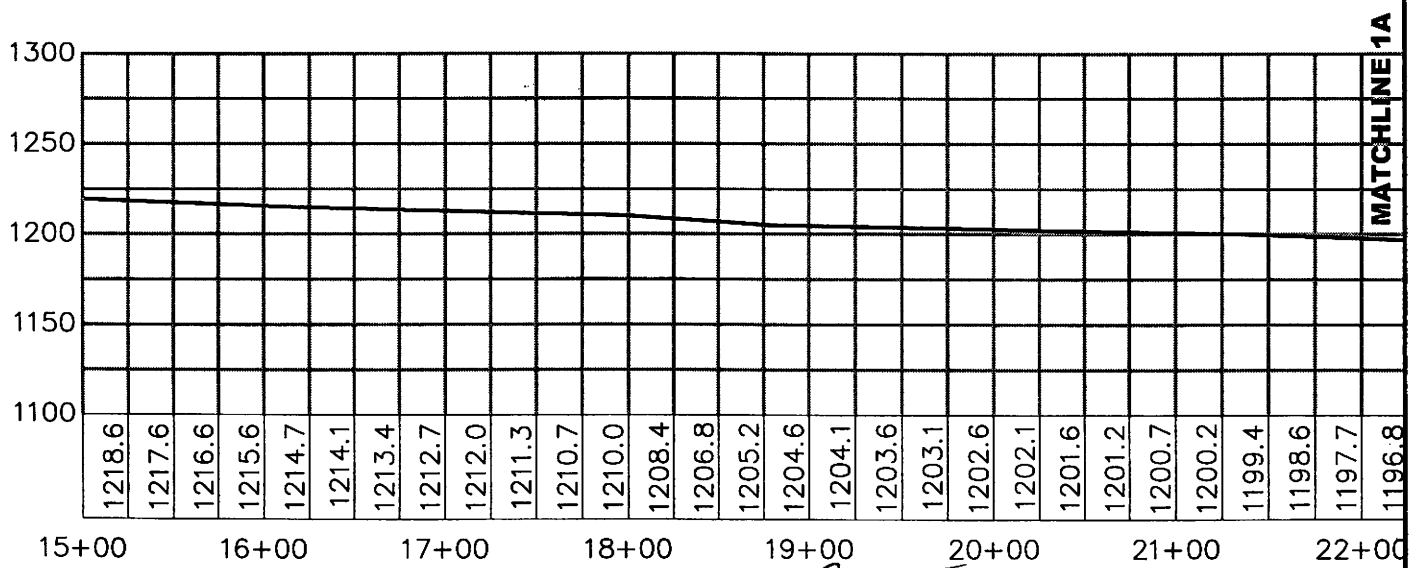
UNAMED TRIBUTARY AREA NO. 3

PROFILE SHEET 1A OF 2

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	MMS	01/02	AS SHOWN

FILE STREAM PROFILES-AB
_consol\24379\drawings\final\





COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
MICHELE STEWART
PE-029157-E

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY
CONSOL PENNSYLVANIA COAL COMPANY

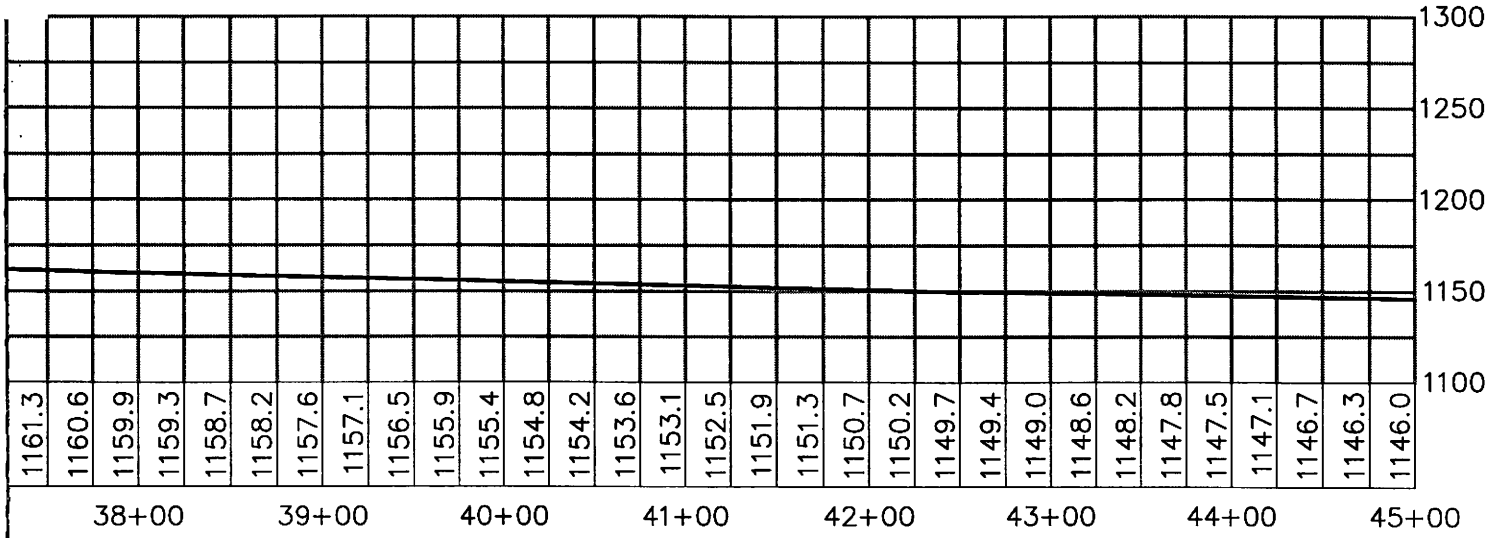
UNAMED TRIBUTARY AREA NO. 3

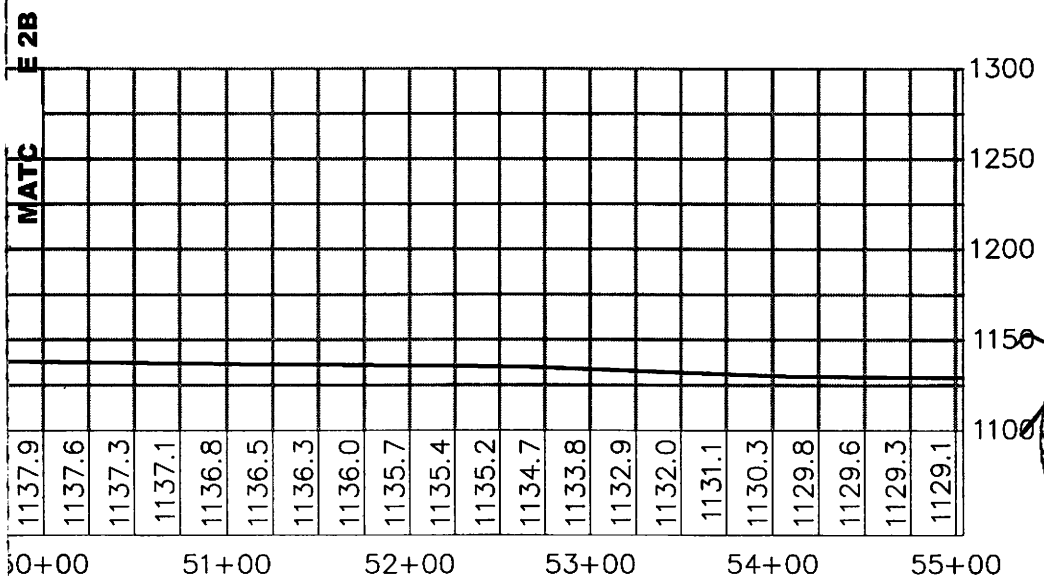
PROFILE SHEET 1B OF 2

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	MMS	01/02	AS SHOWN

FILE STREAM PROFILES-AB
c:_consol\24379\drawings\final\

100 50 0 100
SCALE IN FEET





COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
MICHELE STEWART
ENGINEER
PE-029157-E

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY
CONSOL PENNSYLVANIA COAL COMPANY

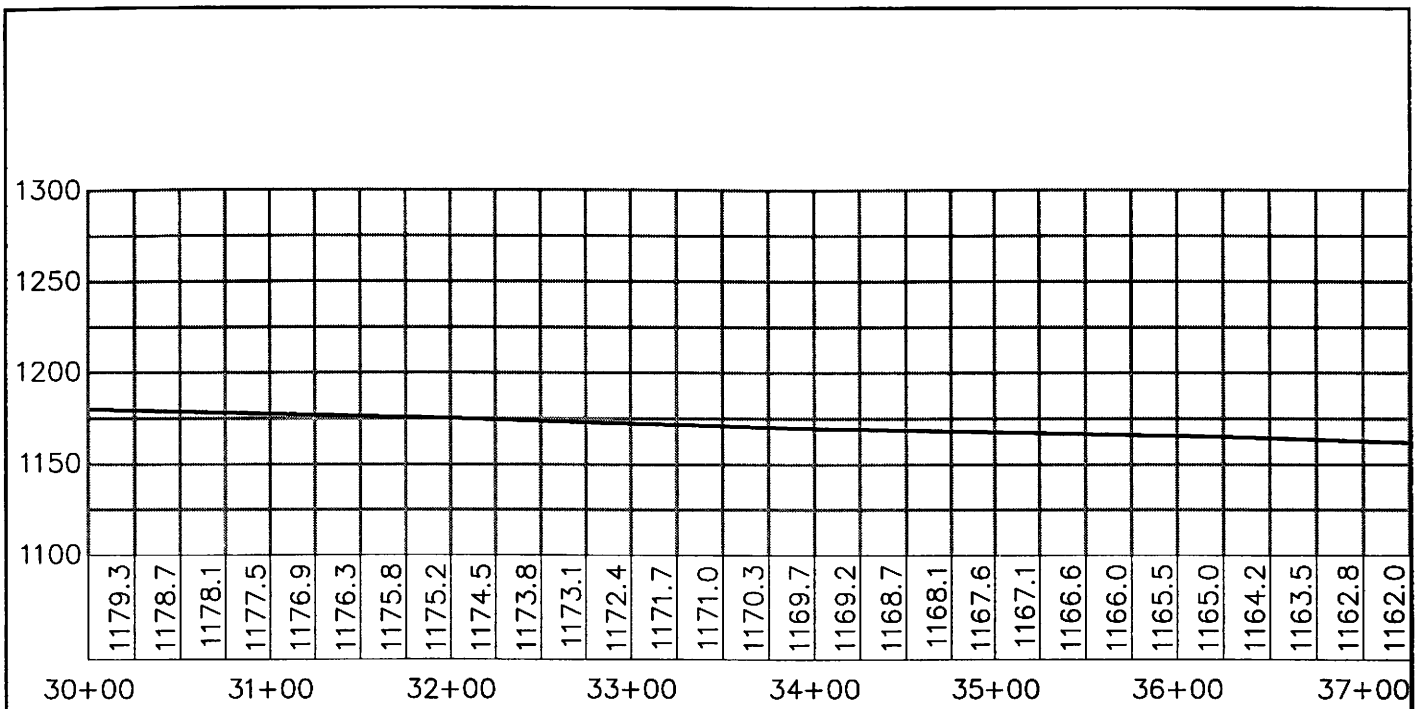
UNAMED TRIBUTARY AREA NO. 3

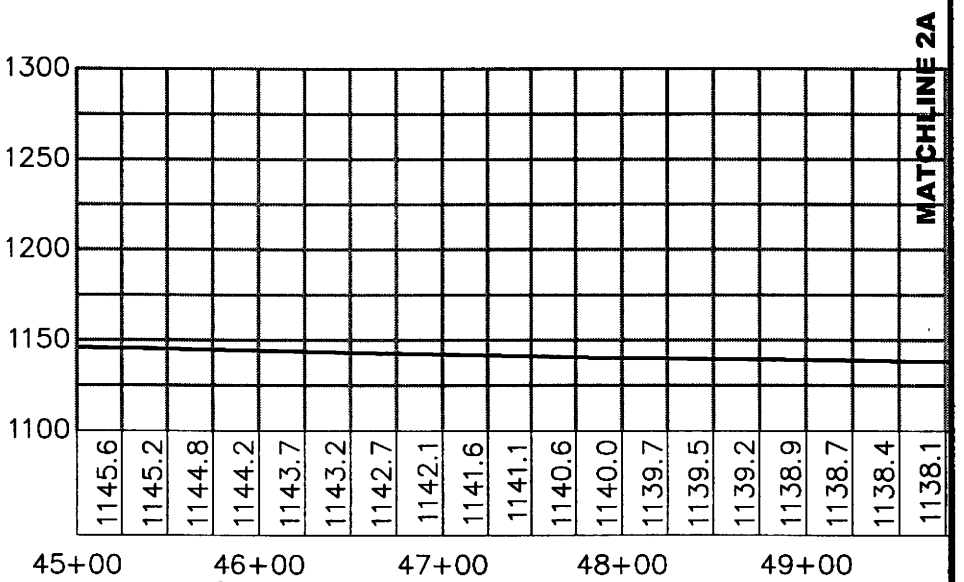
PROFILE SHEET 2A OF 2

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	MMS	01/02	AS SHOWN

FILE STREAM PROFILES-AB

k:_consol\24379\drawings\final\





COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
MICHELE STEWART
ENGINEER
PE-029157-E

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY
CONSOL PENNSYLVANIA COAL COMPANY

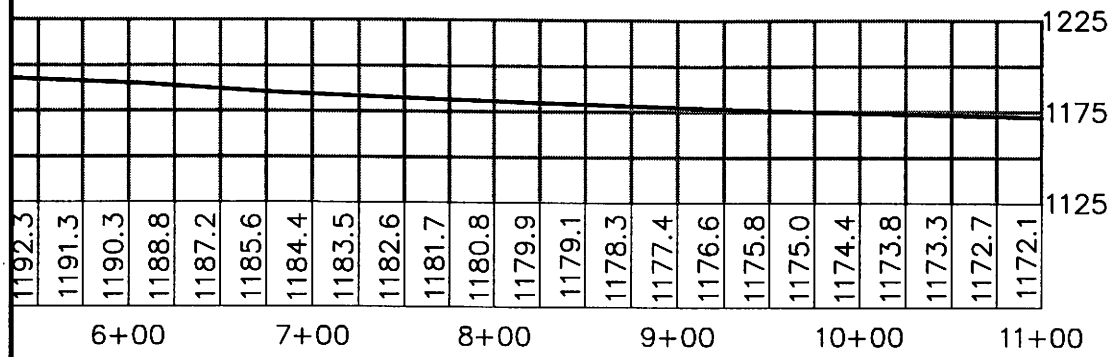
UNAMED TRIBUTARY AREA NO. 3

PROFILE SHEET 2B OF 2

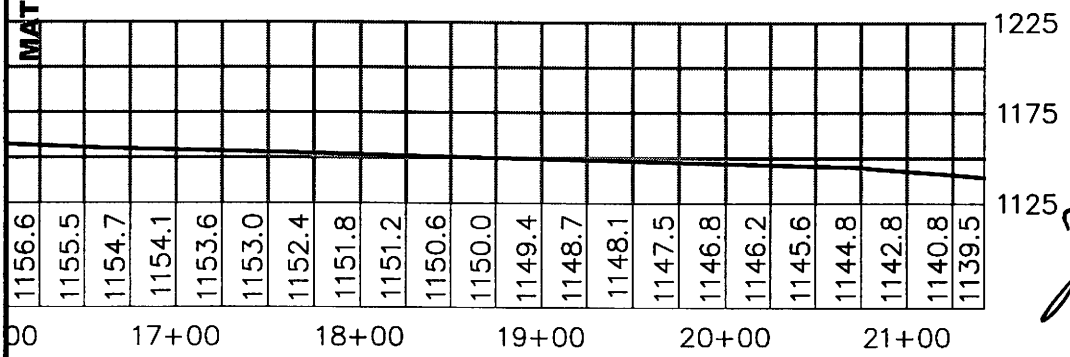
DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	MMS	01/02	AS SHOWN

FILE STREAM PROFILES-AB
c:_consol\24379\drawings\final\

100 50 0 100
SCALE IN FEET



MATCHLINE A-B



COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
MICHELE STEWART
ENGINEER
PE-029157-E

Baker

MICHAEL BAKER JR., INC
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

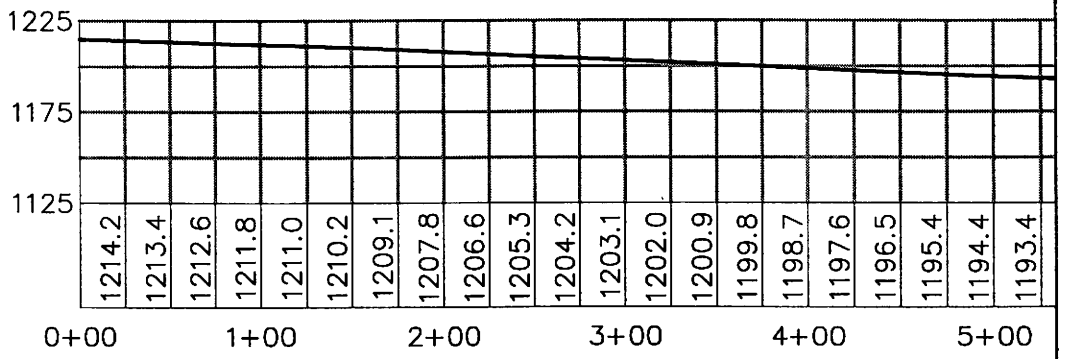
BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY
CONSOL PENNSYLVANIA COAL COMPANY

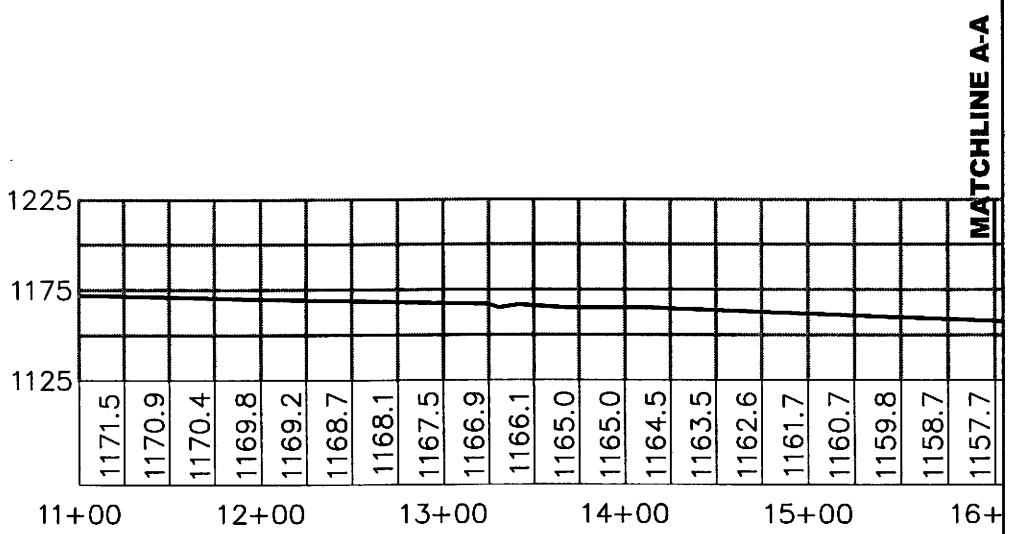
UNAMED TRIBUTARY AREA NO. 4

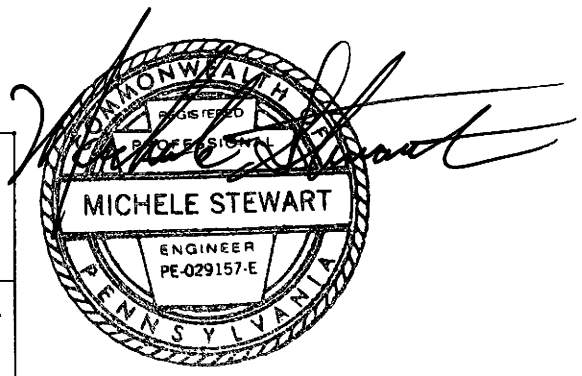
PROFILE A-A

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	MMS	01/02	AS SHOWN

FILE STREAM PROFILES-AB
k:_consol\24379\drawings\final\







Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY
CONSOL PENNSYLVANIA COAL COMPANY

UNAMED TRIBUTARY AREA NO. 4

PROFILE A-B

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	MMS	01/02	AS SHOWN

FILE STREAM PROFILES-AB
lc\...consol\24379\drawings\final\

100 50 0 100
SCALE IN FEET

CONSOL - BAILEY AND ENLOW FORK MINES
ANNUAL COAL & REFUSE PRODUCTION

Year No.	Estimated Clean Coal (tons)	Total Refuse (tons)	Fine Refuse (tons)	Coarse Refuse (tons)*	Combined Total Refuse (CY)	Fine Refuse (CY)**	Coarse Refuse (CY)	Combined Running Total (CY)	Running Total Fine Refuse (CY)	Running Total Crse. Refuse (CY)
1	20,400,000	6,799,993	1,093,012	5,706,982	5,697,368	2,022,071	3,675,296	5,697,368	2,022,071	3,675,296
2	20,400,000	6,799,993	1,093,012	5,706,982	5,697,368	2,022,071	3,675,296	11,394,735	4,044,143	7,350,592
3	21,800,000	7,266,659	1,168,022	6,098,637	6,088,363	2,160,841	3,927,522	17,483,099	6,204,984	11,278,115
4	22,300,000	7,433,326	1,194,812	6,238,514	6,228,005	2,210,402	4,017,603	23,711,103	8,415,386	15,295,718
5	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	30,078,750	10,675,348	19,403,402
6	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	36,446,396	12,935,310	23,511,086
7	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	42,814,042	15,195,272	27,618,770
8	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	49,181,688	17,455,235	31,726,454
9	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	55,549,334	19,715,197	35,834,137
10	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	61,916,980	21,975,159	39,941,821
11	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	68,284,627	24,235,121	44,049,505
12	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	74,652,273	26,495,083	48,157,189
13	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	81,019,919	28,755,046	52,264,873
14	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	87,387,565	31,015,008	56,372,557
15	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	93,755,211	33,274,970	60,480,241
16	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	100,122,857	35,534,932	64,587,925
TOTAL	358,500,000	119,499,881	19,208,072	100,291,809	100,122,857	35,534,932	64,587,925			

* Includes fly ash and bottom ash from the preparation plant thermal dryers and breaker rock, the total at less than 6% of the total coarse coal refuse volume.

** Assumes a density of 40 pcf based on sounding data developed for the existing facility. Calculations are included in Appendix A of the Alternatives Analysis Report that was approved on August 1, 2001.

NOTE: Coal Refuse Disposal Areas No. 3 and No. 4 provide for 15.6 years of fine coal refuse disposal and 15.8 years of coarse coal refuse disposal at the generation rates listed above.

Baker

Michael Baker Jr., Inc.
A Unit of Michael Baker Corporation

Airport Office Park, Building 3
420 Rouser Road
Coraopolis, PA 15108

(412) 269-6000
FAX (412) 269-6100

March 22, 2002

Gray Township
181 Stringtown Road
Graysville, PA 15337

Dear Sirs:

The purpose of this notice is to inform you of our intent to submit an application to the Pennsylvania Department of Environmental Protection (DEP) for the following application:

Project Name:	Bailey Central Mine Complex Coal Refuse Disposal Areas No. 3 and No. 4
Project Description:	A new slurry impoundment (Coal Refuse Disposal Area No. 3) and new coarse coal refuse disposal area (Coal Refuse Disposal Area No. 4) for disposal of coal refuse generated by the Bailey Central Mine Complex. Existing disposal areas that currently service the mine complex are nearing full capacity.
Applicant Name:	Consol Pennsylvania Coal Company
Applicant Contact:	Jonathan M. Pachter 1800 Washington Road Pittsburgh, PA 15241 (412) 831-4679
Site Location:	Area along the west side of S.R. 4009, located approximately 2,000 feet south of Time.
Municipality/County:	Richhill and Gray Townships, Greene County

Section 1905-A of the commonwealth Administrative code, as amended by Act 14, requires that each applicant for a DEP permit must give written notice to the municipalities and the county in which the permitted activity is located. The written notices shall be received by the municipalities and county at least 30 days before the Department may issue or deny the permit.

"Acts 67 and 68, which amended the Municipalities Planning Code to support sound land use practices and planning efforts, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities or infrastructure, and specify that state agencies rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code. Enclosed is a General Information Form (GIF) we have completed for this project. DEP invites you to review the attached GIF and comment on the land use aspects of this project; please be specific to DEP when identifying any areas of conflict. If you wish to submit comments to DEP to consider in a land use review of this project, you must respond within 30 days to the DEP regional office listed below. If there are no land use comments received by the end of the comment period, DEP will assume that there are no substantive land use conflicts and proceed with the normal application review process."

Please submit any comments concerning this project within 30 days from date of receipt of this letter to the DEP Bureau of Mining and Reclamation, 3913 Washington Road, McMurray, PA 15317.

For more information about this land use review process, please visit www.dep.state.pa.us (directLINK: Land Use Reviews).

Sincerely,
MICHAEL BAKER JR., INC.

Michele Stewart, P.E.
Engineering Manager

Enclosure
cc: Mr. Jonathan M. Pachter – Consol Pennsylvania Coal Company

Baker

Michael Baker Jr., Inc.
A Unit of Michael Baker Corporation

Airport Office Park, Building 3
420 Rouser Road
Coraopolis, PA 15108

(412) 269-6000
FAX (412) 269-6100

March 22 2002

Richhill Township
Crabapple Road
Wind Ridge, PA 15380

Dear Sirs:

The purpose of this notice is to inform you of our intent to submit an application to the Pennsylvania Department of Environmental Protection (DEP) for the following application:

Project Name:	Bailey Central Mine Complex Coal Refuse Disposal Areas No. 3 and No. 4
Project Description:	A new slurry impoundment (Coal Refuse Disposal Area No. 3) and new coarse coal refuse disposal area (Coal Refuse Disposal Area No. 4) for disposal of coal refuse generated by the Bailey Central Mine Complex. Existing disposal areas that currently service the mine complex are nearing full capacity.
Applicant Name:	Consol Pennsylvania Coal Company
Applicant Contact:	Jonathan M. Pachter 1800 Washington Road Pittsburgh, PA 15241 (412) 831-4679
Site Location:	Area along the west side of S.R. 4009, located approximately 2,000 feet south of Time.
Municipality/County:	Richhill and Gray Townships, Greene County

Section 1905-A of the commonwealth Administrative code, as amended by Act 14, requires that each applicant for a DEP permit must give written notice to the municipalities and the county in which the permitted activity is located. The written notices shall be received by the municipalities and county at least 30 days before the Department may issue or deny the permit.

"Acts 67 and 68, which amended the Municipalities Planning Code to support sound land use practices and planning efforts, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities or infrastructure, and specify that state agencies rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code. Enclosed is a General Information Form (GIF) we have completed for this project. DEP invites you to review the attached GIF and comment on the land use aspects of this project; please be specific to DEP when identifying any areas of conflict. If you wish to submit comments to DEP to consider in a land use review of this project, you must respond within 30 days to the DEP regional office listed below. If there are no land use comments received by the end of the comment period, DEP will assume that there are no substantive land use conflicts and proceed with the normal application review process."

Please submit any comments concerning this project within 30 days from date of receipt of this letter to the DEP Bureau of Mining and Reclamation, 3913 Washington Road, McMurray, PA 15317.

For more information about this land use review process, please visit www.dep.state.pa.us (directLINK: Land Use Reviews).

Sincerely,
MICHAEL BAKER JR., INC.

Michele Stewart, P.E.
Engineering Manager

Enclosure
cc: Mr. Jonathan M. Pachter – Consol Pennsylvania Coal Company

Baker

Michael Baker Jr., Inc.
A Unit of Michael Baker Corporation

Airport Office Park, Building 3
420 Rouser Road
Coraopolis, PA 15108

(412) 269-6000
FAX (412) 269-6100

March 22, 2002

Greene County Commissioners
County Office Building, Third Floor
93 East High Street
Waynesburg, PA 15370

Attention: Chief Clerk

The purpose of this notice is to inform you of our intent to submit an application to the Pennsylvania Department of Environmental Protection (DEP) for the following application:

Project Name:	Bailey Central Mine Complex Coal Refuse Disposal Areas No. 3 and No. 4
Project Description:	A new slurry impoundment (Coal Refuse Disposal Area No. 3) and new coarse coal refuse disposal area (Coal Refuse Disposal Area No. 4) for disposal of coal refuse generated by the Bailey Central Mine Complex. Existing disposal areas that currently service the mine complex are nearing full capacity.
Applicant Name:	Consol Pennsylvania Coal Company
Applicant Contact:	Jonathan M. Pachter 1800 Washington Road Pittsburgh, PA 15241 (412) 831-4679
Site Location:	Area along the west side of S.R. 4009, located approximately 2,000 feet south of Time.
Municipality/County:	Richhill and Gray Townships, Greene County

Section 1905-A of the commonwealth Administrative code, as amended by Act 14, requires that each applicant for a DEP permit must give written notice to the municipalities and the county in which the permitted activity is located. The written notices shall be received by the municipalities and county at least 30 days before the Department may issue or deny the permit.

"Acts 67 and 68, which amended the Municipalities Planning Code to support sound land use practices and planning efforts, direct state agencies to consider comprehensive plans and zoning ordinances when reviewing applications for permitting of facilities or infrastructure, and specify that state agencies rely upon comprehensive plans and zoning ordinances under certain conditions as described in Sections 619.2 and 1105 of the Municipalities Planning Code. Enclosed is a General Information Form (GIF) we have completed for this project. DEP invites you to review the attached GIF and comment on the land use aspects of this project; please be specific to DEP when identifying any areas of conflict. If you wish to submit comments to DEP to consider in a land use review of this project, you must respond within 30 days to the DEP regional office listed below. If there are no land use comments received by the end of the comment period, DEP will assume that there are no substantive land use conflicts and proceed with the normal application review process."

Please submit any comments concerning this project within 30 days from date of receipt of this letter to the DEP Bureau of Mining and Reclamation, 3913 Washington Road, McMurray, PA 15317.

For more information about this land use review process, please visit www.dep.state.pa.us (directLINK: Land Use Reviews).

Sincerely,
MICHAEL BAKER JR., INC.

Michele Stewart, P.E.
Engineering Manager

Enclosure
cc: Mr. Jonathan M. Pachter – Consol Pennsylvania Coal Company

CERTIFIED MAIL RECEIPTS <u>OR</u> WRITTEN ACKNOWLEDGMENT FROM GRAY AND RICHHILL TOWNSHIPS AND GREENE COUNTY WILL BE PROVIDED WHEN THEY BECOME AVAILABLE.

SUMMARY OF HISTORIC/ARCHAEOLOGICAL SITES DETERMINATION

A Cultural Resource Notice was submitted to the PHMC on April 3, 2000 as part of the Alternatives Analysis. A copy of that submittal is included with this attachment. Five areas, including the proposed project site were investigated and reviewed by PHMC. Their review included a site visit on May 30, 2000. Based on their review PHMC has recommended that a Phase I archaeological survey of the project area be conducted. Letters from the PHMC dated May 4, 2000 and June 2, 2000 summarize results of their review.

A Phase I archaeological survey of the project area will be conducted during the permit review process and will be included as part of the Coal Refuse Disposal Permit Application submittal prior to permit approval.

Baker

Michael Baker Jr., Inc.
A Unit of Michael Baker Corporation

Box 280, 4301 Dutch Ridge Road
Beaver, Pennsylvania 15009-0280

(724) 495-7711
FAX (724) 495-4001

April 3, 2000

24379-000-0000-ARX01
cc: CF, PF

Ms. Noël Strattan
Bureau of Historic Preservation
PA Historical & Museum Commission
Third & North Streets, Box 1026
Harrisburg, PA 17108-1026

RE: Coal Refuse Disposal Site Selection
Consol Pennsylvania Coal Company
Bailey Central Preparation Plant

Dear Ms. Strattan:

Michael Baker Jr., Inc. is currently performing an alternatives analysis for selection of a location for a new coal refuse disposal area. There are five areas being considered which are variously located in Richhill and Gray Townships in Greene County, and East Finley Township in Washington County. The Pennsylvania Department of Environmental Protection guidance document entitled "Coal Refuse Disposal–Site Selection" requires that all persons proposing to develop new coal refuse disposal sites select a site that is most suitable based on comparison of environmental, economic, social, and technical factors. As part of our evaluation we request that Historical Resource Determinations be performed for the five areas under consideration. Enclosed is a completed notice form with accompanying attachments for your review. Please review this information and advise me of your determination so as to aid in the site selection process. If you need additional information, please feel free to contact me at (724) 495-4273.

Thank you for your assistance.

Michael Baker Jr., Inc.

Greg Hynes

Gregory P. Hynes, P.E.
Senior Engineer

0120-PM-PY0003 Rev. 6/96

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bar Code

CULTURAL RESOURCE NOTICE

Before completing this form, read the step-by-step instructions provided with this form.

OFFICIAL USE ONLY

ID# (Assigned by State Agency) _____

Stamp Date Application Received

SECTION A. APPLICANT IDENTIFIER

Applicant Name CONSOL PENNSYLVANIA COAL CO.

1800 WASHINGTON ROAD (412) 831-4679
Street Address Telephone Number

Pittsburgh PA 15241-1421
City State Zip

Project Title BAILEY MINE COMPLEX - NEW REFUSE DISPOSAL AREA

SECTION B. LOCATION OF PROJECT

Municipality Richhill, Gray, and East Finley Townships

County Name GREENE - WASHINGTON
DEP County Code 30 63

SECTION C. REQUEST

☐ DEP Permit ☒ DEP Approval

List other permits, funding or approvals required, if known (federal/state/local).

Alternatives Analysis for new refuse disposal Area
Name of Specific DEP Permit or Approval Requested

SECTION D. RESPONSIBLE DEP REGIONAL, CENTRAL, DISTRICT MINING or OIL AND GAS MGMT. OFFICE

DEP Regional Office Responsible for Review of Permit Application

- ☐ Southeast Regional Office (Conshohocken)
- ☐ Southcentral Regional Office (Harrisburg)
- ☐ Southwest Regional Office (Pittsburgh)
- ☒ District Mining Office: McMurray
- ☐ Central Office (Harrisburg)
- ☐ Northeast Regional Office (Wilkes-Barre)
- ☐ Northcentral Regional Office (Williamsport)
- ☐ Northwest Regional Office (Meadville)
- ☐ Oil and Gas Office: _____

SECTION E. RESPONSIBLE COUNTY CONSERVATION DISTRICT, if applicable.

_____ County Conservation District

_____ Telephone Number, if known

SECTION F. CONSULTANT

Michael Baker Jr. Inc.
Consultant, if applicable

4301 Dutch Ridge Rd.
Street Address

Beaver Pa. 15009
City, State, Zip

(724) 495-4273 - Greg Hynes
Telephone Number

SECTION G. PROJECT BOUNDARIES AND DESCRIPTION

REQUIRED

Indicate the total acres in the property under review. Of this acreage, indicate the total acres of earth disturbance for the proposed activity.

Attach a 7.5' U.S.G.S. Map indicating the defined boundary of the proposed activity.

Attach photographs of any building over 50 years old. Indicate what is to be done to all buildings in the project area.

Attach a narrative description of the proposed activity.

Attach the return receipt of delivery of this notice to the Pennsylvania Historical and Museum Commission.

REQUESTED

Attach photographs of any building over 40 years old

Attach construction drawing, if available.

SECTION H. SIGNATURE BLOCK

4/3/00
Date of Submission of Notice to PHMC

Gregory P. Hynes
Applicant's Signature

Attachment to Section G. Project Boundaries Description

- The total acreage of the areas under review are approximately:

  Site 1 - 495 Acres.
  Site 2 - 422 Acres
  Site 3 - 414 Acres
  Site 4 - 496 Acres
  Site 5 - 405 Acres

  Since these are proposed for refuse storage, assume 100% of each area will be disturbed.

- The proposed activity boundaries are shown on the attached Wind Ridge quadrangle sheet.

- Buildings less than 50 years old are known to exist within the project sites. No buildings over 50 years old are known to exist within the project sites. Any buildings within the ultimately selected site will be demolished.

- Michael Baker Jr., Inc. is currently performing an alternatives analysis for selection of a location for a new coal refuse disposal area. The five areas being considered are located in Richhill and Gray Townships in Greene County, and East Finley Township in Washington County. After completion of the alternatives analysis a site (or sites) will be selected for permitting and design of the proposed coal refuse disposal facilities. The facility is expected to include an embankment and slurry pond for disposal of coarse and fine coal refuse from the Bailey Central Preparation Plant.

photo revised 1973

PENNS NIA
7.5 MINUTE SERIES (TOPOGRAPHIC)

Reduced Copy
original Sent to
PAHMC @
1" = 2000'
on 11"x17"
paper

SELECTED PROJECT SITE

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Post Office Box 1026
Harrisburg, Pennsylvania 17108-1026

May 4, 2000

24379-000-00
- ARX01

TO EXPEDITE REVIEW USE
BHP REFERENCE NUMBER

Gregory P. Hynes, P.E.
Michael Baker Jr., Inc.
Box 280, 4301 Dutch Ridge Road
Beaver, PA 15009-0280

Re: File No. ER 98-2131-042-B
COAL, Consol Pennsylvania Coal Company, Coal Refuse Disposal Site Selection, Bailey Central Preparation Plant, Greene & Washington Counties

Dear Mr. Hynes:

The Bureau for Historic Preservation has reviewed the above named project under the authority of the Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988), and in accordance with relevant Federal legislation. This legislation includes Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, the Surface Mining Control and Reclamation Act, and OSM's regulations. This review includes comments on the project's potential effect on both historic and archaeological resources.

There is a high probability that prehistoric and historic archaeological resources are located in the project area and may be affected by this project. We are unable to proceed with our review until our field archaeologist, Mark McConaughy, conducts a field check of the project area. The information submitted to us will be forwarded onto Mr. McConaughy. We will complete our review upon receipt of the field archaeologist's comments. Call Mr. McConaughy to make an appointment for a field visit. It is our recommendation that the permit should not be issued until this review is completed.

Your request does not include sufficient information. We are unable to proceed with our review for historic structures until the information on the attached form is provided.

If you need further information in this matter please consult Chan Funk at(717) 772-0924. If you need further information regarding archaeological survey please contact Mark McConaughy at (724) 527-5585. If you need further information concerning historic structures please counsult Susan Zacher at (717) 783-9920. If you need a **status only** of the reviewed project please call Tina Webber at (717) 705-4036.

Sincerely,

Kurt W. Carr, Chief
Division of Archaeology & Protection

Cc: Consol Pennsylvania Coal Co., 1800 Washington Road, Pittsburgh, PA 15241-1421
DEP, McMurray District Mining Office
Mark McConaughy

Attachment
KWC/tmw

98-2131-042-B

PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION (PA 11/99)
BUREAU FOR HISTORIC PRESERVATION: INFORMATION REQUEST SHEET
(Please supply items checked below for PHMC to proceed with review)

PROJECT INITIATION

( )A. FUNDING/PERMITTING/LICENSING/APPROVAL PROGRAM
- ( ) 1. Contact person for federal/state/local agency, address, phone number.
- ( ) 2. Letter from federal agency initiating consultation, or a letter from federal agency authorizing an alternate agency or a consultant to initiate consultation.
- ( ) 3. Identify the Federal/State Agency and funding program or permit/license.
- ( ) 4. Identification of all Federal agencies involved in project.
- ( ) 5. Designated "lead" Federal Agency in complex or multi-agency project.

(X)B. PROJECT DESCRIPTION
- ( ) 1. Narrative description of the project and related actions resulting from the project.
- (X) 2. Proposed boundary of the project's Area of Potential Effect (APE) (remember to consider visual impacts)
- (X) 3. Description and Justification of selection of the Area of Potential Effect
- ( ) 4. Plans of existing conditions (as-built or as-found)
- ( ) 5. Preliminary drawings or plans (floor plans, elevations, specifications)
- ( ) 6. Work write-ups
- ( ) 7. Plans and specifications

( ) C. PROJECT LOCATION
- ( ) 1. U.S.G.S. 7.5 min. series quadrangle with the PROJECT LOCATION(S) AND LIMITS CLEARLY MARKED using a colored pen. Please include name of the quadrangle
- ( ) 2. U.S.G.S. 7.5 min. series quadrangle with Area of Potential Effect marked (potential area of direct effect can be delineated inside area of indirect effect)
- ( ) 3. Street map (for properties in densely populated areas)
- ( ) 4. Street map showing location and historic district boundaries (if appropriate)
- ( ) 5. Street address of property
- ( ) 6. Municipality in which project is located (not mailing address location)

( ) D. PROJECT SIZE (supply as appropriate for project)
  ( ) 1. Acreage of project area
  ( ) 2. Miles/feet of project and right-of-way width
  ( ) 3. Extent and nature of ground disturbing activities (i.e. grading, trenching, foundation excavation)

(X) E. PHOTOGRAPHS (no Polaroids, copies or scanned images)
  (X) 1. Exterior of building(s) in project area
  ( ) 2. Interior of building(s) in project area
  ( ) 3. Interior of building(s) illustrating the proposed work areas/features
  ( ) 4. Buildings, streetscape, setting of features in Area of Potential Effect (APE)
  ( ) 5. Views of project site
  ( ) 6. Other _____

PUBIC PARTICIPATION

(X) 1. Measures which will be/or have been taken to identify consulting parties.
( ) 2. List of proposed consulting parties.
(X) 3. Measures which will be/or have been taken to notify and involve the public.

RESOURCE IDENTIFICATION, EVALUATION AND PROJECT EFFECT

(X) A. Cultural Resource Identification
  (X) 1. Description of methodology used for identification and sources examined.
  (X) 2. Plan proposed for identification of historical (including historic districts, buildings, structures, objects) and archaeological resources and proposed methodology to be used.
  (X) 3. Pennsylvania Historic Resource form(s) for all properties 50 years or older and potentially eligible for the National Register identified in the APE.
  ( ) 4. Historical background/context report/information for historic resources identified.
  ( ) 5. Pennsylvania Archaeological Site Survey form(s) (P.A.S.S) for archaeological sites identified in surveys of APE.
  ( ) 6. Phase I, II, III Archaeological Survey Reports
  ( ) 7. 5 Copies of Final Phase I, II, III Archaeological Survey Report(s) (4 bound and 1 unbound copies)

(X) B. Evaluation of Project Effect on Cultural Resources (Physical, visual, atmospheric, direct and indirect, secondary)

( ) C. Other: _____

_____

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Post Office Box 1026
Harrisburg, Pennsylvania 17108-1026

June 2, 2000

Gregory P. Hynes, P.E.
Michael Baker Jr., Inc.
Box 280, 4301 Dutch Ridge Road
Beaver, PA 15009-0280

TO EXPEDITE REVIEW USE
DEP REFERENCE NUMBER

Re: File No. ER 1998-2131-042-C
COAL, Consol Pennsylvania Coal Company, Coal Refuse Disposal Site Selection, Bailey Central Preparation Plant, Gray and East Findley Twps., Green & Washington Counties

Dear Mr. Hynes:

The Bureau for Historic Preservation has reviewed the above named project under the authority of the Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988), and in accordance with relevant Federal legislation. This legislation includes Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, the Surface Mining Control and Reclamation Act, and OSM's regulations. This review includes comments on the project's potential effect on both historic and archaeological resources.

Based on a site visit on May 30, 2000, by Mark McConaughy of our staff, there is a high probability that significant archaeological sites are located in all five proposed project areas and could be adversely affected by project activities. Although there are no recorded archaeological sites within the project boundaries, the soil type, topographic setting, slope direction, and distance to water of the project area are similar to the settings of known archaeological sites in the vicinity. Burial mounds may be located on the hilltops and bluffs overlooking the major tributaries that bound each area. Prehistoric habitation sites could be present on benches and the terraces of the small creeks that flow through each project area. Several historic farmsteads are also located in the areas selected for

possible coal disposal sites. A Phase I archaeological survey of the project area is required to locate potentially significant archaeological resources. Guidelines and information for survey are available from our office upon request.

At this time, we recommend that the permit be denied and we request a conference to discuss the effects to archaeological resources within the permit area. We also recommend that, if the Phase I survey is not undertaken, that the permit be conditioned to require that archaeological investigations be conducted if sites are discovered after the mining permit is issued. We also request that you provide us with written justification for your decision if you decide not to require the Phase I survey.

If you need further information regarding this project, please contact Chan Funk at (717) 772-0924. If you need further information regarding archaeological survey, please contact Mark McConaughy at (724) 527-5585 x103. If you need a status only of the reviewed project please call Tina Webber at (717) 705-4036.

Sincerely yours,

Kurt W. Carr, Chief
Division of Archaeology &
Protection

CC. Consol Pennsylvania Coal Co., 1800 Washington Road, Pittsburgh, PA 15241-1421
DEP, McMurray District Mining Office
Mark A. McConaughy

3630-FM-WQ0037 Rev. 9/98

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY PROTECTION
BUREAU OF WATERWAYS ENGINEERING

PNDI Screening
Reviewer: M62177 gl
Date: 1/22/02
Phone No: 912-5772-4308

SUPPLEMENT NO. 1
PENNSYLVANIA NATURAL DIVERSITY INVENTORY SEARCH FORM

This form provides site information necessary to perform a computer screening for species of special concern listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, the Pennsylvania Fish and Boat Code or the Game Code. Records regarding species of special concern are maintained in a computer data base called the "Pennsylvania Natural Diversity Inventory" (PNDI). This screening represents the most up to date PNDI data and may not reflect actual field conditions. Results of this PNDI search are valid for one year.

Please complete the information below, attach an 8½" x 11" photocopy (DO NOT REDUCE) of the portion of the U.S.G.S. Quadrangle Map that identifies the project location and outlines the approximate boundaries of the project and mail to the appropriate regional office or the delegated County Conservation District prior to completing a Chapter 105 environmental assessment or any other DEP permit application. (SEE REVERSE SIDE FOR LIST OF OFFICES AND ADDRESSES).

NAME: Greg Hynes

ADDRESS: Michael Baker Jr., Inc.
4301 Dutch Ridge Road
Beaver, Pa. 15009

PHONE: 724 495-4273

COUNTY: Greene

TWP./MUNICIPALITY: Richhill & Gray Townships

U.S.G.S. 7½ Minute Quadrangle
Wind Ridge

PROJECT DESCRIPTION AND SIZE (Briefly describe entire area relevant to your project, including acreage.)
Coal Refuse Disposal Site(s)
- Alternatives Analysis

Approx. Center of Area

North (Up) 13.50 inches
West (to the left) 3.35 inches

INDICATE PROJECT LOCATION TO THE NEAREST ONE TENTH INCH MEASURING FROM THE EDGE OF THE MAP IMAGE FROM THE LOWER RIGHT CORNER.

SCREENING RESULTS - Follow the directions of the checked block.

☒ No potential conflicts were encountered during the PNDI computer screening. Include this form with you environmental assessment or permit application submission.

☐ Potential conflicts were resolved with (FAS/PNDI staff person on _____, 19__) Include this form with you environmental assessment or permit application submission.

☐ Potential conflicts must be resolved by contacting the following natural resource agencies checked below. Pleas provide a copy of this form along with a brief description of your project to the following agency for consultation an recommendations.

PLEASE CONTACT:

☐ Dept. of Conservation and Natural Resources
Bureau of Forestry/FAS/PNDI
P.O. Box 8552
Harrisburg, PA 17105
717-787-3444

☐ Mr. Andrew L. Shiels
PA Fish & Boat Commission
450 Robinson Lane
Bellefonte, PA 16823
814-359-5113

☐ Mr. Denver A. McDowell
PA Game Commission
2001 Elmerton Ave.
Harrisburg, PA 17110-9797
717-783-8743

Include this form and the agency's written recommendation with your environmental assessment or permit application submission.

BUREAU OF FISHERIES

Delano R. Graff, Director
(814) 359-5154
FAX: (814) 359-5153

DIVISION OF FISHERIES MANAGEMENT

Richard A. Snyder, Chief
(814) 359-5110
FAX: (814) 359-5153

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA FISH & BOAT COMMISSION
450 Robinson Lane
Bellefonte, PA 16823-9620

IN REPLY REFER TO
SIR# 4782

The following inquiries were performed for the same search area by Killam Associates.

July 14, 2000

KILLAM ASSOCIATES
Edward M. Davis
Morocco Building
651 South Center Avenue
Somerset, PA 15501-2511

Dear Mr. Davis:

RE: Species Impact Review - Rare, Candidate, Threatened and Endangered Species
Consol Pennsylvania Coal Co.
Richhill Township, Greene County, Pennsylvania

I have examined the map accompanying your recent correspondence which shows the location for the proposed above referenced project.

Presently, none of the fishes, amphibians or reptiles we list as endangered or threatened are known to occur at or in the immediate vicinity of this study area.

To allow faster processing of Species Impact Reviews (SIRs) in the future, we are requesting that the attached form be completed and returned to this office together with other relevant project information. Please make copies of the attached form and use with all future project reviews. If you have received, and in fact are using the new form, disregard the above request. Please note that the PFBC conducts Species Impact Reviews **only for reptiles, amphibians, fishes, and aquatic invertebrates.** Reviews concerning other natural resources must be submitted to other appropriate agencies. In any future correspondence with us regarding this specific project, please refer to the SIR number above. Thank you in advance for your cooperation.

Sincerely,

Andrew L. Shiels

Andrew L. Shiels, Leader
Nongame and Endangered Species Unit

hb

Encl. (1)

COMMONWEALTH OF PENNSYLVANIA

PENNSYLVANIA GAME COMMISSION

2001 ELMERTON AVENUE
HARRISBURG, PA 17110-9797

ADMINISTRATIVE BUREAUS

ADMINISTRATION	717-787-5670
AUTOMOTIVE AND PROCUREMENT DIVISION	717-787-6594
LICENSE DIVISION	717-787-2084
PERSONNEL DIVISION	717-787-7836
WILDLIFE MANAGEMENT	717-787-5529
INFORMATION & EDUCATION	717-787-6286
LAW ENFORCEMENT	717-787-5740
LAND MANAGEMENT	717-787-6818
REAL ESTATE DIVISION	717-787-6568
MANAGEMENT INFORMATION SYSTEMS	717-787-4076

July 20, 2000

Mr. Edward M. Davis
Environmental Specialist
Killam Associates
Morocco Building
651 South Center Avenue
Somerset, PA 15501-2511

In re: Consol Pennsylvania Coal Company
Potential coal refuse disposal facility
Richland Township, Greene County, PA

Dear Mr. Davis:

This is in reference to your letter requesting information relative to the above project.

We have completed an office review and determined that except for occasional individuals, this project should not affect any endangered or threatened species of bird or mammal recognized by the Pennsylvania Game Commission.

This response relates only to endangered or threatened species. It does not address other concerns of the Pennsylvania Game Commission. If, in the normal review process, it is determined that the project may impact critical or unique habitats such as wetlands, wintering areas, or nesting cover, etc., you may be requested to conduct additional studies.

For your convenience, please find attached, a copy of the United States Department of Interior's National Wetlands Inventory Map. Based on a map reconnaissance of the project area, your project may encroach upon wetlands. Any encroachment in wetlands will require permits from the Pennsylvania Department of Environmental Resources under the Dam Safety and Encroachment Act, Section 105, and the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act.

If you have any questions on the above, please contact me directly at 717-783-1728.

Very truly yours,

William A. Capouillez, PG
Section Oil/Gas and Mineral Development
Bureau of Land Management

WAC/pfb

cc: File
GRC
Kepler

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850

June 15, 2000

Mr. Edward M. Davis
Killam Associates
Morocco Building
651 South Center Avenue
Somerset, PA 15501-2511

Dear Mr. Davis:

This responds to your letter of May 10, 2000, requesting information about natural resource areas of special concern, and federally listed and proposed species in the vicinity of the proposed coal refuse disposal facility to be located in Richhill Township, Greene County, Pennsylvania. The following comments are provided pursuant to the Fish and Wildlife Coordination Act (48 Stat. 401, 16 U.S.C. 661 *et seq.*) and the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

Except for occasional transient species, no federally listed or proposed threatened or endangered species under our jurisdiction are known to occur within the project impact area. Therefore, no biological assessment or further Section 7 consultation under the Endangered Species Act will be required with the Fish and Wildlife Service. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered. A compilation of certain federal status species in Pennsylvania is enclosed for your information.

Based on our office review of project information provided and map reconnaissance (i.e., County Soils maps and/or National Wetland Inventory maps), wetlands may occur within the boundaries of the proposed project. Work in wetlands requires permits from the Pennsylvania Department of Environmental Protection (DEP) and/or the Army Corps of Engineers (Corps). We suggest you contact the DEP and the Corps at the addresses listed below for information on permit requirements.

Pennsylvania Department of
Environmental Protection
Division of Rivers and
Wetlands Conservation
P.O. Box 8554
Harrisburg, PA 17105-8554

District Engineer, Pittsburgh
U.S. Army Corps of Engineers
Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222

By copy of this letter, we are informing these agencies of the proposed project.

This response relates only to endangered and threatened species under our jurisdiction and a preliminary review for wetlands, based on an office review of the proposed project's location. No field inspection of the project area has been conducted by this office. Therefore, we suggest contacting a qualified consultant to evaluate your site for potential wetland impacts.

For information regarding State resources of special concern, including State-listed endangered and threatened species, please contact the Pennsylvania Game Commission (birds and mammals; State Game Lands), the Pennsylvania Fish and Boat Commission (fish, reptiles, amphibians and aquatic invertebrates; trout streams), the Pennsylvania Department of Conservation and Natural Resources (PNDI; plants and plant sanctuaries; State Forests; State Parks; Natural Areas; State Wild and Scenic Rivers) and the Department of Environmental Protection (Special Protection Watersheds; Wetlands).

If we can be of further assistance, please contact Michael McCarthy of my staff at 814-234-4090.

Sincerely,

Ephraim Ramey

for David Densmore
Supervisor

Enclosure

3930-PM-WM0017A 2/2001

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
and
U.S. ARMY CORPS OF ENGINEERS

ENVIRONMENTAL ASSESSMENT FORM (E.A. Form)

PART 1 - RESOURCE IDENTIFICATION

1. **Indicate water resources which exist on the project site.**

Name of streams(s) and/or body of water (including wetlands) Unnamed tributaries to Enlow Fork; *see Module 15 of the Coal Refuse Disposal Permit Application*

Size of body of water (in acres) *See Modules 15.1.a and 15.4.c*

Wetland - If wetlands are present at the project site, provide the following information relative to the person(s) or organization performing the wetland identification, delineation and related work:

Dale E. Pike, Ph.D and Bradford B. Owen, Jr., Ph.D
Name

Pike Environmental Consulting
Organization/Company

784 Crayne Runs Road
Address

Waynesburg, Pa 15370-2766

724-627-9691
Telephone

QUALIFICATIONS

See attached Resumes for Dale E. Pike, Ph.D and Bradford B. Owen, Jr., Ph.D.

If wetlands are present, attach a copy of the wetland delineation report identified and labeled as **Enclosure A**. Include all field data sheets, denote the size (in acres) of the wetland. If this information details any physical information or features not shown in the "site plan" please attach additional plans which illustrate these features. *Refer to Attachments 15.1 and 15.5 of Module 15 of the Coal Refuse Disposal Permit Application*

Enclosure A

PART 1 - RESOURCE IDENTIFICATION (continued)	YES	NO
2. **Is the site located within or adjacent to any of the following? Please mark either the "yes" or "no" column for each question.**		
A. National, state or local park, forest or recreation area	☐	☒
B. Natural, wild, or wilderness area	☐	☒
C. National natural landmark	☐	☒
D. National wildlife refuge, or Federal, state, local or private wildlife or plant sanctuaries	☐	☒
E. State Game Lands	☐	☒
F. Areas identified as prime farmland	☐	☒
If not included in the permit application package, please attach a map (e.g. 1:2400 scale or greater) indicating the location of the project, all water resources and the features identified above. Label the map as Enclosure B.	**ENCLOSURE B**	
3. Is the water resource listed as stocked waters by the Pennsylvania Fish and Boat Commission?	☐	☒
4. Is the water resource designated as a wild trout stream by the Pennsylvania Fish and Boat Commission?	☐	☒
5. Is the water resource listed as High Quality or Exceptional Value in Title 25 Pa. Code Chapter 93?	☐	☒
Indicate the stream classification found in Chapter 93. Classification *– Warm Water Fishery*		
6. Is the water resource designated as a National Wild or Scenic River or as part of the Commonwealth's Scenic Rivers System or classified as priority 1-A for inclusion in the system?	☐	☒
7. Is the water resource part of or located along a private or public water supply?	☐	☒
(IF COMPLETING A SMALL PROJECT APPLICATION ADVANCE TO PART 3)	**ENCLOSURE C**	
8. Provide a written narrative, identified and labeled as "Enclosure C - Description of Aquatic Habitat," discussing the following ecological functions: *Refer to Module 15 Attachment 15.1 of the Coal Refuse Disposal Permit Application, Volume 2.*		
A. Aquatic habitats including:		
(1) Food chain production		
(2) General habitat a. Nesting e. Migration b. Spawning f. Feeding c. Rearing g. Escape Cover d. Resting h. Other		
(3) Habitat for threatened and endangered plant and animal species (Discuss results of Supplement Form #1)		
(4) Environmental Study Areas a. Sanctuaries b. Refuges		
(5) If project proposes a stream relocation, a stream enclosure, or dredging, provide a description of the instream macroinvertebrate community.		

PART 1 - RESOURCE IDENTIFICATION (continued)	
B. Water Quantity and Streamflow *See Module 8.4A and Module 15 Attachment 15.1 of the Coal Refuse Disposal Permit Application, Volumes 1 & 2.*	ENCLOSURE C Description of Aquatic Habitat
(1) Natural drainage patterns	
(2) Flushing characteristics	
(3) Current patterns	
(4) Groundwater discharge for baseflow	
(5) Natural recharge area for ground and surface waters	
(6) Storm and floodwater storage and control	
C. Water Quality *See Module 8.4A and Module 15 Attachment 15.1 of the Coal Refuse Disposal Permit Application, Volumes 1 & 2 .*	
(1) Preventing Pollution	
(2) Sedimentation control and patterns	
(3) Salinity distribution	
(4) Natural water filtration	
D. Recreation *This site is privately owned and not used for recreation.*	
(1) Game Species	
(2) Non Game Species	
(3) Fishing	
(4) Hiking	
(5) Observation (plant/wildlife)	
(6) Other	
E. Upstream and Downstream Property *N/A-no U.S. property & D.S. is a culvert under the railroad.*	
F. Other Environmental Factors Determined by Site Investigation *None*	
PART 2 - PROJECT DESCRIPTION	
9. **Project Impacts** For impacts to regulated waters of the Commonwealth, answer fully, completely and in detail the following questions; attach and label as **Enclosure D**.	ENCLOSURE D
A. Discuss the impacts on: *Not applicable. No impacts.*	
(1) National, state or local park, forest or recreation area	
(2) Natural, wild, or wilderness area	
(3) National, state, or local historic site	
(4) National natural landmark	
(5) National wildlife refuge	
(6) Cultural or archaeological landmarks	
(7) State Game Lands	

PART 2 - PROJECT DESCRIPTION (continued)	
(8) Federal, state, local or private plant or wildlife sanctuaries	
(9) Areas identified as prime farmland	
B. Discuss the environmental impacts on:	
(1) Aquatic habitats including: *See Module 15.2c & Module 15 Attachments 15.1 and 15.5 of the Coal Refuse Disposal Permit Application, Volume 2.*	
a. Food Chain production	
b. General habitat (1) Nesting (5) Migration (2) Spawning (6) Feeding (3) Rearing (7) Escape Cover (4) Resting (8) Other	
c. Habitat for threatened and endangered plant and animal species	
d. Environmental Study Areas (1) Sanctuaries (2) Refuges	
(2) Water Quantity and Streamflow *See Module 15.1g & Module 8.5 of the Coal Refuse Disposal Permit Application, Volumes 1 & 2..*	
a. Natural drainage patterns	
b. Flushing characteristics	
c. Current patterns	
d. Groundwater discharge for baseflow	
e. Natural recharge area for ground and surface waters	
f. Storm and floodwater storage and control	
(3) Water Quality *See Module 15.1g & Module 8.5 of the Coal Refuse Disposal Permit Application, Volumes 1 & 2.*	
a. Preventing Pollution	
b. Sedimentation control and patterns	
c. Salinity distribution	
d. Natural water filtration	
(4) Recreation *The site is privately owned and not used for recreation.*	
a. Game Species	
b. Non Game Species	
c. Fishing	
d. Hiking	
e. Observation (wildlife)	
f. Other	
(5) Upstream and downstream property *See Modules 8.5 and 15.4e of the Coal Refuse Disposal Permit Application, Volumes 1 & 2..*	
(6) Other Environmental Factors *None*	

ENCLOSURE D

Project Impacts

PART 2 - PROJECT DESCRIPTION (continued)	ENCLOSURED
C. Identify all environmental impacts on other adjacent land and water resources associated with the construction, modification or operation of the dam, reservoir, water obstruction, or encroachment in the area of the project. *See Modules 8.5 and 15.*	
D. Identify and evaluate the potential cumulative environmental impacts of this project and other potential or existing projects like it, and the impacts that may result through numerous piecemeal changes to the resource. *See Modules 8.5 and 15.4e.*	
E. Identify and describe all other dams, water obstructions or encroachments which may or will be needed, in addition to those described in this Application, to fulfill the purpose of the current project.	

PART 3 - CERTIFICATION

I certify that the above statements, attachments including those labeled and identified as Enclosures, and all conclusions are true, correct, and based upon current environmental principles and science, to the best of my knowledge and belief.

Dale E. Pike — Jan. 24, 2002

Bradford Allen Jr — Jan 24, 2002

Signature of Person Completing the Environmental Assessment Form — Date

The Department may waive a specific information requirement in writing, at the request of the Applicant, during the pre-application review process if the Department determines that specific information is not necessary to review the application.

March 2002

24379-000-0000

COAL REFUSE DISPOSAL PERMIT APPLICATION

For
Bailey Central Mine Complex
Coal Refuse Disposal Areas No. 3 and No. 4
And
Sedimentation Pond
Greene County, Pennsylvania

VOLUME 1

Prepared for

Consol Pennsylvania Coal Company
Pittsburgh, Pennsylvania

Prepared by

Baker

Michael Baker Jr., Inc.
Coraopolis, Pennsylvania

CONSOL PENNSYLVANIA COAL COMPANY
BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4

COAL REFUSE DISPOSAL PERMIT APPLICATION

CONTENTS

VOLUME 1

Module 1	Application
Module 2	General Information
Module 3	Ownership/Compliance Information
Module 4	Areas Where Mining is Prohibited or Restricted
Module 5	Property Interests/Right of Entry
Module 6	Environmental Resource Maps
Module 7	Geologic Information
Module 8	Hydrology
Module 9	Operation Maps – Surface Activity Sites
Module 10	Operation Plan
Module 11	Erosion and Sedimentation Controls
Module 12	Treatment Systems
Module 13	Impoundments
Module 14	Liners

VOLUME 2

Module 15	Streams/Wetlands
Module 16	Air Pollution and Noise Control
Module 17	Soils/Prime Farmland
Module 18	Land Use/Reclamation/Fish and Wildlife
Module 19	Reclamation Schedule and Cost Information
Module 20	Coal Refuse/Coal Ash – Sources and Properties
Module 21	Coal Refuse Construction Plans
	Exhibit 21.1 Design Report

VOLUME 3 AND 4

Appendix A – Drawings

VOLUME 5

Appendix B – Technical Specifications
Appendix C – Operations and Maintenance Manual
Appendix D – Test Boring Records, Test Pit Records, and Field Permeability Test Results
Appendix E – Laboratory Test Results
Appendix F – PADEP Module 7 – Geological Information

VOLUME 6, 7 AND 8

Appendix G – Calculations
Module 24 Special Protection Waters
Module 28 Blasting Plan

5600-PM-MR0324 Rev. 4/2001

DEP USE ONLY
Date Received
Permit Number

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF MINING AND RECLAMATION

MODULE 1: APPLICATION FOR BITUMINOUS UNDERGROUND MINE, COAL PREPARATION PLANT AND/OR COAL REFUSE DISPOSAL AREA

Before completing this form, read the step-by-step instructions provided with this Permit Application Package.

SECTION A. PROJECT INFORMATION

Operation Name: *Bailey Central Mine Complex Coal Refuse Disposal Areas No. 3 and No. 4*

Permit No. (existing site):

SECTION B. APPLICANT INFORMATION

Applicant Name
Consol Pennsylvania Coal Company (CPCC)

Mailing Address
1800 Washington Road
(Street # and Name or P.O. Box)

Pittsburgh (City) *PA.* (State) *15241-1421* (Zip Code + Four)

412-831-4000 (Telephone #)	*412-831-4513* (FAX #)	- VOLUNTARY - (Social Security Number) (if individual)	*25-1402386* (Federal Tax ID #)

Applicant Type
- ☐ Individual
- ☐ PA Corporation
- ☒ Non-PA Corporation
- ☐ General Partnership
- ☐ Limited Partnership
- ☐ Municipality
- ☐ Other
- ☐ Pending

4305 (Mining Operators License #)

Application Contact
Pachter (Last Name) *Jonathan* (First Name) *M* (MI) (Social Security #) Voluntary

Manager, Environmental Permits (Title)

Mailing Address
1800 Washington Road
(Street # and Name or P.O. Box)

Pittsburgh (City) *PA.* (State) *15241-1421* (Zip Code + Four)

Type of Mining Activity
- ☐ Underground Mine
- ☐ Coal Preparation
- ☒ Refuse Disposal
- ☐ Refuse Reprocessing

Blasting Anticipated: Yes ☒ No ☐

Application Type
☐ New Permit ☒ Permit Revision ☐ Permit Transfer ☐ Renewal

SECTION C. SITE INFORMATION

Location of Operation – for underground mines provide main portal location

County(ies)	Municipality(ies)	County Code
Greene	*Richhill Township*	*30*
Greene	*Gray Township*	*30*

SECTION C. (continued)

U.S.G.S. Map Name(s) *Wind Ridge, PA and Rogersville, PA*

Map Coordinates (center of proposed permit area) (center of main portal for underground mines)

Latitude 39° 57' 45" Longitude 80° 23' 15"

Name(s) of receiving stream(s)/Chapter 93 Classification

Unnamed tributaries of Enlow Fork / WWF

MSHA Mine I.D. No. (include date of issuance) *36-07230*

Site Contact

Suter (Last Name) *Edward* (First Name) *F* (MI)

Environmental Engineer (Title)

Mailing Address

Consol Pennsylvania Coal Company, P.O. Box 355 (Street # and Name or P.O. Box)

Eighty - Four (City) *PA* (State) *15330* (Zip Code + Four)

edsuter@consolenergy.com (E-mail) *(724) 206-2034* (Telephone #) Ext. *724-206-2007* (FAX #)

Extent of Mining

Coal Preparation Activity Area		acres
Coal Refuse Disposal Area	373.0	acres
Support Area – Disposal/Reprocessing	183.6	acres
Coal Refuse Reprocessing Area		acres
	556.6	Total acres

Underground Mines:

Underground Permit Area		acres
Subsidence Control Plan Area		acres

Surface Activity Sites (List Individually with Site Area Acreage)

	acres
	acres
	acres
	acres
	acres
	acres
	Total acres

SECTION D. PERMIT COORDINATION

1. If coal processing activities are proposed, will the total amount of coal processed be equal to or greater than 200 tons/day? *Not applicable. No coal processing activities are proposed.* Yes ☐ No ☐

2. Will underground tanks for storage of fuel or chemicals be located within the proposed permit area? Yes ☐ No ☒
Not applicable. No underground fuel or storage tanks are proposed with this application.

SECTION E. APPLICATION FEE

Application Fee (make check payable to "Commonwealth of Pennsylvania")

☒	$ 250	NPDES ($250)
☐	$	Mining activity (underground and/or coal preparation) ($250)
☒	$ 5566	Refuse Disposal ($500 + $10 acre for every acre over 50)
☒	$ 350	Stream Enclosure ($350/enclosure)
☐	$	Stream Channel Change ($300/change)
☐	$	Bridge, water obstruction or encroachment in a stream or floodway with a drainage area larger than 100 acres ($200 each)
☐	$	Small project as defined in 25 Pa Code Section 105.1 ($100 each)
☐	$	Dam with contributing drainage area of 100 acres or more, maximum water depth of 15 feet or more at maximum storage elevation or maximum impounding capacity of 50 acre-feet or more ($1,500/dam)
☒	$ 6166	Total Application Fee

SECTION F. CONSULTANT (if more than one consultant prepared this application provide information on separate sheets)

Refer to Section F Attachment for additional consultants.

Stewart (Last Name) Michele (First Name) (MI)

Engineering Manager (Title) Michael Baker Jr., Inc (Name of Consulting Firm)

Mailing Address

Airport Office Park, Bldg. 3, 420 Rouser Road (Street # and Name or P.O. Box)

Coraopolis (City) PA (State) 15108 (Zip Code + Four)

mstewart@mbakercorp.com (E-mail) (412) 269-6022 Ext. (Telephone #) (412) 269-6100 (FAX #)

SECTION G. LAND USE INFORMATION

Will the project involve new land development, change the existing use of the land, or change the "footprint" of an existing facility? ☒ Yes ☐ No

If "yes," respond to the following additional questions.

1. Is there a municipal comprehensive plan? ☐ Yes ☒ No
2. Is there a county comprehensive plan? ☒ Yes ☐ No
3. Is there a multi-municipal or multi-county comprehensive plan? ☐ Yes ☒ No
4. Is the proposed project consistent with these plans? ☒ Yes ☐ No
5. Are there municipal zoning ordinances? ☐ Yes ☒ No
6. Are there joint municipal zoning ordinances? ☐ Yes ☒ No
7. Is the proposed project consistent with zoning ordinances? *Not applicable; there are no zoning ordinances.* ☒ Yes ☐ No
8. Does the proposed project require a change or variance to an existing comprehensive plan or zoning ordinances? ☐ Yes ☒ No
9. Are any zoning ordinances that are applicable to this project currently subject to any type of legal proceeding? ☐ Yes ☒ No

SECTION G. LAND USE INFORMATION (Continued)

10. Have you obtained all applicable local zoning and building approvals? *None required*..... ☒ Yes ☐ No
11. Will the project involve any of the following:
    - a site under DEP's Land Recycling Program? ..... ☐ Yes ☒ No
    - reclamation or re-mining of a previously mined site? ..... ☐ Yes ☒ No
    - a Keystone Opportunity Zone, Select Site or Enterprise Development Area? ..... ☐ Yes ☒ No
    - a Designated Growth Area? ..... ☐ Yes ☒ No

Note: Applicants are encouraged to submit copies of local land use approvals or other evidence of compliance with local comprehensive plans and zoning ordinances.

SECTION H. ADDITIONAL RELATED INFORMATION

Name and Address of Public Review Office where a copy of this application is on file for public review. (reference Appendix B if appropriate)

Greene County Conservation District
Greene County Office Building
93 E. High Street, Room 215
Waynesburg, PA 15370

Have you paid all reclamation fees to the Federal Office of Surface Mining Reclamation and Enforcement as required by the Federal Surface Mining Control and Reclamation Act of 1977 (30 USC 1232)? Yes ☒ No ☐

Provide the following (if applicable to this proposed operation):

Pre-Application No. _____
Small Operator Assistance Program (SOAP) Project No. _____
Notice of Intent to Explore No. _____

Application Date *March 22, 2002*

SECTION I. AFFIDAVIT

Commonwealth of Pennsylvania, County of *Allegheny*

I, *Dan R. Baker* being duly sworn, according to law, depose and say that I (am the applicant) (am an officer or official of the applicant) (have the authority to make this application) and that the plans, reports and documents submitted as part of the application are true and correct to the best of my knowledge and belief. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Sworn and Subscribed to Before Me This

22nd Day of March (month) 2002 (year)

Signature of Applicant or Responsible Official

Notarial Seal
Jonathan M. Pachter, Notary Public
Upper St. Clair Twp., Allegheny County
My Commission Expires Aug. 1, 2002

Member, Pennsylvania Association of Notaries

Dan R. Baker
Name (Typed)

President
Title and Seal

P.O. Box 355, Eighty – Four, PA 15330
Address

Attachment To Section F

SECTION F. CONSULTANT (if more than one consultant prepared this application provide information on separate sheets)

Pike	*Dale*	*E*
(Last Name)	(First Name)	(MI)
PHD	*Pike Environmental Consulting*	
(Title)	(Name of Consulting Firm)	

Mailing Address

784 Craynes Run Road

(Street # and Name or P.O. Box)

Waynesburg	*PA*	*15370-2766*
(City)	(State)	(Zip Code + Four)

pikenviron@alltel.net	*(724) 627-9691* Ext.	*(724) 852-2394*
(E-mail)	(Telephone #)	(FAX #)

SECTION F. CONSULTANT (if more than one consultant prepared this application provide information on separate sheets)

Waite	*Burt*	*A.*
(Last Name)	(First Name)	(MI)
Senior Geologist	*Moody & Associates, Inc.*	
(Title)	(Name of Consulting Firm)	

Mailing Address

11548 Cotton Road

(Street # and Name or P.O. Box)

Meadville	*PA*	*16335*
(City)	(State)	(Zip Code + Four)

bwaite@moody-s.com	*(814) 724-4970* Ext.	*(814) 724-4973*
(E-mail)	(Telephone #)	(FAX #)

Module 2: General Information

Check those modules included in this application (Submit only those which apply). See Appendix D for modules and documents required for permit transfer, name changes and ownership changes.

Yes	No			Module	Date of Last Revision
☒	☐	1:	Application	1	4/2001
☒	☐	2:	General Information	2	4/2001
☒	☐	3:	Ownership/Compliance Information	3	4/2001
☒	☐	4:	Areas Where Mining is Prohibited or Restricted	4	4/2001
☒	☐	5:	Property Interests/Right of Entry	5	4/2001
☒	☐	6:	Environmental Resource Maps	6	4/2001
☒	☐	7:	Geologic Information	7	4/2001
☒	☐	8:	Hydrology	8	4/2001
☒	☐	9:	Operations Maps - Surface Activity Sites	9	4/2001
☒	☐	10:	Operation Plan	10	4/2001
☒	☐	11:	Erosion and Sedimentation Controls	11	4/2001
☒	☐	12:	Treatment Systems	12	4/2001
☒	☐	13:	Impoundments	13	4/2001
☒	☐	14:	Liners	14	4/2001
☒	☐	15:	Streams/Wetlands	15	4/2001
☒	☐	16:	Air Pollution and Noise Control	16	4/2001
☒	☐	17:	Soils/Prime Farmland	17	4/2001
☒	☐	18:	Land Use/Reclamation/Fish and Wildlife	18	4/2001
☒	☐	19:	Reclamation Schedule and Cost Information	19	4/2001
☒	☐	20:	Coal Refuse/Coal Ash - Sources and Properties	20	4/2001
☒	☐	21:	Coal Refuse Construction Plans	21	4/2001
☐	☒	22:	Subsidence Control and Underground Mine Maps	22	4/2001
☐	☒	23:	Mine Openings	23	4/2001
☒	☐	24:	Special Protection Waters	24	4/2001
☐	☒	25:	Coal Ash Beneficial Use	25	4/2001
☐	☒	26:	Remining of Areas With Preexisting Pollutional Discharges	26	4/2001
☐	☒	27:	Sewage Sludge/Coal Ash Beneficial Use	27	4/2001
☒	☐	28:	Blasting Plan	28	4/2001
☐	☒	29:	Disposal of Excess Spoil	29	4/2001
☐	☒	30:	Underground Disposal/Backstowing	30	4/2001
☐	☒	31:	In Situ Processing	31	4/2001

Has a check, payable to the Commonwealth of Pennsylvania for the proper amount, been included? ☒ yes ☐ no

Has the application been properly executed and if a corporation, the corporate seal affixed? ☒ yes ☐ no

Is a copy of the public notice attached to this module? (The notice must indicate whether the application is for a new permit, permit revision, permit renewal or permit transfer, and specifically reference areas to be affected by both surface and underground operations, stream variances, stream crossings, stream channel changes, road variances, blasting, fly ash deposition and land use changes). Example Public Notices are included in the Instructions as Appendix F (deep mines and prep plants) and Appendix G (coal refuse). ☒ yes ☐ no

Have arrangements been made to publish public notice of this application? (Proof of publication must be submitted to the Department upon completion of the publication requirements). See Appendix E of the Instructions for information regarding permit type vs. public notice and proof of publication requirements. ☒ yes ☐ no

Has documentation been provided indicating that the advertisement requirement of §86.31(a) is in the process of being satisfied? (Intent to publish requirement, 86.70) ☒ yes ☐ no

I do hereby certify that this application includes: all of the modules checked above; payment of application fee(s); and all other information as noted above.

Signature of Applicant or Responsible Official

PERSON(S) AUTHORIZED BY APPLICANT TO PREPARE THIS APPLICATION

The application, plans, reports and specifications shall be prepared by a professional engineer, professional geologist or registered land surveyor, as appropriate. Certain items, such as; haul road design (87.160, 89.26, 90.134), stream channel diversions (87.104, 90.105), dams and impoundments (87.73, 87.112, 90.39, 80.112, 89.101), disposal of excess spoil (87.131), variance to contouring (87.175), subsidence control plan maps (89.154), and maps, plans, and cross sections (90.21, 90.46) require preparation and certification by specific professionals. Please review the appropriate sections of Chapters 86-90 to ensure compliance with these certification requirements.

Registered Professional Engineer

I, *Michele Stewart* do hereby certify to the best of my knowledge, information and belief, that the information contained in Modules *1 through 6, 9 through 21, 24 and 28* and the accompanying application, plans, specifications and reports have been prepared in accordance with accepted practice of engineering, are true and correct, and are in accordance with the Rules and Regulations of the Department of Environmental Protection. I further certify that it is within my professional expertise to verify the correctness of the information. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature

Address *Michael Baker Jr., Inc.*
Airport Office Park, Bldg. 3, 420 Rouser Road
Coraopolis, PA. 15108

Telephone No. *(412) 269- 6022*

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
MICHELE STEWART
ENGINEER
PE-029157-E

Registered Professional Geologist

I, _____ do hereby certify to the best of my knowledge, information and belief, that the information contained in Modules _____ and the accompanying application, plans, specifications and reports has been prepared in accordance with accepted practice of geology and hydrology, are true and correct and are in conformance with the Rules and Regulations of the Department of Environmental Protection. I further certify that it is within my professional expertise to verify the correctness of the information. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature _____

Address _____

Professional Seal

Telephone No. _____

Registered Professional Land Surveyor

I, _____ do hereby certify to the best of my knowledge, information and belief, that the information contained in the accompanying application, plans, specifications and reports has been prepared in accordance with accepted practice of land surveying and engineering land surveys, are true and correct and are in conformance with the Rules and Regulations of the Department of Environmental Protection. I further certify that it is within my professional expertise to verify the correctness of the information. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature _____

Address _____

Professional Seal

Telephone No. _____

PERSON(S) AUTHORIZED BY APPLICANT TO PREPARE THIS APPLICATION

The application, plans, reports and specifications shall be prepared by a professional engineer, professional geologist or registered land surveyor, as appropriate. Certain items, such as; haul road design (87.160, 89.26, 90.134), stream channel diversions (87.104, 90.105), dams and impoundments (87.73, 87.112, 90.39, 80.112, 89.101), disposal of excess spoil (87.131), variance to contouring (87.175), subsidence control plan maps (89.154), and maps, plans, and cross sections (90.21, 90.46) require preparation and certification by specific professionals. Please review the appropriate sections of Chapters 86-90 to ensure compliance with these certification requirements.

Registered Professional Engineer

I, _____ do hereby certify to the best of my knowledge, information and belief, that the information contained in Modules _, and the accompanying application, plans, specifications and reports have been prepared in accordance with accepted practice of engineering, are true and correct, and are in accordance with the Rules and Regulations of the Department of Environmental Protection. I further certify that it is within my professional expertise to verify the correctness of the information. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature _____

Address _____

_____

_____

Telephone No. _____

Professional Seal

Registered Professional Geologist

I, *Burt A. Waite* do hereby certify to the best of my knowledge, information and belief, that the information contained in Modules *7 and 8*, and the accompanying application, plans, specifications and reports has been prepared in accordance with accepted practice of geology and hydrology, are true and correct and are in conformance with the Rules and Regulations of the Department of Environmental Protection. I further certify that it is within my professional expertise to verify the correctness of the information. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature _____

Address *Moody and Associates, Inc.*

11548 Cotton Road

Meadville, PA 16335

Telephone No. *814-724-4970*

Professional Seal

Registered Professional Land Surveyor

I, _____ do hereby certify to the best of my knowledge, information and belief, that the information contained in the accompanying application, plans, specifications and reports has been prepared in accordance with accepted practice of land surveying and engineering land surveys, are true and correct and are in conformance with the Rules and Regulations of the Department of Environmental Protection. I further certify that it is within my professional expertise to verify the correctness of the information. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature _____

Address _____

_____

_____

Telephone No. _____

Professional Seal

PUBLIC NOTICE

Pursuant to the PENNSYLVANIA CLEAN STREAMS LAW, the PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION Rules and Regulations, the SURFACE MINING CONSERVATION and RECLAMATION ACT and the Bituminous Mine Subsidence and Land Conservation Act as amended and the COAL REFUSE DISPOSAL CONTROL ACT as amended, notice is hereby given that Consol Pennsylvania Coal Company doing business at 1800 Washington Road, Pittsburgh, PA has made application to the Pennsylvania Department of Environmental Protection to permit a new coal refuse disposal facility for the Bailey Central Mine Complex . The new disposal facility is comprised of two coal refuse disposal areas - Coal Refuse Disposal Areas No. 3 and No. 4.

The proposed project will affect approximately 556.6 total acres with 545.6 acres in Richhill Township and 11 acres in Gray Township, Greene County, PA. The project site is located approximately 3,300 feet south of the intersection of State Routes 4009 (Grinnage Road) and 4013 (Dog Town Road). The proposed area can be located on the Wind Ridge and Rogersville U.S.G.S., 7-1/2 minute series topographic maps.

The project site encompasses two unnamed tributaries to Enlow Fork beginning at a point approximately 450 feet west of the confluence of Enlow Fork and the main unnamed tributary and continuing upstream. Consequently, the application includes a request for a variance to encroach on 13,198 feet of stream channel. Stream flow will be carried under the proposed disposal areas in a rock drain. The rock drain will begin at a point approximately 1300 feet east of the main unnamed tributary's confluence with Enlow Fork and will extend upstream through the project site through both unnamed tributaries. The remaining 850 feet of stream channel will be used for sedimentation pond construction. The proposed operation will discharge surface runoff and drainage from the coal refuse disposal areas through the sedimentation pond and into the unnamed tributary to Enlow Fork.

The application includes requests for variances to abandon approximately 6400 feet of State Route (S.R.) 4009 (Grinnage Road), 4115 feet of S.R. 4011 (Allen School Road), and 950 feet of Township Road T-370 (Fletcher Run Road). These roads cross through the project site between a point approximately 3300 feet south of the S.R. 4009/4013 intersection and the S.R. 4011/T-611 intersection. The application also includes requests for variances to encroach within 100 feet of the right of way of remaining sections of S.R. 4009 and T-370 for distances of 100 feet. These

road variances are needed to facilitate construction and operation of the coal refuse disposal areas and sedimentation pond.

Blasting, if deemed necessary will also be a part of the proposed operation.

A copy of the application is available for public inspection, and copying for a fee, by appointment at the Greene County Conservation District, Greene County Office Building, Room 215, 93 East High Street, Waynesburg, PA 15370, and by appointment at the Pennsylvania Department of Environmental Protection, McMurray District Mining Office, 3913 Washington Road, McMurray, PA 15317. Written comments, objections, or a request for an informal conference may be submitted to the Department of Environmental Protection, District Mining Operations, at the above address, no later than thirty (30) days following the final publication date of this notice.

NOTE: To be advertised by the Observer Reporter, Greene County Edition once a week for four (4) consecutive weeks.

Module 3: Ownership/Compliance Information

Instructions: Provide the following information on 8½ x 11" sheets of paper. Attach the page(s) to this module and identify as *Exhibit 3: Ownership/Compliance Information.* Use number, letter, and heading to identify information.

Note: If the applicant is currently a licensed mine operator or has submitted an application for a mine operator's license to the Department, provide only information concerning coal ownership, contractors, compliance on Federal mining permits, and violation history on mining permits outside Pennsylvania. The general ownership information outlined in 3.1 and the compliance information regarding mining permits within Pennsylvania will be generated from the information on file with the Department (in eFACTS) for licensed mine operators.

Consol Pennsylvania Coal Company is a PA licensed mine operator with license number 4305.

3.1 ***Ownership Interest.*** Identify whether the applicant is a single proprietorship, corporation, partnership, association, or other business entity. For businesses other than single proprietorships provide the following:

Not required. See note above.

a) names, social security number (voluntary), employer identification number and addresses of every officer, partner, associate, director, or other person performing a function similar to a director of the applicant;

b) name, social security number (voluntary), employer identification number and address of any person who is a principal shareholder of the applicant; (Note: A principal shareholder is any person who is the legal owner of ten percent or more of any class of voting stock).

c) names under which the applicant, partner, or principal shareholder previously operated a coal mining operation in Pennsylvania and the United States within the five years preceding the date of this application.

d) name, social security number (voluntary), employer identification number of the following persons:

- person having the ability to commit the financial or real property assets or working resources of an entity.
- person controlling or owning the coal to be mined under the proposed permit under a lease, sublease or other contact, and having the right to receive the coal after mining or having authority to determine the manner in which the proposed coal mining activity is conducted.
- person who is another relationship with the permit applicant which gives the person authority directly or indirectly to determine the manner in which the proposed coal mining activity is to be conducted.
- person who owns or controls the persons specified in Module 3, Section 3.1, either directly or indirectly.

e) for each person listed in 3.1 a) through d), provide the following: title of person's position, date position or stock ownership was assumed, date of departure from position (if applicable, percentage of ownership, location within organizational structure, relationship to the applicant.

3.2 ***Contractor.*** If a contractor will be conducting the operation provide the name, address and telephone number of the contractor and if the contractor is a business entity other than a single proprietor, provide the names and addresses of the respective principals, officers, and resident agents.

Not applicable. Consol Pennsylvania Coal Company will conduct its own operations.

3.3 ***Permit Interests.*** Identify by permit or application number and regulatory authority any current or previous coal mining permits in Pennsylvania and the United States held by the applicant for the five-year period immediately preceding this application and of any pending permit application to conduct coal mining activities in the United States.

Not required. See note above.

3.4 ***Related Entity Information.*** List the names of entities who own or control the applicant or who are owned or controlled by the applicant. Provide the following for each: employer ID number, federal and state permit numbers, MSHA numbers (include date of issuance), application numbers for pending mining permits, name,

address, social security number (voluntary) and employer ID number of every officer, partner, associate, principal shareholder, director or other person performing a function similar to director. Also, for each person listed in 3.1 a) through d) and 3.2 who is, or has been, associated with another entity as an owner or controller within the five-year period preceding the date of this application, provide the following: name of each entity they were/are associated with, employer ID number, federal and state permit numbers, MSHA numbers (with date of issuance)

Not applicable. No entities own or control the applicant.

3.5 ***Compliance.*** Identify any State or Federal mining permit or bond in the last five-year period prior to the date of submission of this application that the applicant, person owned or controlled by the applicant, person who owns or control the applicant, or any related party had suspended, revoked or forfeited. (Note: Any related party is any partner, associate, officer, parent corporation, subsidiary corporation, affiliate or persons under common control with the applicant, contractor or subcontractor.) Identify the suspension, revocation, or forfeiture by:

a) identification number and date of the issuance of the permit or date and amount of bond or similar security;

b) identification of the authority that suspended or revoked a permit or forfeited a bond and the stated reason for that action;

c) the current status of the permit, bond or similar security involved;

d) the date, location, and type of any administrative or judicial proceedings initiated concerning the suspension, revocation, or forfeiture; and

e) the current status of these proceedings.

Not applicable. There are no State or Federal mining permits or bonds in the last five years prior to the date of the submission of this application that the applicant, person owned or controlled by the applicant, person who owns or control the applicant, or any related party has suspended, revoked or forfeited.

3.6 ***Violation History.*** List each violation for which the applicant, related party, person owned or controlled by the applicant, or person who owns or controls the applicant, has been found responsible in any adjudicated proceeding, agreement, consent order or decree, or which resulted in a cease order or an assessment of a civil penalty notice received by the applicant in connection with any coal mining activities during the three-year period prior to the date of application. Only list the violations of the Surface Mining Conservation and Reclamation Act, Air Pollution Control Act, Clean Streams Law, Coal Refuse Disposal Control Act, Article IX-A of the Administrative Code of 1929, Bituminous Mine Subsidence and Land Conservation Act, Dam Safety and Encroachments Act, Solid Waste Management Act, or the Federal Surface Mining Control and Reclamation Act of 1977 and any law, rule or regulation of any department or agency of the United States or of any state in the United States pertaining to environmental protection. For each violation notice, provide the following:

a) the date of issuance and identity of the appropriate regulatory authority, department, or agency;

b) permit number, compliance order number and a brief description of the particular violation;

c) the date, location, and type of any administrative or judicial proceedings initiated concerning the violation;

d) the current status of the violation; and

e) the actions, if any, taken by the applicant to abate the violation, and proof which is satisfactory to the regulatory authority, department, or agency which has jurisdiction over such violation that the violation has been corrected, or is in the process of being corrected.

The applicant's violation history is provided as Exhibit 3.6.

EXHIBIT 3.6
VIOLATION HISTORY

Module 4: Areas Where Mining is Prohibited or Restricted

4.1 Will surface mining activities be conducted within any of the following areas?

Yes	No	
☐	☒	areas which have been designated unsuitable for mining
☐	☒	areas included in a petition, which has been accepted for review by the Department, for designation as unsuitable for mining
☐	☒	Federal Wild and Scenic Rivers System, including study rivers
☐	☒	National System of Trails
☐	☒	300 feet of any public building, school, church, community or institutional building or public park
☐	☒	100 feet of a cemetery or Indian burial ground
☐	☒	National Recreation Areas
☐	☒	National Park

4.2 Identify any of the following which overlie the mine plan or lie within 1,000 feet of a surface mining activity: (show the location on maps in Modules 6.2, 6.3, 9.1, and 18.1)

Yes	No	
☐	☒	Allegheny National Forest
☐	☒	public park
☐	☒	any cultural and historic resources listed on or eligible for inclusion on the National Register of Historic Places
☐	☒	known archaeological sites. Describe the site _____.
☐	☒	State Park
☐	☒	State Forest
☐	☒	State Game Land
☐	☒	Pennsylvania Scenic Rivers System
☐	☒	State Wilderness Area

Attach a completed Cultural Resources Notice for each surface mining activity site to be disturbed under this permit or revision. Include the certified mail return receipt as proof of submission to PA Historical and Museum Commission.

Pennsylvania Historical and Museum Commission has requested that a Phase I archaeological survey of the project area be performed to locate potentially significant archaeological resources. Refer to Attachment 4.2 at the end of this module. The Phase I study will be done during the permit review process and will be included as part of this permit submittal prior to permit approval.

4.3 If any surface mining activities are to be conducted within 300 feet from any occupied dwelling, attach the notarized written waiver of the current owner consenting to surface mining activities closer than 300 feet. Otherwise, show the area as a restricted zone on maps in Module 9.1. (Note that a waiver is not required if the only part of the mining operation within 300 feet is a haul road or access road which connects with an existing public road on the side of the public road opposite the dwelling.)

One occupied dwelling is located within 300 feet of the proposed surface mining activities. CPCC owns the dwelling so a waiver is not provided.

4.4 Public Roads. If surface mining activities are proposed to be conducted within 100 feet of the outside right of way of a public road or a relocation of a public road is proposed, provide the following information: (Note: if the initial newspaper advertisement does not contain notice of the variance, attach the proof of publication for advertisement of the variance).

a) The name and section of public road involved.

Permission will be obtained to abandon the following public roads to accommodate proposed coal refuse disposal site activities:

Road	Location	Approx Length (LF)
SR 4009 (Grinnage Rd)	*Section between the Railroad (located ~3100 LF S of the SR 4009/4013 intersection) and SR 4011*	*5900*
SR 4009 (Grinnage Rd)	*Section immediately south of SR 4011 (within permit boundary)*	*500*
SR 4011 (Allen School Rd)	*From its intersection with SR 4009 to its end at T-611*	*4115*
T-370 (Fletcher Run Rd)	*Section immediately south of SR 4011*	*950*

A variance to encroach within 100 feet of the right of way of the following public roads is requested to accommodate proposed coal refuse disposal activities:

Road	Location	Approx Length (LF)
SR 4009 (Grinnage Rd)	*Section immediately south of the section to be abandoned (adjacent to the permit boundary)*	*100*
T-370 (Fletcher Run Rd)	*Section immediately south of the section to be abandoned (adjacent to the permit boundary)*	*100*

b) A description of the activities to be conducted.

The proposed work will consist of grading, excavation and embankment construction necessary to construct the sedimentation pond and haul/access roads and to prepare the site for receipt of coal refuse as shown on the Module 21 drawings. Work also will consist of coal refuse disposal operations associated with development of the slurry impoundment and coarse coal refuse disposal area.

Written approval from the government agency having jurisdiction over the road.

The variance and abandonment approvals will be provided as Attachment 4.4 when received and prior to permit approval.

4.5 Streams.

a) Is the proposed permit area (including underground and surface areas) within a watershed designated as "High Quality Waters" pursuant to 25 Pa. Code Chapter 93? (Complete Module 24 if there will be a discharge to the High Quality Water) ☒ Yes ☐ No

The proposed operation will encroach within the Fletcher Run watershed which is designated as High Quality Waters. However, proposed activities will have not have a point source discharge to the stream. Refer to Module 24 of this application.

b) Will surface mining activities be conducted within 100 feet of any intermittent or perennial stream? (If yes, complete Module 15) ☒ Yes ☐ No *See Module 15 of this application.*

4.6 Public Parks and Historic Places. For each category marked "yes" in section 4.2 and any publicly owned park that may be adversely affected by proposed underground or surface mining activities, describe the measures to be used to prevent or minimize these impacts.

As mentioned above a Phase I archaeological survey of the project area will be performed to locate potentially significant archaeological resources.

ATTACHMENT 4.2

HISTORICAL DETERMINATION

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Post Office Box 1026
Harrisburg, Pennsylvania 17108-1026

May 4, 2000

24379-000-000
- ARX01

TO EXPEDITE REVIEW USE
BHP REFERENCE NUMBER

Gregory P. Hynes, P.E.
Michael Baker Jr., Inc.
Box 280, 4301 Dutch Ridge Road
Beaver, PA 15009-0280

Re: File No. ER 98-2131-042-B
COAL, Consol Pennsylvania Coal Company, Coal Refuse Disposal Site Selection, Bailey Central Preparation Plant, Greene & Washington Counties

Dear Mr. Hynes:

The Bureau for Historic Preservation has reviewed the above named project under the authority of the Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988), and in accordance with relevant Federal legislation. This legislation includes Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, the Surface Mining Control and Reclamation Act, and OSM's regulations. This review includes comments on the project's potential effect on both historic and archaeological resources.

There is a high probability that prehistoric and historic archaeological resources are located in the project area and may be affected by this project. We are unable to proceed with our review until our field archaeologist, Mark McConaughy, conducts a field check of the project area. The information submitted to us will be forwarded onto Mr. McConaughy. We will complete our review upon receipt of the field archaeologist's comments. Call Mr. McConaughy to make an appointment for a field visit. It is our recommendation that the permit should not be issued until this review is completed.

Your request does not include sufficient information. We are unable to proceed with our review for historic structures until the information on the attached form is provided.

If you need further information in this matter please consult Chan Funk at(717) 772-0924. If you need further information regarding archaeological survey please contact Mark McConaughy at (724) 527-5585. If you need further information concerning historic structures please counsult Susan Zacher at (717) 783-9920. If you need a **status only** of the reviewed project please call Tina Webber at (717) 705-4036.

Sincerely,

Kurt W. Carr, Chief
Division of Archaeology & Protection

Cc: Consol Pennsylvania Coal Co., 1800 Washington Road, Pittsburgh, PA 15241-1421
DEP, McMurray District Mining Office
Mark McConaughy

Attachment
KWC/tmw

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Post Office Box 1026
Harrisburg, Pennsylvania 17108-1026

June 2, 2000

Gregory P. Hynes, P.E.
Michael Baker Jr., Inc.
Box 280, 4301 Dutch Ridge Road
Beaver, PA 15009-0280

TO EXPEDITE REVIEW USE
DEP REFERENCE NUMBER

Re: File No. ER 1998-2131-042-C
COAL, Consol Pennsylvania Coal Company, Coal Refuse Disposal Site Selection, Bailey Central Preparation Plant, Gray and East Findley Twps., Green & Washington Counties

Dear Mr. Hynes:

The Bureau for Historic Preservation has reviewed the above named project under the authority of the Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988), and in accordance with relevant Federal legislation. This legislation includes Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, the Surface Mining Control and Reclamation Act, and OSM's regulations. This review includes comments on the project's potential effect on both historic and archaeological resources.

Based on a site visit on May 30, 2000, by Mark McConaughy of our staff, there is a high probability that significant archaeological sites are located in all five proposed project areas and could be adversely affected by project activities. Although there are no recorded archaeological sites within the project boundaries, the soil type, topographic setting, slope direction, and distance to water of the project area are similar to the settings of known archaeological sites in the vicinity. Burial mounds may be located on the hilltops and bluffs overlooking the major tributaries that bound each area. Prehistoric habitation sites could be present on benches and the terraces of the small creeks that flow through each project area. Several historic farmsteads are also located in the areas selected for

possible coal disposal sites. A Phase I archaeological survey of the project area is required to locate potentially significant archaeological resources. Guidelines and information for survey are available from our office upon request.

At this time, we recommend that the permit be denied and we request a conference to discuss the effects to archaeological resources within the permit area. We also recommend that, if the Phase I survey is not undertaken, that the permit be conditioned to require that archaeological investigations be conducted if sites are discovered after the mining permit is issued. We also request that you provide us with written justification for your decision if you decide not to require the Phase I survey.

If you need further information regarding this project, please contact Chan Funk at (717) 772-0924. If you need further information regarding archaeological survey, please contact Mark McConaughy at (724) 527-5585 x103. If you need a **status only** of the reviewed project please call Tina Webber at (717) 705-4036.

Sincerely yours,

Kurt W. Carr, Chief
Division of Archaeology & Protection

CC. Consol Pennsylvania Coal Co., 1800 Washington Road, Pittsburgh, PA 15241-1421
DEP, McMurray District Mining Office
Mark A. McConaughy

ATTACHMENT 4.3

300' CONSENT WAIVER

CONSOL ENERGY™

CONSOL Energy Inc.
Consol Plaza
1800 Washington Road
Pittsburgh, PA 15241-1421

phone: 412/831-4679
fax: 412/831-4513
e-mail: Jonathanpachter@consolenergy.com
web: www.consolenergy.com

March 22, 2002

Pennsylvania Department of Environmental Protection
McMurray District Mining Office
3913 Washington Road
McMurray, PA 15317

RE: Consol Pennsylvania Coal Company
Bailey Central Mine Complex
Proposed Coal Refuse Disposal Areas No. 3 and 4
300' Waiver from a Dwelling

Gentlemen:

As required for the Coal Refuse Disposal Permit Application for the above –referenced facility, Consol Pennsylvania Coal Company (CPCC), a subsidiary of CONSOL Energy Inc., hereby waives the right and consents to the proposed surface activities to take place within 300 feet of the dwelling owned by CPCC on Parcel No. 126 on Greene County Tax Map 2210. This dwelling and tract are shown on drawings contained in the above-referenced permit application. Please feel free to call Jonathan M. Pachter, Manager -Environmental Permits, CONSOL Energy Inc., at (412) 831-4679 with any questions regarding this letter.

Sincerely,

Dan. R. Baker
President
Consol Pennsylvania Coal Company

ATTACHMENT 4.4

PENNDOT AND TOWNSHIP ROAD VARIANCES

Module 5: Property Interests/Right of Entry

Instruction: Provide the following information on 8½ x 11" sheets of paper. Attach the pages to this module and identify as Exhibit 5: Property Interests/Right of Entry. Use question number, letter and heading to identify information.

5.1 Surface Mining Activity Sites. For each parcel of surface land which will be affected by surface mining activities provide the following information (identify each parcel and key to the maps in Module 6.2 and 9.1):

a) site name.

Bailey Central Mine Complex Coal Refuse Disposal Areas No. 3 and No. 4.

b) the names and addresses of every legal or equitable owner of record, the holder of record of any leasehold interest, and any purchaser of record under a real estate contract.

The legal owner of record of the proposed project site is:

Consol Pennsylvania Coal Company
1800 Washington Road
Pittsburgh, PA 15241-1421

c) descriptions of the documents on which the applicant bases the legal right to enter upon the property and commence activities, including:

1) the type of document;

All property within the proposed permit boundary is owned by Consol Pennsylvania Coal Company. This ownership is documented in the deeds listed below at the Greene County Recorder of Deeds Office. Refer to the Operations Map, as Exhibit 9.1 for the property locations.

2) the date of execution;

Parcel No. 1001 - 136
Executed October 29, 1981
Deed Book 655, Page 872

Parcel No. 2209 - 142
Executed October 29, 1981
Deed Book 655, Page 872

Parcel No. 2209 - 155
Executed October 29, 1981
Deed Book 655, Page 872

Parcel No. 2209 – 157
Executed October 29, 1981
Deed Book 655, Page 872

Parcel No. 2209 - 158
Executed October 29, 1981
Deed Book 655, Page 872

Parcel No. 2209 - 159
Executed October 29, 1981
Deed Book 655, Page 872

Parcel No. 2209 - 166
Executed August 19, 1999
Deed Book 207, Page 662

Parcel No. 2209 - 168
Executed October 29, 1981
Deed Book 655, Page 872

Parcel No. 2210 – 125A
Executed October 29, 1981
Deed Book 655, Page 872

Parcel No. 2210 - 126
Executed February 26, 2002
Record Book 251, Page 1098

Parcel No. 2210 – 126A
Executed October 29, 1981
Deed Book 655, Page 872

Parcel No. 2210 - 127
Executed January 31, 1986
Record Book 36, Page 962

Parcel No. 2210 - 127A
Executed October 29, 1981
Deed Book 655, Page 872

Parcel No. 2210 - 128
Executed October 29, 1981
Deed Book 655, Page 872

3) the specific lands to which the document pertains;

Refer to Item 5.1c2 above.

4) the legal rights claimed by the applicant;

Consol Pennsylvania Coal Company has the right to enter upon the proposed surface site and perform all actions necessary to develop the site as proposed with this application and to operate the site as a refuse disposal facility.

5) whether or not the applicant's right of entry is subject of current or pending court litigation.

There is no current or pending court litigation regarding Consol Pennsylvania Coal Company's' right of entry.

d) the name and address of the owner of each surface and subsurface tract contiguous to the permit boundary of the site.

There are no tracts contiguous to the permit boundary of the proposed site not already listed in Item 5.1c2 above.

e) the name and address of the owner of each surface and subsurface tract within 1,000 feet of the permit boundary.

The following are the names and addresses of each tract owner within 1,000 feet of the proposed permit boundary.

Parcel No. 2210 – 121
Consol Pennsylvania Coal Co.
1800 Washington Road
Pittsburgh, PA 15241

Parcel No. 2209 – 162
Consol Pennsylvania Coal Co.
1800 Washington Road
Pittsburgh, PA 15241

Parcel No. 2210 – 123
Consol Pennsylvania Coal Co.
1800 Washington Road
Pittsburgh, PA 15241

Parcel No. 2210 – 124
Consol Pennsylvania Coal Co.
1800 Washington Road
Pittsburgh, PA 15241

Parcel No. 2210– 123
Consol Pennsylvania Coal Co.
1800 Washington Road
Pittsburgh, PA 15241

[redacted]

[redacted]

[redacted]

Exemption 6 - Privacy

5.2 Underground Permit Area. For each coal tract within the area to be mined underground, provide the following information (identify each parcel and key to the maps in Module 6.3 and the listing at 22.7):

a) the names and addresses of every legal or equitable owner of record, the holder of record of any leasehold interest, and any purchaser of record under a real estate contract.

b) descriptions of the documents on which the applicant bases the legal right to enter upon the property and commence activities, including:

1) the type of document;

2) the date of execution;

3) the specific lands and coal seams to which the document pertains;

4) the legal rights claimed by the applicant;

5) whether or not the applicant's right of entry is subject of current or pending court litigation.

c) the name and address of the owner of the seam to be mined on each subsurface tract contiguous to the underground permit boundary.

Not applicable since no underground mining is proposed with this permit application.

5.3 Anticipated Permits. Identify any contiguous coal tracts or surface lands for which it is anticipated that individual permits for mining will be sought as a result of interest in lands, options or pending bids on interest held or made by the applicant.

No individual mining permits are anticipated for any contiguous coal tracts or surface lands in the future.

5.4 Structure Inventory.

Provide the following information for each building which lies within 1000 feet of the boundaries of a surface mining activity site, and, if the application is for an underground mine, each building which is located within the subsidence control plan boundary and within a 30-degree angle of draw projected from that boundary. List structures in ascending order by their identification numbers.

a) Structure identification number.

b) Owner.

c) Current use.

d) Current resident (if structure is a dwelling).

d) Subsidence map sheet on which structure appears.

Refer to Attachment 5.4 for the Structure Inventory. Subsidence maps are not part of this application. Refer to the Attachment 5.4 for the structure locations and the Exhibit 6.2, Environmental Resource Map for the structure locations keyed to the Structure Inventory.

5.5 Sewage and Water Treatment Authorities and Water Companies.

List the names and addresses of all sewage authorities, water treatment authorities and water companies over the underground permit area.

Not applicable since no underground mining is proposed with this permit application.

5.6 Local Government.

List the names and mailing addresses of all local governments with jurisdiction in areas in which mining activities are located and/or above the proposed underground workings.

The local government entities with jurisdiction at the proposed site are:

Greene County Commissioners
93 East High Street
Waynesburg, PA 15370

Gray Township
c/o Phyllis Welling, Secretary
105 East Church Street
Graysville, PA 15337

Richhill Township
C/o Mary Lou Hughes, Secretary
311 Dividing Ridge Road
Wind Ridge, PA 15380

ATTACHMENT 5.4
STRUCTURE INVENTORY

ATTACHMENT 5.4
STRUCTURE INVENTORY

Structure Identification Number	Owner	Current Use	Current Resident
1	Consol Pennsylvania Coal Company	Barn	Not applicable.
2	Consol Pennsylvania Coal Company	Barn	Not applicable.
3	Consol Pennsylvania Coal Company	Dwelling	Olive T. Webb
4	Consolidated Railroad Company	Shed	Not applicable.
5	Consolidated Railroad Company	Shed	Not applicable.
6	Consolidated Railroad Company	Shed	Not applicable.

Module 6: Environmental Resource Maps

6.1 Location Map

Provide a 7.5 Minute USGS map covering the area within 1 mile of the site boundaries (underground permit area boundaries in the case of an underground mine). Show the following information, highlighting any features which are newly proposed under a permit revision. Identify the map as Exhibit 6.1.

a) Boundaries of surface mining activity site(s).

Refer to the Location Map, Exhibit 6.1 at the end of this module.

b) Boundaries of underground permit area.

Not applicable. Underground permit acreage is not proposed as part of this application.

c) Roads covered under permit.

Refer to the Location Map, Exhibit 6.1 at the end of this module.

d) Mine openings and boreholes.

Refer to the Location Map, Exhibit 6.1 at the end of this module.

e) Springs, water wells, and surface water intakes which are sources to public water supply systems.

There are no springs, water wells, or surface water intakes which are sources to public water supply systems within 1000 feet of or within the proposed permit boundary.

f) Outlines of areas designated unsuitable for mining or under petition for such designation.

There are no areas designated unsuitable for mining or under petition for such designation within 1000 feet of or within the proposed permit boundary.

g) State and public parks.

There are no state or public parks within 1000 feet of or within the proposed permit boundary.

h) Point source discharges associated with the proposed mining operation.

Refer to the Location Map, Exhibit 6.1 at the end of this module.

6.2 Environmental Resource Maps - Surface Mining Activity Sites.

a) Coverage. Provide a separate map for each surface mining activity site covering the permit area and all areas within 1000 feet of the permit boundaries unless otherwise directed by the Department. For purposes of this section, the permit area must include the surface activity site and the following roads used in association with it: access roads, haul roads, portions of common use or public roads which are or will be improved to accommodate site operations, and portions of common use or public roads which are or will be substantially impacted by site operations. (Contiguous sites may be shown on the same map.)

b) **Scale.** Each map must be clear, accurate, easily read and on the following scale; 1 inch = 200 ft. for sites greater than 100 acres, 1 inch = 100 ft. for sites from 25 to 100 acres, and 1 inch = 50 ft. for sites less than 25 acres.

c) **Title.** Identify each map as Exhibit 6.2: Environmental Resource Map and site name (if there is more than one site).

d) **Certification.** Each map must be prepared and certified by a registered professional engineer; a registered professional land surveyor or a registered professional geologist.

e) **Details and information.** Show all the following features and details as they occur within or pertain to the area shown on the map.

1) Topographic contours at a contour interval of 5 feet or less.

Refer to the Environmental Resource Map, Exhibit 6.2 at the end of this module.

2) Surface permit area boundaries.

Refer to the Environmental Resource Map, Exhibit 6.2 at the end of this module.

3) Property lines - surface and subsurface (key ownership to Module 5).

Refer to the Environmental Resource Map, Exhibit 6.2 at the end of this module.

4) Surface water bodies - streams, lakes, ponds, impoundments, springs, seeps, wetlands, mine discharges, and constructed or natural drains, and:

   i) the name or identity of each;

   ii) identification of those which are public water supplies;

   iii) identification of those used to provide background and life-of-mine hydrologic information;

Refer to the Environmental Resource Map, Exhibit 6.2 at the end of this module.

4) Water wells,

Refer to the Environmental Resource Map, Exhibit 6.2 at the end of this module.

5) Buildings (key to structure inventory in Module 5.4)

Refer to the Environmental Resource Map, Exhibit 6.2 at the end of this module.

6) Roads (public, private, haul, and access). For public roads, identify with name and/or route number.

Refer to the Environmental Resource Map, Exhibit 6.2 at the end of this module. T-611 (Kerr Road) is abandoned.

7) Cemeteries (public and private).

There are no public or private cemeteries within 1000 feet of or within the proposed permit boundary.

8) Surface and subsurface man-made features (including pipelines, power lines, telephone lines, rail lines, rights-of-way, etc).

Refer to the Environmental Resource Map, Exhibit 6.2 at the end of this module.

9) Oil wells and gas wells.

Refer to the Environmental Resource Map, Exhibit 6.2 at the end of this module.

10) Existing waste disposal sites. (key to Module 7)

There are no waste disposal sites within 1000 feet of or within the proposed permit boundary.

11) Existing surface-mined areas (key to Module 7).

There are no existing surface-mined areas within 1000 feet of or within the proposed permit boundary.

12) Existing spoil storage and disposal areas, noting those owned or operated by applicant.

The existing Bailey Central Mine Complex slurry impoundment (Coal Refuse Disposal Area No. 1) is located within 1000 feet of the new proposed permit boundary.

13) Existing coal refuse disposal areas (key to Module 7).

The existing Bailey Central Mine Complex slurry impoundment (Coal Refuse Disposal Area No. 1) is located within 1000 feet of the new proposed permit boundary.

14) Existing dams and embankments, noting those owned or operated by the applicant.

Refer to the Operations Map, Exhibit 9.1 at the end of Module 9 of this application.

15) Existing coal and mineral preparation facilities and conveyance systems, noting those owned or operated by the applicant.

Refer to the Operations Map, Exhibit 9.1 at the end of Module 9 of this application..

17) Existing underground mine workings, including

i) the boundaries of underground mine workings which lie beneath the proposed site (key to Module 7); and

ii) the location and identification of mine openings.

Refer to the Operations Map, Exhibit 9.1 at the end of Module 9 of this application.

18) Areas designated as unsuitable for all or certain types of mining or under petition for such designation.

There are no areas unsuitable for mining or under petition for such within 1000 feet of or within the proposed permit boundary.

19) State parks and public parks, noting name and owner.

There are no state or public parks within 1000 feet of or within the proposed permit boundary.

20) Cultural or historical resources listed on or eligible for listing on the National Register of Historic Places.

There are no known cultural or historical resources listed on or eligible for listing on the national Register of Historic Places within 1000 feet of or within the proposed permit boundary.

21) Known archeological sites.

A Phase I archeological study is being performed to determine known sites. If sites are found within the proposed boundary they will be included on the map prior to permit approval.

22) Indian burial grounds.

There are no Indian burial grounds within 1000 feet of or within the proposed permit boundary.

23) Land which is within a corridor under the National System of Trails.

There is no land which is within a corridor under the National System of Trails within 1000 feet of or within the proposed permit boundary.

24) Land which is within the corridor of a Wild and Scenic River, or river under study for such designation. (Include areas under state and federal scenic rivers programs)

There is no land which is within a corridor of a Wild and Scenic River or river under study for such designation within 1000 feet of or within the proposed permit boundary.

25) State Forests.

There are no State Forests within 1000 feet of or within the proposed permit boundary.

26) State Game Lands.

There are no State Game Lands within 1000 feet of or within the proposed permit boundary.

27) State Wilderness Areas.

There are no State Wilderness Lands within 1000 feet of or within the proposed permit boundary.

28) Surface and groundwater monitoring points.

Refer to the Environmental Resource Map, Exhibit 6.2 at the end of this module.

f) **Geologic information.** If the site will be used for coal refuse disposal, coal preparation, mine drainage treatment, or mine opening, show the following information: (A separate map may be used if the 6.2 map becomes cluttered.)

1) Test hole and borehole locations, including identification, surface elevation, bottom of coal elevations(s), and elevation(s) of any water encountered.

Refer to the Hydrologic Data Map, Exhibit 8.2B at the end of Module 8, included as part of this submittal.

2) Axis and plunge of regional structure (if not shown on map in Exhibit 6.3);

Refer to the Hydrologic Data Map, Exhibit 8.2B at the end of Module 8, included as part of this submittal.

3) Strike and dip of the local geologic structure and/or contours on an underlying coal seam, marker bed, or other stratigraphic unit;

Refer to the Hydrologic Data Map, Exhibit 8.2B at the end of Module 8, included as part of this submittal.

4) Joint set orientations;

Refer to the Hydrologic Data Map, Exhibit 8.2B at the end of Module 8, included as part of this submittal.

5) Faults and fracture traces;

Refer to the Hydrologic Data Map, Exhibit 8.2B at the end of Module 8, included as part of this submittal.

6) Coal croplines and bedrock outcroppings;

No coal croplines or bedrock outcroppings are present.

7) Geologic section lines (key to Module 7); and

Refer to the Hydrologic Data Map, Exhibit 8.2B at the end of Module 8, included as part of this submittal.

8) Groundwater contours or arrow indicating directions of groundwater flow.

Refer to the Hydrologic Data Map, Exhibit 8.2B at the end of Module 8, included as part of this submittal.

6.3 Environmental Resource Maps - Underground Permit Area.

Not applicable. This is not required as part of this permit application since underground acreage is not being added.

a) **Coverage.** Provide a map showing the area above and adjacent to the mining activity. At a minimum the map shall include all areas within 1,000 feet beyond the permit boundary unless otherwise directed by the Department.

b) **Scale.** Each map must be clear, accurate, easily read and on a scale of no smaller than 1 inch = 500 feet.

c) **Title.** Identify the map as Exhibit 6.3: Environmental Resource Map - Underground Permit Area.

d) **Certification**. The map must be prepared and certified by a registered professional engineer, a registered professional land surveyor or a registered professional geologist.

e) **Details and information**. Show all the following features and details as they occur within or pertain to the area shown on the map.

1) Surface contours at a contour interval of 20 feet generally, and 5 feet where cover is less than 100 feet.

2) Boundaries of underground permit area.

3) Boundaries of associated surface activity sites.

4) Property lines - surface and subsurface (key ownership to Module 5).

5) Surface water bodies - streams, lakes, ponds, impoundments, springs, wetlands, mine discharges, and constructed or natural drains, and:

   i) the name or identity of each;

   ii) identification of those which are public water supplies;

   iii) identification of those used to provide background hydrologic information;

   iv) identification of those which will be used for monitoring;

   v) identification of stations which were used to distinguish between intermittent and perennial stream segments;

   vi) identification of perennial stream segments listed on Form 8.4B.

6) Water wells

7) Locations and elevations of mine openings, noting their status as proposed, open, or sealed.

8) Outlines of other active, inactive, and abandoned mine workings (surface, auger and underground), which lie above, below, or within 1000 feet laterally of the underground permit area. (For active operations, the proposed limit of coal extraction or permit boundaries must be shown). (key to Module 7).

9) Outlines of mine pools in workings above, below and within 1000 feet laterally of the underground permit area. Include previously identified "safety zones" required under Act 729 (P.L. 1984), Mining in Safety Zones.

10) Discharges from abandoned underground mines and surface mines.

11) Dwellings, public buildings, commercial buildings and industrial plants.

12) Public roads, haul roads and access roads to surface activity sites.

13) Waste disposal sites. (key to Module 7)

14) Coal refuse disposal areas. (key to Module 7)

15) Oil wells and gas wells.

16) State and public parks, noting name and owner.

17) Areas designated as unsuitable for surface mining or under petition for such designation.

18) Land which is within a corridor under the National System of Trails.

19) Land which is within the corridor of a Wild and Scenic River, or river under study for such designation. (Include areas under state and federal scenic rivers programs)

20) Cultural or historical resources listed on or eligible for listing on the National Register of Historic Places.

21) Known archeological sites.

22) Indian burial grounds.

23) State Forests.

24) State Game Lands.

25) State Wilderness Areas.

26) Geologic features and information:

i) test hole and borehole locations, including identification, surface elevation, bottom of coal elevations(s), and elevation(s) of any water encountered.

ii) axis and plunge of regional structure;

iii) geologic faults and fracture traces;

iv) croplines of the coal to be mined;

v) "miner's faults", "wants", and areas where the coal seam thins to less than mineable thickness;

vi) geologic section lines (key to Module 7); and

viii) coal contours. (Indicate top or bottom of seam).

EXHIBIT 6.1
LOCATION MAP

LEGEND

Proposed Surface Permit Area Boundaries

Existing Surface Permit Area Boundaries

NPDES Outlet (Existing) — NPDES 008

NPDES Outlet (Proposed) — NPDES 301

Airshaft

Degas Borehole

N

2000 1000 0 2000

SCALE IN FEET

COMMONWEALTH OF PENNSYLVANIA
MICHELE STEWART
ENGINEER
PE-029157-E

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

EXHIBIT 6.1
LOCATION MAP

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
KLK	GEC	MMS	3/02	AS SHOWN

FILE: EXHIBIT 6.1
k:_consol\24379\drawings\final\

DRAWING NO.

January 24, 2002 9:01:03 a.m. LOGIN NAME : gcarrocci
Drawing: J:\PROJECTS\CONSOL\24379\DRAWINGS\FINAL\EXHIBIT 6-1 DWG-EXHIBIT LOCATION MAP
Attached Xrefs: BDR24356a.DWG
S.O. No.: 24379-000-0000-ENG03

EXHIBIT 6.2
ENVIRONMENTAL RESOURCE MAP

LEGEND

- Proposed Surface Permit Area Boundaries
- Property Line
- Perennial Stream
- Intermittent Stream
- Pond
- Groundwater Monitoring Well Location — MW-J
- Surfacewater Monitoring Location — SW-V
- Spring Sampling & Inventory Location — S-25
- Spring Location (No Sample)
- Degas Borehole
- Soil Borings
- Test Pits
- Gas Well
- Existing Wetlands
- Gasline and 50' Right-of-Way
- Electric Line
- Structure Identified in Structure Inventory Attachment 5.4 — 2

SOURCES OF INFORMATION

ALTERNATIVE ANALYSIS – BAILEY MINE COMPLEX APPROVED AUGUST 1, 2001. PADEP

WIND RIDGE AND ROGERSVILLE 7-1/2 MINUTE U.S.G.S. QUADRANGLES

COMMONWEALTH OF PENNSYLVANIA
MICHELE STEWART
ENGINEER
PE-029157-E

400 200 0 400
SCALE IN FEET

Baker
MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

EXHIBIT 6.2 ENVIRONMENTAL RESOURCE MAP

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
KLK	GEC	MMS	3/02	AS SHOWN

FILE: MODULE 6.2
k:_consol\24379\drawings\final\

DRAWING NO.

January 16, 2002 9:16:58 a.m. LOGIN NAME: gcarroll
Drawing: J:\PROJECTS_CONSOL\24379\DRAWINGS\FINAL\MODULE 6-2.DWG-(LAYOUT)
Attached Xrefs: gas line.DWG SDR24-36.DWG
S.O. No.: 24379-000-000-ENG03

Module 7: Geologic Information

7.1 Drill Logs.

The Module 7 was prepared by Moody and Associates, Inc.

Provide drill hole data sufficient to describe the stratigraphy at the following sites covered by this application: coal preparation activity sites, coal refuse disposal sites, sites which will be surface-mined, and areas which will be undermined. Drill hole information must cover the stratigraphic interval from the surface to the deeper of the following: the bottom of the shallowest aquifer system beneath the site or proposed underground mine, or the bottom of existing underground mine workings lying beneath the site or proposed underground mine. (If the application is for an underground mine which is more than 200 feet below surface drainage and not underlain by existing mine workings, the drill hole information need only extend to the stratum immediately below the coal seam to be mined.) Use Form 7.1A for general reporting purposes, or 7.1B if overburden analysis is required.

Drilling records which show approximately the greatest and least intervals between the mined Pittsburgh Coal Seam and the ground surface in the refuse disposal area are provided in Appendix 7.1.

7.2 Geologic Cross Sections.

Provide geologic cross sections or fence diagrams which correlate the stratigraphic information contained in the drill logs. Cross sections or fence diagrams should be of appropriate scale, detail and orientation that they can be used to depict stratigraphic and hydrologic conditions at surface sites where coal preparation, coal refuse disposal, and surface mining operations will take place, and in settings where underground mining will take place. Cross sections should include information on lithology, stratigraphy, existing groundwater and surface water, monitoring wells, water supplies and aquifers within the stratigraphic interval for which data was collected. Limits of proposed surface activities and underground mining activities should also be shown. Include static water level data and groundwater flow directions. Lines of cross section should be shown on the Exhibits 6.2, 6.3 and 8.2.

Two geologic cross sections have been prepared. The sections show the approximate minimum and maximum intervals (761-1192 feet) between the Pittsburgh Coal base and the ground surface, and the approximate range of topographic relief (total of about 414 feet) across the refuse area. The sections are oriented to generally display the strike and dip of the rock strata. The section locations are shown on Exhibit 8.2B (Hydrologic Data Map), and the geologic sections are presented on Exhibit 7.2, Sheets 1 and 2.

The sections display rock strata of the Greene, Washington and Waynesburg Formations of the Dunkard Group, the full section of undifferentiated formation strata of the Monongahela Group, and a few feet of the underlying Conemaugh Group. The Greene Formation is shown to be surficial across the sections, and to be sculpted by erosion to form the topography. The Tenmile Coal stratum lies within the Greene Formation and is identified in some of the reference borings. The Upper Washington Limestone stratum is the upper member of the Washington Formation, and lies in contact with the bottom of the Greene Formation. The base of this limestone is shown and correlated across the sections. The basal member of the Washington Formation (Washington Coal) and the basal member of the underlying Waynesburg Formation (Waynesburg Coal, lower bench) are shown and are correlated where possible. Selected, persistent strata within the Monongahela Group (Uniontown Coal, Benwood Limestone, Sewickley Coal, Sewickley or "Fishpot" Limestone), and the basal Pittsburgh Coal are shown and correlated where possible.

The Pittsburgh seam of coal has been deep-mined beneath a portion of the refuse area, and the limits of the mining are shown on the sections.

The surficial Greene Formation has no reported persistent aquifers. The presence of two coal seams within the formation, the Fish Creek and the underlying Tenmile, are noted in drilling records, but neither coal appears to be continuous across the site. The Fish Creek Coal position lies above the valley bottoms at the CRDA, but is noted in only one drilling record. The Tenmile Coal position lies below the valley bottoms at the CRDA, but is noted in only three drilling records. Ground water occurrence and flow within this formation is dominated by fractures and their interaction with topography, and secondarily by bedding plane orientation. Springs and seeps are localized and unique features and do not necessarily represent general ground water positions that can be extrapolated to a cross section line. The springs identified in Module 8 are considered to have unique positions and have not been extrapolated to the geologic sections. Ground water conditions are more fully discussed in Module 8.

7.3 Geologic Structure.

Describe the local geologic structure and its relation to the regional geologic structure. Describe the attitude of the bedrock. Attach maps or diagrams as necessary.

The refuse area lies on the eastern flank of the northeast trending Washington anticline. The local structure is a gently sloping monocline, and the rock strata appear to be generally sub-parallel with only depositional variances in thickness. The attitude of the strata can generally be assumed to mirror the base of the Pittsburgh Coal which is a dominant and persistent marker stratum. The attitude of the base of the Pittsburgh Coal was computed using the elevations reported in the reference borings, and the average strike is N 21° E, and the average dip is 1° SE. The regional structure is shown on Exhibit 8.2B (Hydrologic Data Map).

7.4 Fracturing.

Describe the attitude and characteristics of joints, cleats, fracture zones and faults as they occur at surface sites where coal preparation, coal refuse disposal and surface mining operations will take place and within the underground permit area of a proposed underground mining operation. Show linear traces of faults and fracture zones on the Exhibit 8.2.

Dominant joint sets in this region are secondary features generally attributed to stress relief resulting from the removal of confining loads by erosion over geological time scales. No anomalous surface feature or drill hole information has been identified that might indicate the presence of major fracture or fault zones at this site. Joints related to stress relief are generally oriented sub-parallel to valley and ridge axes and typically are near-vertical; separations along bedding planes are typical along the bottoms of valleys. Apparent linear features and the topography of the site are shown on Exhibit 8.2B, Hydrologic Data Map. The apparent linear features were identified on steroscopic aerial photographs obtained from the United States Geological Survey.

7.5 Additional Geologic Information - Underground Mines.

Not applicable

a) Provide the following based on drill hole data representative of the underground permit area using form 7.1B. (Enclose in separate envelope, if coal analysis is confidential).

1) Lithologic description of the strata immediately above and below the coal seam to be mined;

2) Neutralization potential of roof strata, coal, and floor strata;

3) Total sulfur content of roof strata, coal, and floor strata;

b) Provide RQD results (%) for overburden strata in each stream valley where underground mining will take place at depths less than 200 feet. Report results under "Lithologic Description" on Form 7.1A.

(Additional RQD testing may be required in circumstances where the applicant is proposing multiple seam mining, where an alternative pillar plan is submitted or for areas where postmining mine pool levels may exceed surface elevations).

7.6 Additional Geologic Information On Sites Where Overburden Will Be Excavated

Not applicable

Note: The requirement for overburden analysis may be applicable to any site where overburden is removed to the level of a mineable coal seam and should be resolved prior to application submittal. This can be done as part of the pre-application review process or more informally through a meeting and discussion with District Office personnel.

a) Request for Waiver of Overburden Analysis ☐ Yes ☐ No

Typically the Department will not grant waivers if the proposed site meets any of the following criteria:

1) lies within a High Quality, Exceptional Value, Wilderness Trout Stream or other stream sensitive to mining impact;
2) is in proximity to a public water supply;
3) there is an absence of mining in the watershed or little mining on seam(s) of interest;
4) there is an indication of acid or elevated metals from the same seam(s) on adjacent mines; or
5) removal of alkaline material is proposed.

As stated above, if the proposed site clearly qualifies under one of the above five (5) categories, overburden analysis will almost certainly be required. If a waiver is requested, the applicant must provide a written narrative explanation and documentation supporting the basis for the waiver. This narrative must provide evidence that there is equivalent information available and must include:

- a discussion as to the relationship between the proposed site and the five categories discussed above;
- an explanation as to the existing hydrogeologic information that supports the waiver (e.g. stratigraphy, water chemistry, nearby overburden analyses, and so forth); and
- previous mining history on the watershed or adjacent areas (including percentage or relative acreages of mined and unmined portions of the watershed) and the postmining water quality associated with the proposed seams (including specific examples).

b) Overburden Analysis Report

The overburden analysis report must include at a minimum:

1) geologic logs of overburden analysis test holes. This must include a lithologic description (including the information requested in Form 7.1B, lithologic thickness of strata and depth of strata, type of drill used, collar elevation and the geologist who logged the hole. The Munsell system is to be used for color identification. Water condition information must include static water level (measured 24 or more hours after drilling), where water was encountered and estimated yield. This information is to be presented on a completed Form 7.1B "Overburden Analysis Data" or on a similar form approved by the Department.

2) an explanation of considerations employed in determining
   - drill hole spacing and number of holes,
   - sampling depth and
   - sampling intervals of overburden analysis test holes.

3) a series of stratigraphic cross-sections or fence diagrams including all overburden analysis test holes, plus other representative test holes. It is suggested that the vertical exaggeration not be more than five (5) times the horizontal scale. The vertical scale must be sufficient to show all potentially acidic and alkaline zones and any zones proposed for special handling; a scale of one (1) inch to twenty (20) feet or greater is recommended. The stratigraphic correlations between overburden holes and other test holes must be shown. Additionally hydrogeologic information (such as water table, perched systems and so forth) should be portrayed.

4) overburden holes accurately located on Exhibit 6.2. Overburden holes must be surveyed such that surface elevations and hole locations are accurately determined and plotted.

5) results of the chemical analysis of all overburden strata, coals and strata immediately below the coal. Acid-base accounting data must be presented on Form 7.1B "Overburden Analysis Data" or on a similar form approved by the Department Actual laboratory analysis sheets may be submitted in addition to Form 7.1B. Forms of sulfur (when submitted) should be submitted on a separate sheet.

6) techniques and methods of chemical analyses. References pertaining to technique or method should be cited as appropriate (e.g. Sobek, and others 1978, p. 47-50; ASTM Method D2492-84) and where a standard method is not used or has been modified, the method used should be described in detail.

7) an identification of any stratigraphic units possessing the potential for significant acid or alkaline production and an overall interpretation of the overburden analysis data. The criterion and rationale by which the overburden is being judged must be explained.

8) the name, address and telephone number of the individual(s) responsible for the collection and analysis of the data and interpretation of the data.

7.9 *Surface Mines and Coal Refuse Disposal Areas.*

Submit the following information on all active, completed and abandoned surface mines and coal refuse disposal sites which lie within 1000 feet of the permit area. Show sites on Exhibits 6.2, 6.3 and 9.1.

Operator	**Consol Pennsylvania Coal Company**			
Site Name	**Bailey CRDA**			
Permit No.	**30710703**			
Map Key				
Status	**Active**			
Coal Seams	**NA**			
Augering (yes/no)	**NA**			
Discharge (yes/no)	**Yes**			

7.10 Underground Mines.

Submit the following information on all active, completed and abandoned underground mines which lie within 1000 feet of the permit area. Show boundaries and openings on Exhibits 6.2, 6.3, and 9.1.

Operator	**Consol Pennsylvania Coal Company**			
Site Name	**Bailey Mine**			
Permit No.	**30841316**			
Map Key				
Status	**Active**			
Coal Seams	**Pittsburgh**			
Opening Elev.'s	**Main Portal El. 1066**			
Discharge Elev.'s	**None**			
Mine Pool Elev.'s	**None**			

7.11 Waste Disposal Facilities/Sites.

Submit the following information on all hazardous, municipal, and residual waste disposal sites (both active or completed) which lie within 1000 feet of the permit area. Show sites on Exhibits 6.2, 6.3, and 9.1.

No such disposal sites have been identified.

Operator				
Site Name				
Permit No.				
Map Key				
Status				
Waste Type				

APPENDIX 7.1

DRILL LOGS

GENERAL NOTES ON DRILLING RECORDS

1. **The Operation Name of this facility is Bailey Central Mine Complex Coal Refuse Disposal Area (CRDA).**
2. **North and East Coordinates are referenced to UTM Zone 17T.**
3. **Drilling locations and surface elevations were determined by physical site survey methods.**
4. **All reported drilling locations are in Richhill Township, Greene County, Pennsylvania.**
5. **The CRDA can be located on the USGS 7.5 minute topographic quadrangle *Wind Ridge, PA.***
6. **All identifiable coal seams encountered in drilling are noted on the logs with elevations, thicknesses, descriptions, and correlation codes; correlation codes are listed alphabetically in a legend on Exhibit 7.2, Sheet 2.**
7. **The drilling records that are presented were drilled for the purpose of coal exploration and determination of lithology, and ground water positions were not reported on these logs.**
8. **All of the presented borings were drilled using rotary continuous core methods.**
9. **Shallow ground water position information is provided in the facility design documentation contained in Module 21.**

DRILL HOLE MB84 6

NORTH: 240365.34 EAST: 1258958.00 SOURCE:2 LOCATION:1 SURF.ELEV.: 1450.15 DET.:7

STATE:37 PENNSYLVANIA COUNTY: 59 GREENE TWP.: RANGE: MERIDIAN:999 SECTION:00 SECTION CODE:

USGS QUAD:WINDRIDGE SIZE:1 TOWNSHIP:RICHHILL PROP/FARM:CONSOLCHARMR AZIMUTH: DIP:

DATE DRILLED FROM: 05/23/84 TO:05/30/84 CONTRACTOR:L.J.HUGHES DRILLER:JOE MILLER INSP:D.G.PUGLIO

ELOG	DRILL TYPE	FLUID TYPE	FLOW	CEMENT	WRAPPING	CONTAINER	CORED	UNITS OF MEASURE
1235	1	2	0	1 0- 997	0	0	1	E

DATA SOURCE:CONSOL

COMMENTS
BAILEY MINE-MINE BLOCK NO.1

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
					0001	SURFACE CASING,OVERBURDEN	
20	1450.15	15.00	15.00		0134	SHALE,LIGHT GRAY-GREEN	CLY WEA INS SPC
40	1435.15	20.85	5.85		0544	SANDSTONE,GRAY,MASSIVE	VRY FGR FUP MIC WEA INS SPC
60	1429.30	22.38	1.53		0194	SHALE,GRAY	BKN CLY WEA INS GLC
80	1427.77	30.35	7.97		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	CHN WEA INS GLC
100	1419.80	31.95	1.60		0124	SHALE,DARK GRAY	SMO SLY WEA BKN TBD INS SPC
120	1418.20	37.22	5.27		0101	CLAYSTONE	DRK GRY SFT SPC
140	1412.93	37.77	.55		0804	SHALY LIMESTONE,FGR,MAS	MED DRK GRY HRD SPC
160	1412.38	38.95	1.18		0101	CLAYSTONE	MED DRK GRY SFT WEA INS SPC
180	1411.20	41.01	2.06		0124	SHALE,DARK GRAY	CLY SMO WEA BKN INS SPC
200	1409.14	47.96	6.95		0124	SHALE,DARK GRAY	SMO SPC
220	1402.19	48.24	.28		0114	BLACK SHALE	MIC SLY SPC
240	1401.91	49.94	1.70		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
260	1400.21	50.64	.70		0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED GRY HRD FSH SPC
280	1399.51	52.50	1.86		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
300	1397.65	52.90	.40		0114	BLACK SHALE	SFT BKN SPC
320	1397.25	53.75	.85		0804	SHALY LIMESTONE,FGR,MAS	MED DRK GRY HRD SPC
340	1396.40	56.95	3.20		0101	CLAYSTONE	DRK GRY SFT SPC
360	1393.20	57.91	.96		0324	SANDY SHALE,DARK GRAY,MASSIVE	SLY MIC GLC
380	1392.24	59.18	1.27		0194	SHALE,GRAY	CLY SMO SPC
400	1390.97	60.76	1.58		0324	SANDY SHALE,DARK GRAY,MASSIVE	MIC SLY THN FLT RIP SSS SPC
420	1389.39	66.83	6.07		0114	BLACK SHALE	MIC SLY
440	1383.32	67.81	.98		0544	SANDSTONE,GRAY,MASSIVE	VRY FGR MIC FUP SHY SPC
460	1382.34	68.62	.81		0101	CLAYSTONE	MED GRY SFT SPC
480	1381.53	69.27	.65		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC SLY FLT RIP SSS SPC
500	1380.88	76.14	6.87		0541	SANDSTONE,GRAY,CROSSBEDDED	VRY FGR FUP MIC THN RIP SHS
520	1374.01	86.74	10.60		0101	CLAYSTONE	DRK GRY SDY SFT SPC
540	1363.41	87.88	1.14		0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED DRK GRY HRD SPC
560	1362.27	89.18	1.30		0101	CLAYSTONE	MED DRK GRY SFT SPC
580	1360.97	90.82	1.64		0644	CARBONATE CEMENTED SANDSTONE	LIT GRY FGR FUP MAS MIC SPC
600	1359.33	92.69	1.87		0101	CLAYSTONE	MED GRY SFT SPC
620	1357.46	93.06	.37		0194	SHALE,GRAY	MIC SLY THN FLT SSS GLC
640	1357.09	97.75	4.69		0124	SHALE,DARK GRAY	MIC SLY SMO SPC
660	1352.40	100.69	2.94		0101	CLAYSTONE	DRK GRY SFT BKN SPC
680	1349.46	100.98	.29				

DRILL HOLE MB84 6

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
700	1349.17	101.92	.94		0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED DRK GRY HRD FSH SPC
720	1348.23	106.55	4.63		0335	SANDY SHALE,LT GRY-GRN,MAS,CHN	MIC SLY SPC
740	1343.60	110.79	4.24		0124	SHALE,DARK GRAY	SMO SPC
760	1339.36	113.13	2.34		0114	BLACK SHALE	CLY SFT WBD TBD SPC
780	1337.02	114.08	.95		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD FSH SPC
800	1336.07	114.66	.58		0101	CLAYSTONE	MED GRY SFT SPC
820	1335.49	119.61	4.95		0335	SANDY SHALE,LT GRY-GRN,MAS,CHN	MIC SLT THN FLT SSS SPC
840	1330.54	120.22	.61		0101	CLAYSTONE	MED GRY SFT SPC
860	1329.93	121.75	1.53		0644	CARBONATE CEMENTED SANDSTONE	LIT GRY FGR FUP MAS SHY SPC
880	1328.40	125.08	3.33		0101	CLAYSTONE	MED DRK GRY SFT BKN SKD SPC
900	1325.07	126.04	.96		0167	CLAYSTONE,RED	SFT WBD SPC
920	1324.11	132.58	6.54		0194	SHALE,GRAY	LIM CLY THN BKN SKD SPC
940	1317.57	137.75	5.17	FS	0335	SANDY SHALE,LT GRY-GRN,MAS,CHN	MIC SLY THN FLT SSS GLC
960	1312.40	143.30	5.55	FS	0544	SANDSTONE,GRAY,MASSIVE	VRY FGR FUP MIC FLT RIP SHS
980	1306.85	155.14	11.84	FS	0541	SANDSTONE,GRAY,CROSSBEDDED	FGR FUP MIC FLT RIP SHS SPC
1000	1295.01	158.45	3.31		0124	SHALE,DARK GRAY	MIC SLY PLT GLC
1020	1291.70	158.45	.00	FC	0021	COMMON BANDED COAL	EXH
1040	1291.70	162.45	4.00		0124	SHALE,DARK GRAY	MIC SMO GLC
1060	1287.70	163.15	.70		0101	CLAYSTONE	DRK GRY SFT BKN SPC
1080	1287.00	163.45	.30		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
1100	1286.70	164.52	1.07		0114	BLACK SHALE	MIC SLY SPC
1120	1285.63	165.22	.70		0324	SANDY SHALE,DARK GRAY,MASSIVE	LIM MIC SLY SPC
1140	1284.93	167.55	2.33		0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED DRK GRY HRD FSH SPC
1160	1282.60	168.11	.56		0101	CLAYSTONE	BLK SFT SPC
1180	1282.04	168.72	.61		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD FSH SPC
1200	1281.43	181.92	13.20		0124	SHALE,DARK GRAY	MIC SLY GLC
1220	1268.23	182.27	.35		0101	CLAYSTONE	DRK GRY BLK SPC
1240	1267.88	184.06	1.79		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY MIC SLY HRD SPC
1260	1266.09	184.45	.39		0101	CLAYSTONE	DRK GRY SFT SPC
1280	1265.70	195.08	10.63		0124	SHALE,DARK GRAY	SMO MIC SLY SPC
1300	1255.07	195.64	.56		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
1320	1254.51	197.53	1.89		0101	CLAYSTONE	MED GRY SFT SPC
1340	1252.62	209.88	12.35		0194	SHALE,GRAY	MIC SLY CLY SPC
1360	1240.27	212.38	2.50		0114	BLACK SHALE	MIC SLY PLT GLC
1380	1237.77	216.44	4.06		0101	CLAYSTONE	DRK GRY BLK SPC
1400	1233.71	216.65	.21		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD GLC
1420	1233.50	217.36	.71		0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT MED BRN GRY HRD FSH SPC
1440	1232.79	221.80	4.44		0101	CLAYSTONE	MED GRY SHY WBD GLC
1460	1228.35	225.92	4.12		0194	SHALE,GRAY	MIC SLY SMO SPC
1480	1224.23	227.18	1.26		0101	CLAYSTONE	DRK GRY SFT BKN SPC
1500	1222.97	228.28	1.10		0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED BRN GRY HRD FSH SPC
1520	1221.87	229.34	1.06		0101	CLAYSTONE	DRK GRY SFT BKN SPC
1540	1220.81	229.86	.52		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
1560	1220.29	236.10	6.24		0124	SHALE,DARK GRAY	MIC SLY CHN CLY GLC
1580	1214.05	236.96	.86		0101	CLAYSTONE	DRK GRY SPC
1600	1213.19	237.98	1.02		0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED BRN GRY HRD FSH SPC
1620	1212.17	238.32	.34		0804	SHALY LIMESTONE,FGR,MAS	MED DRK GRY SPC
1640	1211.83	239.25	.93		0101	CLAYSTONE	MED GRY BKN SKD SPC
1660	1210.90	241.44	2.19		0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED GRY HRD SPC

DRILL HOLE MB84 6

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
1680	1208.71	243.32	1.88		0101	CLAYSTONE	MED DRK GRY SFT SPC
1700	1206.83	243.81	.49		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
1720	1206.34	245.74	1.93		0124	SHALE,DARK GRAY	MIC SLY CHN CLY SPC
1740	1204.41	246.78	1.04		0101	CLAYSTONE	DRK GRY SFT SPC
1760	1203.37	247.01	.23	TM	0114	BLACK SHALE	CAR PLT SPC
1780	1203.14	247.26	.25	TM	0021	COMMON BANDED COAL	SHY SHS FF5 SPC
1800	1202.89	247.45	.19	TM	0021	COMMON BANDED COAL	CCA FF5 SPC
1820	1202.70	252.58	5.13		0101	CLAYSTONE	MED DRK GRY SFT SKD SPC
1840	1197.57	252.92	.34		0114	BLACK SHALE	CLY SPC
1860	1197.23	253.93	1.01		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
1880	1196.22	255.36	1.43		0101	CLAYSTONE	MED GRY SFT SKD BKN SPC
1900	1194.79	261.08	5.72		0101	CLAYSTONE	DRK GRY SFT BKN SKD GLC
1920	1189.07	271.45	10.37		0194	SHALE,GRAY	MIC SMO GLC
1940	1178.70	282.68	11.23		0124	SHALE,DARK GRAY	MIC SMO SPC
1960	1167.47	286.21	3.53		0101	CLAYSTONE	DRK GRY SFT SPC
1980	1163.94	286.76	.55		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
2000	1163.39	287.51	.75		0101	CLAYSTONE	DRK GRY SFT SPC
2020	1162.64	287.88	.37		0904	LIMESTONE,FINE-GRAINED,MASSIVE	DRK GRY HRD SPC
2040	1162.27	290.05	2.17		0101	CLAYSTONE	DRK GRY SFT SKD BKN SPC
2060	1160.10	306.45	16.40		0541	SANDSTONE,GRAY,CROSSBEDDED	FGR FUP MIC RIP FLT SHS SPC
2080	1143.70	308.02	1.57		0324	SANDY SHALE,DARK GRAY,MASSIVE	HRD MIC CHN THN FLT SSS GLC
2100	1142.13	313.33	5.31		0124	SHALE,DARK GRAY	MIC SLY SMO GLC
2120	1136.82	314.99	1.66		0124	SHALE,DARK GRAY	MIC SLY SGT SDY CHN SSS PLT
2140	1135.16	315.95	.96		0544	SANDSTONE,GRAY,MASSIVE	FGR FUP SHY MIC RIP SHS SPC
2160	1134.20	321.85	5.90		0113	BLACK SHALE WITH COAL STREAKS	CPF SPC
2180	1128.30	321.85	.00	UW	0021	COMMON BANDED COAL	EXH
2200	1128.30	322.73	.88	UL	0114	BLACK SHALE	LIM HRD SLY SPC
2220	1127.42	325.06	2.33	UL	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD GLC
2240	1125.09	325.58	.52	UL	0124	SHALE,DARK GRAY	LIM CLY SPC
2260	1124.57	326.24	.66	UL	0101	CLAYSTONE	DRK GRY SFT SPC
2280	1123.91	328.43	2.19	UL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED GRY HRD OST SPC
2300	1121.72	334.37	5.94	UL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT MED BRN GRY HRD OST SPC
2320	1115.78	335.15	.78	UL	0101	CLAYSTONE	DRK GRY SPC
2340	1115.00	337.63	2.48	UL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED BRN GRY HRD OST SPC
2360	1112.52	339.03	1.40	UL	0804	SHALY LIMESTONE,FGR,MAS	MED DRK GRY HRD SPC
2380	1111.12	340.51	1.48	UL	0101	CLAYSTONE	DRK GRY SFT SPC
2400	1109.64	340.80	.29	UL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD OST SPC
2420	1109.35	341.50	.70	UL	0101	CLAYSTONE	DRK GRY SFT SKD BKN SPC
2440	1108.65	341.84	.34	UL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD SPC
2460	1108.31	343.93	2.09	UL	0101	CLAYSTONE	MED DRK GRY BKN SPC
2480	1106.22	344.83	.90	UL	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD OST SPC
2500	1105.32	345.23	.40	UL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED BRN GRY HRD SPC
2520	1104.92	346.44	1.21		0101	CLAYSTONE	DRK GRY SFT SKD BKN CAN SPC
2540	1103.71	347.90	1.46		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC SLY GLC
2560	1102.25	353.25	5.35		0544	SANDSTONE,GRAY,MASSIVE	VRY FGR FUP MIC RIP SHS SPC
2580	1096.90	357.36	4.11		0324	SANDY SHALE,DARK GRAY,MASSIVE	MIC SMO THN FLT SSS SPC
2600	1092.79	368.31	10.95		0124	SHALE,DARK GRAY	MIC SLY SMO GLC
2620	1081.84	372.96	4.65	JT	0114	BLACK SHALE	SMO CLY GLC
2640	1077.19	373.91	.95	JT	0101	CLAYSTONE	BLK SLY SFT SPC

DRILL HOLE MB84 6

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
2660	1076.24	374.38	.47	JT	0113	BLACK SHALE WITH COAL STREAKS	CAR PLT SPC
2680	1075.77	375.55	1.17		0021	COMMON BANDED COAL	BNY HRD CCA FF5 PYS PYN
2700	1074.60	376.22	.67		0101	CLAYSTONE	MED GRY SFT SPC
2720	1073.93	380.95	4.73		0124	SHALE,DARK GRAY	MIC SLY SPC
2740	1069.20	384.34	3.39		0544	SANDSTONE,GRAY,MASSIVE	VRY FGR FUP SHY MIC GLC
2760	1065.81	390.54	6.20		0124	SHALE,DARK GRAY	MIC SLY GLC
2780	1059.61	393.11	2.57		0124	SHALE,DARK GRAY	SPC
2800	1057.04	396.44	3.33		0124	SHALE,DARK GRAY	LIM CLY SKD FSH SPC
2820	1053.71	399.50	3.06		0167	CLAYSTONE,RED	LIM WBD SHY SKD SPC
2840	1050.65	402.71	3.21		0101	CLAYSTONE	LIT MED GRY SFT SKD BKN SPC
2860	1047.44	408.04	5.33		0544	SANDSTONE,GRAY,MASSIVE	FGR FUP MIC FLT RIP SHS GLC
2880	1042.11	413.34	5.30		0194	SHALE,GRAY	MIC SMO THN FLT SSS GLC
2900	1036.81	416.65	3.31		0194	SHALE,GRAY	MIC SMO SPC
2920	1033.50	418.41	1.76		0167	CLAYSTONE,RED	SFT SKD BKN SPC
2940	1031.74	418.75	.34		0101	CLAYSTONE	DRK GRY SFT SPC
2960	1031.40	419.21	.46	ML	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
2980	1030.94	419.93	.72	ML	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD SPC
3000	1030.22	420.66	.73	ML	0804	SHALY LIMESTONE,FGR,MAS	MED GRY HRD SPC
3020	1029.49	421.82	1.16	ML	0101	CLAYSTONE	MED DRK GRY SFT SPC
3040	1028.33	422.74	.92	ML	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD OST SPC
3060	1027.41	425.05	2.31	ML	0124	SHALE,DARK GRAY	CLY THN SKD SPC
3080	1025.10	425.63	.58	ML	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED BRN GRY HRD OST SPC
3100	1024.52	431.50	5.87	ML	0134	SHALE,LIGHT GRAY-GREEN	LIM CLY SKD SPC
3120	1018.65	433.22	1.72		0167	CLAYSTONE,RED	SFT SKD SPC
3140	1016.93	433.57	.35		0101	CLAYSTONE	MED GRY SFT SKD SPC
3160	1016.58	434.66	1.09		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC SLY SPC
3180	1015.49	435.86	1.20		0101	CLAYSTONE	MED GRY SFT SPC
3200	1014.29	437.51	1.65		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC HRD GLC
3220	1012.64	438.91	1.40		0544	SANDSTONE,GRAY,MASSIVE	HRD FGR FUP MIC GLC
3240	1011.24	441.91	3.00		0194	SHALE,GRAY	MIC SLY SPC
3260	1008.24	442.45	.54		0101	CLAYSTONE	MED GRY SFT SKD BKN SPC
3280	1007.70	445.85	3.40		0544	SANDSTONE,GRAY,MASSIVE	VRY FGR FUP MIC SPC
3300	1004.30	447.11	1.26		0101	CLAYSTONE	MED GRY SFT SKD BKN GLC
3320	1003.04	453.36	6.25		0194	SHALE,GRAY	MIC SLY SMO SPC
3340	996.79	458.71	5.35		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC SLY FLT RIP SSS GLC
3360	991.44	463.36	4.65		0124	SHALE,DARK GRAY	MIC SLY SMO GLC
3380	986.79	465.05	1.69		0101	CLAYSTONE	DRK GRY BLK WBD SHY SPC
3400	985.10	466.51	1.46	LL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED BRN GRY HRD FSH SPC
3420	983.64	467.55	1.04	LL	0101	CLAYSTONE	DRK GRY SFT SKD BKN SPC
3440	982.60	469.81	2.26	LL	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
3460	980.34	470.50	.69	LL	0101	CLAYSTONE	DRK GRY SFT SPC
3480	979.65	472.55	2.05	LL	0804	SHALY LIMESTONE,FGR,MAS	MED DRK GRY HRD GLC
3500	977.60	476.20	3.65	LL	0544	SANDSTONE,GRAY,MASSIVE	VRY FGR FUP MIC SHY SPC
3520	973.95	482.65	6.45	LL	0124	SHALE,DARK GRAY	MIC SLY SMO SPC
3540	967.50	483.22	.57	LL	0124	SHALE,DARK GRAY	SMO SPC
3560	966.93	486.24	3.02	LL	0804	SHALY LIMESTONE,FGR,MAS	MED DRK GRY HRD SPC
3580	963.91	486.68	.44	LL	0101	CLAYSTONE	BLK CHN SPC
3600	963.47	490.52	3.84	LL	0804	SHALY LIMESTONE,FGR,MAS	MED DRK GRY HRD OST SPC
3620	959.63	492.66	2.14	LL	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY CLS HRD SPC

DRILL HOLE MB84 6

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
3640	957.49	493.95	1.29	LL	0101	CLAYSTONE	DRK GRY SFT SKD BKN SPC
3660	956.20	494.60	.65	LL	0124	SHALE,DARK GRAY	MIC SLY CHN SPC
3680	955.55	495.38	.78	LL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD SPC
3700	954.77	497.90	2.52	LL	0124	SHALE,DARK GRAY	CLY SMO BKN SPC
3720	952.25	499.30	1.40	LL	0124	SHALE,DARK GRAY	LIM HRD SPC
3740	950.85	500.17	.87	LL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED GRY HRD SPC
3760	949.98	500.96	.79	LL	0101	CLAYSTONE	MED GRY SFT CHN SPC
3780	949.19	504.46	3.50	LL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED GRY HRD SPC
3800	945.69	505.20	.74	LL	0101	CLAYSTONE	MED GRY SFT BKN SPC
3820	944.95	507.04	1.84	LL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED DRK GRY HRD SPC
3840	943.11	509.45	2.41		0101	CLAYSTONE	MED GRY SFT SKD CHN SPC
3860	940.70	510.14	.69		0194	SHALE,GRAY	SMO BKN TBD SPC
3880	940.01	514.07	3.93	WS	0114	BLACK SHALE	SMO SPC
3900	936.08	514.68	.61	WS	0021	COMMON BANDED COAL	BNY HRD FF5 CCA PYS SHS SPC
3920	935.47	515.43	.75		0114	BLACK SHALE	SMO CLY SPC
3940	934.72	517.97	2.54		0544	SANDSTONE,GRAY,MASSIVE	VRY FGR FUP SHY MIC COS SHS
3960	932.18	526.52	8.55		0114	BLACK SHALE	SMO MIC SLY PLT GLC
3980	923.63	535.07	8.55		0124	SHALE,DARK GRAY	MIC SLY CHN PLT FLT SSS SPC
4000	915.08	539.94	4.87		0541	SANDSTONE,GRAY,CROSSBEDDED	VRY FGR FUP MIC COS RIP SHS
4020	910.21	540.48	.54		0021	COMMON BANDED COAL	PYS FF5 SPC
4040	909.67	542.70	2.22		0114	BLACK SHALE	MIC SLY SMO SPC
4060	907.45	545.04	2.34		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY BLK HRD TBD SPC
4080	905.11	546.34	1.30		0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED GRY HRD SPC
4100	903.81	548.20	1.86		0194	SHALE,GRAY	LIM MIC SKD SPC
4120	901.95	561.08	12.88		0194	SHALE,GRAY	MIC CHN GLC
4140	889.07	562.63	1.55		0101	CLAYSTONE	MED GRY SFT SPC
4160	887.52	568.25	5.62		0194	SHALE,GRAY	CLY SMO SPC
4180	881.90	568.87	.62		0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD SPC
4200	881.28	571.17	2.30		0804	SHALY LIMESTONE,FGR,MAS	MED GRY HRD SPC
4220	878.98	574.18	3.01		0194	SHALE,GRAY	LIM CLY CAN SPC
4240	875.97	574.41	.23		0134	SHALE,LIGHT GRAY-GREEN	CLY SPC
4260	875.74	575.38	.97		0544	SANDSTONE,GRAY,MASSIVE	VRY FGR SHY MIC GLC
4280	874.77	584.98	9.60		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC THN FLT SSS GLC
4300	865.17	588.08	3.10		0194	SHALE,GRAY	SMO CLY SPC
4320	862.07	592.05	3.97		0124	SHALE,DARK GRAY	MIC SGT SDY THN FLT SSS GLC
4340	858.10	592.64	.59		0124	SHALE,DARK GRAY	SMO CLY SPC
4360	857.51	593.75	1.11		0124	SHALE,DARK GRAY	MIC SLY THN FLT SSS SPC
4380	856.40	593.88	.13	WA	0114	BLACK SHALE	CAR PLT SPC
4400	856.27	593.98	.10	WA	0021	COMMON BANDED COAL	BNY FF5 GLC
4420	856.17	594.11	.13	WA	0113	BLACK SHALE WITH COAL STREAKS	BNY FF5 SPC
4440	856.04	594.46	.35	WA	0021	COMMON BANDED COAL	BNY FF5 SPC
4460	855.69	594.50	.04	WA	0114	BLACK SHALE	CAR PLT FF5 SPC
4480	855.65	595.11	.61	WA	0021	COMMON BANDED COAL	HRD BNY FF5 PYS SHS SPC
4500	855.04	601.05	5.94	MM	0804	SHALY LIMESTONE,FGR,MAS	MED DRK GRY HRD SPC
4520	849.10	611.25	10.20		0194	SHALE,GRAY	MIC SLY SMO FLT RIP SSS SPC
4540	838.90	614.99	3.74	WD	0544	SANDSTONE,GRAY,MASSIVE	VRY FGR MIC SHY FUP SHS GLC
4560	835.16	666.87	51.88	WD	0541	SANDSTONE,GRAY,CROSSBEDDED	FGR MGR FUP MIC SHS SPC
4580	783.28	667.91	1.04		0101	CLAYSTONE	MED GRY CHN SFT SKD BKN SPC
4600	782.24	668.03	.12	WB2	0021	COMMON BANDED COAL	BNY FF5 GLC

DRILL HOLE MB84 6

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
4620	782.12	668.27	.24	WB2	0021	COMMON BANDED COAL	FF5 SHS PYS GLC
4640	781.88	668.38	.11	WB2	0021	COMMON BANDED COAL	BNY FF5 GLC
4660	781.77	668.50	.12	WB2	0021	COMMON BANDED COAL	FF5 GLC
4680	781.65	668.69	.19	WB2	0034	BONE	HRD FF5 SPC
4700	781.46	668.82	.13	WB2	0114	BLACK SHALE	CAR PLT FF5 SPC
4720	781.33	669.09	.27	WB2	0021	COMMON BANDED COAL	FF5 SHS SPC
4740	781.06	670.44	1.35	WP	0101	CLAYSTONE	MED GRY SMO SHY WBD TBD SPC
4760	779.71	670.68	.24	WB1	0021	COMMON BANDED COAL	SHS PYS FF5 SPC
4780	779.47	670.98	.30	WB1	0034	BONE	FF5 HRD SHS SPC
4800	779.17	671.51	.53	WB1	0021	COMMON BANDED COAL	FF5 PYS SHS SPC
4820	778.64	671.64	.13	WB1	0114	BLACK SHALE	CAR PLT SPC
4840	778.51	672.59	.95	WB1	0021	COMMON BANDED COAL	FF5 PYS SHS GLC
4860	777.56	672.65	.06	WB1	0034	BONE	FF5 GLC
4880	777.50	672.78	.13	WB1	0021	COMMON BANDED COAL	BNY HRD FF5 SPC
4900	777.37	675.28	2.50		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC THN FLT RIP SSS GLC
4920	774.87	680.18	4.90		0124	SHALE,DARK GRAY	MIC SLY CHN FLT RIP SSS GLC
4940	769.97	687.31	7.13		0194	SHALE,GRAY	SLY SMO SPC
4960	762.84	687.98	.67	WL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED DRK GRY HRD SPC
4980	762.17	689.30	1.32	WL	0147	CLAYSTONE,GREEN	SFT UNC SPC
5000	760.85	691.45	2.15	WL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED BRN GRY HRD SPC
5020	758.70	692.09	.64	WL	0194	SHALE,GRAY	SMO CLY SKD TBD SPC
5040	758.06	694.18	2.09	WL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD SPC
5060	755.97	697.88	3.70	WL	0804	SHALY LIMESTONE,FGR,MAS	MED DRK GRY HRD GLC
5080	752.27	698.51	.63	WL	0787	SHALY LIMESTONE BRECCIA,LS PEB	DRK GRY HRD SPC
5100	751.64	698.86	.35	WL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT MED BRN GRY HRD SPC
5120	751.29	699.75	.89	WL	0194	SHALE,GRAY	LIM CLY SKD TBD SPC
5140	750.40	704.12	4.37	US	0544	SANDSTONE,GRAY,MASSIVE	VRY FGR FUP MIC SHY SHS GLC
5160	746.03	705.08	.96	US	0194	SHALE,GRAY	MIC SLY THN FLT SSS GLC
5180	745.07	715.03	9.95		0124	SHALE,DARK GRAY	SMO CLY GLC
5200	735.12	721.46	6.43		0194	SHALE,GRAY	SMO MIC THN FLT SSS GLC
5220	728.69	727.17	5.71		0194	SHALE,GRAY	SMO SPC
5240	722.98	727.27	.10	UT	0113	BLACK SHALE WITH COAL STREAKS	CAR PLT SPC
5260	722.88	727.38	.11	UT	0034	BONE	HRD FF5 PYS PYN SPC
5280	722.77	727.92	.54	UT	0021	COMMON BANDED COAL	BNY HRD PYS SPC
5300	722.23	728.05	.13	UT	0113	BLACK SHALE WITH COAL STREAKS	SMO CAR PLT SPC
5320	722.10	731.53	3.48	UT	0124	SHALE,DARK GRAY	MIC SLY CHN COS PLT SSS SPC
5340	718.62	732.85	1.32	UT	0021	COMMON BANDED COAL	HRD FF5 SPC
5360	717.30	733.14	.29	UT	0113	BLACK SHALE WITH COAL STREAKS	PLT SPC
5380	717.01	734.55	1.41	LD	0804	SHALY LIMESTONE,FGR,MAS	MED DRK GRY HRD SPC
5400	715.60	735.05	.50	LD	0147	CLAYSTONE,GREEN	SFT SKD SPC
5420	715.10	736.31	1.26	LD	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED BRN GRY HRD SPC
5440	713.84	738.73	2.42	LD	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED DRK GRY HRD GLC
5460	711.42	740.85	2.12	LD	0124	SHALE,DARK GRAY	CLY SKD LIM SPC
5480	709.30	744.75	3.90		0134	SHALE,LIGHT GRAY-GREEN	MIC SLY SGT SDY SPC
5500	705.40	745.11	.36		0101	CLAYSTONE	MED GRY SFT SPC
5520	705.04	747.91	2.80		0544	SANDSTONE,GRAY,MASSIVE	VRY FGR FUP MIC RIP SHS SPC
5540	702.24	752.53	4.62		0194	SHALE,GRAY	SMO MIC THN FLT SSS GLC
5560	697.62	756.43	3.90		0124	SHALE,DARK GRAY	SMO CLY BKN TBD SPC
5580	693.72	758.40	1.97	LC	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC

DRILL HOLE MB84 6

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
5600	691.75	758.97	.57	LC	0114	BLACK SHALE	CLY CHN SPC
5620	691.18	762.98	4.01	LC	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD OST GLC
5640	687.17	764.43	1.45	LC	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
5660	685.72	769.03	4.60	LC	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD OST SPC
5680	681.12	770.04	1.01		0147	CLAYSTONE,GREEN	SHY WBD GLC
5700	680.11	772.05	2.01		0335	SANDY SHALE,LT GRY-GRN,MAS,CHN	MIC SLY SPC
5720	678.10	772.54	.49	LB	0124	SHALE,DARK GRAY	LIM HRD SPC
5740	677.61	775.41	2.87	LB	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD SPC
5760	674.74	776.24	.83	LB	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
5780	673.91	779.66	3.42	LB	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD SPC
5800	670.49	779.97	.31	LB	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
5820	670.18	781.77	1.80	LB	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD SPC
5840	668.38	783.70	1.93	LB	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
5860	666.45	787.95	4.25		0157	CLAYSTONE,RED-GREEN	SKD BKN SPC
5880	662.20	788.31	.36	LA	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
5900	661.84	795.77	7.46	LA	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD FSH SPC
5920	654.38	796.02	.25	LA	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
5940	654.13	797.74	1.72		0147	CLAYSTONE,GREEN	SKD BKN SPC
5960	652.41	800.45	2.71		0335	SANDY SHALE,LT GRY-GRN,MAS,CHN	MIC SLY SPC
5980	649.70	804.14	3.69	BN	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
6000	646.01	807.29	3.15	BN	0805	SHALY LIMESTONE,FGR,MOZ	DRK GRY HRD SPC
6020	642.86	821.04	13.75	BN	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED BRN GRY HRD SPC
6040	629.11	830.89	9.85	BN	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD GLC
6060	619.26	838.29	7.40	BN	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED BRN GRY HRD GLC
6080	611.86	850.64	12.35	BN	0804	SHALY LIMESTONE,FGR,MAS	MED DRK GRY HRD GLC
6100	599.51	854.91	4.27	BN	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD SPC
6120	595.24	855.83	.92	BN	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
6140	594.32	856.54	.71	BN	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED BRN GRY HRD SPC
6160	593.61	858.99	2.45	BN	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
6180	591.16	861.84	2.85		0101	CLAYSTONE	DRK GRY SFT SKD BKN SPC
6200	588.31	862.05	.21	SW	0114	BLACK SHALE	CAR PLT SPC
6220	588.10	862.13	.08	SW	0034	BONE	HRD SHS FF5 SPC
6240	588.02	862.85	.72	SW	0021	COMMON BANDED COAL	HRD BNY SHS CCA FF5 SPC
6260	587.30	863.21	.36	SW	0021	COMMON BANDED COAL	FF5 PYS PYN CLS SPC
6280	586.94	863.88	.67	SW	0021	COMMON BANDED COAL	HRD BNY SHS CCA FF5 SPC
6300	586.27	863.95	.07	SW	0034	BONE	SHY HRD FF5
6320	586.20	865.97	2.02		0101	CLAYSTONE	DRK GRY SFT SKD BKN COS SPC
6340	584.18	868.07	2.10		0124	SHALE,DARK GRAY	SMO MIC SLY RAR THN FLT SSS
6360	582.08	874.01	5.94		0124	SHALE,DARK GRAY	SMO MIC SLY GLC
6380	576.14	874.32	.31	FP	0114	BLACK SHALE	SMO PLT SPC
6400	575.83	874.96	.64	FP	0021	COMMON BANDED COAL	BNY HRD FF5 SPC
6420	575.19	875.50	.54	FP	0113	BLACK SHALE WITH COAL STREAKS	MIC SLY CHN COS GLC
6440	574.65	875.88	.38	SL	0804	SHALY LIMESTONE,FGR,MAS	BLK MIC SLY HRD GLC
6460	574.27	877.02	1.14	SL	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
6480	573.13	878.45	1.43	SL	0101	CLAYSTONE	DRK GRY SFT SKD BKN SPC
6500	571.70	889.02	10.57	SL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD SPC
6520	561.13	891.03	2.01	SL	0101	CLAYSTONE	DRK GRY SFT SKD SPC
6540	559.12	891.96	.93	SL	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
6560	558.19	905.26	13.30	SL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED BRN GRY HRD SPC

DRILL HOLE MB84 6

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
6580	544.89	907.31	2.05	SL	0101	CLAYSTONE	DRK GRY SFT SPC
6600	542.84	910.64	3.33	SL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD SPC
6620	539.51	912.12	1.48	SL	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD SPC
6640	538.03	912.98	.86	SL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD SPC
6660	537.17	913.91	.93	SL	0134	SHALE,LIGHT GRAY-GREEN	LIM HRD SPC
6680	536.24	918.03	4.12	FY	0147	CLAYSTONE,GREEN	SFT SKD BKN SPC
6700	532.12	922.21	4.18	FY	0134	SHALE,LIGHT GRAY-GREEN	HRD CAN CLY SPC
6720	527.94	928.21	6.00	FY	0134	SHALE,LIGHT GRAY-GREEN	LIM HRD CAN GLC
6740	521.94	930.55	2.34	FY	0134	SHALE,LIGHT GRAY-GREEN	SFT SKD BKN SPC
6760	519.60	933.05	2.50		0194	SHALE,GRAY	SMO CLY GLC
6780	517.10	935.09	2.04	PS	0335	SANDY SHALE,LT GRY-GRN,MAS,CHN	MIC THN FLT SSS GLC
6800	515.06	945.01	9.92	PS	0194	SHALE,GRAY	MIC SLY THN FLT SSS GLC
6820	505.14	948.78	3.77	PS	0541	SANDSTONE,GRAY,CROSSBEDDED	VRY FGR FUP MIC SHY SHS SPC
6840	501.37	951.90	3.12	PS	0194	SHALE,GRAY	MIC SLY THN FLT SSS GLC
6860	498.25	952.63	.73	PS	0544	SANDSTONE,GRAY,MASSIVE	VRY FGR MIC SHY RIP SHS SPC
6880	497.52	953.45	.82	PS	0124	SHALE,DARK GRAY	MIC SLY SMO SPC
6900	496.70	964.01	10.56	PS	0541	SANDSTONE,GRAY,CROSSBEDDED	FGR FUP MIC RIP SHS SPC
6920	486.14	967.97	3.96		0124	SHALE,DARK GRAY	MIC SLY CHN PLT GLC
6940	482.18	968.26	.29		0124	SHALE,DARK GRAY	MIC SMO PLT THN FLT SSS SPC
6960	481.89	972.86	4.60		0114	BLACK SHALE	SMO MIC SLY SPC
6980	477.29	973.63	.77		0114	BLACK SHALE	CLY CHN BKN MIC SLY SPC
7000	476.52	973.71	.08	P1	0034	BONE	SHY HRD FF5 GLC
7020	476.44	973.83	.12	P1	0021	COMMON BANDED COAL	FF5 PYS SPC
7040	476.32	974.04	.21	P1	0034	BONE	HRD FF5 SPC
7060	476.11	974.22	.18	P1	0021	COMMON BANDED COAL	FF5 PYS SPC
7080	475.93	974.61	.39	DS	0124	SHALE,DARK GRAY	SMO CLY SPC
7100	475.54	974.83	.22	PG	0021	COMMON BANDED COAL	FF5 SPC
7120	475.32	975.11	.28	PG	0034	BONE	HRD FF5 SPC
7140	475.04	975.54	.43	PG	0021	COMMON BANDED COAL	SHS PYS FF5 GLC
7160	474.61	975.82	.28	PG	0021	COMMON BANDED COAL	BNY SHS HRD GLC
7180	474.33	977.04	1.22	PG	0021	COMMON BANDED COAL	FF5 PYS SHS SPC
7200	473.11	977.26	.22	PG	0114	BLACK SHALE	PLT CAR SPC
7220	472.89	978.89	1.63	PG	0021	COMMON BANDED COAL	FF5 CCA PYS SHS SPC
7240	471.26	979.11	.22	PG	0034	BONE	SHY HRD FF5 SPC
7260	471.04	979.32	.21	PG	0021	COMMON BANDED COAL	FF5 GLC
7280	470.83	979.48	.16	PG	0021	COMMON BANDED COAL	BNY FF5 GLC
7300	470.67	980.07	.59	PG	0021	COMMON BANDED COAL	SHS PYS FF5 GLC
7320	470.08	980.23	.16	PG	0021	COMMON BANDED COAL	BNY SPC
7340	469.92	980.41	.18	PG	0114	BLACK SHALE	SPC
7360	469.74	980.75	.34	PG	0021	COMMON BANDED COAL	BNY HRD PYS FF5 SPC
7380	469.40	981.04	.29		0114	BLACK SHALE	SMO CLY SPC
7400	469.11	983.28	2.24		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY HRD FSH SPC
7420	466.87	983.95	.67		0114	BLACK SHALE	SMO SPC
7440	466.20	986.05	2.10		0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED GRY HRD SPC
7460	464.10	987.15	1.10		0101	CLAYSTONE	MED GRY SFT BKN SPC
7480	463.00	990.16	3.01		0335	SANDY SHALE,LT GRY-GRN,MAS,CHN	MIC THN FLT SSS SPC
7500	459.99	990.74	.58		0101	CLAYSTONE	DRK GRY SFT SPC
7520	459.41	991.65	.91		0904	LIMESTONE,FINE-GRAINED,MASSIVE	MED BRN GRY HRD SPC
7540	458.50	992.80	1.15		0101	CLAYSTONE	MED GRY SFT SPC

DRILL HOLE MB84 6

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
7560	457.35	996.63	3.83		0194	SHALE,GRAY	MIC SLY THN FLT SSS SPC
7580	453.52	997.00	.37		0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT BRN GRY HRD

DRILL HOLE F 20

NORTH: 239213.00 EAST: 1260638.00 SOURCE:2 LOCATION:2 SURF.ELEV.: 1236.99 DET.:6

STATE:37 PENNSYLVANIA COUNTY: 59 GREENE TWP.: RANGE: MERIDIAN:000 SECTION:00 SECTION CODE:

USGS QUAD:WIND RIDGE SIZE:0 TOWNSHIP:RICHHILL PROP/FARM:UNKNOWN AZIMUTH: INC:

DATE DRILLED FROM: 04/07/78 TO:04/18/78 CONTRACTOR:BOYLES BROS. DRILLER:UNKNOWN INSP:US STEEL

ELOG	DRILL TYPE	FLUID TYPE	FLOW	CEMENT	WRAPPING	CONTAINER	CORED	UNITS OF MEASURE
0	1	2	0	1 0- 846	0	0	0	E

DATA SOURCE:US STEEL

----------COMMENTS----------

BAILEY BLOCK NO. 1

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	----------LITHOLOGY----------	------CHARACTERISTICS------
20	1236.99	20.00	20.00		0001	SURFACE CASING,OVERBURDEN	
40	1216.99	29.12	9.12		0124	SHALE,DARK GRAY	SLY FRB CAN GLC
60	1207.87	47.01	17.89		0194	SHALE,GRAY	SLY TBD SSS CAN SPC
80	1189.98	59.45	12.44		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY CAR GLC
100	1177.54	59.87	.42		0114	BLACK SHALE	PYN GLC
120	1177.12	60.09	.22		0030	IMPURE COAL	DUL SHY CFF PLT SPC
140	1176.90	76.25	16.16		0124	SHALE,DARK GRAY	CAN FRB SKD GLC
160	1160.74	84.95	8.70		0194	SHALE,GRAY	SLY CAN GLC
180	1152.04	95.15	10.20		0194	SHALE,GRAY	SDY TBD SSS GLC
200	1141.84	96.70	1.55		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY SPC
220	1140.29	105.39	8.69		0134	SHALE,LIGHT GRAY-GREEN	SLY FRB CAN CAR GLC
240	1131.60	126.16	20.77		0540	SANDSTONE,GRAY	FGR MGR TBD SHS GLC
260	1110.83	135.60	9.44		0124	SHALE,DARK GRAY	TBD IPY SSS PYS GLC
280	1101.39	139.68	4.08		0194	SHALE,GRAY	SLY CAN SPC
300	1097.31	158.34	18.66	UL	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY PYS
320	1078.65	165.54	7.20		0124	SHALE,DARK GRAY	SLY CAN SPC
340	1071.45	169.61	4.07		0541	SANDSTONE,GRAY,CROSSBEDDED	MGR TBD SHS GLC
360	1067.38	184.38	14.77		0194	SHALE,GRAY	SLY TBD CAN GLC
380	1052.61	187.13	2.75		0114	BLACK SHALE	TBD CAR PLT SKD PYN SPC
400	1049.86	194.80	7.67		0194	SHALE,GRAY	SLY TBD SSS SKD GLC
420	1042.19	202.35	7.55		0540	SANDSTONE,GRAY	FGR SHS CAR GLC
440	1034.64	204.88	2.53		0124	SHALE,DARK GRAY	TBD SKD GLC
460	1032.11	214.52	9.64		0301	SILTSTONE	GRY GRN SKD PYN GLC
480	1022.47	240.05	25.53		0194	SHALE,GRAY	SDY TBD PYN CAN RAR IPY
500	996.94	259.75	19.70		0124	SHALE,DARK GRAY	SLY SKD CAN SSS GLC
520	977.24	263.63	3.88		0124	SHALE,DARK GRAY	SLY RAR CAN RAR PYN GLC
540	973.36	270.38	6.75		0540	SANDSTONE,GRAY	FGR TBD SHS GLC
560	966.61	283.12	12.74		0124	SHALE,DARK GRAY	SLY TBD CAN GLC
580	953.87	287.37	4.25		0540	SANDSTONE,GRAY	MGR TBD SHS CAL GLC

DRILL HOLE F 20

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
600	949.62	304.81	17.44		0124	SHALE,DARK GRAY	SLY TBD RAR CAN GLC
620	932.18	311.85	7.04		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY CAR GLC
640	925.14	324.72	12.87		0124	SHALE,DARK GRAY	FRB CAR RAR PYN
660	912.27	325.47	.75		0114	BLACK SHALE	IPY GLC
680	911.52	326.73	1.26	WS	0030	IMPURE COAL	DUL SHY PYS GLC
700	910.26	340.42	13.69		0124	SHALE,DARK GRAY	SDY TBD SSS IPY GLC
720	896.57	351.73	11.31		0541	SANDSTONE,GRAY,CROSSBEDDED	MGR CAR SPC
740	885.26	357.43	5.70		0194	SHALE,GRAY	SDY TBD SSS IPY SPC
760	879.56	357.98	.55		0030	IMPURE COAL	DUL SHY FRB SPC
780	879.01	361.96	3.98		0114	BLACK SHALE	TBD PYS PLT SPC
800	875.03	366.74	4.78		0194	SHALE,GRAY	SDY CAN SPC
820	870.25	371.53	4.79		0540	SANDSTONE,GRAY	FGR MGR CLY GLC
840	865.46	377.55	6.02		0124	SHALE,DARK GRAY	SDY TBD SSS GLC
860	859.44	386.21	8.66		0301	SILTSTONE	GRY GRN SKD RAR IKY
880	850.78	400.20	13.99		0540	SANDSTONE,GRAY	FGR TBD SHS CAL CAN GLC
900	836.79	408.45	8.25		0124	SHALE,DARK GRAY	TBD CAN IKY SKD
920	828.54	409.45	1.00		0114	BLACK SHALE	
940	827.54	409.97	.52	WA	0021	COMMON BANDED COAL	CFF SPC
960	827.02	424.65	14.68		0124	SHALE,DARK GRAY	SKD CAL CAN SSS GLC
980	812.34	489.49	64.84	WD	0541	SANDSTONE,GRAY,CROSSBEDDED	FGR MGR TBD SHS CAN SPC
1000	747.50	490.61	1.12		0124	SHALE,DARK GRAY	TBD FRB PLT PYS NBM GLC
1020	746.38	493.28	2.67	WB1	0030	IMPURE COAL	DUL SHY PYS FRB SPC
1040	743.71	497.80	4.52		0124	SHALE,DARK GRAY	SDY TBD COS SSS PYN GLC
1060	739.19	501.79	3.99		0540	SANDSTONE,GRAY	MGR TBD PLT CAR RAR PYN
1080	735.20	511.68	9.89		0124	SHALE,DARK GRAY	TBD PYS IPY GLC
1100	725.31	514.89	3.21		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY SPC
1120	722.10	522.85	7.96		0301	SILTSTONE	DRK GRY CAL SKD FRB
1140	714.14	526.55	3.70		0541	SANDSTONE,GRAY,CROSSBEDDED	MGR TBD CAL SPC
1160	710.44	550.18	23.63		0124	SHALE,DARK GRAY	SLY TBD CAN SSS GLC
1180	686.81	555.06	4.88		0113	BLACK SHALE WITH COAL STREAKS	TBD IPY PLT PYS SPC
1200	681.93	555.38	.32	UT	0020	COAL	DUL PYS
1220	681.61	555.97	.59	UT	0021	COMMON BANDED COAL	SPC
1240	681.02	558.13	2.16		0124	SHALE,DARK GRAY	CAL SKD SPC
1260	678.86	559.75	1.62		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY CAR GLC
1280	677.24	580.92	21.17		0194	SHALE,GRAY	SLY TBD CAL SKD GLC
1300	656.07	604.33	23.41		0804	SHALY LIMESTONE,FGR,MAS	GRY CAR SPC
1320	632.66	610.75	6.42		0194	SHALE,GRAY	TBD FRB SPC
1340	626.24	620.54	9.79		0900	LIMESTONE	LIT GRY FGR SHS RAR CAR
1360	616.45	632.85	12.31		0134	SHALE,LIGHT GRAY-GREEN	TBD CAL CAN FRB GLC
1380	604.14	660.52	27.67	BN	0804	SHALY LIMESTONE,FGR,MAS	GRY CAR SSS
1400	576.47	667.45	6.93	BN	0194	SHALE,GRAY	CAL GLC
1420	569.54	681.08	13.63	BN	0804	SHALY LIMESTONE,FGR,MAS	DRK GRY CAR RAR PYN
1440	555.91	683.40	2.32		0124	SHALE,DARK GRAY	SLY TBD SKD CFF PYS GLC
1460	553.59	683.61	.21	SW	0030	IMPURE COAL	DUL SHY PYS

DRILL HOLE F 20

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
1480	553.38	684.04	.43	SW	0021	COMMON BANDED COAL	FRB PYS GLC
1500	552.95	684.51	.47		0114	BLACK SHALE	TBD PYS PLT SPC
1520	552.48	692.15	7.64		0540	SANDSTONE,GRAY	FGR TBD CAR SHS GLC
1540	544.84	699.03	6.88		0124	SHALE,DARK GRAY	SLY TBD IPY SSS SKD PYS
1560	537.96	699.46	.43		0021	COMMON BANDED COAL	RAR PYN SPC
1580	537.53	703.91	4.45		0124	SHALE,DARK GRAY	SLY CAL RAR COS SPC
1600	533.08	739.18	35.27	SL	0804	SHALY LIMESTONE,FGR,MAS	GRY SPC
1620	497.81	744.15	4.97		0194	SHALE,GRAY	FRB SKD RAR CAR GLC
1640	492.84	760.43	16.28		0194	SHALE,GRAY	SLY CAL SKD RAR PYT SPC
1660	476.56	775.98	15.55		0194	SHALE,GRAY	SLY TBD SSS CAN RAR PYN
1680	461.01	778.60	2.62	PS	0540	SANDSTONE,GRAY	FGR TBD CLY RAR CAR GLC
1700	458.39	782.26	3.66	PS	0113	BLACK SHALE WITH COAL STREAKS	TBD SSS PYN SPC
1720	454.73	785.87	3.61	PS	0540	SANDSTONE,GRAY	FGR TBD CAR SPC
1740	451.12	795.32	9.45		0114	BLACK SHALE	SSS PYN PYS
1760	441.67	798.23	2.91	DS	0124	SHALE,DARK GRAY	TBD RAR PYN RAR COS SPC
1780	438.76	798.40	.17	PG	0020	COAL	DUL
1800	438.59	798.46	.06	PG	0021	COMMON BANDED COAL	
1820	438.53	798.49	.03	PG	0020	COAL	DUL
1840	438.50	799.56	1.07	PG	0021	COMMON BANDED COAL	RAR PYS NBM
1860	437.43	799.59	.03	PG	0020	COAL	FUS
1880	437.40	799.71	.12	PG	0021	COMMON BANDED COAL	
1900	437.28	799.78	.07	PG	0020	COAL	FUS
1920	437.21	800.70	.92	PG	0021	COMMON BANDED COAL	
1940	436.29	800.74	.04	PG	0114	BLACK SHALE	
1960	436.25	800.78	.04	PG	0021	COMMON BANDED COAL	
1980	436.21	800.80	.02	PG	0114	BLACK SHALE	
2000	436.19	800.84	.04	PG	0021	COMMON BANDED COAL	
2020	436.15	800.87	.03	PG	0030	IMPURE COAL	DUL SHY
2040	436.12	800.91	.04	PG	0124	SHALE,DARK GRAY	
2060	436.08	803.26	2.35	PG	0021	COMMON BANDED COAL	RAR CFF RAR PYS
2080	433.73	803.28	.02	PG	0030	IMPURE COAL	DUL SHY
2100	433.71	803.45	.17	PG	0021	COMMON BANDED COAL	
2120	433.54	803.47	.02	PG	0080	PYRITE	
2140	433.52	803.90	.43	PG	0021	COMMON BANDED COAL	RAR CFF RAR PYS
2160	433.09	810.06	6.16		0124	SHALE,DARK GRAY	SLY TBD CAL CAN SPC
2180	426.93	824.40	14.34		0194	SHALE,GRAY	SLY TBD RAR SSS RAR SKD
2200	412.59	825.55	1.15		0900	LIMESTONE	DRK GRY FGR CAR GLC
2220	411.44	829.43	3.88		0124	SHALE,DARK GRAY	FRB RAR CAL GLC
2240	407.56	834.02	4.59		0900	LIMESTONE	LIT GRY FGR RAR CAR GLC
2260	402.97	841.31	7.29		0134	SHALE,LIGHT GRAY-GREEN	CAN FRB CAN SKD GLC
2280	395.68	845.90	4.59		0194	SHALE,GRAY	SDY TBD SSS

DRILL HOLE MB85 1

NORTH: 237695.00 EAST: 1261352.00 SOURCE:2 LOCATION:1 SURF.ELEV.: 1421.50 DET.:7

STATE:37 PENNSYLVANIA COUNTY: 59 GREENE TWP.: RANGE: MERIDIAN:999 SECTION:00 SECTION CODE:

USGS QUAD:WINDRIDGE SIZE:1 TOWNSHIP:RICHHILL PROP/FARM:CONSOLCHARMR AZIMUTH: DIP:

DATE DRILLED FROM: 09/30/85 TO:10/04/85 CONTRACTOR:DUNCAN BROS DRILLER:J.VANKIRK INSP:D.G.PUGLIO

ELOG	DRILL TYPE	FLUID TYPE	FLOW	CEMENT	WRAPPING	CONTAINER	CORED	UNITS OF MEASURE
0	2	1	0	1 0- 1009	0	0	1	E

DATA SOURCE:CONSOL

COMMENTS
BAILEY QUALITY PROGRAM; BLOCK NO. 1; SPOT CORE PG

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
20	1421.50	7.00	7.00		0001	SURFACE CASING,OVERBURDEN	
40	1414.50	12.00	5.00		0100	SHALE	BRN
60	1409.50	19.00	7.00		0900	LIMESTONE	
80	1402.50	38.00	19.00		0500	SANDSTONE	BRN
100	1383.50	70.00	32.00		0194	SHALE,GRAY	LSS
120	1351.50	72.00	2.00		0114	BLACK SHALE	
140	1349.50	142.00	70.00		0194	SHALE,GRAY	
160	1279.50	278.00	136.00		0194	SHALE,GRAY	LIM LSS
180	1143.50	350.00	72.00		0194	SHALE,GRAY	
200	1071.50	365.00	15.00	UL	0900	LIMESTONE	
220	1056.50	470.00	105.00		0194	SHALE,GRAY	SSS
240	951.50	498.00	28.00		0900	LIMESTONE	SHS
260	923.50	618.00	120.00		0194	SHALE,GRAY	LSS
280	803.50	650.00	32.00		0900	LIMESTONE	
300	771.50	694.00	44.00	WD	0540	SANDSTONE,GRAY	
320	727.50	697.00	3.00	WB1	0021	COMMON BANDED COAL	
340	724.50	874.00	177.00		0194	SHALE,GRAY	LSS
360	547.50	888.00	14.00	200SW	0021	COMMON BANDED COAL	
380	533.50	909.00	21.00		0194	SHALE,GRAY	LSS
400	512.50	951.00	42.00	SL	0900	LIMESTONE	
420	470.50	988.00	37.00		0194	SHALE,GRAY	
440	433.50	994.00	6.00	PS	0540	SANDSTONE,GRAY	
460	427.50	996.00	2.00		0194	SHALE,GRAY	
480	425.50	999.30	3.30		0124	SHALE,DARK GRAY	TBD SMO GLC
500	422.20	1001.79	2.49		0114	BLACK SHALE	TBD SMO SPC
520	419.71	1001.97	.18	P1	0021	COMMON BANDED COAL	BNY FF5 SPC
540	419.53	1001.99	.02	P1	0114	BLACK SHALE	SPC
560	419.51	1002.11	.12	P1	0021	COMMON BANDED COAL	FF5 SPC
580	419.39	1002.66	.55	DS	0124	SHALE,DARK GRAY	CLY SKD TBD SPC
600	418.84	1004.33	1.67	PG	0021	COMMON BANDED COAL	FF4 SHS PYS SPC
620	417.17	1004.35	.02	PG	0114	BLACK SHALE	SPC
640	417.15	1004.78	.43	PG	0021	COMMON BANDED COAL	FF4 SPC
660	416.72	1004.82	.04	PG	0114	BLACK SHALE	SPC
680	416.68	1004.88	.06	PG	0021	COMMON BANDED COAL	SHS FF4 SPC

DRILL HOLE MB85 1

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
700	416.62	1004.95	.07	PG	0114	BLACK SHALE	CAR HRD
720	416.55	1007.98	3.03	PG	0021	COMMON BANDED COAL	FF4 SPC
740	413.52	1008.01	.03	PG	0080	PYRITE	SPC
760	413.49	1008.45	.44	PG	0021	COMMON BANDED COAL	SHS FF4 SPC
780	413.05	1008.58	.13	PG	0021	COMMON BANDED COAL	BNY HRD SPC
800	412.92	1008.70	.12		0114	BLACK SHALE	CLY SFT TBD SPC
820	412.80	1008.98	.28		0101	CLAYSTONE	DRK GRY BLK CHN SFT SPC
840	412.52	1009.45	.47		0804	SHALY LIMESTONE,FGR,MAS	MED GRY HRD

DRILL HOLE MB81 56

NORTH: 235448.00 EAST: 1263160.00 SOURCE:2 LOCATION:6 SURF.ELEV.: 1559.20 DET.:7

STATE:37 PENNSYLVANIA COUNTY: 59 GREENE TWP.: RANGE: MERIDIAN:000 SECTION:00 SECTION CODE:

USGS QUAD:WIND RIDGE SIZE:0 TOWNSHIP:RICHHILL PROP/FARM:CONSOL AZIMUTH: DIP:

DATE DRILLED FROM: 04/24/81 TO:05/08/81 CONTRACTOR:W.J.MOTT DRILLER:G.ROBY INSP:D. G. PUGLIO

ELOG	DRILL TYPE	FLUID TYPE	FLOW	CEMENT	WRAPPING	CONTAINER	CORED	UNITS OF MEASURE
1235	1	2	0	1 0- 1210	0	0	0	E

DATA SOURCE:CONSOL

COMMENTS
MINE BLOCK NO. 3

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
20	1559.20	63.50	63.50		0001	SURFACE CASING,OVERBURDEN	
40	1495.70	70.67	7.17		0300	SANDY SHALE	GRY MIC GLC
60	1488.53	74.75	4.08		0540	SANDSTONE,GRAY	MIC FGR SHS RIP XBD SPC
80	1484.45	77.97	3.22		0194	SHALE,GRAY	CLY SPC
100	1481.23	78.45	.48		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
120	1480.75	80.91	2.46		0124	SHALE,DARK GRAY	CLY GLC
140	1478.29	85.08	4.17		0134	SHALE,LIGHT GRAY-GREEN	CLY SKD SPC
160	1474.12	88.98	3.90		0134	SHALE,LIGHT GRAY-GREEN	CLY GLC
180	1470.22	94.44	5.46		0194	SHALE,GRAY	GLC
200	1464.76	95.55	1.11		0154	SHALE,RED-GREEN	CLY SPC
220	1463.65	97.05	1.50		0127	FIRECLAY,DARK GRAY	GLC
240	1462.15	101.91	4.86		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC GLC
260	1457.29	104.33	2.42		0134	SHALE,LIGHT GRAY-GREEN	CLY SPC
280	1454.87	105.62	1.29		0544	SANDSTONE,GRAY,MASSIVE	MIC FGR SPC
300	1453.58	117.25	11.63		0124	SHALE,DARK GRAY	MIC GLC
320	1441.95	121.16	3.91		0124	SHALE,DARK GRAY	CLY SPC
340	1438.04	122.97	1.81		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
360	1436.23	124.45	1.48		0194	SHALE,GRAY	CLY LIM SPC
380	1434.75	126.46	2.01		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
400	1432.74	132.13	5.67		0194	SHALE,GRAY	MIC SPC
420	1427.07	134.58	2.45		0544	SANDSTONE,GRAY,MASSIVE	FGR MIC SHS FLT GLC
440	1424.62	138.23	3.65		0124	SHALE,DARK GRAY	SDY MIC SPC
460	1420.97	139.59	1.36		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
480	1419.61	141.15	1.56		0127	FIRECLAY,DARK GRAY	SKD GLC
500	1418.05	144.75	3.60		0124	SHALE,DARK GRAY	MIC CLY SPC
520	1414.45	147.89	3.14		0544	SANDSTONE,GRAY,MASSIVE	FGR SPC
540	1411.31	154.71	6.82		0124	SHALE,DARK GRAY	MIC GLC
560	1404.49	157.16	2.45		0124	SHALE,DARK GRAY	BLK SPC
580	1402.04	158.35	1.19		0904	LIMESTONE,FINE-GRAINED,MASSIVE	FGR HRD SPC
600	1400.85	159.09	.74		0127	FIRECLAY,DARK GRAY	SPC
620	1400.11	160.41	1.32		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
640	1398.79	162.04	1.63		0127	FIRECLAY,DARK GRAY	SPC
660	1397.16	162.36	.32		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
680	1396.84	166.08	3.72		0134	SHALE,LIGHT GRAY-GREEN	LIM RAR SPC

DRILL HOLE MB81 56

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
700	1393.12	177.02	10.94		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	SSS FLT SPC
720	1382.18	194.01	16.99		0544	SANDSTONE,GRAY,MASSIVE	MIC FGR SHS FLT RAR
740	1365.19	195.55	1.54		0194	SHALE,GRAY	CLY SKD GLC
760	1363.65	202.47	6.92		0300	SANDY SHALE	GRY MIC SPC
780	1356.73	206.41	3.94		0194	SHALE,GRAY	GLC
800	1352.79	208.62	2.21		0124	SHALE,DARK GRAY	GLC
820	1350.58	211.31	2.69		0137	FIRECLAY,LIGHT GRAY-GREEN	SPC
840	1347.89	212.71	1.40		0134	SHALE,LIGHT GRAY-GREEN	CLY SPC
860	1346.49	218.71	6.00		0194	SHALE,GRAY	MIC FLT SSS GLC
880	1340.49	220.31	1.60		0134	SHALE,LIGHT GRAY-GREEN	CLY RAR SPC
900	1338.89	221.44	1.13		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
920	1337.76	222.07	.63		0101	CLAYSTONE	GRY SPC
940	1337.13	223.34	1.27		0300	SANDY SHALE	GRY MIC GLC
960	1335.86	225.98	2.64		0544	SANDSTONE,GRAY,MASSIVE	FGR MIC SPC
980	1333.22	227.29	1.31		0300	SANDY SHALE	MIC SSS FLT GRY GLC
1000	1331.91	231.94	4.65		0134	SHALE,LIGHT GRAY-GREEN	GLC
1020	1327.26	233.88	1.94		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC SPC
1040	1325.32	234.61	.73		0544	SANDSTONE,GRAY,MASSIVE	MIC FGR SPC
1060	1324.59	235.48	.87		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC GLC
1080	1323.72	237.54	2.06		0134	SHALE,LIGHT GRAY-GREEN	CLY RAR GLC
1100	1321.66	240.88	3.34		0124	SHALE,DARK GRAY	SSS FLT GLC
1120	1318.32	243.98	3.10		0124	SHALE,DARK GRAY	LIM BLK SPC
1140	1315.22	244.93	.95		0804	SHALY LIMESTONE,FGR,MAS	GRY GLC
1160	1314.27	246.08	1.15		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
1180	1313.12	249.19	3.11		0124	SHALE,DARK GRAY	LIM SPC
1200	1310.01	250.63	1.44		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
1220	1308.57	251.19	.56		0124	SHALE,DARK GRAY	LIM
1240	1308.01	251.51	.32		0134	SHALE,LIGHT GRAY-GREEN	CLY SPC
1260	1307.69	251.73	.22		0124	SHALE,DARK GRAY	LIM SPC
1280	1307.47	253.26	1.53		0134	SHALE,LIGHT GRAY-GREEN	LIM SPC
1300	1305.94	255.02	1.76		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	SPC
1320	1304.18	257.52	2.50		0124	SHALE,DARK GRAY	LIM SSS FLT
1340	1301.68	258.65	1.13		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY GLC
1360	1300.55	260.21	1.56		0804	SHALY LIMESTONE,FGR,MAS	GRY HRD SPC
1380	1298.99	260.66	.45		0124	SHALE,DARK GRAY	SPC
1400	1298.54	261.09	.43		0137	FIRECLAY,LIGHT GRAY-GREEN	SPC
1420	1298.11	262.61	1.52		0544	SANDSTONE,GRAY,MASSIVE	MIC FGR SHS FLT
1440	1296.59	266.65	4.04		0134	SHALE,LIGHT GRAY-GREEN	SPC
1460	1292.55	266.91	.26		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
1480	1292.29	268.33	1.42		0134	SHALE,LIGHT GRAY-GREEN	CLY SKD GLC
1500	1290.87	270.50	2.17		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC SSS FLT GLC
1520	1288.70	275.33	4.83		0540	SANDSTONE,GRAY	MIC FGR XBD SHS RIP SPC
1540	1283.87	279.07	3.74		0134	SHALE,LIGHT GRAY-GREEN	SPC
1560	1280.13	280.31	1.24		0124	SHALE,DARK GRAY	LIM SPC
1580	1278.89	281.56	1.25		0137	FIRECLAY,LIGHT GRAY-GREEN	GRN SPC
1600	1277.64	281.88	.32		0804	SHALY LIMESTONE,FGR,MAS	GRY SPC
1620	1277.32	282.31	.43		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
1640	1276.89	283.17	.86		0134	SHALE,LIGHT GRAY-GREEN	LIM SPC
1660	1276.03	285.00	1.83		0544	SANDSTONE,GRAY,MASSIVE	FGR MIC GLC

DRILL HOLE MB81 56

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
1680	1274.20	289.06	4.06		0322	INTBD SANDSTONE & SHALE,DRK GRY	SPC
1700	1270.14	294.42	5.36		0134	SHALE,LIGHT GRAY-GREEN	GLC
1720	1264.78	294.79	.37		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC SPC
1740	1264.41	296.92	2.13		0134	SHALE,LIGHT GRAY-GREEN	SDY MIC SSS FLT SPC
1760	1262.28	298.98	2.06		0544	SANDSTONE,GRAY,MASSIVE	FGR MIC SPC
1780	1260.22	301.35	2.37		0134	SHALE,LIGHT GRAY-GREEN	GLC
1800	1257.85	303.51	2.16		0124	SHALE,DARK GRAY	SPC
1820	1255.69	307.16	3.65		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
1840	1252.04	308.84	1.68		0134	SHALE,LIGHT GRAY-GREEN	SDY CAN SPC
1860	1250.36	309.11	.27		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
1880	1250.09	312.62	3.51		0134	SHALE,LIGHT GRAY-GREEN	SPC
1900	1246.58	314.43	1.81		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
1920	1244.77	317.61	3.18		0134	SHALE,LIGHT GRAY-GREEN	CLY SPC
1940	1241.59	317.85	.24		0154	SHALE,RED-GREEN	CLY SPC
1960	1241.35	318.29	.44		0134	SHALE,LIGHT GRAY-GREEN	CLY SPC
1980	1240.91	318.91	.62		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
2000	1240.29	319.35	.44		0137	FIRECLAY,LIGHT GRAY-GREEN	SPC
2020	1239.85	321.52	2.17		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC SPC
2040	1237.68	322.02	.50		0137	FIRECLAY,LIGHT GRAY-GREEN	SPC
2060	1237.18	324.97	2.95		0167	CLAYSTONE,RED	GRY RAR SKD GLC
2080	1234.23	330.65	5.68		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC GLC
2100	1228.55	350.64	19.99		0544	SANDSTONE,GRAY,MASSIVE	FUP SHS RIP XBD SPC
2120	1208.56	355.96	5.32		0134	SHALE,LIGHT GRAY-GREEN	SPC
2140	1203.24	356.96	1.00		0124	SHALE,DARK GRAY	LIM SPC
2160	1202.24	359.16	2.20		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
2180	1200.04	360.77	1.61		0804	SHALY LIMESTONE,FGR,MAS	GRY SPC
2200	1198.43	370.46	9.69		0194	SHALE,GRAY	DRK SDY GLC
2220	1188.74	372.62	2.16		0124	SHALE,DARK GRAY	SPC
2240	1186.58	373.38	.76		0134	SHALE,LIGHT GRAY-GREEN	LIM HRD SPC
2260	1185.82	375.52	2.14		0134	SHALE,LIGHT GRAY-GREEN	CLY SKD GLC
2280	1183.68	376.56	1.04		0134	SHALE,LIGHT GRAY-GREEN	GLC
2300	1182.64	377.76	1.20		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC GLC
2320	1181.44	384.77	7.01		0544	SANDSTONE,GRAY,MASSIVE	FGR MIC SPC
2340	1174.43	390.41	5.64		0134	SHALE,LIGHT GRAY-GREEN	CLY MIC GLC
2360	1168.79	394.09	3.68		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC GLC
2380	1165.11	395.94	1.85		0544	SANDSTONE,GRAY,MASSIVE	VRY FGR MIC SPC
2400	1163.26	400.19	4.25		0134	SHALE,LIGHT GRAY-GREEN	CLY NBM GLC
2420	1159.01	402.55	2.36		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	SPC
2440	1156.65	403.07	.52		0544	SANDSTONE,GRAY,MASSIVE	SPC
2460	1156.13	403.69	.62		0114	BLACK SHALE	SPC
2480	1155.51	403.71	.02		0020	COAL	
2500	1155.49	404.11	.40		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY SPC
2520	1155.09	405.22	1.11		0904	LIMESTONE,FINE-GRAINED,MASSIVE	DRK GRY SPC
2540	1153.98	407.35	2.13		0134	SHALE,LIGHT GRAY-GREEN	CLY RAR GLC
2560	1151.85	407.98	.63		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC SPC
2580	1151.22	409.32	1.34		0544	SANDSTONE,GRAY,MASSIVE	VRY FGR MIC SPC
2600	1149.88	413.96	4.64		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	SSS FLT RAR GLC
2620	1145.24	414.34	.38		0544	SANDSTONE,GRAY,MASSIVE	VRY FGR MIC SPC
2640	1144.86	421.57	7.23		0134	SHALE,LIGHT GRAY-GREEN	GLC

DRILL HOLE MB81 56

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
2660	1137.63	423.16	1.59		0124	SHALE,DARK GRAY	CLY SPC
2680	1136.04	423.62	.46		0114	BLACK SHALE	SPC
2700	1135.58	424.46	.84		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY GLC
2720	1134.74	425.45	.99		0137	FIRECLAY,LIGHT GRAY-GREEN	SKD SPC
2740	1133.75	426.98	1.53		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY
2760	1132.22	427.41	.43		0127	FIRECLAY,DARK GRAY	SPC
2780	1131.79	427.86	.45		0124	SHALE,DARK GRAY	LIM CLY SPC
2800	1131.34	427.97	.11		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
2820	1131.23	431.56	3.59		0127	FIRECLAY,DARK GRAY	SKD SPC
2840	1127.64	432.02	.46		0134	SHALE,LIGHT GRAY-GREEN	SDY LIM GLC
2860	1127.18	432.47	.45		0904	LIMESTONE,FINE-GRAINED,MASSIVE	DRK HRD SPC
2880	1126.73	445.17	12.70		0134	SHALE,LIGHT GRAY-GREEN	SDY MIC SPC
2900	1114.03	445.45	.28	TM	0114	BLACK SHALE	BNY COL CAR SPC
2920	1113.75	445.74	.29	TM	0034	BONE	COL SPC
2940	1113.46	446.70	.96	TM	0021	COMMON BANDED COAL	DUL BNY
2960	1112.50	450.33	3.63		0127	FIRECLAY,DARK GRAY	SPC
2980	1108.87	451.87	1.54		0114	BLACK SHALE	CLY RAR SPC
3000	1107.33	453.62	1.75		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
3020	1105.58	454.11	.49		0137	FIRECLAY,LIGHT GRAY-GREEN	SPC
3040	1105.09	455.23	1.12		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
3060	1103.97	461.32	6.09		0137	FIRECLAY,LIGHT GRAY-GREEN	SFT SKD GLC
3080	1097.88	464.31	2.99		0134	SHALE,LIGHT GRAY-GREEN	GRN CLY GLC
3100	1094.89	465.09	.78		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC SPC
3120	1094.11	469.49	4.40		0540	SANDSTONE,GRAY	XBD FGR MIC SPC
3140	1089.71	472.51	3.02		0134	SHALE,LIGHT GRAY-GREEN	CLY GLC
3160	1086.69	479.01	6.50		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	GLC
3180	1080.19	484.21	5.20		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	SSS FLT GLC
3200	1074.99	487.84	3.63		0134	SHALE,LIGHT GRAY-GREEN	SDY SPC
3220	1071.36	495.21	7.37		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	SSS FLT GLC
3240	1063.99	504.57	9.36		0544	SANDSTONE,GRAY,MASSIVE	FGR SHS FLT GLC
3260	1054.63	515.46	10.89		0124	SHALE,DARK GRAY	PLT SSS FLT RAR
3280	1043.74	517.79	2.33		0134	SHALE,LIGHT GRAY-GREEN	DRK GLC
3300	1041.41	519.81	2.02		0124	SHALE,DARK GRAY	GLC
3320	1039.39	520.71	.90		0114	BLACK SHALE	GLC
3340	1038.49	521.46	.75		0114	BLACK SHALE	LIM GLC
3360	1037.74	524.85	3.39		0804	SHALY LIMESTONE,FGR,MAS	HRD GRY SPC
3380	1034.35	525.71	.86		0124	SHALE,DARK GRAY	CLY SPC
3400	1033.49	529.55	3.84	UL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD GLC
3420	1029.65	531.85	2.30	UL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY BRN HRD GLC
3440	1027.35	533.96	2.11	UL	0194	SHALE,GRAY	CLY RAR SPC
3460	1025.24	536.61	2.65	UL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY BRN HRD SPC
3480	1022.59	537.94	1.33	UL	0804	SHALY LIMESTONE,FGR,MAS	HRD GRY SPC
3500	1021.26	539.22	1.28	UL	0137	FIRECLAY,LIGHT GRAY-GREEN	
3520	1019.98	539.29	.07	UL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
3540	1019.91	540.79	1.50	UL	0194	SHALE,GRAY	SPC
3560	1018.41	541.63	.84	UL	0124	SHALE,DARK GRAY	BLK CAL SPC
3580	1017.57	543.13	1.50	UL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
3600	1016.07	543.51	.38	UL	0101	CLAYSTONE	GRN SPC
3620	1015.69	543.81	.30	UL	0134	SHALE,LIGHT GRAY-GREEN	CLY LIM SPC

DRILL HOLE MB81 56

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
3640	1015.39	545.24	1.43	UL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
3660	1013.96	549.65	4.41		0101	CLAYSTONE	GRN SKD SPC
3680	1009.55	558.51	8.86		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC SSS FLT SPC
3700	1000.69	561.28	2.77		0134	SHALE,LIGHT GRAY-GREEN	CLY NBM SPC
3720	997.92	562.49	1.21		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
3740	996.71	563.18	.69		0137	FIRECLAY,LIGHT GRAY-GREEN	GLC
3760	996.02	567.55	4.37		0134	SHALE,LIGHT GRAY-GREEN	SPC
3780	991.65	568.29	.74		0127	FIRECLAY,DARK GRAY	SKD GLC
3800	990.91	570.00	1.71		0124	SHALE,DARK GRAY	LIM SPC
3820	989.20	571.55	1.55		0124	SHALE,DARK GRAY	CLY BLK GLC
3840	987.65	574.10	2.55		0114	BLACK SHALE	SKD SPC
3860	985.10	574.45	.35	JT	0022	COAL WITH BONE LAYERS	
3880	984.75	574.57	.12		0114	BLACK SHALE	SPC
3900	984.63	576.17	1.60		0137	FIRECLAY,LIGHT GRAY-GREEN	SPC
3920	983.03	577.22	1.05		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	SPC MIC
3940	981.98	578.05	.83		0544	SANDSTONE,GRAY,MASSIVE	MIC FGR SPC
3960	981.15	578.23	.18		0134	SHALE,LIGHT GRAY-GREEN	SPC
3980	980.97	578.49	.26		0904	LIMESTONE,FINE-GRAINED,MASSIVE	BRN GRY HRD SPC
4000	980.71	578.58	.09		0137	FIRECLAY,LIGHT GRAY-GREEN	SPC
4020	980.62	582.95	4.37		0134	SHALE,LIGHT GRAY-GREEN	MIC GLC
4040	976.25	585.92	2.97		0540	SANDSTONE,GRAY	FGR MIC SHS RIP GLC
4060	973.28	587.42	1.50		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC SSS FLT SPC
4080	971.78	590.44	3.02		0194	SHALE,GRAY	GLC
4100	968.76	591.23	.79		0101	CLAYSTONE	GRY SKD SPC
4120	967.97	593.52	2.29		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY GLC
4140	965.68	594.18	.66		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
4160	965.02	594.57	.39		0127	FIRECLAY,DARK GRAY	SPC
4180	964.63	595.49	.92		0804	SHALY LIMESTONE,FGR,MAS	GRY SPC
4200	963.71	596.31	.82		0904	LIMESTONE,FINE-GRAINED,MASSIVE	BRN GRY HRD SPC
4220	962.89	603.62	7.31		0134	SHALE,LIGHT GRAY-GREEN	LIM CLY SKD SPC
4240	955.58	604.43	.81		0137	FIRECLAY,LIGHT GRAY-GREEN	SPC
4260	954.77	612.14	7.71		0194	SHALE,GRAY	CLY RAR GLC
4280	947.06	612.51	.37		0154	SHALE,RED-GREEN	CLY SPC
4300	946.69	613.62	1.11		0134	SHALE,LIGHT GRAY-GREEN	CLY SPC
4320	945.58	614.22	.60		0137	FIRECLAY,LIGHT GRAY-GREEN	RED MID SPC
4340	944.98	614.61	.39		0124	SHALE,DARK GRAY	LIM SPC
4360	944.59	614.75	.14		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
4380	944.45	615.00	.25		0804	SHALY LIMESTONE,FGR,MAS	HRD GRY SPC
4400	944.20	615.65	.65		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD GLC
4420	943.55	616.58	.93		0804	SHALY LIMESTONE,FGR,MAS	GRY HRD SPC
4440	942.62	618.12	1.54		0194	SHALE,GRAY	SPC
4460	941.08	618.87	.75		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
4480	940.33	621.57	2.70		0804	SHALY LIMESTONE,FGR,MAS	GRY HRD SPC
4500	937.63	623.66	2.09		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
4520	935.54	645.79	22.13		0134	SHALE,LIGHT GRAY-GREEN	CLY RAR GLC
4540	913.41	646.51	.72		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	GLC
4560	912.69	652.28	5.77		0544	SANDSTONE,GRAY,MASSIVE	MIC FGR SHS RIP SPC
4580	906.92	658.47	6.19		0194	SHALE,GRAY	SPC
4600	900.73	661.98	3.51		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC

DRILL HOLE MB81 56

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
4620	897.22	662.76	.78		0127	FIRECLAY,DARK GRAY	SPC
4640	896.44	663.13	.37		0804	SHALY LIMESTONE,FGR,MAS	DRK GRY SPC
4660	896.07	664.44	1.31		0101	CLAYSTONE	GRY SPC
4680	894.76	670.91	6.47		0544	SANDSTONE,GRAY,MASSIVE	VRY FGR MIC RAR SHS FLT
4700	888.29	673.29	2.38		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC SPC
4720	885.91	677.92	4.63		0124	SHALE,DARK GRAY	SPC
4740	881.28	679.35	1.43		0804	SHALY LIMESTONE,FGR,MAS	HRD DRK GRY SPC
4760	879.85	680.78	1.43		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY CLY MID
4780	878.42	681.21	.43		0124	SHALE,DARK GRAY	CLY SPC
4800	877.99	684.05	2.84		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	HRD SDY GLC
4820	875.15	689.61	5.56		0134	SHALE,LIGHT GRAY-GREEN	GLC
4840	869.59	690.64	1.03		0124	SHALE,DARK GRAY	
4860	868.56	691.33	.69		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
4880	867.87	692.52	1.19		0137	FIRECLAY,LIGHT GRAY-GREEN	SPC
4900	866.68	695.99	3.47		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	HRD SSS FLT SPC
4920	863.21	696.62	.63		0804	SHALY LIMESTONE,FGR,MAS	DRK HRD SPC
4940	862.58	697.43	.81		0904	LIMESTONE,FINE-GRAINED,MASSIVE	DRK HRD SPC
4960	861.77	698.23	.80		0137	FIRECLAY,LIGHT GRAY-GREEN	SPC
4980	860.97	699.05	.82		0904	LIMESTONE,FINE-GRAINED,MASSIVE	DRK HRD SPC
5000	860.15	704.62	5.57		0137	FIRECLAY,LIGHT GRAY-GREEN	SKD SPC
5020	854.58	705.61	.99		0194	SHALE,GRAY	DRK SDY SPC
5040	853.59	710.97	5.36		0194	SHALE,GRAY	SPC
5060	848.23	712.08	1.11		0124	SHALE,DARK GRAY	CLY SPC
5080	847.12	714.34	2.26		0194	SHALE,GRAY	GLC
5100	844.86	720.47	6.13		0324	SANDY SHALE,DARK GRAY,MASSIVE	SSS FLT MIC GLC
5120	838.73	722.99	2.52		0540	SANDSTONE,GRAY	FGR MIC COS SHS RIP SPC
5140	836.21	724.45	1.46		0124	SHALE,DARK GRAY	GLC
5160	834.75	729.41	4.96		0114	BLACK SHALE	PLT
5180	829.79	729.88	.47		0114	BLACK SHALE	CAR PLT
5200	829.32	729.88	.00	WS	0020	COAL	EXH
5220	829.32	731.73	1.85		0324	SANDY SHALE,DARK GRAY,MASSIVE	MIC PLT GLC
5240	827.47	743.98	12.25		0540	SANDSTONE,GRAY	VRY FGR MIC SHS RIP
5260	815.22	744.84	.86		0324	SANDY SHALE,DARK GRAY,MASSIVE	PLT SPC
5280	814.36	749.88	5.04		0134	SHALE,LIGHT GRAY-GREEN	GLC
5300	809.32	750.80	.92		0124	SHALE,DARK GRAY	PLT
5320	808.40	750.85	.05		0034	BONE	SHY
5340	808.35	751.27	.42		0021	COMMON BANDED COAL	
5360	807.93	751.55	.28		0034	BONE	SHY
5380	807.65	752.29	.74		0127	FIRECLAY,DARK GRAY	GLC
5400	806.91	753.68	1.39		0114	BLACK SHALE	COS SPC
5420	805.52	753.82	.14		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY SPC
5440	805.38	755.19	1.37		0124	SHALE,DARK GRAY	LIM GLC
5460	804.01	755.54	.35		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY SPC
5480	803.66	759.97	4.43		0134	SHALE,LIGHT GRAY-GREEN	SDY LIM GLC
5500	799.23	762.88	2.91		0134	SHALE,LIGHT GRAY-GREEN	SDY MIC HRD GLC
5520	796.32	770.91	8.03		0194	SHALE,GRAY	GLC
5540	788.29	773.95	3.04		0124	SHALE,DARK GRAY	CLY NBM GLC
5560	785.25	775.61	1.66		0134	SHALE,LIGHT GRAY-GREEN	SDY MIC GLC
5580	783.59	778.61	3.00		0194	SHALE,GRAY	GLC

DRILL HOLE MB81 56

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
5600	780.59	778.76	.15		0194	SHALE,GRAY	LIM SPC
5620	780.44	782.39	3.63		0904	LIMESTONE,FINE-GRAINED,MASSIVE	BRN GRY HRD SPC
5640	776.81	784.41	2.02		0544	SANDSTONE,GRAY,MASSIVE	MIC LIM SPC
5660	774.79	784.57	.16		0137	FIRECLAY,LIGHT GRAY-GREEN	LIM SPC
5680	774.63	785.13	.56		0904	LIMESTONE,FINE-GRAINED,MASSIVE	BRN GRY HRD GLC
5700	774.07	794.43	9.30		0134	SHALE,LIGHT GRAY-GREEN	MIC SDY CAN RAR
5720	764.77	796.34	1.91		0134	SHALE,LIGHT GRAY-GREEN	SKD CLY SPC
5740	762.86	798.39	2.05		0544	SANDSTONE,GRAY,MASSIVE	FGR MIC SPC
5760	760.81	802.98	4.59		0124	SHALE,DARK GRAY	SPC
5780	756.22	803.93	.95		0137	FIRECLAY,LIGHT GRAY-GREEN	SPC
5800	755.27	807.61	3.68		0100	SHALE	GRN LIM CAN SPC
5820	751.59	808.90	1.29		0134	SHALE,LIGHT GRAY-GREEN	SDY MIC SPC
5840	750.30	813.63	4.73		0544	SANDSTONE,GRAY,MASSIVE	MIC FGR SHS RIP SPC
5860	745.57	818.43	4.80		0134	SHALE,LIGHT GRAY-GREEN	GLC
5880	740.77	821.68	3.25		0124	SHALE,DARK GRAY	CLY RAR SPC
5900	737.52	825.37	3.69		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	MIC GLC
5920	733.83	827.88	2.51		0334	SANDY SHALE,LT GRY-GRN,MASSIVE	SSS GLC
5940	731.32	877.30	49.42	WD	0544	SANDSTONE,GRAY,MASSIVE	XBD CGR MID SHB RAR SPC
5960	681.90	877.58	.28		0137	FIRECLAY,LIGHT GRAY-GREEN	SPC
5980	681.62	878.24	.66		0124	SHALE,DARK GRAY	CLY SPC
6000	680.96	878.78	.54		0114	BLACK SHALE	COS PLT SPC
6020	680.42	879.23	.45	WB2	0020	COAL	BNY PYS
6040	679.97	880.57	1.34	WB2	0020	COAL	SHS PYS
6060	678.63	880.79	.22	WP	0114	BLACK SHALE	
6080	678.41	881.24	.45	WB1	0020	COAL	BNY
6100	677.96	884.26	3.02		0134	SHALE,LIGHT GRAY-GREEN	SSS
6120	674.94	886.48	2.22		0544	SANDSTONE,GRAY,MASSIVE	FGR MIC SHS COS RIP SPC
6140	672.72	895.48	9.00		0324	SANDY SHALE,DARK GRAY,MASSIVE	MIC PLT NTP GLC
6160	663.72	897.20	1.72		0134	SHALE,LIGHT GRAY-GREEN	LIM GLC
6180	662.00	902.72	5.52		0134	SHALE,LIGHT GRAY-GREEN	MIC SPC
6200	656.48	906.14	3.42		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
6220	653.06	912.98	6.84		0134	SHALE,LIGHT GRAY-GREEN	LIM SKD GLC
6240	646.22	915.33	2.35		0137	FIRECLAY,LIGHT GRAY-GREEN	SKD SPC
6260	643.87	918.77	3.44		0194	SHALE,GRAY	MIC SPC
6280	640.43	922.52	3.75		0544	SANDSTONE,GRAY,MASSIVE	XBD MIC FGR SHS RIP SPC
6300	636.68	926.51	3.99		0194	SHALE,GRAY	SPC
6320	632.69	927.17	.66		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
6340	632.03	930.77	3.60		0194	SHALE,GRAY	SPC
6360	628.43	941.98	11.21		0124	SHALE,DARK GRAY	SPC
6380	617.22	948.80	6.82		0124	SHALE,DARK GRAY	BKN CLS SPC
6400	610.40	949.45	.65	UT	0020	COAL	BNY GLC
6420	609.75	950.65	1.20	UT	0021	COMMON BANDED COAL	DUL COM
6440	608.55	952.16	1.51		0124	SHALE,DARK GRAY	LIM HRD SPC
6460	607.04	952.94	.78		0127	FIRECLAY,DARK GRAY	SKD SPC
6480	606.26	954.87	1.93		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
6500	604.33	960.66	5.79		0804	SHALY LIMESTONE,FGR,MAS	HRD SPC
6520	598.54	967.51	6.85		0134	SHALE,LIGHT GRAY-GREEN	SDY SPC
6540	591.69	972.94	5.43		0194	SHALE,GRAY	MIC SPC
6560	586.26	975.55	2.61		0904	LIMESTONE,FINE-GRAINED,MASSIVE	DRK HRD

DRILL HOLE MB81 56

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
6580	583.65	979.55	4.00		0904	LIMESTONE,FINE-GRAINED,MASSIVE	LIT GRY HRD SPC
6600	579.65	981.35	1.80		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY GLC
6620	577.85	987.45	6.10		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY BRN SPC
6640	571.75	989.28	1.83		0194	SHALE,GRAY	CLY LIM SPC
6660	569.92	998.48	9.20		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
6680	560.72	1001.66	3.18		0804	SHALY LIMESTONE,FGR,MAS	GRY HRD SPC
6700	557.54	1010.00	8.34		0194	SHALE,GRAY	CLY RED RAR SPC
6720	549.20	1011.20	1.20		0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD SPC
6740	548.00	1016.00	4.80		0194	SHALE,GRAY	CLY SPC
6760	543.20	1029.57	13.57	BN	0804	SHALY LIMESTONE,FGR,MAS	GRY DRK HRD
6780	529.63	1030.45	.88	BN	0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY HRD GLC
6800	528.75	1037.51	7.06	BN	0804	SHALY LIMESTONE,FGR,MAS	GRY HRD SPC
6820	521.69	1037.87	.36	BN	0194	SHALE,GRAY	CLY SPC
6840	521.33	1043.29	5.42	BN	0904	LIMESTONE,FINE-GRAINED,MASSIVE	DRK HRD $$$ NTP SHS RAR
6860	515.91	1049.25	5.96	BN	0804	SHALY LIMESTONE,FGR,MAS	DRK HRD SPC
6880	509.95	1063.21	13.96	BN	0904	LIMESTONE,FINE-GRAINED,MASSIVE	DRK HRD GLC
6900	495.99	1063.73	.52	BN	0804	SHALY LIMESTONE,FGR,MAS	DRK HRD SPC
6920	495.47	1069.34	5.61	BN	0904	LIMESTONE,FINE-GRAINED,MASSIVE	DRK HRD GLC
6940	489.86	1070.64	1.30	BN	0804	SHALY LIMESTONE,FGR,MAS	DRK HRD SPC
6960	488.56	1073.13	2.49		0137	FIRECLAY,LIGHT GRAY-GREEN	SFT SKD SPC
6980	486.07	1074.11	.98		0114	BLACK SHALE	
7000	485.09	1074.11	.00	SW	0020	COAL	EXH
7020	485.09	1076.57	2.46		0124	SHALE,DARK GRAY	
7040	482.63	1081.13	4.56		0194	SHALE,GRAY	DRK SDY SSS FLT MIC SPC
7060	478.07	1082.45	1.32		0544	SANDSTONE,GRAY,MASSIVE	MIC FGR SHS RIP SPC
7080	476.75	1087.23	4.78		0124	SHALE,DARK GRAY	SDY SSS FLT GLC
7100	471.97	1092.30	5.07		0124	SHALE,DARK GRAY	BLK NBM SPC
7120	466.90	1092.49	.19		0113	BLACK SHALE WITH COAL STREAKS	BNY
7140	466.71	1092.64	.15		0021	COMMON BANDED COAL	DUL
7160	466.56	1092.75	.11		0114	BLACK SHALE	CAR PLT
7180	466.45	1093.54	.79		0194	SHALE,GRAY	CLS SPC
7200	465.66	1094.53	.99		0124	SHALE,DARK GRAY	LIM SPC
7220	464.67	1095.42	.89		0127	FIRECLAY,DARK GRAY	SPC
7240	463.78	1107.29	11.87	SL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	SHS SPC
7260	451.91	1108.91	1.62	SL	0101	CLAYSTONE	GRN SKD SPC
7280	450.29	1109.98	1.07	SL	0804	SHALY LIMESTONE,FGR,MAS	DRK SPC
7300	449.22	1123.55	13.57	SL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	GRY SPC
7320	435.65	1124.34	.79	SL	0804	SHALY LIMESTONE,FGR,MAS	HRD DRK SPC
7340	434.86	1127.67	3.33	SL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	SPC HRD
7360	431.53	1127.98	.31	SL	0194	SHALE,GRAY	CLY SPC
7380	431.22	1131.08	3.10	SL	0904	LIMESTONE,FINE-GRAINED,MASSIVE	SPC HRD GRY
7400	428.12	1131.89	.81		0194	SHALE,GRAY	CLY LIM SPC
7420	427.31	1134.66	2.77		0101	CLAYSTONE	GRN SKD BKN SPC
7440	424.54	1141.66	7.00		0804	SHALY LIMESTONE,FGR,MAS	HRD GRY GLC
7460	417.54	1144.55	2.89		0100	SHALE	GRN CLY LIM GLC
7480	414.65	1145.94	1.39		0137	FIRECLAY,LIGHT GRAY-GREEN	GLC
7500	413.26	1148.25	2.31		0194	SHALE,GRAY	CLY GLC
7520	410.95	1150.81	2.56		0101	CLAYSTONE	GRY SPC
7540	408.39	1153.49	2.68		0194	SHALE,GRAY	CLY SPC

DATE OF LISTING : 05/23/86

DRILL HOLE MB81 56

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
7560	405.71	1155.91	2.42		0124	SHALE,DARK GRAY	SDY SSS FLT RAR GLC
7580	403.29	1161.45	5.54		0194	SHALE,GRAY	GLC
7600	397.75	1170.02	8.57		0124	SHALE,DARK GRAY	MIC SSS FLT SPC
7620	389.18	1170.42	.40		0544	SANDSTONE,GRAY,MASSIVE	FGR MIC GLC
7640	388.78	1172.93	2.51		0124	SHALE,DARK GRAY	MIC SDY SSS FLT GLC
7660	386.27	1174.57	1.64		0544	SANDSTONE,GRAY,MASSIVE	MIC FGR SHS FLT COS SPC
7680	384.63	1181.48	6.91		0124	SHALE,DARK GRAY	MIC SHS RAR PLT GLC
7700	377.72	1181.96	.48		0124	SHALE,DARK GRAY	SPC
7720	377.24	1182.02	.06		0101	CLAYSTONE	SFT GRY SPC
7740	377.18	1182.19	.17		0124	SHALE,DARK GRAY	SPC
7760	377.01	1182.22	.03		0101	CLAYSTONE	GRY SFT SPC
7780	376.98	1182.43	.21		0124	SHALE,DARK GRAY	SPC
7800	376.77	1184.87	2.44		0101	CLAYSTONE	SFT GRY SPC
7820	374.33	1185.15	.28	P1	0021	COMMON BANDED COAL	
7840	374.05	1185.32	.17	P1	0021	COMMON BANDED COAL	PYS NTP
7860	373.88	1185.49	.17	P1	0021	COMMON BANDED COAL	PYS NTP
7880	373.71	1185.50	.01	P1	0080	PYRITE	
7900	373.70	1185.54	.04	P1	0021	COMMON BANDED COAL	
7920	373.66	1185.57	.03	P1	0124	SHALE,DARK GRAY	
7940	373.63	1185.72	.15	P1	0021	COMMON BANDED COAL	
7960	373.48	1185.87	.15	P1	0124	SHALE,DARK GRAY	
7980	373.33	1185.95	.08	P1	0021	COMMON BANDED COAL	
8000	373.25	1185.97	.02	P1	0124	SHALE,DARK GRAY	
8020	373.23	1186.16	.19	P1	0021	COMMON BANDED COAL	
8040	373.04	1186.40	.24	DS	0194	SHALE,GRAY	MED DRK CLY RAR SPC
8060	372.80	1186.58	.18	DS	0101	CLAYSTONE	SFT DRK GRY SPC
8080	372.62	1186.73	.15	DS	0194	SHALE,GRAY	CLY DRK SPC
8100	372.47	1186.89	.16	PG	0021	COMMON BANDED COAL	BNY
8120	372.31	1187.16	.27	PG	0021	COMMON BANDED COAL	
8140	372.04	1187.18	.02	PG	0021	COMMON BANDED COAL	PYS
8160	372.02	1187.24	.06	PG	0021	COMMON BANDED COAL	PYS NBM
8180	371.96	1187.53	.29	PG	0021	COMMON BANDED COAL	
8200	371.67	1187.56	.03	PG	0021	COMMON BANDED COAL	PYS
8220	371.64	1187.95	.39	PG	0021	COMMON BANDED COAL	
8240	371.25	1187.96	.01	PG	0124	SHALE,DARK GRAY	
8260	371.24	1188.54	.58	PG	0020	COAL	SHY BNY HRD
8280	370.66	1189.22	.68	PG	0021	COMMON BANDED COAL	SHB NBM
8300	369.98	1189.88	.66	PG	0021	COMMON BANDED COAL	
8320	369.32	1190.05	.17	PG	0021	COMMON BANDED COAL	PYB
8340	369.15	1191.72	1.67	PG	0021	COMMON BANDED COAL	
8360	367.48	1191.84	.12		0124	SHALE,DARK GRAY	CLY SPC
8380	367.36	1194.45	2.61		0804	SHALY LIMESTONE,FGR,MAS	GLC HRD
8400	364.75	1195.01	.56		0194	SHALE,GRAY	CLY RAR LIM SPC
8420	364.19	1196.24	1.23		0101	CLAYSTONE	MED GRY SKD SPC
8440	362.96	1197.75	1.51		0904	LIMESTONE,FINE-GRAINED,MASSIVE	HRD GRY SPC
8460	361.45	1199.01	1.26		0101	CLAYSTONE	MED GRY GLC
8480	360.19	1207.21	8.20		0300	SANDY SHALE	MED GRY GLC
8500	351.99	1208.78	1.57		0124	SHALE,DARK GRAY	SPC
8520	350.42	1209.44	.66		0300	SANDY SHALE	GRY SPC

DRILL HOLE MB81 56

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
8540	349.76	1210.00	.56		0544	SANDSTONE,GRAY,MASSIVE	LIT GRY FGR

DRILL HOLE D 57

NORTH: 238709.00 EAST: 1263359.00 SOURCE:2 LOCATION:1 SURF.ELEV.: 1144.68 DET.:6

STATE:37 PENNSYLVANIA COUNTY: 59 GREENE TWP.: RANGE: MERIDIAN:000 SECTION:00 SECTION CODE:

USGS QUAD:WINDRIDGE SIZE:1 TOWNSHIP:RICHHILL PROP/FARM:JAMES ALLUM AZIMUTH: INC:

DATE DRILLED FROM: TO:02/22/57 CONTRACTOR:B B R DRILLER:R. ANDERSON INSP:J. VONFELD

ELOG	DRILL TYPE	FLUID TYPE	FLOW	CEMENT	WRAPPING	CONTAINER	CORED	UNITS OF MEASURE
0	1	2	0	0	0	0	0	E

DATA SOURCE:CONSOL

COMMENTS

MINE BLOCK NO. 3

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
20	1144.68	11.00	11.00		0001	SURFACE CASING,OVERBURDEN	
40	1133.68	15.00	4.00		0100	SHALE	GRY
60	1129.68	16.25	1.25		0100	SHALE	GRY SDY
80	1128.43	18.92	2.67		0063	CLAY	GRY SHY
100	1125.76	19.58	.66		0100	SHALE	BLK
120	1125.10	19.92	.34	TM	0020	COAL	
140	1124.76	23.92	4.00		0063	CLAY	GRY SHY
160	1120.76	26.50	2.58		0100	SHALE	GRY
180	1118.18	33.50	7.00		0063	CLAY	GRY SHY
200	1111.18	55.50	22.00		0100	SHALE	GRY
220	1089.18	78.17	22.67		0100	SHALE	GRY SDY
240	1066.51	90.17	12.00		0100	SHALE	DRK GRY
260	1054.51	94.17	4.00		0100	SHALE	GRY
280	1050.51	96.67	2.50	UL	0900	LIMESTONE	GRY
300	1048.01	106.67	10.00	UL	0100	SHALE	GRY LIM NOD
320	1038.01	107.33	.66		0063	CLAY	DRK GRY SHY
340	1037.35	129.33	22.00		0100	SHALE	GRY LIM NOD
360	1015.35	136.00	6.67		0063	CLAY	DRK GRY SHY
380	1008.68	149.67	13.67		0100	SHALE	GRY
400	995.01	162.50	12.83		0500	SANDSTONE	GRY
420	982.18	166.50	4.00		0100	SHALE	DRK GRY
440	978.18	188.50	22.00		0100	SHALE	GRY SDY
460	956.18	193.25	4.75		0063	CLAY	GRN GRY SHY
480	951.43	201.00	7.75		0100	SHALE	GRN GRY
500	943.68	206.17	5.17		0063	CLAY	RED GRY SHY
520	938.51	207.58	1.41		0900	LIMESTONE	GRY
540	937.10	209.58	2.00		0100	SHALE	GRY
560	935.10	210.25	.67		0900	LIMESTONE	GRY
580	934.43	210.67	.42		0100	SHALE	GRY

DRILL HOLE D 57

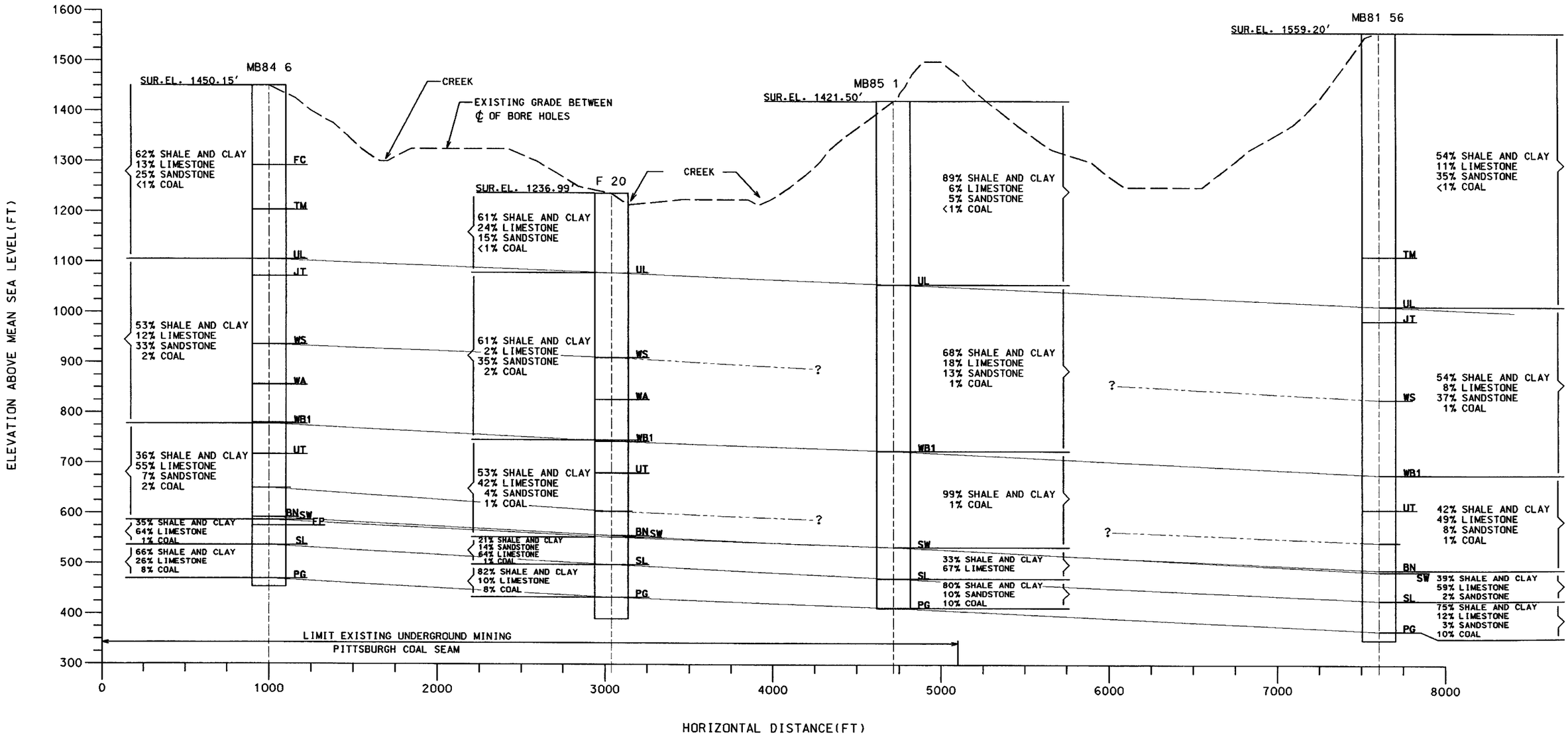
SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
1480	674.18	480.50	10.00		0100	SHALE	GRY CAL
1500	664.18	485.58	5.08		0100	SHALE	GRY SDY
1520	659.10	486.00	.42		0100	SHALE	GRY
1540	658.68	486.50	.50		0500	SANDSTONE	GRY
1560	658.18	497.50	11.00		0100	SHALE	GRY SDY LIM NOD
1580	647.18	507.67	10.17		0500	SANDSTONE	GRY
1600	637.01	516.08	8.41		0100	SHALE	DRK GRY
1620	628.60	517.83	1.75	UT	0020	COAL	
1640	626.85	519.83	2.00		0100	SHALE	DRK GRY
1660	624.85	542.25	22.42		0100	SHALE	GRN GRY LIM NOD
1680	602.43	545.58	3.33		0900	LIMESTONE	GRY
1700	599.10	547.50	1.92		0100	SHALE	GRY LIM NOD
1720	597.18	548.17	.67		0063	CLAY	GRY
1740	596.51	564.67	16.50		0900	LIMESTONE	GRY ARG
1760	580.01	565.67	1.00		0100	SHALE	GRN GRY
1780	579.01	568.08	2.41		0100	SHALE	RED GRN GRY
1800	576.60	578.83	10.75		0900	LIMESTONE	GRY ARG
1820	565.85	582.83	4.00		0100	SHALE	GRN GRY
1840	561.85	585.08	2.25		0100	SHALE	GRY
1860	559.60	590.08	5.00		0100	SHALE	GRY ARG
1880	554.60	594.83	4.75		0100	SHALE	GRY
1900	549.85	618.83	24.00		0900	LIMESTONE	GRY ARG
1920	525.85	625.42	6.59		0100	SHALE	GRY
1940	519.26	637.83	12.41	BN	0900	LIMESTONE	GRY
1960	506.85	639.58	1.75		0100	SHALE	DRK GRY ARG
1980	505.10	640.58	1.00		0063	CLAY	DRK GRY
2000	504.10	641.42	.84		0100	SHALE	DRK GRY
2020	503.26	642.42	1.00	SW	0020	COAL	
2040	502.26	644.42	2.00		0100	SHALE	DRK GRY
2060	500.26	653.42	9.00		0100	SHALE	GRY SDY
2080	491.26	656.58	3.16		0100	SHALE	DRK GRY SDY
2100	488.10	660.42	3.84		0100	SHALE	DRK GRY
2120	484.26	661.08	.66	FP	0020	COAL	BLK SHY
2140	483.60	662.50	1.42		0100	SHALE	DRK GRY
2160	482.18	666.83	4.33		0100	SHALE	GRY
2180	477.85	675.50	8.67	SL	0900	LIMESTONE	GRY ARG
2200	469.18	678.00	2.50	SL	0100	SHALE	GRY
2220	466.68	699.67	21.67	SL	0900	LIMESTONE	GRY
2240	445.01	699.67	.00	RD	0020	COAL	
2260	445.01	703.50	3.83		0063	CLAY	GRY SHY
2280	441.18	711.50	8.00		0100	SHALE	GRY CAL
2300	433.18	716.08	4.58		0100	SHALE	GRN GRY
2320	428.60	717.42	1.34		0100	SHALE	DRK GRY
2340	427.26	723.75	6.33		0100	SHALE	GRY SDY

DRILL HOLE D 57

SEQ.NO.	ELEV. OF TOP OF UNIT	DEPTH TO BOTTOM OF UNIT	THICKNESS OF UNIT	CORR. CODE	LITH CODE	LITHOLOGY	CHARACTERISTICS
2360	420.93	730.00	6.25		0100	SHALE	DRK GRY
2380	414.68	732.42	2.42		0100	SHALE	GRY SDY
2400	412.26	742.50	10.08		0100	SHALE	DRK GRY
2420	402.18	748.50	6.00		0100	SHALE	DRK GRY SDY
2440	396.18	752.00	3.50		0100	SHALE	BLK
2460	392.68	753.33	1.33		0100	SHALE	DRK GRY
2480	391.35	753.92	.59	P2	0020	COAL	
2500	390.76	754.17	.25		0100	SHALE	DRK GRY
2520	390.51	754.79	.62	P1	0020	COAL	
2540	389.89	754.98	.19	DS	0100	SHALE	BLK
2560	389.70	755.81	.83	PG	0020	COAL	
2580	388.87	757.27	1.46	PG	0020	COAL	
2600	387.41	757.41	.14	PG	0020	COAL	
2620	387.27	760.33	2.92	PG	0020	COAL	
2640	384.35	760.83	.50	PG	0020	COAL	
2660	383.85	763.00	2.17		0063	CLAY	DRK GRY SHY

EXHIBIT 7.2

GEOLOGIC SECTIONS



GEOLOGIC CROSS SECTION

50 0 50 100 200 300
VERTICAL SCALE(FT)

150 0 150 300 600 900
HORIZONTAL SCALE(FT)

NOTE:
SEE DRWG GS-2 FOR LEGEND OF STRATA CORRELATION CODES.

SEE EXHIBIT 8.2B HYDROLOGIC DATA MAP FOR BOREHOLE AND SECTION LOCATIONS

REV.	REVISION DESCRIPTION	MADE BY	CHKD BY	DATE
8				
7				
6				
5				

REV.	REVISION DESCRIPTION	MADE BY	CHKD BY	DATE
4				
3				
2				
1				

Moody and Associates
PROJECT NO. 00-369-WW
CAD FILENAME GS-1/Z.DGN

CONSOL ENERGY
THIS DRAWING IS THE PROPERTY OF CONSOL ENERGY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH OUR WORK. ALL RIGHTS OF REUSE OR REPRODUCTION ARE RESERVED

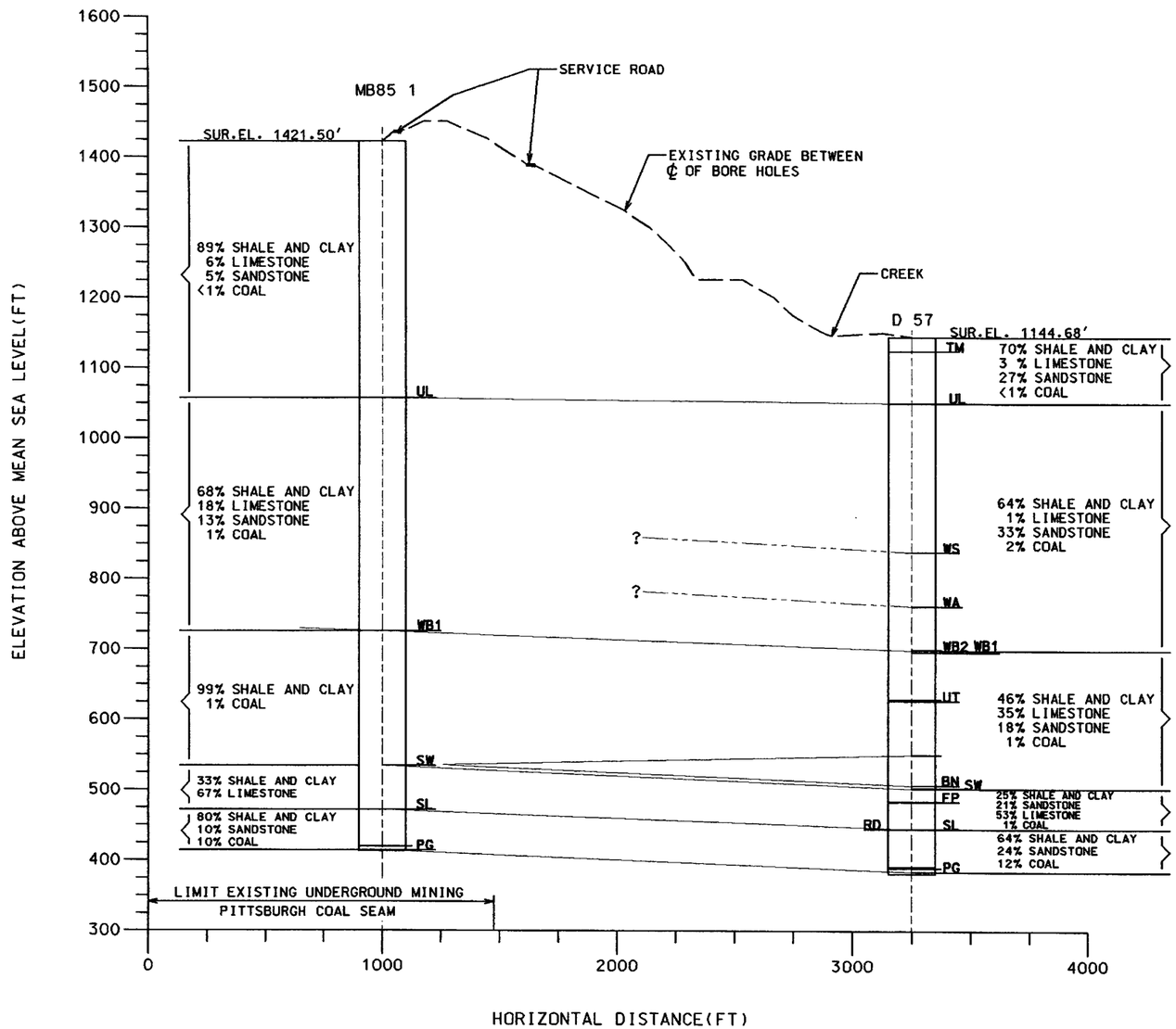
SEAL

MODULE 7. EXHIBIT 7.2
GEOLOGIC CROSS SECTIONS
SHEET 1 of 2

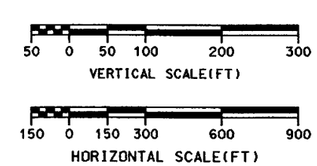
BAILEY PREPARATION COMPLEX
PROPOSED COAL REFUSE STORAGE AREA
GREENE COUNTY, PENNSYLVANIA

DRAWN	CHECKED	APPROVED	SCALE
C.D.Goodwin	D.N.Goodwin		AS SHOWN
DATE 12-31-01	DATE 01-02-02	DATE	

DRAWING NO. GS-1
REVISION 0



GEOLOGIC CROSS SECTION



LEGEND OF GEOLOGIC CORRELATION CODES NORTHERN APPALACHIAN REGION

AC	Ames Coal
AD	'A' Donley Limestone
AM	Ames Limestone
AS	Arnoldsburg Sandstone
BC	Brush Creek Coal
BC1	Brush Creek Coal Lower Bench
BC2	Brush Creek Coal Upper Bench
BH	Briar Hill Sandstone
BJ	"B" Jollytown Limestone"
BK	Bakerstown Coal (undiff.)
BL	Brush Creek Limestone
BN	Benwood Limestone
CP	'C' Prosperity Limestone
CR	Creston Red Beds
CS	Cassville Shale
DC	'D' Claysville Limestone
DK	Dunkard Coal
DN	Dunlap Sandstone
DQ	Duquesne Coal
DS	Drawslate (PG Seam)
DV	Davistown Sandstone
EL	Elk Lick Coal
FC	Fish Creek Coal
FP	Fishpot Coal
FS	Fish Creek Sandstone
FY	Fishpot Claystone
GS	Gilboy Sandstone
HR	Harlem Coal
JL	Jollytown Limestone
JT	Jollytown Coal
LA	Limestone 'A' (Uniontown)
LB	Limestone 'B' (Uniontown)
LC	Limestone 'C' (Uniontown)
LD	Limestone 'D' (Uniontown)
LL	Lower Washington Limestone
LN	Lower Uniontown Coal
LP	Little Pittsburgh Coal
LS	Lower Sewickley Sandstone
LSC	Lower Bakerstown Coal
LW	Little Washington Coal
LWS	Lower Washington Coal
MA	Mahoning Coal
MH	Mahoning Sandstone
ML	Middle Washington Limestone
MM	Mount Morris Limestone
MS	Morgantown Sandstone
NV	Ninevah Coal
P1	Pittsburgh 'Roof' / 'Rider' Coals
P2	Pittsburgh 'Roof' / 'Rider' Coals
P3	Pittsburgh 'Roof' / 'Rider' Coals
P4	Pittsburgh 'Roof' / 'Rider' Coals
P5	Pittsburgh 'Roof' / 'Rider' Coals
P6	Pittsburgh 'Roof' / 'Rider' Coals
PA	Pittsburgh Limestone 'A'
PB	Pittsburgh Limestone 'B'
PC	Pittsburgh Limestone 'C'
PG	Pittsburgh Coal (Main Bench)
PR	Pittsburgh 'Rooster' Coal
PS	Pittsburgh Sandstone
RB	Richhill Beds
RD	Redstone Coal
RL	Redstone Limestone
RR	Rush Run Sandstone
RS	Redstone Sandstone
SL	Sewickley (Fishpot) Limestone
SS	Sewickley Sandstone
SW	Sewickley Coal
TL	Ten Mile Limestone
TM	Ten Mile Limestone
UB	Upper Bakerstown Coal
UC	Upper Washington Claystone
UL	Upper Washington Limestone
UR	Upper Marietta Sandstone
US	Uniontown Sandstone
UT	Uniontown Coal
UW	Upper Washington Coal
UW1	Upper Washington Rider Coal
UW2	Upper Washington Rider Coal
WA	Waynesburg 'A' Coal
WA1	Waynesburg 'A' Rider Coal
WA2	Waynesburg 'A' Rider Coal
WB	Waynesburg Coal (undiff.)
WB1	Waynesburg Coal Lower Bench
WB2	Waynesburg Coal Upper Bench
WB3	Waynesburg 'Rider' Coal
WB4	Waynesburg 'Rider' Coal
WBB	Waynesburg 'B' Coal
WD	Waynesburg Sandstone
WD1	Waynesburg Sandstone Lower Bench
WD2	Waynesburg Sandstone Upper Bench
WL	Waynesburg Limestone
WM	Waynesburg Sandstone Parting
WP	Waynesburg Parting
WR	Woods Run Limestone
WS	Washington Coal
WS1	Washington 'Rider' Coal
WS2	Washington 'Rider' Coal
WS3	Washington 'Rider' Coal

REV.	REVISION DESCRIPTION	MADE BY	CHKD BY	DATE
8				
7				
6				
5				
4				
3				
2				
1				

Moody and Associates
PROJECT NO. 00-389-WW
CAD FILENAME GS-1/2.DGN

CONSOL ENERGY
THIS DRAWING IS THE PROPERTY CONSOL ENERGY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH OUR WORK. ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED

SEAL

MODULE 7, EXHIBIT 7.2
GEOLOGIC CROSS SECTIONS
SHEET 2 of 2

BAILEY PREPARATION COMPLEX
PROPOSED COAL REFUSE STORAGE AREA
GREENE COUNTY, PENNSYLVANIA

DRAWN	CHECKED	APPROVED	DRAWING NO.
C.D.Goodwin	D.N.Goodwin		GS-2
DATE 12-31-01	DATE 01-02-02	DATE	REVISION 0
			SCALE AS SHOWN

Module 8: Hydrology

8.1 Hydrologic Description - Permit Area.

The Module 8 was prepared by Moody and Associates, Inc.

Attach a narrative description of existing groundwater and surface water resources of the area to be affected by the proposed activity, addressing the items listed below. For underground mining operations separate descriptions should be prepared to address the underground permit area and surface activity sites where coal preparation, coal refuse disposal, coal storage, surface mining, and mine drainage treatment will take place. Information must be specific to the proposed permit area and not general statements from published regional hydrogeology reports.

a) The groundwater flow conditions (confined, unconfined, perched) within the permit and adjacent areas.

The occurrence and movement of ground water within the proposed refuse disposal area is a function of the geologic setting as described in Module 7. The bedrock is overlain by a mantle of soil and weathered bedrock. During periods of rapid recharge ground water may be found at the soil-bedrock interface and within the weathered bedrock zone. An abandoned well on the Olive Webb property located near the Webb 1 well (see Exhibit 8.2A Hydrogeologic Data Map) is 34.5 feet deep and is suspected to be a dug well completed in the layer of soil and weathered bedrock. Intermittent seeps were identified along the hillsides that appear to be related to this very shallow ground water zone. Ground water within this zone is under unconfined conditions.

Thin alluvial deposits were observed in the valley bottoms adjacent to the unnamed tributaries. These deposits are composed primarily of sandy silt. No wells completed in the alluvial deposits were identified in the vicinity of the proposed refuse disposal area. Ground water in this zone is under unconfined conditions.

In general, the underlying Greene Formation is a poor aquifer with median well yields of only two gallons per minute (Stoner, 1987). Ground water within the upper weathered zone of the Greene Formation is under water table or unconfined conditions. Deeper waters in the formation can be expected to be under semi-confined to confined conditions.

b) The depth to respective groundwater flow systems and seasonal fluctuations.

The depth to ground water within the proposed CRDA was determined from nine geotechnical core holes drilled as part of the design study. The locations of these core holes are shown on the Exhibit 8.2B Hydrologic Data Map and the logs are included in the Module 8 as ATTACHMENT 1. The water level measurements were made from open boreholes of varying depths and as such can not be used to construct a water table map. The following table summarizes the depths to ground water observed in the borings.

TABLE 1

Depth to the ground water surface in the geotechnical borings

Core Hole	Total Depth	Topographic Setting	Static Water Level
B-10	27.5'	Valley	17'
B-11	25'	Valley	5'
B-8	50'	Valley	6'
B-3	200'	Valley	5.9'
B-7	50'	Valley	2.8'
B-1	53'	Hillside	dry
B-4	100'	Hillside	3.6'
B-5A	150'	Hillside	12'
B-6	100'	Hilltop	90'

The depth to ground water in the valley bottom is relatively shallow and the water table was reported to be at or near the stream bed elevation. The depth to ground water on the hillsides and hilltops was variable, ranging from 3.6 feet in Boring B-4 to 90 feet in Boring B-6.

c) General patterns of groundwater movement.

Ground water movement is controlled by the hydraulic gradient, where ground water moves from areas of higher hydraulic head to areas of lower hydraulic head (Stoner and others, 1987). The flow gradients in the proposed new coal refuse disposal area are controlled by the local topography. Ground water flow is from the uplands on the hillsides and hilltops toward the valley bottoms to the east. Low permeability beds within the stratigraphic section slow ground water infiltration and joints or joint patterns that intersect these beds provide for water collection and enhanced horizontal ground water flow which is discharged through hillside seeps and springs. Numerous seeps and springs of this type were inventoried within the proposed refuse disposal area valleys and on the adjacent hillsides outside the proposed disposal area. The locations of the identified springs and seeps are shown on Exhibit 8.2A Hydrogeologic Data Map.

d) Any unusual conditions that influence groundwater movement.

There were no unusual ground water or surface water conditions identified.

e) The relationship between groundwater discharge and surface water flow.

The base flow of the unnamed tributaries in the proposed slurry valley and coarse refuse valley is maintained by ground water flow (Stoner and others, 1987). The source of this water is the shallow ground water flow system discussed in Sections 8.1 a), b) and c). During dry times of the year the water table may drop below the elevation of portions of the streambeds. At these times the streams or portions thereof may cease to flow.

f) The general quality and quantity of water in aquifers that serve as current sources of supply and those which may be used to develop alternate supplies.

There are only three ground water supplies located within 1000 feet of the proposed refuse disposal area. The owners of these supplies have indicated the quantity and quality of water is adequate to meet their needs. The details of these supplies are summarized on 8.3A and 8.4A Forms.

g) The impact of past mining activities on the quality and quantity of local water resources.

An abandoned well on the Olive Webb property, which is located within the proposed coal refuse disposal area, appears to have been affected by past underground coal mining activities in 1987. A replacement well (Webb 1 well, see Exhibit 8.2 A Hydrologic Data Map) was drilled on the Webb property. The Webb 1 well has met the daily needs of the homeowner and the well remains in service today. CPCC has reached an agreement to purchase the Webb property. The Webb 1 well is to be plugged and abandoned.

An evaluation of the current ground water quality in this area was completed in order to evaluate if the existing Bailey CRDA had any detrimental impacts on the local ground water quality. The findings of this evaluation are presented below.

Evaluation of the impacts of the existing Bailey CRDA on ground water and surface water

Introduction

The existing Bailey Mine central coal processing and refuse disposal facility began operation in 1982 and currently encompasses approximately 1000 acres for the total site footprint. The site consists of a coal preparation plant, fine coal refuse disposal impoundment, coarse refuse disposal area, support areas and numerous sedimentation ponds. Coal mined from the Bailey and Enlow Fork Mines is transported to the Bailey central coal processing and refuse disposal facility via conveyor belts from the respective mines and is processed for use primarily as an energy source in electric generation. Presently approximately 25 million tons of coal is processed each year with 5 million tons of coarse and fine refuse placed in the adjacent existing coal refuse disposal area (CRDA).

Study Objectives

This study was undertaken to evaluate the performance of the existing coal refuse disposal facility relative to surface and ground water resources in the area. In particular, the study was designed to determine if the existing facility has degraded surface or ground water relative to the discharge requirements for iron, manganese, total suspended solids or pH. Numerous springs, wells and the spring collector were sampled as part of this investigation and as part of the monitoring requirements for the existing CRDA to characterize the shallow ground water regime adjacent to the Bailey CRDA. A substantial database of current and historical ground and surface water

quality has been accumulated for this evaluation. The locations of the sample points used in this evaluation are shown on the Exhibit 8.2A Hydrologic Data Map.

The analytical data for the sampling points are listed on the 8.4A Forms. A discussion of the analytical data is presented below to determine if the existing facility has degraded surface or ground water. The NPDES discharge requirements, which are the basis for the comparative analysis, are:

Iron	1.5 Average	3.0 Maximum
Manganese	1.5 Average	3.0 Maximum
Suspended Solids	35 Average	70 Maximum
pH	6 to 9	

Group 1 - We-A, We-B, We-C, Spring Collector No. 2, S-1 and S-2
Wells and springs within the existing CRDA. (See Exhibit 8.2A)

Monitoring well We-A is downgradient from the entire refuse area and monitors the quality of ground water exiting the site. Form 8.4A summarizes the water quality data from this point for the time period from September 1992 through June 2001. With respect to the parameters of interest (Fe, Mn, pH and TSS), the water quality is generally good and does not indicate adverse impacts from the existing refuse disposal facility. During this monitoring period, iron only exceeded the allowable discharge average twice and only once did iron exceed the instantaneous maximum discharge limit. On both of these occasions the suspended solids exceeded 100 mg/l and it is presumed that this contributed to the abnormal iron levels. The data do not indicate that iron presents a trend of ground water degradation at this monitoring point. Manganese did not exceed the discharge limits in any samples. On a few occasions, lab pH exceeded the upper limit of 9; however, a trend of increasing pH was not apparent and the majority of pH values as shown appear to be characteristic of well We-A.

Analytical data for We-B (located downgradient from the existing slurry pond) and We-C (located downgradient from the existing coarse refuse) were reviewed for the same 10 year period. The water quality from both wells was generally good with but four iron excursions in We-B and one iron and one manganese excursion in We-C. There is not a discernable trend of ground water degradation from the coal refuse disposal facility.

Likewise, the water quality data from Talley Run upstream (S1) and downstream (S2) does not indicate that the facility has adversely impacted the stream with respect to these four discharge parameters. From 1998 through the summer of 2001 no excursions were noted in S1 and in the database for the Talley Run downstream station only one iron excursion and only eight total suspended solid excursions were documented. These few excursions are not indicative of a systematic degradation of the surface water quality in Talley Run.

Spring Collector No. 2, which discharges to a treatment pond, does exhibit iron concentrations in excess of the discharge standard for about half of the samples and manganese exceeds the standard for most of the sampling points. However, these seemingly elevated concentrations are attributed to the commingling of the spring

collector water with the leachate collection water at the sampling location. The water exiting from both the spring and leachate collectors discharge into the treatment pond from the rock drains. The leachate collector is located immediately above the spring collector. Separation of the two water flows has not been possible for many years and the spring collector water is mixed with the leachate water. The water quality data for the spring collector samples listed on the 8.4A forms represent commingled spring collector water and leachate collector water and are not representative of the spring water alone.

The Group 1 monitoring points located within the footprint of the existing Bailey CRDA do not indicate a continuing trend of ground or surface water degradation based on the discharge limits for iron, manganese, total suspended solids or pH.

Group 2 – S-5, S-6, S-7A, S-8A, S-10, S-11 and Spring E
Wells and springs on the hillside east and downdip of the coarse refuse area and across a surface water divide (see Exhibit 8.2A)

The water quality data for the Group 2 monitoring points indicate that the existing Bailey CRDA has not adversely impacted these springs with respect to iron, manganese, suspended solids or pH; however, suspended solids have exceeded the discharge limits on several occasions. These excursions are attributed to the physical conditions of the sampling site and not the migration of suspended solids from the existing Bailey CRDA. In most cases, the flow from the sampled springs was very low, the watercourse was very shallow and the substrate was composed of silt and clay. During sampling in this setting the substrate may have been disturbed and a small amount of mud may have been unintentionally included in the sample. The occasional elevated suspended solids reported on the 8.4A Forms can be attributed to these sampling conditions.

Group 3 – S-14, S-15, S-16 and S-17
Springs in unnamed tributary east of the coarse refuse area and north of new CRDA (See Exhibit 8.2A)

The water quality data for these monitoring points indicate that the existing Bailey CRDA has not adversely impacted the springs with respect to iron, manganese, suspended solids or pH. On one occasion, the total suspended solids exceeded the discharge limits in S-16. The flow from the sampled springs was very low, the watercourse was very shallow and the substrate was composed of silt and clay. During sampling in this setting the substrate may have been disturbed and a small amount of mud may have been unintentionally included in the sample. The occasional elevated suspended solids reported on the 8.4A Forms can be attributed to these sampling conditions.

Group 4 – S-18, S-19, S-20 and S-30
Springs southeast of the existing refuse disposal area and within new CRDA (See Exhibit 8.2A)

The water quality data for these monitoring points indicate the existing Bailey CRDA has not adversely impacted the springs with respect to iron, manganese, suspended solids or pH. On one occasion, the total suspended solids exceeded the discharge limits in

S-19. The flow from the sampled springs was very low, the watercourse was very shallow and the substrate was composed of silt and clay. During sampling in this setting the substrate may have been disturbed and a small amount of mud may have been unintentionally included in the sample. The occasional elevated suspended solids reported on the 8.4A Forms can be attributed to these sampling conditions.

Group 5 – S-21, S-22, S-23, S-24, S-25, S-26, S-31, S-32, S-33, S-34, S-35, S-36 and S-37
Springs southeast of the existing refuse disposal area and at lower elevation in new CRDA (see Exhibit 8.2A)

The water quality data for the Group 5 monitoring points indicate the existing Bailey CRDA has not adversely impacted these springs with respect to iron, manganese, suspended solids or pH; however, suspended solids have exceeded the discharge limits on several occasions. These excursions are attributed to the physical conditions of the sampling site and not the migration of suspended solids from the existing Bailey CRDA. In most cases, the flow from the sampled springs was very low, the watercourse was very shallow and the substrate was composed of silt and clay. During sampling in this setting the substrate may have been disturbed and a small amount of mud may have been unintentionally included in the sample. The occasional elevated suspended solids reported on the 8.4A Forms can be attributed to these sampling conditions.

Group 6 – S-1A, S-2A, S-3A, S-7, S-8, S-9, Spring D and Well 53
Springs and wells south of existing CRDA (see Exhibit 8.2A)

The water quality data for the Group 6 monitoring points indicates the refuse facility has not adversely impacted the springs with respect to iron, manganese, suspended solids or pH. On several occasions, the total suspended solids exceeded the discharge limit. These excursions are attributed to the physical conditions of the sampling site and not the migration of suspended solids from the existing Bailey CRDA. In most cases, the flow from the sampled springs was very low, the watercourse was very shallow and the substrate was composed of silt and clay. During sampling in this setting the substrate may have been disturbed and a small amount of mud may have been unintentionally included in the sample. The occasional elevated suspended solids reported on the 8.4A Forms can be attributed to these sampling conditions. On one occasion the iron limit of 1.5 mg/l was exceeded in Well 52 and on two occasions the iron limit was exceeded in Well 53. In both of these wells the limited occurrence of relative high iron levels did not appear to represent a trend or indication that the existing facility had negatively impacted the water resources.

Conclusions

A total of six groupings of ground and surface water monitoring points have been evaluated within and around the existing Bailey refuse disposal area were evaluated. The water quality in the area was evaluated in terms of the discharge limits for the facility for iron (1.5 mg/l), manganese (1.5 mg/l), total suspended solids (35 mg/l) and pH (6-9). The data clearly indicates the ground water and surface water resources in the area have not been negatively impacted by the existing coarse and fine refuse disposal facility. Almost all of the water quality test results were below the discharge limits.

Although the limits were exceeded in a few isolated cases, no trends or indications of long term impacts were detected. The few excursions identified as discussed above were not attributed to the migration of contaminants from the existing Bailey CRDA, but were attributed to the variability of data sets of this type. The inherent difficulties associated with obtaining sediment free samples in very shallow slow moving water with mud substrates and the natural variability of ground water and surface water chemistry contributed to the variations in the data.

h) Document the nature of water problems or peculiar conditions associated with the operation (zones of high inflow, breached barriers, drainage conduits from other workings, etc.)

Not applicable

8.2 Hydrologic Data Map.

Provide a 7.5 minute USGS map showing the following information. Include a legend indicating map title, activity name, coal seam to be mined, company name, township, county, scale, quadrangle name, and date.

Due to the amount of information presented, two hydrologic data maps identified as Exhibit 8.2A and Exhibit 8.2B are included with the Module 8.

a) Permit boundaries of the proposed activity (underground permit area boundaries in the case of an underground mine).

Shown on Exhibits 8.2A and 8.2B Hydrologic Data Maps.

b) Outline(s) and openings of underground mines and surface mines within 1000 feet of the proposed permit area (show permit limits in cases where adjacent mining has not yet transgressed into the review area).

Shown on Exhibits 8.2A and 8.2B Hydrologic Data Maps

c) Seeps and discharges from mines which lie above, below, or within 1000 feet of the permit area.

All mine water from the CPCC Enlow Fork Mine and Bailey Mine is pumped into the slurry pond in the existing coal refuse disposal area.

d) Sources of public water supply within 1 mile of the permit boundary.

Shown on Exhibits 8.2A Hydrologic Data Map

e) Proposed point source discharges.

Treated effluent from the facility will be discharged from a proposed water treatment pond immediately upstream from proposed surface water point SW-N. (See Exhibit 8.2A Hydrologic Data Map)

f) Proposed groundwater and surface water background and life-of-mine monitoring points.

See Exhibit 8.2A Hydrologic Data Map

g) Fold axes.

See Exhibit 8.2B Hydrologic Data Map

h) Geologic faults.

No geologic faults were identified.

i) Fracture traces.

See Exhibit 8.2B Hydrologic Data Map

j) Outcrop of coal seam to be mined.

Not applicable

k) Structure contours of the coal seam to be mined.

Not applicable

l) Lines of geologic cross section (key to 7.2).

See Exhibit 8.2B Hydrologic Data Map

8.3 Inventory Information.

a) Well and spring inventory -

1) Using Form 8.3A provides inventory data on all well and spring supplies which are located within 1000 feet of the permit area (underground permit area in the case of an underground mine).

See Form 8.3A

2) If the application is for an underground mine and mining operations will encroach within 2,000 feet of a well or spring which serves as a significant source of public water supply, identify the horizontal and vertical extent of the aquifer which feeds it on the map in Exhibit 22.4 and the cross sections in 7.2. Attach a description of how this determination was made including all relevant pumping test results, water level measurements, geologic considerations, drawdown calculations, etc.

Not applicable.

b) Stream inventory -

1) Using Form 8.3B provide inventory information for the following streams.

See Form 8.3B

i) For streams which will receive discharges from the proposed activity provide the name, designated uses from 25 Pa Code Chapter 93, and general quality characteristics.

See Form 8.3B

ii) For streams which flow over the underground permit area of a proposed underground mine or within 200 feet of the underground permit boundaries, provide the name, flow characteristics (i.e., intermittent or perennial according to §89.141), average annual flow, surveyed uses, and general quality characteristics. Use the "segment" block to subdivide the stream into segments of similar flow characteristics and uses. Show all stream segments on the map in Exhibit 6.3. Also, list the basis for flow characterization, i.e. how was a given stream or segment determined to be nonperennial.

Not applicable.

iii) For streams which lie within 1000 feet of a proposed coal refuse disposal site, coal preparation site, or surface activity site, provide the name, flow characteristics (i.e., ephemeral, intermittent, or perennial according to §87.1), designated uses from 25 Pa. Code Chapter 93, and general quality characteristics.

See Form 8.3B

2) For a stream with a public water supply intake within 10 miles downstream of a site provide the following information, as specified.

i) If the stream will receive discharges from the proposed operation or lies within the site of a valley fill refuse disposal operation, provide a map of appropriate scale showing the location of the intake with respect to the site.

The location of the non-community water supply intake for the existing Bailey CRDA is shown on Exhibit 8.3A Hydrologic Data Map.

ii) If the stream is perennial according to §89.141 and flows over the underground permit area of a proposed underground mining operation or within 200 feet of the underground permit boundaries, provide either:

- A map of appropriate scale showing the respective drainage areas of the stream at the downstream limit of mining and at the point of intake; or
- the respective drainage areas (acres or square miles) at the downstream limit of mining and at the point of intake.

c) Adjacent mine discharges - Using Form 8.3C, list all discharge points from any adjacent underground, coal refuse operation, or surface mine which lies above, below or within 1000 feet of the permit area (underground permit area if application is for an underground mine). Include the mine name, description of the discharge, elevation, contributing pool level, range of flow rates, quality, and an indication of whether or not the discharge is treated.

Two active underground coal mines have discharge points within 1000 feet of the proposed refuse disposal facility. Both the Bailey and Enlow Fork Mines discharge pumped water to the slurry pond at the existing slurry pond west of the proposed new facility. While the characteristics of these discharges are detailed on the 8.3C Mine Discharge Inventory Form, the mine water is not discharged to the environment – but is reused in the existing coal preparation plant located west of the proposed facility

d) Lake, pond and dam information - Using Form 8.3D, provide information on all lakes ponds, dams and impoundments which lie within 1000 feet of the permit area (underground permit area if application is for an underground mine).

See Form 8.3D

e) Public water supplies (community and noncommunity)

1) List the names and addresses of all public water supplies with water intakes within 10 miles downstream along any stream which will receive discharges from the permitted activity or flows over the underground permit area.

Bailey Mine

332 Enon Church Road

West Finley, PA 15377

2) List the names and addresses of all public water supplies with groundwater or surface water sources within 1 mile of the permit area.

Bailey Mine

332 Enon Church Road

West Finley, PA 15377

3) List the names and addresses of all public water supply systems with service lines over the underground permit area.

Not applicable.

8.4 Background Sampling and Measurements.

Provide the results of water quality analyses, pumping tests, water level and flow measurements on Forms 8.4A and 8.4B sufficient to describe the groundwater and surface water resources of the permit and adjacent areas. Where information is not available from existing wells the applicant must drill test holes, wells, or piezometers to obtain the required data. The results should meet the specifications set forth below. Background monitoring points must be clearly marked and identified in the field. The field identification scheme should correspond with the identification scheme in the application.

a) Sampling/measurement points - The background sampling and measurement program should address the following points.

See Forms 8.4 A for the analytical results and Hydrologic Data Map 8.2A for the location of the sampling points.

1) Each stream which will receive a discharge from the proposed operation (up and downstream of discharge).

2) Streams, springs and wetlands that are representative of the surface and groundwater systems in the general area.

3) All streams, springs, and wetlands within 1000 feet of a surface mining activity site.

4) Wells and piezometers used to determine groundwater conditions in the permit (surface and underground) and adjacent areas.

5) Discharges from adjacent surface mines and underground mines with workings that lie beneath or within 1000 feet of surface mining activity site.

6) Discharges from adjacent underground mines with workings that lie above, below, or within 1000 feet horizontally of the underground permit area of a proposed underground mine.

7) Each impoundment within 1000 feet of a surface mining activity site.

b) Required parameters -

1) Wells and piezometers must be sampled for the following minimum set of parameters: total dissolved solids or specific conductance corrected to 25°C, pH, total iron, total manganese, alkalinity, acidity, sulfates, and water level.

2) Springs, streams, wetlands, seeps, impoundments, underground mine discharges and surface mine discharges must be sampled for the following minimum set of parameters: total dissolved solids or specific conductance corrected to 25°C, total suspended solids, pH, total iron, total manganese, total aluminum, alkalinity, acidity, sulfates, and flow.

c) Sampling period and frequency - All points included in the background sampling program must be sampled in a manner which provides an accurate representation of average conditions and seasonal variations. At a minimum, samples and measurements must be taken at monthly intervals over a period of six successive months including at least one sample from the low flow period which typically extends from August to October. An application may be accepted with a minimum of three monthly sampling and measurement reports per point, however, a permit will not be issued until at least six reports are provided.

d) Special Background Sampling and Measurement Requirements -

1) In cases where underground mining operations are planned to encroach within 200 feet horizontally of stream which is shown as perennial or intermittent on the USGS 7.5 minute quadrangle map, an operator may be required to take flow measurements or photographs to determine where the stream is perennial and where it is intermittent (according to §89.141); and to take additional flow measurements at a comparison site where geology, cover thickness and mining are similar. The need for this information should be discussed with the Department at the pre-application conference.

2) In cases where a coal refuse disposal area is proposed within a stream valley, an operator will be required to submit flow and biological survey results to document whether the stream is ephemeral, intermittent, or perennial (according to §90.1) at the point of impact, and whether it is capable of supporting its designated uses under 25 Pa. Code Chapter 93.

8.5 Prediction of Hydrologic Consequences/Protection of Hydrologic Balance.

a) For underground mining activities

Not applicable.

1) Describe the quality and volume of mine drainage which is anticipated at the end of the 5-year permit period and upon complete development of the planned mine. Describe the methodology and/or calculations used to estimate the drainage characteristics.

2) Estimate the postmining pool level, and indicate the basis for this estimate.

3) Describe the barrier pillars which will be left around the perimeter of the mine to promote flooding, and the basis for the barrier design. Barrier pillar design must be customized to fit site conditions. Provide data gathered at the site which confirms assumptions regarding barrier width and integrity.

4) Provide a narrative description addressing the following concerns and how each will be prevented or mitigated.

i) The potential for postmining pollutional discharges to occur from the proposed mine, with particular attention to areas with thin and/or fractured overburden.

ii) The potential for the post closure mine pool to cause or contribute to discharges from adjacent mines.

iii) The potential for seepage along downgradient outcrops of the mined seam and adjacent aquifers.

iv) Water quality impacts on streams which will receive mine drainage and runoff from surface activity sites.

v) Flow reduction in streams which overlie the underground permit area (the discussion must specifically address streams which serve as significant sources of public water supply, and streams where cover is less than 400 feet).

vi) The potential for altering the hydrology of dams, ponds, impoundments, and wetlands which overlie the underground permit area. Wetlands deemed to be at risk must be further characterized as outlined in Module 15.4(f).

vii) Groundwater contamination and effects on water supplies at surface sites where coal or spoil will be stored or treatment ponds will be located and near shafts, slopes and drift openings.

viii) Postmining pollutional discharges from areas which will be surface mined and/or reclaimed under this permit

5) Describe the probability of depleting or contaminating well and spring supplies as a result of underground coal extraction, and the measures which will be taken to restore or replace impacted supplies. Include a demonstration that the quantity and quality of any proposed replacement supply will be sufficient to meet the needs of the water supply use. Address the potential for mining-induced material damage to public water supply aquifers and bodies of water which are sources for public water supplies. If there is a significant potential for damage, then describe the measures which will be employed to minimize the potential impacts.

b) For Coal Preparation Activities

Not applicable.

1) Describe the manner in which process water from the coal preparation circuit will be handled and the circumstances under which it may be discharged.

2) Provide a narrative description addressing the following concerns and how each will be prevented or mitigated.

i) Water quality impacts on streams which will receive discharges from site activities.

ii) Groundwater contamination resulting from treatment pond leakage or infiltration of water contaminated by surface mining activities.

iii) The contamination of adjacent water supplies (address the measures which will be taken to restore or replace impacted supplies).

iv) Include a demonstration that any proposed replacement supply will meet the quantity and quality needs of the current water supply user.

c) For Coal Refuse Disposal Activities -

1) Describe the nature and anticipated quality of all discharges which will emanate from the refuse pile and underdrains.

The discharges from the new CRDA are expected to be similar to the discharges to the existing CRDA. An evaluation of the discharges from the existing CRDA is discussed in Section 8.1 g) of this Module 8.

2) Provide a narrative description addressing the following concerns and how each will be prevented or mitigated.

i) Water quality impacts on streams and wetlands which will receive discharges from site activities.

The receiving stream is an unnamed tributary to the South Branch of Enlow Fork. The treatment procedures include a collection system for all leachate generated at the site, settling, and discharge to the unnamed tributary of the South Branch of Enlow Fork. The discharge will occur in accordance with the requirements of a NPDES permit that has been applied for at this site. An NPDES discharge for the existing CRDA currently occurs into Talley Run. Monitoring point S-1 is upstream of the existing CRDA discharge and S-2 is down steam of the discharge. The locations of S-1 and S-2 are shown on Exhibit 8.2A Hydrologic Data Map and the analytical results are listed on the 8.4A Forms. The analytical results from the long term monitoring of S-1 and S-2 show that no adverse impacts to the receiving stream have been identified. No adverse impacts to the receiving stream for this proposed facility are anticipated.

ii) Groundwater contamination resulting from treatment pond leakage or infiltration of water that has come into contact with coal refuse or coal ash.

The proposed new refuse disposal area will be constructed in a manner similar to the existing refuse disposal area. Moody and Associates, Inc conducted a detailed evaluation of the impacts of the existing facility on ground and surface water. This evaluation is included in the Module 8 in Section 8.1g). . The evaluation indicates that there has been little or no impact to the ground or surface water resources within and adjacent to the existing refuse area relative to the NPDES discharge requirements for iron, manganese, total suspended solids or pH. Given the proximity and similarity of the physical setting of the two sites and the similarity of the proposed construction designs, no adverse impacts to the ground or surface water resources are predicted with respect to these parameters from the new proposed facility.

iii) The contamination of adjacent water supplies (address the measures by which will be taken to restore or replace impacted supplies). Include a demonstration that any proposed replacement supply will meet the quality and quantity needs of the water supply user.

There are two water supplies within 1000 feet of the proposed facility and contamination of these water supplies is not predicted. CPCC has reached an agreement to purchase the property owned Ms. Olive Webb. The water supply well (Webb1) will be taken out of service and the well will be properly plugged prior to construction of the site. The other site, which includes two water wells, is owned by Mr. Charles Greene and is located across the South Branch Enlow Fork east of the site. South Branch represents a ground water discharge zone and migration of ground water from the site across the valley is not predicted. Thus no contamination of adjacent water supplies is predicted.

iv) Contaminated seepage or underdrain discharges following site closure.

The leachate collection system will continue to operate as designed (see Module 21) and the NPDES discharge will continue after the site is closed. A detailed monitoring network of eight (8) monitoring wells and piezometers and ten (10) surface water monitoring points is proposed in section 8.6 below to verify that no underdrain discharges go undetected.

8.6 Hydrologic Monitoring Plan.

Monitoring points must be clearly marked and identified (with durable markers) in the field. The field identification scheme should correspond with the identification scheme in the application.

All monitoring points will be marked and identified in the field following the approval of this monitoring plan by the Department.

a) Complete Form 8.6A identifying the points which will be used in the monitoring program, the parameters to be measured at each point, and the period and frequency of sampling at each point. (At a minimum, chemical sampling and water level or flow measurements must be conducted and reported to the Department every three months for each monitoring location).

See Form 8.6A

b) Attach a narrative describing how the proposed monitoring points relate to the detection and mitigation of impacts discussed under 8.5.

A total of eight (8) ground water, ten (10) surface water and two underdrain monitoring points are proposed as the hydrologic monitoring points for the proposed new CRDA. The location of the proposed monitoring points are shown on the Exhibit 8.2A Hydrologic Data Map and the details of the monitoring points are outlined herein. Monitoring of the surface water monitoring points has begun and the data collected to date are included in the 8.4A Forms. The proposed monitoring wells and piezometers will be installed upon issuance of the permit to construct the refuse disposal facility.

Ground Water Monitoring Points (See Exhibit 8.2A – Hydrologic Data Map)

Piezometers Cluster H (Two Piezometers)-East Side (down-dip) Side of Refuse Area

This piezometer cluster will be located on the south side of the unnamed tributary in a fill area west of the railroad grade and east of the road guardrail. These are the most down-gradient ground water monitoring points proposed and are intended to monitor ground water moving parallel to the valley toward the points of ground water discharge to the east.

<u>Piezometer H-Shallow (MW H – S)</u>
To be completed to a depth of ten feet below the elevation of the streambed (total depth estimated at 20 feet). This piezometer will be screened from 5 to 20 feet below land surface and will monitor the shallowest ground water flow system leaving the proposed refuse disposal area.

Piezometer H- Deep (MW H-D)
This piezometer will be screened from 40 to 50 feet below land surface and will monitor the ground water flow system immediately below the flow system monitored by MW H-S.

Piezometer Cluster I (Two Piezometers) - West Side (up-dip) Side of Refuse Area

This piezometer cluster will be located along the ridgeline between the existing slurry pond and the new area. This is the most up-gradient ground water monitoring point.

Piezometer I-Shallow (MW I – S)
This piezometer will be completed to the approximate bottom elevation of 1460 msl, which is twenty feet above the maximum planned elevation of the existing slurry pond. Final elevation of existing slurry pond is projected to be 1420 msl. and the surface elevation is approximately 1480 msl. Piezometer I-Shallow will be 40 feet deep with a screened interval from 20 to 40 feet. This piezometer is intended to monitor the quality of any ground water in the shallow subsurface that may be moving through the ridge separating the existing and proposed new disposal facilities. In the event the water table is below the bottom elevation of the piezometer, the monitoring point will be maintained to document any changes in the shallow ground water flow system that may occur in the future.

Piezometer I-Deep (MW I – D)
The surface elevation of this piezometer is approximately 1480 msl and the projected elevation of the slurry pond to the west is 1420 msl. The screened interval of this piezometer will be 40 feet from an elevation of 1420 to an elevation of 1380 feet and is intended to monitor any deeper migration of water from the slurry pond through the ridge separating the valleys.

Monitoring Well J (MW – J) - North Side of Refuse Area
This monitoring well will be located between the unnamed tributary to the north and the proposed refuse area. This well will be completed to a depth of 100 feet with 20 feet of casing and a monitoring interval from 20 to 100 feet. This well is intended to monitor any migration of ground water that may occur in the near surface fracture flow zone between the refuse area and the unnamed tributary valley to the north.

Monitoring Well K (MW – K) - Southwest Side of Refuse Area
This monitoring well will be competed on the ridgeline between the proposed refuse area and streams to the southwest. This well will be completed to a depth of 100 feet with 20 feet of casing and a monitoring interval from 20 to 100 feet. This well is intended to monitor any migration of ground water that may occur in the near surface fractured flow zone between the refuse area and streams to the southwest.

Monitoring Well L (MW – L) - South Side of Refuse Area
This monitoring well will be located on the ridgeline between the proposed refuse area and Stream to the southwest. This well will be completed to a depth of 100 feet with 20 feet of casing and a monitoring interval from 20 to 100 feet. This well is intended to monitor any migration of ground water that may occur in the near surface fractured flow zone between the refuse area and streams to the southwest.

Monitoring Well M (MW – M) - Southeast Side of Refuse Area
This monitoring well will be located on the ridgeline between the proposed refuse area and tributary valleys to the southeast. This well will be completed to a depth of 100 feet with 20 feet of casing and a monitoring interval from 20 to 100 feet. This well is intended to monitor any migration of ground water that may occur in the near surface fractured flow zone between the refuse area and the valleys to the southeast.

All of the ground water monitoring wells and piezometers will be completed with four-inch diameter PVC casing and well screen. The annular space throughout the screened monitoring interval will be gravel packed with clean silica sand. The annular space between the highest monitoring elevation and the surface will be sealed with a bentonite plug and cement grout. The top of the monitoring wells will be fitted with a steel protective casing with a locking cap and will be clearly marked and identified with durable markers.

In general the permeability of rocks decreases by one order of magnitude for every 100 feet of depth (Stoner and others, 1987). For this reason no monitoring wells or piezometers will be completed deeper than 100 feet from the land surface. Below this depth the permeability of the rocks decreases substantially and very little ground water circulation occurs. A figure depicting the typical construction for the piezometers and monitoring wells is attached to the Module 8 as FIGURE 8.6 b – 1.

Pumping tests will be conducted on each monitoring well and piezometer when they are installed and the pumping test data will be submitted as supplemental information to this module.

Surface Water Monitoring Points (See Exhibit 8.2A – Hydrologic Data Map)

Unnamed tributary immediately below the refuse area -SW-N
This surface water monitoring point is located at the east end of the culvert passing under the railroad grade immediately below the proposed refuse area.

Kerr Run - SW-O
This surface water monitoring point is located in Kerr Run approximately halfway between the headwaters and the confluence with Owens Run.

Kerr Run - SW-P
This surface water monitoring point is located on Kerr Run near the confluence of Kerr Run with Owens Run.

Fletcher Run - SW-Q
This surface water monitoring point is located approximately halfway between the headwaters of Fletcher Run and the confluence with Owens Run.

Fletcher Run - SW-R
This surface water monitoring point is located on Fletcher Run near the confluence of Fletcher Run and Owens Run.

Grinnage Run - SW-S
This surface water monitoring point is located on Grinnage Run halfway between the headwaters of Grinnage Run and the confluence with Owens Run.

Grinnage Run - SW-T
This monitoring point is located on Grinnage Run near the confluence of Grinnage Run with Owens Run.

South Branch of Enlow Fork East of the Site - SW-U
This surface water monitoring point is located on the South Branch of Enlow Fork approximately 1000 feet up-stream from the confluence of the unnamed tributary draining the site.

South Branch of Enlow Fork East of the Site - SW-V
This surface water monitoring point is located on the South Branch of Enlow Fork approximately 1000 feet down-stream from the confluence of the unnamed tributary draining the site.

Unnamed tributary to the South Branch of Enlow Fork North of the Site - SW-W
This surface water monitoring point is located on the unnamed tributary north of the proposed refuse area near the confluence of the unnamed tributary with the South Branch of Enlow Fork.

Spring Collector Underdrain
An underdrain system of rock drains and collector pipes will be installed at the base of the refuse pile to prevent spring water from coming in contact with the refuse or refuse leachate at the base of the facility. The spring water collected in this drain system will be conveyed to the toe of the site. When installed, the water discharged from this drain will be sampled on a quarterly basis and tested for the parameters shown on Form 8.6A. This monitoring point will have the added benefit of detecting changes in spring water quality that may indicate the liner system is leaking.

Leachate Collector Underdrain
A leachate collector drain system will be installed at the base of the refuse pile to convey leachate water from the refuse to the treatment pond at the toe of the site. When installed, the water discharged from this drain will be sampled on a quarterly basis and tested for the parameters shown on Form 8.6A. This monitoring point will characterize the quality of leachate through time.

c) Describe how flows from springs, streams, and mine discharges will be measured.

Stream flows will be determined using a flow meter and cross sectional area technique. No springs or mine discharges are proposed as part of the monitoring program.

d) Describe how samples will be taken, preserved, and shipped to the laboratory.

Grab samples will be collected from their respective sources in clean bottles and the samples will be transported to a laboratory in a cooler. Temperature and pH will be determined in the field. Preservation of samples will be in accordance with standard acceptable methods.

e) Indicate the name and address of the laboratory which will perform analyses.

H & H Water Controls, Inc. (PA DEP Certification No. 30-287)
565 Route 88 South
Carmichaels, PA 15320

Consolidation Coal Company Water Lab
State Route 2
Benwood, WV 26041
or other qualified commercial laboratory

f) Provide the name and credentials of individual(s) performing well pumping tests.

Pumping tests will be conducted under the supervision of an experienced ground water consultant.

g) Address the scope, location, and frequency of postmining monitoring, e.g., mine pool level monitoring.

Not applicable

8.7 Water Supply Impacts - Premining Surveys.

Not applicable

No water supplies are expected to be impacted by the proposed new CRDA. There are only three identified private water supply wells (Webb 1, Greene 1 and Greene 2) located within 1000 feet of the proposed CRDA. The Webb 1 well will be plugged and abandoned. The Greene wells are located across South Branch of Enlow Fork from the site. The South Branch of Enlow Fork represents a ground water discharge zone and migration of ground water from the site across the valley is not expected to occur.

Provide premining quality and quantity information for all water supplies which may be affected by mining activities. For underground mines, data must be collected prior to the mining encroaching within 1,000 feet of the supply. Applicants are encouraged to survey sufficient supplies in and adjacent to the 5-year subsidence control plan to avoid mining delays. Survey information should include:

a) location and type of water supply;

b) existing and planned future uses of the water supply;

c) chemical and physical characteristics of the water, including, at a minimum, total dissolved solids or specific conductance, pH, total iron, total manganese, hardness, total coliform, acidity, alkalinity, and sulfate;

d) water quantity (well yield or spring flow) (use form 8.4B to supply well data);

e) physical description of the water supply, including the depth and diameter of the well, length of casing, static water level, and description of any treatment or distribution system.

Quality sampling should consist of at least two (2) distinct samples preferably taken during wet and dry times.

Spring flow data (item d) above) should consist of a minimum of two (2) flow measurements - one during a wet period and a second during a dry period.

Well yield data (item d) above) must be gathered through a standardized, reproducible pumping exercise. This will allow for meaningful premining/postmining survey comparisons. Please contact the appropriate District Mining Office prior to conducting the yield test to avoid wasting resources on unacceptable test methods.

FORM 8.3A
GROUND WATER INVENTORY

Sample Point No.	Well/Spring	Owner	Use	Surface Elevation (MSL)	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Static Water Elevation MSL or Flow, Date of Measurement	Type of treatment if any (iron filter, etc.)
Greene 1	well	Charles Greene	domestic	1185'	~130	8	N/A	N/A	none
Greene 2	well	Charles Greene	domestic	1185'	~130	8	N/A	N/A	none
Webb	well	Olive Webb	domestic	1465'	~250	8	N/A	N/A	none

FORM 8.3B
STREAM INVENTORY

Stream Name	Segment (From/To)	Flow Status ----- Basis	Uses	*Average Annual Flow (CFS or GPM)	General Quality Characteristics
Unnamed tributary to South Branch Enlow Fork	Enlow Fork to Headwaters	PD / e	3	29 gpm	See Form 8.4A - SW - N
Grinnage Run	from 1000' boundary to north east headwaters	PD/ e	3	48 gpm	See Form 8.4A - SW - S
Fletcher Run	from 1000' boundary north east to headwaters	PD / e	3	50 gpm	See Form 8.4A - SW - Q
South Branch of Enlow Fork	From SW - U to SW - V	PD / e	3	1537 gpm	See Form 8.4A - SW – U & SW - V

Status/Basis

PD = Perennial (per 89.141)
PS = Perennial (per 87.1, 89.5, 90.1)
I - Intermittent
E = Ephemeral
a = by joint inspection with DEP staff
b = by flow measurements
c = by g/w level measurements
d = by aquatic survey
e = by photographs

Uses

1 = Cold Water
2 = Trout Stocked Fishery
3 = Warm Water Fishery
4 = Potable Water Supply
5 = Industrial Water Supply
6 = Wildlife Water Supply
7 = Livestock Water Supply
8 = Boating, Navigation
9 = Swimming
10 = Irrigation
11 = Recreational Fishery
12 = Waterfowl Habitat

Flow

* Indicate method of computing average annual flow

Average of recorded flows_____
_____
_____
_____

FORM 8.3C
MINE DISCHARGE INVENTORY

Map Reference	Mine Name	Nature of Discharge (Seep Opening, Etc.)	Surface Elevation	Pool Level (if known)	Discharge Volume (Range)	Gen. Quality Characteristics	Type of Treatment
Slurry Pond	Enlow Fork Mine	Water is pumped from the mine to the existing slurry pond. The water is then used in the prep plant. There is not a discharge to the surface.	Final planned elevation of the slurry pond is 1420 msl	None	50 to 100 gpm	pH – 7.9 Alkalinity > Acidity Fe <1.0 to 2.8 mg/l Mn <1.0 to 1.9 mg/l	Settling in slurry pond
Slurry Pond	Bailey Mine	Water is pumped from the mine to the existing slurry pond. The water is then used in the prep plant. There is not a discharge to the surface.	Final planned elevation of the slurry pond is 1420 msl	None	Approximately 500 gpm	pH – 7.8 to 8.0 Alkalinity > Acidity Fe <1.0 to 7.0 mg/l Mn <1.0 to 2.6 mg/l	Settling in slurry pond

FORM 8.3D
DAM AND POND INVENTORY

Map Reference	Owner	Use	Volume or Dimensions	Source of Water	General Quality Characteristics
P54	Consol Pennsylvania Coal Company	Livestock	< ½ acre	Surface runoff	See Form 8.4A

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: We-A
Description: Well - Downgradient of Existing Bailey Surface Facilities
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:27 W80:25:15
Elevation: 1002

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
9/36/92	969.10	9.2	8.6	15.9	472	-423	0.53	0.00	0.24	1	4	1300	
12/29/92	968.60	9.1	9.0	12.9	489	-450	1.39	0.01	0.17	0	16	1260	
3/29/93	973.90	9.2	8.8	14.2	499	-447	0.48	0.02	0.30	0	9	1210	
6/28/93	977.40	9.2	9.0	15.9	514	-477	0.55	0.04	0.20	9	8	1160	
9/28/93	969.10	9.1	8.9	14.4	488	-437	0.72	0.07	0.43	0	31	1210	
3/28/94	968.40	9.3	8.6	13.0	449	-397	0.11	0.01	0.11	0	2	1014	
6/23/94	967.70	8.8	8.4	15.5	479	-366	0.12	0.06	0.04	0	28	1150	
9/30/94	967.30	9.2	8.7	14.5	456	-384	0.11	0.02	0.18	25	17	1070	
10/17/94	967.30	9.4	8.6	14.4	466	-404	0.12	0.02	0.04	1	41	1070	
3/27/95	967.20	10.0	8.5	13.8	447	-345	1.58	0.11	0.56	7	274	1120	
6/28/95	966.60	9.1	8.4	15.7	378	-323	0.25	0.03	0.19	57	40	1110	
9/14/95	966.80	9.6	8.6	16.1	427	-324	0.08	0.01	0.13	0	2	1090	
12/18/95	966.50	9.4	8.6	13.2	383	-328	0.94	0.10	0.40	1	6	937	
3/18/96	966.10	9.3	9.0	15.6	438	-383	0.15	0.07	0.34	23	2	1063	
6/12/96	966.80	9.2	8.7	17.5	433	-390	0.11	0.02	0.04	2	9	1116	
8/10/96	967.20	9.0	8.6	16.8	435	-400	0.50	0.02	0.11	4	2	1096	
11/6/96	967.40	9.3	8.7	13.2	433	-375	0.27	0.02	0.06	5	5	1078	
2/13/97	966.00	9.3	8.7	10.0	437	-349	0.69	0.03	0.36	5	14	1095	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: We-A
Description: Well - Downgradient of Existing Bailey Surface Facilities
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:27 W80:25:15
Elevation: 1002

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
5/28/97	966.50	9.0	9.0	18.3	429	-318	0.95	0.03	0.26	2	2	1116	
9/29/97	966.70	9.2	8.7	16.5	422	-400	0.32	0.04	0.07	75	2	1156	
11/20/97	965.90	8.9	8.7	15.4	435	-344	0.45	0.02	0.47	12	0	1177	
3/31/98	966.00	8.4	8.4	20.3	408	-247	0.42	0.05	0.33	100	6	1970	
6/26/98	967.50	9.0	8.8	16.8	423	-401	0.63	0.04	0.26	12	5	1159	
9/21/98	968.00	9.0	8.6	19.0	344	-330	0.92	0.05	0.60	2	0	988	
11/10/98	968.20	9.0	8.4	15.5	314	-286	1.06	0.05	0.36	20	20	1043	
3/23/99	968.00	9.0	9.1	13.3	394	-367	0.15	0.01	0.19	15	6	1132	
6/9/99	969.20	9.0	8.3	20.6	413	-388	0.31	0.00	0.19	0	0	1135	
9/29/99	965.70	9.0	8.7	17.1	438	-391	0.38	0.03	0.10	38	0	1327	
11/1/99	964.80	9.0	8.7	17.2	451	-433	0.25	0.02	0.14	5	5	1321	
3/24/00	963.50	9.3	8.9	18.8	445	-441	0.09	<0.01	0.10	<10	<5	960	
9/12/00	969.70	9.2	9.2	N/A	450	-447	5.80	0.03	N/A	99	120	920	
10/4/00	967.00	8.8	9.0	N/A	583	-582	0.80	<0.01	N/A	14	18	1090	
3/23/01	968.20	9.2	8.9	N/A	668	-664	1.50	0.02	N/A	17	27	910	
6/8/01	968.20	9.2	9.0	N/A	272	-267	0.40	0.01	N/A	<10	13	1110	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: WE-B
Description: Well - Downgradient of Existing Bailey Slurry Pond
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:03 W80:24:37
Elevation: 1089

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
9/26/92	1071.90	8.1	7.8	19.4	44	-30	0.80	0.01	0.38	94	27	290	
12/29/92	1072.00	7.9	7.5	12.5	66	-53	3.05	0.12	0.36	96	37	344	
3/29/93	1072.50	8.3	7.8	11.6	113	-104	0.83	0.02	0.11	98	10	472	
6/28/93	1071.80	8.1	8.0	14.2	145	-130	0.61	0.05	0.10	92	12	556	
3/28/94	1072.20	8.5	8.3	9.5	96	-88	1.16	0.04	1.10	75	6	383	
6/17/94	1071.90	8.2	8.0	13.2	71	-47	0.96	0.04	0.25	0	74	295	
9/30/94	1072.50	8.9	7.8	18.5	62	-47	1.50	0.07	1.06	0	12	454	
10/17/94	1072.00	8.4	7.6	16.5	66	-53	0.37	0.05	0.19	126	16	401	
3/27/95	1072.40	8.6	7.9	11.2	100	-77	0.55	0.03	0.20	114	8	465	
6/23/95	1072.20	7.8	7.6	13.8	74	-56	0.23	0.02	0.06	58	3	281	
9/11/95	1072.00	8.6	7.6	16.5	92	-75	3.25	0.06	1.10	51	8	424	
12/18/95	1072.30	8.4	8.0	12.4	112	-94	1.39	0.03	0.48	82	7	452	
3/18/96	1073.10	8.5	8.2	12.0	118	-107	0.54	0.03	0.47	78	4	461	
6/12/96	1072.00	7.7	7.7	21.0	70	-60	0.91	0.06	0.23	43	26	228	
8/10/96	1072.80	7.8	7.5	16.7	51	-40	0.83	0.03	0.14	39	0	178	
11/6/96	1072.90	7.4	7.6	14.7	51	-36	0.37	0.02	0.00	40	0	157	
2/11/97	1072.90	8.6	7.7	9.5	95	-71	1.14	0.03	0.59	48	11	275	
5/28/97	1076.70	7.4	7.8	15.1	167	-126	1.19	0.06	1.20	193	15	719	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: WE-B
Description: Well - Downgradient of Existing Bailey Slurry Pond
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:03 W80:24:37
Elevation: 1089

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
9/29/97	1073.70	7.5	7.7	18.5	181	-175	1.98	0.30	0.09	275	8	1307	
11/20/97	1074.60	7.5	7.6	16.8	174	-143	0.69	0.04	0.23	250	0	1292	
3/31/98	1074.20	8.3	8.0	20.5	431	-249	0.49	0.09	0.27	250	0	1851	
6/26/98	1074.80	8.2	8.2	17.3	422	-401	0.28	0.17	0.15	275	2	1967	
9/21/98	1076.30	8.1	8.1	20.6	419	-403	1.46	0.04	0.60	275	7	2069	
11/10/98	1076.30	8.0	8.0	17.3	397	-374	3.72	0.10	0.04	300	8	2041	
3/23/99	1076.60	8.4	8.4	12.2	429	-386	0.32	0.02	0.18	313	3	2075	
6/9/99	1075.90	8.3	8.0	21.3	434	-415	0.42	0.01	0.13	225	4	2061	
9/29/99	1074.60	7.8	7.9	19.1	336	-288	0.45	0.04	0.12	63	6	1575	
11/1/99	1074.70	8.2	8.3	20.1	346	-329	0.51	0.05	0.19	158	4	1623	
3/23/00	1075.20	8.6	8.1	N/A	377	-375	0.60	0.02	N/A	534	19	1490	
6/2/00	1075.10	8.2	7.9	N/A	416	-413	0.50	0.03	N/A	95	10	1670	
8/28/00	1074.60	7.8	7.7	N/A	369	-367	0.50	0.09	N/A	481	6	1520	
10/30/00	1077.20	8.1	8.0	N/A	374	-369	0.60	<0.01	N/A	438	<5	1170	
3/23/01	1076.50	8.5	8.2	N/A	406	-402	1.00	0.02	N/A	391	10	1200	
6/8/01	1077.50	8.2	8.2	N/A	462	-459	0.30	0.03	N/A	342	13	1530	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: WE-C
Description: Downgradient of Existing Bailey Coarse Refuse
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58: W80:24:29
Elevation: 1119

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
9/26/92	1086.10	8.8	8.5	18.8	497	-461	0.12	0.00	0.19	85	6	1780	
12/29/92	1085.60	8.7	8.6	11.7	503	-431	0.66	0.01	0.11	76	0	1750	
3/29/93	1086.80	8.7	8.7	13.0	499	-462	0.20	0.01	0.03	78	2	1680	
6/28/93	1084.80	8.8	8.6	14.6	508	-448	0.14	0.04	0.08	76	6	1710	
9/28/93	1084.80	8.7	8.6	13.1	516	-418	0.09	0.07	1.62	77	7	1840	
12/27/93	1085.10	8.7	8.3	10.9	519	-436	0.17	0.03	0.06	100	0	1850	
3/28/94	1086.60	8.6	8.0	11.0	574	-506	0.53	0.01	0.07	25	6	1870	
6/16/94	1085.10	8.4	8.4	16.1	540	-398	0.29	0.02	0.02	0	17	1970	
9/29/94	1085.40	8.7	8.4	13.4	548	-423	0.09	0.02	0.05	0	3	1950	
10/17/94	1085.50	8.8	8.3	12.9	539	-468	0.16	0.02	0.19	9	4	1990	
3/27/95	1084.70	8.6	8.2	12.3	536	-415	0.21	0.00	0.10	10	4	2050	
6/20/95	1084.70	8.7	8.4	16.2	539	-416	0.05	0.02	0.02	5	0	2040	
9/11/95	1083.80	9.1	8.1	12.3	536	-414	0.27	0.01	0.11	15	0	2100	
12/18/95	1083.50	8.9	8.4	12.0	534	-456	0.47	0.03	0.07	36	7	2020	
3/18/96	1085.60	8.6	8.5	12.5	533	-462	0.45	0.03	0.32	100	1	990	
6/12/96	1083.50	8.6	8.4	17.3	526	-485	0.27	0.03	0.02	60	4	2150	
8/10/96	1083.30	8.5	8.4	15.2	527	-474	0.46	0.01	0.00	38	0	2190	
11/6/96	1082.40	8.9	8.5	13.8	525	-475	0.21	0.03	0.00	60	0	2130	

Monitoring Point We-C

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: WE-C
Description: Downgradient of Existing Bailey Coarse Refuse
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58: W80:24:29
Elevation: 1119

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
2/13/97	1084.40	8.9	8.3	10.5	516	-407	0.31	0.01	0.10	59	6	2190	
5/15/97	1086.80	8.5	8.3	13.4	505	-371	0.48	0.01	0.14	63	3	2330	
9/29/97	1084.40	8.8	8.4	14.2	397	-355	0.37	0.02	0.07	150	2	2130	
11/20/97	1085.80	8.2	8.2	16.0	399	-320	0.27	0.02	0.26	75	1	2080	
3/31/98	1087.30	8.4	8.4	20.6	416	-244	0.88	0.09	0.75	150	13	1971	
9/21/98	1087.30	6.8	7.9	17.6	535	-510	3.25	5.70	0.12	2275	11	6800	
3/23/99	1084.40	9.0	8.7	11.5	364	-325	0.40	0.03	0.84	43	4	1245	
6/9/99	1085.10	8.6	8.2	18.4	354	-334	0.42	0.10	0.28	0	1	1169	
9/29/99	1084.80	8.4	8.3	15.5	344	-310	0.38	0.07	0.15	38	3	1117	
11/1/99	1084.60	8.5	8.5	14.5	350	-304	0.37	0.05	0.25	5	4	1114	
3/23/00	1084.80	8.9	8.7	N/A	336	-334	0.50	<0.01	N/A	29	5	830	
6/2/00	1084.90	8.7	8.6	N/A	368	-365	<0.03	<0.01	N/A	18	5	860	
8/28/00	1084.40	8.6	8.7	N/A	320	-316	0.10	0.06	N/A	48	<5	810	
10/30/00	1086.00	8.7	8.7	N/A	362	-358	0.40	<0.01	N/A	43	<5	720	
3/23/01	1085.00	8.5	8.8	N/A	346	-341	0.20	<0.01	N/A	38	<5	570	
6/8/01	1085.60	8.8	8.8	N/A	327	-319	0.10	<0.01	N/A	36	6	920	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Spring-D
Description: Spring - Upgradient of Existing Bailey Surface Facility
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:32 W80:23:57
Elevation: 1330

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
9/28/92	0.00												
12/30/92	0.13	6.6	6.4	9.7	20	-13	5.40	0.09	2.91	36	177	164	
3/29/93	0.75	6.7	6.5	7.6	12	-3	0.08	0.01	0.18	34	1	143	
6/28/93	0.00												
9/29/93	0.00												
12/27/93	0.00												
3/28/94	3.75	6.1	6.1	6.0	6	1	0.12	0.02	0.09	0	0	118	
6/7/94	0.00												
9/29/94	0.00												
10/27/94	0.00												
3/15/95	0.00												
6/20/95	0.00												
8/28/95	0.00												
12/18/95	0.00												
3/18/96	0.50	6.0	6.2	8.5	8	-1	0.39	0.05	0.31	28	2	140	
6/10/96	0.00												
8/12/96	0.00												
11/5/96	0.00												

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Spring-D
Description: Spring - Upgradient of Existing Bailey Surface Facility
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:32 W80:23:57
Elevation: 1330

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
1/21/97	0.00												
5/20/97	0.53	6.5	6.3	15.3	13	-1	0.69	0.02	0.06	30	2	130	
9/23/97	0.00												
11/20/97	0.00												
2/3/98	<0.10	7.3	7.2	9.5	12	1	2.29	0.05	1.64	33	5	152	
6/2/98	0.00												
9/21/98	0.00												
10/6/98	0.00												
1/19/99	2.00	6.0	6.0	10.5	4	3	0.14	0.07	0.18	35	0	151	
6/9/99	0.00												
8/10/99	0.00												
10/19/99	0.00												
2/15/00	3.00	8.0	5.6	N/A	4	-10	0.40	0.02	N/A	29	<5	120	
4/20/00	0.50	6.7	6.9	N/A	8	-5	0.10	<0.01	N/A	48	18	90	
7/5/00	0.00												
11/8/00	0.00												
2/6/00	0.00												
3/27/01	0.00	N/A	8.4	N/A	11	-9	0.20	<0.01	0.10	37	12	150	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Spring-D
Description: Spring - Upgradient of Existing Bailey Surface Facility
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:32 W80:23:57
Elevation: 1330

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
4/24/01	1.00	6.5	6.3	N/A	14	-5	0.30	0.03	N/A	24	5	520	
10/30/01	ND	7.8	7.4	11.0	219	-203	0.03	1.00	0.20	530	7	2272	
11/27/01	ND	7.9	7.6	11.0	129	-117	0.30	0.70	0.10	537	35	1770	
12/19/01	1.98	7.1	7.6	7.0	142	-141	0.09	0.20	0.10	544	<5	1641	
1/29/02	2.64	7.4	7.7	11.0	173	-160	0.08	0.70	0.06	480	8	2136	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Spring-E
Description: Spring - Upgradient of Existing Bailey Surface Facility
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:15 W80:23:39
Elevation: 1220

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
9/26/92	0.00												
12/29/92	0.19	8.0	8.1	9.5	187	-173	0.87	0.04	0.50	46	41	440	
3/29/93	1.25	7.5	7.6	11.0	150	-134	0.16	0.00	0.10	52	1	401	
6/28/93	0.00												
9/29/93	0.00												
12/27/93	0.05	7.9	8.0	7.5	198	-173	0.07	0.02	0.05	150	3	587	
3/28/94	1.88	7.5	7.5	7.7	116	-104	0.07	0.00	0.07	0	0	365	
6/7/94	<1.00	7.6	7.8	9.0	192	-156	0.09	0.01	0.06	0	10	716	
9/29/94	0.00												
10/27/94	0.00												
3/15/95	1.00	7.4	7.6	10.6	152	-123	0.11	0.01	0.04	78	2	700	
6/23/95	0.00												
8/28/95	0.00												
12/18/95	0.00												
3/26/96	1.00	7.2	7.8	8.7	116	-106	0.26	0.01	0.00	93	1	440	
6/10/96	0.10	7.1	8.0	21.6	206	-189	0.05	0.01	0.00	268	6	1125	
8/10/96	<0.50	8.1	8.1	17.0	188	-168	1.09	0.04	0.28	38	12	780	
11/5/96	0.02	8.0	8.0	13.3	183	-167	0.27	0.02	0.00	195	1	748	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Spring-E
Description: Spring - Upgradient of Existing Bailey Surface Facility
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:15 W80:23:39
Elevation: 1220

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
1/21/97	0.13	7.2	7.7	8.9	184	-165	0.31	0.01	0.04	312	5	1501	
5/20/97	0.88	7.1	7.4	15.1	165	-132	0.41	0.01	0.12	300	3	2450	
9/23/97	0.26	7.2	7.7	14.2	234	-216	0.04	0.01	0.04	800	0	9280	
11/20/97	0.20	7.1	7.4	14.9	229	-186	0.37	0.01	0.56	900	1	10350	
2/3/98	0.40	7.1	8.0	11.9	206	-197	0.02	0.00	0.00	813	0	5430	
6/2/98	<1.00	7.2	7.8	22.4	216	-206	0.04	0.00	0.06	750	0	5250	
9/21/98	0.20	7.1	7.9	22.4	235	-226	0.07	0.01	0.08	1150	0	7310	
10/6/98	0.22	7.0	7.5	19.5	237	-227	0.03	0.02	0.09	1075	5	7380	
1/19/99	1.60	6.8	7.3	11.4	101	-91	0.07	0.02	0.13	338	0	1833	
6/9/99	0.40	7.1	7.7	18.6	241	-230	0.23	0.00	0.09	875	2	6030	
8/10/99	0.23	7.2	8.1	N/A	225	-225	0.10	0.00	0.07	1075	0	7080	
10/19/99	0.20	7.0	7.6	13.0	279	-264	0.06	0.00	0.10	1125	1	7510	
2/15/00	2.00	6.6	7.1	5.9	87	-77	0.10	<0.01	0.20	154	<5	780	
4/20/00	0.90	6.8	7.2	N/A	173	-169	0.10	<0.01	N/A	941	<5	1370	
7/5/00	0.80	6.9	7.4	N/A	268	-264	0.10	0.02	N/A	1910	6	4390	
11/8/00	0.04	7.4	7.2	N/A	294	-279	0.10	<0.01	N/A	1203	7	4370	
2/7/01	0.23	7.3	7.2	N/A	258	-253	0.07	0.02	N/A	881	7	3930	
4/24/01	2.00	7.0	7.3	N/A	189	-174	0.10	0.02	N/A	288	<5	2210	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Spring-E
Description: Spring - Upgradient of Existing Bailey Surface Facility
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:15 W80:23:39
Elevation: 1220

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Spring Collector No. 2
Description: Main Valley Existing Spring Collection Drain
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:14 W80:24:03
Elevation: N/A

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
1/12/94	N/A	7.1	7.4	9.8	455	-378	0.10	6.20	0.11	2600	3	5350	
2/14/94	N/A	7.2	8.2	9.4	450	-415	0.10	7.80	0.34	1800	4	4810	
3/24/94	N/A	7.8	8.0	11.9	286	-271	0.34	1.52	0.78	2300	13	3690	
4/21/94	20.00	7.6	7.8	14.2	448	-350	0.21	3.19	0.20	2700	14	4920	
5/6/94	50.00	7.0	7.7	13.5	538	-449	0.16	6.80	0.27	2300	3	4440	
6/3/94	50.00	7.0	7.0	15.0	524	-524	<0.21	7.02	<0.21	1126	4	4070	
7/1/94	30.00	6.9	7.6	14.3	469	-414	0.33	7.00	0.22	963	2	3830	
9/9/94	20.00	7.9	8.2	21.0	601	-499	1.16	0.61	1.18	3250	39	8200	
10/27/94	75.00	7.2	7.6	13.1	630	-557	0.30	1.14	0.08	2800	2	8510	
11/3/94	75.00	6.9	7.2	15.5	588	-502	1.85	4.25	0.15	2100	2	6420	
12/2/94	50.00	7.2	7.2	4.5	557	-499	0.56	4.89	0.06	2400	3	6570	
1/4/95	75.00	7.3	7.5	13.7	581	-489	0.70	4.91	0.19	2700	58	6850	
2/3/95	75.00	7.5	7.4	12.6	580	-491	2.25	4.79	0.21	2450	17	7040	
3/3/95	75.00	7.0	7.2	13.7	564	-483	3.62	4.10	0.08	2600	10	6760	
4/19/95	100.00	6.8	7.9	15.0	596	-497	3.52	3.72	0.11	2350	7	7150	
5/1/95	60.00	6.9	7.4	13.9	614	-521	2.43	3.97	0.12	2200	12	7060	
6/5/95	50.00	7.1	7.3	16.0	608	-478	3.03	3.68	0.12	2300	12	6900	
7/10/95	50.00	7.2	7.0	17.3	596	-450	2.90	3.74	0.16	1925	17	6500	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Spring Collector No. 2
Description: Main Valley Existing Spring Collection Drain
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:14 W80:24:03
Elevation: N/A

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
8/2/95	25.00	7.3	7.3	14.0	590	-458	1.26	3.83	0.17	2050	5	6480	
9/6/95	50.00	7.3	7.6	16.1	591	-468	4.15	3.58	0.07	1950	12	6640	
10/3/95	25.00	7.0	7.2	14.7	557	-483	5.60	4.20	0.12	1250	14	5350	
11/10/95	15.00	6.6	7.0	13.2	549	-382	6.60	5.60	0.17	2800	14	7280	
12/1/95	75.00	6.9	7.8	13.1	561	-476	7.20	5.00	0.17	3400	9	8710	
1/15/96	5.00	7.2	7.4	12.6	564	-472	5.99	4.89	0.03	2500	8	7550	
2/19/96	2.00	6.9	8.0	12.6	623	-480	7.85	4.05	0.00	3000	17	7750	
3/1/96	2.00	6.8	7.4	14.1	622	-516	3.94	2.29	0.17	3150	22	7090	
4/3/96	2.00	7.0	7.5	14.6	689	-565	5.44	3.26	0.21	3250	23	8280	
5/1/96	<1.00	7.0	8.0	13.6	680	-633	7.79	3.04	0.19	2000	26	7090	
6/5/96	0.00												
7/9/96	0.00												
8/5/96	0.00												
9/10/96	Cannot Measure	7.1	7.8	18.6	667	-516	6.25	3.39	0.98	1500	72	5630	
10/9/96	25.00	6.9	7.7	18.2	749	-580	0.55	2.21	0.03	1800	6	6800	
11/4/96	25.00	7.2	7.8	13.2	738	-665	0.12	1.97	0.00	2550	1	6510	
12/4/96	25.00	7.4	7.5	11.4	669	-542	0.33	1.66	0.00	1650	4	5810	
1/15/97	20.00	7.4	7.4	N/A	709	-662	0.17	1.66	0.00	1825	2	5590	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Spring Collector No. 2
Description: Main Valley Existing Spring Collection Drain
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:14 W80:24:03
Elevation: N/A

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
2/7/97	10.00	7.1	7.4	9.1	585	-486	0.64	1.55	0.00	1225	7	5000	
3/12/97	20.00	7.1	7.5	11.7	666	-586	0.47	1.67	0.00	1450	0	5370	
4/7/97	15.00	6.9	7.6	11.8	790	-724	0.95	1.85	0.00	1700	4	5630	
5/7/97	10.00	7.1	7.4	17.0	720	-584	2.97	1.65	0.11	1300	3	6740	
6/11/97	15.00	7.2	8.0	19.3	710	-628	0.90	1.57	0.00	1300	0	7030	
7/11/97	15.00	7.1	7.8	21.0	718	-684	4.05	1.62	0.12	1200	6	6940	
8/6/97	<5.00	7.0	8.0	17.4	671	-591	3.46	1.77	0.10	1300	7	6650	
9/2/97	20.00	7.0	7.8	18.1	639	-564	2.91	1.94	0.01	1050	4	6480	
10/9/97	15.00	7.0	7.7	21.0	615	-549	0.05	1.64	0.23	1025	3	6520	
11/5/97	15.00	6.7	7.4	14.0	540	-394	2.92	1.97	0.00	975	10	5200	
1/12/98	10.00	7.2	7.6	13.5	508	-485	0.15	1.58	0.14	1500	11	6950	
2/3/98	5.00	7.1	7.4	13.7	545	-524	0.06	1.55	0.12	1450	3	6280	
3/17/98	N/A	7.0	7.9	10.3	598	-572	0.36	1.50	0.09	1600	0	6440	
4/8/98	20.00	7.0	7.3	16.9	593	-559	4.72	1.71	0.19	1500	17	6370	
6/29/99	10.00	6.9	7.1	18.2	694	-691	4.10	1.60	0.08	1076	8	4680	
12/1/99	5.00	6.9	8.5	9.3	627	-565	7.57	2.70	0.06	1000	16	5910	
5/4/00	5.00	6.9	7.1	15.4	778	-758	4.90	1.90	0.20	865	16	4310	
6/14/00	<5.00	6.9	7.0	22.0	715	-714	5.50	1.90	0.60	1020	20	3490	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Spring Collector No. 2
Description: Main Valley Existing Spring Collection Drain
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:14 W80:24:03
Elevation: N/A

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
7/5/00	2.00	6.7	7.2	22.0	685	-681	5.80	2.00	0.20	820	23	4300	
9/6/00	5.00	7.1	7.4	20.2	730	-711	0.20	1.40	0.30	1558	30	3980	
10/4/00	5.00	7.0	7.0	21.0	656	-654	0.60	2.80	0.10	1804	20	4680	
11/1/00	5.00	7.1	8.0	12.7	651	-630	1.80	4.00	<0.04	1390	17	4700	
12/5/00	5.00	7.0	7.0	9.0	569	-568	5.00	2.70	0.20	841	18	620	
1/4/01	3.00	7.6	7.1	6.9	629	-608	8.50	3.50	0.01	1596	24	4220	
2/6/01	2.00	6.7	7.1	6.8	629	-625	4.60	1.80	<0.04	1490	18	4480	
3/1/01	5.00	7.0	7.1	7.3	708	-707	0.30	2.70	0.07	1265	18	4250	
4/18/01	10.00	7.2	7.1	10.5	770	-769	0.60	2.50	0.07	820	11	5500	
5/10/01	10.00	7.0	7.2	11.1	922	-916	3.70	2.00	0.09	849	17	4850	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S1 Talley Run
Description: Stream - Upstream Talley Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:56 W80:24:41
Elevation: 1060

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
1/29/98	1.10	8.2	7.6	N/A	290	-280	0.30	1.34	0.10	775	6	4690	
4/29/98	1.10	8.0	7.8	N/A	296	-283	0.42	0.64	0.18	1075	13	5390	
7/29/98	1.16	7.8	7.8	N/A	277	0	0.24	0.24	N/A	950	0	6320	
10/28/98	1.10	8.0	8.3	N/A	271	-245	0.44	0.33	N/A	1100	5	6940	
1/26/99	1.50	8.2	8.1	N/A	241	-222	0.55	0.94	N/A	925	20	4660	
4/14/99	1.10	8.2	8.1	N/A	235	-219	0.73	0.58	N/A	900	13	5370	
8/11/99	0.89	7.9	8.1	N/A	264	-264	0.99	0.66	N/A	1225	1	6990	
11/1/99	0.67	8.0	8.2	N/A	303	-291	0.37	0.41	N/A	925	3	6270	
2/16/00	2.20	8.0	8.0	N/A	189	-183	0.30	0.80	N/A	1201	8	2900	
6/9/00	0.61	8.1	8.0	N/A	313	-309	0.30	0.30	N/A	847	5	4330	
8/28/00	0.91	8.0	7.9	N/A	324	-322	0.20	0.50	N/A	1157	<5	4600	
10/30/00	1.40	8.2	8.1	N/A	351	-344	0.50	0.60	N/A	1238	<5	4040	
3/23/01	2.70	8.3	8.2	N/A	321	-319	0.90	0.80	N/A	1143	18	3010	
6/8/01	2.70	8.2	8.2	N/A	255	-251	0.30	0.40	N/A	1124	37	3440	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S2 - Talley Run
Description: Stream - Downstream Talley Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:19 W80:25:18
Elevation: 980

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
1/6/86	0.67	N/A	8.0	N/A	110	-100	0.09	0.14	0.12	550	55	1700	
5/29/86	0.56	N/A	8.0	N/A	168	-163	0.74	<0.20	0.45	117	46	4470	
7/3/86	0.28	N/A	8.4	N/A	137	-109	1.32	0.07	0.03	350	51	1710	
12/18/86	1.65	N/A	8.4	N/A	159	-138	0.18	0.03	0.17	560	2	2990	
12/4/86	N/A	N/A	8.2	N/A	139	-125	<0.20	<0.20	<0.20	500	24	2400	
2/4/87	1.28	N/A	8.4	N/A	156	-134	0.15	0.18	0.19	292	10	1180	
3/11/87	0.76	N/A	8.2	N/A	187	-171	0.04	0.20	0.11	265	2	2150	
4/2/87	4.90	N/A	7.9	N/A	136	-133	5.01	0.33	6.20	190	173	1167	
5/6/87	1.65	N/A	8.3	N/A	156	-146	<0.50	<0.50	<0.50	3000	11	1570	
6/3/87	1.87	N/A	8.4	N/A	158	-151	0.94	<0.30	<0.30	500	6	1858	
7/8/87	N/A	N/A	8.4	N/A	173	-167	<0.30	<0.30	<0.30	450	14	2030	
8/6/87	0.90	N/A	8.3	N/A	136	-136	<0.40	<0.20	<0.80	380	9	2200	
9/2/87	1.32	N/A	8.4	N/A	192	-184	<0.30	<0.30	<0.30	668	2	2430	
9/16/87	N/A	N/A	8.2	N/A	169	-158	<0.30	<0.30	<0.30	583	29	2190	
10/14/87	1.08	N/A	8.2	N/A	186	-177	<0.30	<0.30	<0.30	419	8	2030	
10/20/87	N/A	N/A	8.3	N/A	135	-127	<0.30	<0.30	1.12	292	16	1932	
11/4/87	0.99	N/A	8.4	N/A	195	-190	<0.30	<0.30	<0.30	147	10	1900	
11/19/87	N/A	N/A	8.4	N/A	179	-172	<0.30	<0.30	<0.30	610	8	N/A	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S2 - Talley Run
Description: Stream - Downstream Talley Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:19 W80:25:18
Elevation: 980

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
12/2/87	2.50	N/A	8.4	N/A	196	-187	0.66	0.34	0.34	611	35	2320	
12/30/87	N/A	N/A	8.5	N/A	184	-177	<0.30	<0.30	<0.30	567	12	2110	
1/13/88	0.67	N/A	8.2	N/A	222	-218	<0.30	0.37	<0.30	442	19	2080	
1/28/88	N/A	N/A	8.3	N/A	183	-177	<0.30	0.41	<0.30	432	1	1990	
2/10/88	2.95	N/A	8.4	N/A	213	-198	<0.80	<0.80	<0.80	479	16	2530	
2/18/88	N/A	N/A	8.4	N/A	180	-172	<0.30	0.30	<0.30	416	5	1891	
3/2/88	1.46	N/A	8.5	N/A	197	-188	<0.30	<0.30	<0.30	430	14	1990	
3/29/88	N/A	N/A	8.5	N/A	174	-165	<0.30	<0.30	<0.30	157	13	1645	
4/5/88	1.25	N/A	8.4	N/A	167	-156	<0.30	<0.30	<0.30	344	16	1478	
5/2/88	1.00	N/A	8.2	N/A	181	-176	<0.30	<0.30	<0.30	395	14	1930	
6/6/88	0.62	N/A	8.4	N/A	169	-163	0.20	0.14	<0.05	371	5	2290	
7/14/88	0.50	N/A	8.2	N/A	163	-147	0.12	0.09	<0.05	401	2	2451	
8/3/88	1.50	N/A	8.4	N/A	176	-171	0.46	0.55	<0.20	787	35	4827	
9/16/88	0.66	N/A	8.3	N/A	186	-174	0.12	0.56	<0.05	697	11	2935	
10/27/88	0.33	N/A	8.2	N/A	176	-169	<0.20	1.01	<0.20	658	3	3060	
11/14/88	0.89	N/A	8.3	N/A	218	-211	0.39	0.73	<0.05	692	10	3097	
12/9/88	1.56	N/A	8.3	N/A	223	-21	<0.20	0.69	<0.20	633	1	3044	
1/25/89	3.00	N/A	8.3	N/A	200	-193	0.07	0.47	<0.05	647	4	2297	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S2 - Talley Run
Description: Stream - Downstream Talley Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:19 W80:25:18
Elevation: 980

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
2/17/89	5.00	N/A	8.2	N/A	143	-133	0.29	0.25	0.15	462	15	1609	
3/10/89	9.70	N/A	8.4	N/A	168	-158	0.31	0.32	0.18	510	14	1888	
4/29/89	2.80	N/A	8.4	N/A	170	-160	0.07	0.25	<0.05	471	14	1932	
5/22/89	3.00	N/A	8.2	N/A	196	-180	0.26	0.25	0.21	463	17	1887	
6/2/89	2.50	N/A	8.4	N/A	204	-196	0.35	<0.20	<0.20	436	8	2474	
7/21/89	0.62	N/A	8.3	N/A	211	-211	0.57	1.00	0.16	614	27	2722	
8/23/89	1.12	N/A	8.3	N/A	138	-136	0.35	0.25	0.14	511	7	2625	
9/27/89	997.00	N/A	8.4	N/A	188	-177	<0.20	<0.20	<0.20	876	4	2990	
10/27/89	996.00	N/A	8.3	N/A	180	-170	0.09	<0.05	<0.05	714	5	3037	
12/15/89	1.25	N/A	8.4	N/A	203	-196	0.12	0.13	<0.05	554	18	2649	
1/30/90	6.00	N/A	8.2	N/A	148	-142	1.12	0.13	0.62	279	65	1524	
2/21/90	2.66	N/A	8.3	N/A	194	-184	<0.05	0.23	<0.05	554	2	2056	
3/5/90	1.25	N/A	8.3	N/A	194	-184	<0.05	0.17	<0.05	487	2	2213	
4/9/90	1.25	N/A	8.2	N/A	174	-168	0.14	0.20	0.07	457	14	2163	
5/23/90	1.69	N/A	8.4	N/A	201	-191	0.11	0.67	0.09	608	6	2574	
6/28/90	1.46	N/A	8.4	N/A	185	-156	0.26	0.09	0.15	547	17	2673	
7/25/90	1.69	N/A	8.2	N/A	133	-121	0.36	0.07	<0.05	161	8	851	
11/5/90	1.13	N/A	8.0	N/A	178	-170	0.08	0.20	0.05	584	2	2596	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S2 - Talley Run
Description: Stream - Downstream Talley Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:19 W80:25:18
Elevation: 980

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
2/15/91	2.44	N/A	8.2	N/A	169	-159	0.16	0.13	0.09	398	24	1810	
5/23/91	561.00	N/A	8.2	N/A	204	-193	0.29	0.78	0.13	525	62	2783	
9/9/91	617.00	N/A	8.2	N/A	183	-177	<0.20	<0.20	<0.20	632	15	4334	
3/30/92	1495.00	N/A	8.2	N/A	160	-151	<0.05	0.08	0.07	671	21	2657	
6/22/92	898.00	N/A	8.3	N/A	219	-214	<0.21	<0.21	0.32	741	11	3917	
9/3/92	1572.00	N/A	8.2	N/A	197	-190	0.28	0.62	0.24	1149	8	4164	
12/18/92	1863.00	N/A	8.1	N/A	164	-157	0.81	0.31	0.86	528	42	1930	
2/20/93	748.00	N/A	8.3	N/A	209	-199	0.14	0.35	0.16	651	10	2517	
5/28/93	561.00	N/A	8.2	N/A	193	-189	0.25	0.27	0.22	635	24	3310	
8/4/93	1010.00	N/A	8.2	N/A	163	-145	<0.21	0.58	<0.21	1134	7	3852	
11/8/93	1092.00	N/A	8.3	N/A	167	-157	<0.21	0.30	<0.21	913	11	4088	
2/10/94	1497.00	N/A	8.3	N/A	209	-197	0.28	0.83	0.15	724	16	2741	
6/21/94	2019.00	N/A	8.0	N/A	209	-174	0.06	0.09	0.04	925	7	4000	
6/16/94	2244.00	N/A	7.9	N/A	270	-269	<0.21	0.23	<0.21	597	6	4000	
11/3/94	N/A	N/A	7.9	N/A	215	-215	0.29	0.44	0.17	608	36	2860	
3/31/95	673.00	N/A	7.7	N/A	262	-262	0.21	0.70	0.16	714	4	3220	
6/15/95	1885.00	N/A	8.0	N/A	203	-203	0.79	0.53	0.44	947	15	3720	
8/25/95	449.00	N/A	7.7	N/A	244	-243	<0.21	<0.21	<0.21	648	7	4440	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S2 - Talley Run
Description: Stream - Downstream Talley Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:19 W80:25:18
Elevation: 980

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
11/20/95	1870.00	N/A	8.1	N/A	185	-136	1.19	2.60	1.70	1475	34	4820	
1/29/98	1122.00	N/A	7.8	N/A	272	-262	0.15	0.73	0.10	675	33	3530	
1/29/98	2.50	8.3	7.7	N/A	243	-231	0.17	0.75	0.00	700	3	4000	
4/29/98	1400.00	N/A	8.0	N/A	239	-239	0.22	0.28	0.14	737	12	3700	
4/29/98	3.10	7.9	7.8	N/A	228	-219	0.20	0.27	0.15	775	6	4020	
5/27/98	842.00	N/A	7.9	N/A	220	-215	0.25	0.19	0.24	893	22	5050	
6/17/98	1234.00	N/A	7.8	N/A	272	-263	0.41	0.57	N/A	1150	36	5550	
7/22/98	1010.00	N/A	7.7	N/A	253	-238	0.12	0.14	<0.05	988	12	5790	
7/29/98	1.05	8.2	7.9	N/A	235	-222	0.14	0.10	N/A	975	0	6150	
8/19/98	842.00	N/A	7.7	N/A	195	-169	<0.21	<0.21	0.21	4260	10	5500	
9/21/98	561.00	N/A	7.7	N/A	211	-202	0.21	0.21	0.09	1010	17	5530	
10/28/98	539.00	N/A	7.7	N/A	253	-246	0.15	0.17	<0.05	1040	4	6090	
10/28/98	1.20	8.1	8.3	N/A	227	-208	0.19	0.16	N/A	1025	6	6420	
11/11/98	617.00	N/A	7.6	N/A	241	-238	0.19	0.16	0.14	1060	17	6230	
1/26/99	898.00	N/A	7.8	N/A	194	-188	0.32	0.52	0.22	619	22	3150	
1/26/99	2.00	8.1	8.1	N/A	199	-187	0.34	0.46	N/A	713	12	3740	
4/14/99	898.00	N/A	7.8	N/A	213	-208	0.33	0.34	0.33	792	1	3710	
4/14/99	2.00	8.3	8.1	N/A	205	-191	0.39	0.31	N/A	725	5	4380	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S2 - Talley Run
Description: Stream - Downstream Talley Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:19 W80:25:18
Elevation: 980

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
8/11/99	299.00	N/A	7.8	N/A	226	-221	0.17	0.16	0.12	1050	21	5440	
8/11/99	0.67	8.1	8.3	N/A	209	-209	0.24	0.16	N/A	1150	1	6440	
11/1/99	448.00	N/A	7.6	N/A	253	-247	0.16	0.23	<0.05	1020	14	5360	
11/1/99	1.00	8.2	8.2	N/A	253	-241	0.18	0.20	N/A	675	2	6520	
2/16/00	4.40	8.3	8.3	N/A	163	-158	0.40	0.50	N/A	830	9	2270	
3/1/00	504.00	N/A	8.2	N/A	220	-214	0.60	0.30	0.10	1042	13	3510	
6/9/00	0.67	8.2	8.1	N/A	242	-239	0.20	0.04	N/A	1199	15	3920	
8/28/00	1.06	8.2	8.1	N/A	261	-256	0.10	0.20	N/A	967	<5	4500	
10/18/00	673.00	N/A	8.0	N/A	271	-265	0.30	0.40	0.30	865	46	4160	
10/30/00	1.50	8.3	8.3	N/A	271	-265	0.50	1.20	N/A	1159	13	4150	
2/6/01	700.00	N/A	8.2	N/A	284	-269	0.60	0.90	0.30	1566	16	3870	
3/23/01	4.50	8.5	8.5	N/A	261	-256	0.50	0.40	N/A	800	23	2290	
6/8/01	2.70	8.4	8.4	N/A	217	-212	0.30	0.30	N/A	1066	32	3080	
8/1/01	N/A	N/A	8.1	N/A	347	-331	N/A	N/A	N/A	N/A	23	N/A	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S1A
Description: Unnamed Trib to Kerr Road Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:25 W80:24:37
Elevation: 1310

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/27/01	ND	N/A	7.6	N/A	115	-103	0.02	<0.01	<0.04	44	<5	186	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S2A
Description: Unnamed Trib to Kerr Road Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:22 W80:24:36
Elevation: 1310

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/27/01	ND	N/A	7.5	N/A	150	-137	0.10	<0.01	<0.04	48	<5	192	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S3A
Description: Unnamed Trib to Kerr Road Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:222 W80:24:41
Elevation: 1220

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/27/01	ND	N/A	7.8	N/A	115	-103	0.20	<0.01	<0.04	70	<5	227	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S5A
Description: Hillside South of Existing Coarse Refuse
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:16 W80:23:37
Elevation: 1200

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/27/01	ND	N/A	8.5	N/A	268	-253	0.20	0.02	<0.04	840	5	2731	
6/19/01	ND	8.0	7.9	19.0	200	-180	0.09	0.02	0.20	445	26	1950	
7/24/01	ND	8.5	8.3	24.0	193	-181	0.30	0.04	<0.04	641	32	3600	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S6A
Description: HillSide East of Existing Coarse Refuse
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:17 W80:23:12
Elevation: 1290

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/27/01	ND	N/A	7.8	N/A	195	-182	0.20	0.03	0.09	744	5	2690	
6/19/01	ND	8.0	7.7	17.0	194	-180	0.10	0.04	0.10	770	21	1870	
7/24/01	ND	N/A	8.0	N/A	199	-191	0.08	0.02	<0.04	573	2806	3100	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S7
Description:Upstream of 1 South on Unnamed Tributary to Owens Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:31 W80:25:01
Elevation: 1220

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
1/28/98	0.11	7.7	7.5	N/A	116	-100	0.12	0.02	0.04	63	0	357	
5/27/98	0.06	7.9	8.6	N/A	163	-151	0.32	0.04	0.27	55	3	414	
7/29/98	trickle	8.2	8.5	N/A	187	-171	0.38	0.01	N/A	53	1	460	
1/27/98	0.31	7.9	7.8	N/A	94	-77	0.15	0.02	N/A	63	1	337	
4/14/99	0.02	7.9	8.0	N/A	100	-88	0.56	0.04	N/A	55	10	323	
11/3/99	0.01	7.7	8.2	N/A	94	-76	0.15	0.04	N/A	165	2	518	
1/12/00	0.02	8.2	7.8	N/A	118	-113	0.03	<0.01	N/A	117	6	420	
6/2/00	0.01	8.1	8.1	N/A	162	-157	0.07	<0.01	N/A	49	7	380	
8/28/00	0.00	8.0	8.0	N/A	182	-177	0.09	0.07	N/A	193	<5	460	
10/30/00	<0.001	7.5	7.4	N/A	209	-202	0.40	0.20	N/A	676	5	430	
3/23/01	0.41	8.1	N/A	N/A	87	-80	0.30	0.01	N/A	84	9	190	
6/8/01	0.15	8.0	7.9	N/A	146	-138	0.20	0.01	N/A	68	9	360	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S7A
Description: Hillside East of Existing Coarse Refuse
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:17 W80:23:42
Elevation: 1290

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/27/01	ND	N/A	7.5	N/A	331	-316	0.20	<0.01	<0.04	1059	10	3667	
6/19/01	ND	8.0	8.2	13.0	320	-301	0.08	0.02	0.20	682	6	2250	
7/24/01	ND	N/A	8.0	N/A	277	-271	0.10	0.03	<0.04	801	56	5010	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S8
Description:Downstream of 1 South Shaft on Unnamed Tributary to Owens Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:13 W80:24:56
Elevation: 1200

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
1/28/98	0.13	7.4	7.3	N/A	114	-100	0.07	0.01	0.03	63	0	350	
5/27/98	0.07	8.0	8.5	N/A	161	-146	0.44	0.04	0.35	55	6	412	
7/29/98	trickle	7.9	8.0	N/A	185	-170	0.15	0.02	N/A	51	0	454	
1/27/99	0.33	8.2	7.9	N/A	89	-74	0.21	0.02	N/A	63	0	330	
4/14/99	0.02	8.0	8.1	N/A	99	-88	0.61	0.03	N/A	51	6	320	
11/3/99	0.01	7.8	8.2	N/A	93	-81	0.21	0.02	N/A	153	2	500	
1/12/00	0.02	8.2	7.9	N/A	123	-110	<0.03	1.40	N/A	113	5	370	
6/2/00	0.01	8.0	8.1	N/A	167	-163	0.20	0.02	N/A	60	9	370	
8/28/00	0.00	7.4	7.5	N/A	194	-189	0.09	0.10	N/A	157	5	450	
10/30/00	<0.001	7.5	7.4	N/A	214	-207	0.40	0.10	N/A	163	12	330	
3/23/01	0.54	7.7	7.8	N/A	85	-77	0.60	0.03	N/A	81	9	190	
6/8/01	0.17	8.2	7.9	N/A	124	-116	0.30	0.02	N/A	64	20	320	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S8A
Description: Hillside East of Existing Coarse Refuse
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:26 W80:23:40
Elevation: 1220

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/27/01	ND	N/A	7.8	N/A	179	-167	0.20	<0.01	<0.04	189	<5	608	
6/19/01	ND	8.3	7.9	15.0	196	-179	0.06	0.01	0.10	127	25	890	
7/24/01	ND	N/A	8.3	N/A	194	-187	0.08	0.02	<0.04	174	72	1050	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S9
Description: Unnamed Trib to Kerr Road Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates:
Elevation: N/A

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/27/01	ND	N/A	7.5	N/A	101	-88	0.20	<0.01	<0.04	38	<5	175	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S10
Description: Hillside East of Existing Coarse Refuse
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:10 W80:23:41
Elevation: 1280

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/28/01	ND	N/A	7.4	N/A	107	-95	0.10	<0.01	0.09	46	<5	186	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S11
Description: Hillside East of Existing Coarse Refuse
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:12 W80:23:29
Elevation: 1220

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
3/28/01	ND	N/A	7.2	N/A	66	-56	0.09	<0.01	<0.04	81	<5	269	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S14
Description: Unnamed Trib North of New Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:58 W80:25:23
Elevation: 1350

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/28/01	ND	N/A	7.2	N/A	89	-77	0.09	<0.01	<0.04	61	<5	167	
6/19/01	ND	7.7	7.0	15.0	130	-114	0.07	<0.01	0.10	58	<5	360	

ND - Not Determined

Monitoring Point S14

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S15
Description: Unnamed Trib North of New Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:00 W80:23:24
Elevation: 1380

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/28/01	ND	N/A	7.4	N/A	47	-36	0.10	<0.01	<0.04	38	<5	115	
6/18/01	ND	7.3	7.3	12.0	68	-52	0.06	<0.01	0.10	42	25	240	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S16
Description: Unnamed Trib North of New Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:56 W80:23:21
Elevation: 1370

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
3/28/01	ND	N/A	8.1	N/A	34	-22	0.30	0.02	0.08	41	<5	87	
6/19/01	ND	7.4	8.1	14.0	40	-27	0.10	<0.01	0.20	42	183	180	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S17
Description: Unnamed Trib North of New Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:55 W80:23:23
Elevation: 1350

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/28/01	ND	N/A	8.1	N/A	106	-94	0.10	<0.01	0.05	57	<5	186	
6/19/01	ND	7.8	8.1	14.0	170	-155	0.07	<0.01	0.10	59	6	350	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S18
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:45 W80:23:30
Elevation: 1330

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/28/01	ND	N/A	7.5	N/A	104	-101	0.70	0.30	0.10	71	5	280	
6/18/01	ND	7.9	8.3	13.0	150	-133	0.07	<0.01	0.20	73	<5	430	
7/24/01	ND	7.8	8.3	17.0	183	-176	0.09	0.02	<0.04	78	14	540	
8/30/01	ND	8.1		19.0									
9/25/01	ND	8.0	8.1	10.0	223	203	0.30	0.08	0.09	92	98	468	
10/24/01	DRY												
11/28/01	ND	8.1	7.9	10.0	180	-165	0.10	0.03	0.20	95	51	295	
12/19/01	0.61	7.5	8.1	9.0	137	-127	0.06	0.01	0.04	89	11	229	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S19
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:43 W80:23:37
Elevation: 1350

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/28/01	ND	N/A	7.7	N/A	184	-179	0.20	<0.01	<0.04	81	<5	375	
6/18/01	ND	7.3	8.5	11.0	188	-176	0.07	0.03	0.10	92	15	580	
7/24/01	ND	8.1	8.0	17.0	223	-219	0.10	0.06	<0.04	133	151	650	
8/30/01	ND	7.9	7.8	16.0	258	-245	0.10	0.20	0.08	80	41	610	
9/25/01	ND	8.2	8.1	13.0	227	213	0.30	0.07	0.06	84	22	366	
10/24/01	ND	8.6	8.1	16.0	202	178	<0.03	0.08	0.20	99	<5	311	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No. : S20
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:42 W80:23:40
Elevation: 1480

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
3/28/01	ND	N/A	6.3	N/A	179	-175	0.10	<0.01	<0.04	80	<5	285	
6/19/01	ND	8.2	8.3	17.0	179	-164	0.05	<0.01	0.10	105	20	450	
7/24/01	DRY												
8/30/01	DRY												
9/25/01	DRY												
10/24/01	DRY												
11/27/01	ND	7.8	6.8	9.0	115	-101	0.70	0.03	1.00	75	38	199	
12/20/01	DRY												

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No. : S21
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:39 W80:23:17
Elevation: 1320

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
6/18/01	ND	7.5	8.2	14.5	177	-159	0.07	0.01	0.07	62	30	390	
7/24/01	ND	7.8	8.2	21.0	170	-164	0.09	0.02	<0.04	63	39	440	
8/30/01	ND	7.5	7.6	18.0	180	-167	0.08	<0.01	0.10	42	76	410	
9/25/01	ND	8.1	8.2	11.0	181	146	0.40	0.02	0.10	51	222	246	
10/24/01	DRY												
11/28/01	ND	8.2	7.9	10.0	146	-135	0.20	0.02	0.10	84	37	247	
12/19/01	0.13	7.5	8.2	9.0	165	-154	0.04	0.02	0.10	114	53	262	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No. : S22
Description :Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:31 W80:23:04
Elevation: 1260

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
6/18/01	ND	7.9	7.1	18.0	148	-134	0.10	0.02	0.10	28	14	330	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No. : S23
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:36 W80:23:00
Elevation: 1340

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
6/18/01	ND	8.0	8.1	19.0	151	-135	0.09	<0.01	0.10	38	16	380	
7/24/01	DRY												
8/30/01	DRY												
9/25/01	DRY												
10/24/01	DRY												
11/28/01	DRY												
12/19/01	DRY												

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No. : S24
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:41 W80:23:00
Elevation: 1330

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
6/18/01	ND	7.3	7.8	12.0	139	-118	0.09	<0.01	0.10	55	27	370	
7/24/01	DRY												
8/30/01	DRY												
9/25/01	DRY												
10/24/01	DRY												
11/28/01	DRY												
12/19/01	DRY												

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point o.: S25
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:44 W80:23:00
Elevation: 1380

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
6/18/01	ND	7.5	7.6	15.0	194	-183	0.08	0.03	0.10	59	8	400	
7/24/01	ND	7.9	7.5	22.0	124	-117	0.10	0.02	<0.04	111	10	690	
8/30/01	ND	7.9	8.2	18.0	183	-170	0.10	0.03	0.08	33	10	380	
9/25/01	ND	8.0	8.2	10.0	122	-109	1.20	0.09	1.00	71	24	398	
10/24/01	ND	8.0	7.8	16.0	110	-101	0.40	0.05	0.60	88	7	335	
11/28/01	DRY												
12/19/01	0.04	7.4	8.0	10.0	162	-150	0.10	0.01	0.20	76	15	245	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S26
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:32 W80:22:44
Elevation: 1250

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
6/18/01	ND	7.3	7.6	12.0	197	-179	0.07	<0.01	0.10	47	28	360	
7/24/01	DRY												
8/30/01	ND	7.8	8.0	18.0	184	-172	0.06	<0.01	0.10	43	8	450	
9/25/01	ND	8.1	8.2	12.0	184	-169	0.20	<0.01	0.05	44	116	152	
10/24/01	ND	8.4	7.7	16.0	180	-164	0.10	0.05	0.20	71	17	573	
11/28/01	ND	8.9	7.9	9.0	136	-125	0.10	<0.03	0.09	67	31	254	
12/19/01	0.88	7.3	7.9	12.0	78	-67	0.08	<0.01	0.10	42	5	162	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S27
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:27 W80:23:15
Elevation: 1280

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
9/25/01	ND	7.9	7.8	14.0	302	-289	0.40	0.03	0.20	100	26	400	
10/23/01	ND	8.4	8.0	18.0	256	-242	0.20	0.05	0.20	106	21	419	
11/28/01	ND	8.2	7.9	9.0	233	-220	<0.03	0.05	0.07	115	26	397	
12/19/01	~0.79	7.3	7.9	9.0	276	-263	0.10	0.02	0.06	104	<5	360	
1/30/02	~1.22	7.1	7.6	8.0	224	-210	0.10	0.07	0.20	91	56	342	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S28
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:23 W80:23:22
Elevation: 1430

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
12/19/01	~2	7.4	8.0	6.0	136	-125	0.08	0.90	0.06	69	17	1423	
1/30/02	N/A	7.1	7.8	8.0	113	-97	0.50	0.30	0.70	59	164	110	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S30
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:42 W80:29:36
Elevation: 1350

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
6/18/01	ND	8.1	7.8	20.0	183	-169	0.09	0.01	0.20	79	6	440	
7/24/01	DRY												
8/30/01	DRY												
9/25/01	DRY												
10/24/01	DRY												
11/28/01	DRY												
12/19/01	DRY												

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S31
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:29 W80:23:16
Elevation: 1290

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
6/18/01	ND	7.5	7.6	12.0	222	-207	0.07	0.01	0.10	74	6	550	
7/24/01	ND	8.4	8.4	18.0	206	-191	0.10	0.01	<0.04	84	129	510	
8/30/01	ND		8.2		227	-212	0.07	<0.01	0.08	34	32	460	
9/25/01	ND	8.2	8.2	11.0	204	-191	0.09	0.01	0.05	69	18	292	
10/24/01	ND	8.4	8.0	18.0	210	-204	0.10	0.02	0.50	83	5	314	
11/28/01	ND	8.1	7.9	9.0	193	-182	<0.03	<0.01	0.09	79	28	294	
12/19/01	5.28	7.3	8.0	9.0	143	-131	0.05	<0.01	0.07	54	13	184	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S31
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:29 W80:23:16
Elevation: 1290

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S32
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:23 W80:23:16
Elevation: 1290

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
6/18/01	ND	7.4	7.7	12.0	232	-217	0.08	0.02	0.09	104	14	500	
7/24/01	ND	8.2	8.2	18.0	232	-217	0.04	0.01	<0.04	141	23	660	
8/30/01	ND	8.3	8.1	16.0	232	-218	0.20	0.01	0.09	91	9	560	
9/25/01	DRY												
10/24/01	DRY												
11/28/01	DRY												
12/19/01	DRY												

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S33
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:22 W80:23:19
Elevation: 1330

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
6/18/01	ND	7.3	7.7	14.0	260	-243	0.07	0.02	0.07	102	26	540	
7/24/01	DRY												
8/30/01	DRY												
9/25/01	DRY												
10/24/01	DRY												
11/28/01	DRY												
12/19/01	1.59	7.1	7.6	10.0	237	-223	0.04	0.01	0.05	191	<5	209	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S34
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:22 W80:23:19
Elevation: 1360

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
6/18/01	ND	7.5	8.0	14.0	250	-233	0.07	<0.01	0.10	125	52	650	
7/24/01	ND	8.2	8.2	16.0	208	-196	0.10	0.02	<0.04	150	55	650	
8/30/01	DRY												
9/25/01	DRY												
10/24/01	DRY												
11/28/01	DRY												
12/19/01	DRY	7.3	8.0	10.0	224	-212	0.07	<0.01	0.04	103	72	365	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No. : S35
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:20 W80:23:18
Elevation: 1330

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
6/18/01	ND	7.9	8.0	12.0	269	-253	0.08	0.02	0.08	128	24	630	
7/24/01	ND	8.6	8.6	18.0	256	-242	0.10	0.04	<0.04	146	41	690	
8/30/01	ND	8.6	8.4	17.0	239	-227	0.07	<0.01	0.06	87	12	630	
9/25/01	ND	8.6	8.4	10.0	261	-246	<0.03	<0.01	<0.04	115	56	390	
10/24/01	ND	8.6	7.3	14.0	248	-244	0.10	0.02	0.20	145	36	378	
11/28/01	ND	8.5	8.2	10.0	200	-189	<0.03	<0.01	<0.04	112	51	404	
12/19/01	1.13	7.8	8.3	8.0	196	-184	0.05	<0.01	0.08	98	26	290	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S36
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:26 W80:22:51
Elevation: 1290

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
6/18/01	ND	7.8	8.2	14.0	223	-208	0.08	0.01	0.10	55	8	430	
7/24/01	ND		8.5		245	-231	0.10	0.02	<0.04	63	48	520	
8/30/01	ND	8.5		18.0									
9/25/01	ND	8.5	8.4	9.0	242	-227	0.20	0.02	<0.04	48	74	276	
10/24/01	ND	8.7	7.9	15.0	234	-215	0.20	0.03	0.20	81	119	405	
11/28/01	ND	8.1	7.9	9.0	187	-176	0.30	0.07	0.04	72	80	283	
12/20/01	0.61	7.5	8.2	6.0	209	-193	0.04	0.01	0.20	62	14	214	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S37
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:20 W80:22:50
Elevation: 1280

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
6/18/01	ND	8.1	7.6	14.0	190	-171	0.06	0.01	0.10	71	46	480	
7/24/01	DRY												
8/30/01	DRY												
9/25/01	ND	8.1	8.0	12.0	201	-189	0.10	0.30	<0.04	51	10	268	
10/24/01	ND	8.6	7.9	17.0	208	-200	0.60	0.30	0.20	70	<5	306	
11/28/01	ND	8.2	8.0	8.0	182	-171	0.10	0.30	0.06	64	11	282	
12/20/01	0.72	7.2	8.1	5.0	178	-167	0.06	0.04	0.20	67	32	251	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S38
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:578:20 W80:22:53
Elevation: 1170

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
9/20/01	ND	8.2	8.2	17.0	240	-226	0.07	<0.01	0.20	51	30	306	
10/25/01	ND	8.4	7.7	14.0	272	-257	0.09	<0.01	0.10	82	37	369	
11/29/01	ND	8.5	8.2	13.0	235	-223	0.20	<0.01	0.09	83	27	347	
12/18/01	1.59	7.7	8.2	8.0	223	-211	0.20	0.01	0.10	103	44	336	
1/30/02	1.98	7.5	8.2	8.0	209	-192	0.10	0.01	0.08	81	83	300	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S39
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:18 W80:22:50
Elevation: 1300

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
9/27/01	ND	8.1	8.5	11.0	281	-270	0.05	<0.01	0.20	43	256	478	
10/25/01	ND	8.8	8.1	14.0	223	-209	1.00	0.03	1.20	87	5	299	
11/29/01	ND	8.4	8.2	11.0	218	-206	0.10	<0.01	0.08	95	15	314	
12/18/01	1.13	7.6	8.2	7.0	178	-165	0.10	<0.01	0.10	101	16	306	
1/30/02	1.76	7.5	8.2	8.0	198	-182	0.05	0.01	0.08	99	115	321	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S40
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:17 W80:22:49
Elevation: 1280

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
9/27/01	ND	8.0	8.4	12.0	245	-233	0.05	0.01	0.20	75	<5	365	
10/25/01	ND	8.5	7.9	12.0	224	-211	0.10	0.01	0.20	93	22	337	
11/29/01	ND	8.4	8.0	11.0	173	-162	0.10	<0.01	0.09	88	17	288	
12/18/01	1.98	7.2	7.9	9.0	137	-125	0.20	0.10	0.20	67	77	213	
1/30/02	2.64	7.3	8.0	8.0	176	-163	0.10	0.01	0.05	79	219	276	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S41
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:05 W80:22:52
Elevation: 1320

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
9/27/01	ND	8.1	8.6	11.0	124	-111	0.06	0.01	0.20	74	39	583	
10/25/01	ND	8.8	8.2	11.0	240	-227	0.30	<0.01	0.30	96	7	373	
11/29/01	ND	8.4	8.2	11.0	200	-188	0.10	0.02	0.10	76	18	261	
12/18/01	1.59	7.3	8.1	9.0	117	-104	0.10	<0.01	0.10	57	23	172	
1/30/02	3.96	7.3	8.1	9.0	117	-99	0.07	0.01	0.04	48	87	176	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S42
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:05 W80:22:51
Elevation: 1240

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
9/27/01	ND	8.5	8.4	10.0	184	-176	0.04	0.03	0.20	31	<5	352	
10/25/01	ND	7.8	7.8	10.0	115	-101	0.10	<0.01	0.20	40	8	179	
11/29/01	ND	8.4	7.9	10.0	120	-104	0.09	<0.01	0.10	50	5	150	
12/18/01	4.53	7.2	7.8	8.0	61	-51	0.10	<0.01	0.10	43	33	131	
1/30/02	5.28	7.0	7.8	7.0	78	-67	0.03	0.01	<0.03	46	23	136	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S43
Description: Spring Grinnage Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:56:50 W80:23:10
Elevation: 1310

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/1/01	ND	8.0	8.5	11.0	185	-176	0.60	0.05	0.20	42	12	258	
10/26/01	ND	8.5	7.9	8.0	191	-177	0.20	0.01	0.40	55	15	273	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S44
Description: Spring Grinnage Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:56:52 W80:23:07
Elevation: 1330

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/1/01	ND	8.1	8.5	12.0	184	-173	0.04	0.02	0.20	41	107	246	
10/22/01	ND	7.9	8.1	9.0	189	-176	0.30	0.02	0.40	73	23	280	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S45
Description: Spring Grinnage Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:56:55 W80:23:04
Elevation: 1290

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/1/01	ND	7.6	8.2	14.0	247	-235	<0.03	<0.01	0.20	78	18	423	
10/26/01	ND	7.1	7.5	10.0	250	-236	0.20	0.01	0.04	112	<5	346	
11/30/01	ND	7.7	7.4	11.0	148	-138	0.20	<0.01	0.20	99	8	261	
12/20/01	0.66	7.0	7.7	10.0	173	-161	0.05	<0.01	0.10	93	<5	278	
1/29/02	1.59	7.4	8.0	10.0	163	-149	0.06	0.01	0.09	95	7	266	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S46
Description: Spring Grinnage Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:00 W80:23:18
Elevation: 1390

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/1/01	ND	8.0	8.5	15.0	249	-236	0.07	0.04	0.20	120	103	440	
10/26/01	ND	7.8	8.0	10.0	288	-275	0.10	0.03	0.30	148	8	438	
11/29/01	ND	8.3	8.1	11.0	219	-207	0.20	0.09	0.10	89	18	337	
12/20/01	0.88	7.6	8.3	6.0	244	-233	0.05	0.10	0.20	152	9	394	
1/29/02	2.64	7.7	8.2	10.0	219	-205	0.05	0.01	0.05	144	60	371	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S47
Description: Spring Grinnage Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:56:58 W80:23:22
Elevation: 1320

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
10/1/01	ND	7.9	8.7	10.0	309	-293	0.20	<0.01	0.30	65	157	511	
10/26/01	ND	8.2	8.1	15.0	376	-359	0.20	0.04	0.06	136	98	502	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No:S48
Description: Spring Time Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:53 W80:23:17
Elevation: 1350

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/25/01	ND	8.7	7.9	10.0	121	-107	0.09	0.01	0.20	40	27	198	
11/27/01	ND	7.9	7.7	12.0	64	-54	0.30	<0.01	0.20	38	28	218	
12/20/01	1.98	7.2	8.1	6.0	78	-67	0.10	0.01	0.09	40	5	127	
1/28/02	3.17	7.0	7.3	10.0	75	-63	0.08	0.01	0.09	37	<5.0	160	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S49
Description: Spring Time Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:50 W80:23:02
Elevation: 1290

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
10/25/01	ND	8.8	8.0	11.0	141	-129	0.30	0.01	0.30	44	22	222	
11/27/01	ND	8.2	8.1	12.0	97	-86	0.20	0.01	0.20	67	13	220	
12/20/01	0.79	7.1	8.1	6.0	116	-105	0.06	<0.01	0.10	59	27	209	
1/28/02	2.64	7.1	7.9	6.0	103	-90	0.20	0.01	0.10	47	<5.0	216	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S50
Description: Spring Fletcher Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:56:56 W80:23:47
Elevation: 1300

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/26/01	ND	7.8	7.7	7.0	272	-256	0.20	0.02	0.10	88	69	337	
11/27/02	ND	8.0	7.9	9.0	155	-142	0.20	0.07	0.20	82	15	237	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S51
Description: Spring Fletcher Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:08 W80:23:38
Elevation: 1300

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/26/01	ND	7.8	7.8	5.0	169	-165	0.30	0.03	0.06	89	<5	284	
11/27/01	ND	7.8	7.0	10.0	64	-39	2.30	0.07	2.20	80	85	197	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S52
Description: Spring Fletcher Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:15 W80:23:35
Elevation: 1330

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/26/01	ND	8.0	8.0	6.0	258	-252	0.30	0.20	0.07	118	89	404	
11/27/01	ND	8.2	8.0	11.0	184	-172	0.20	0.10	0.20	119	19	331	
12/18/01	0.72	7.5	7.6	8.0	247	-235	0.10	0.03	0.04	137	21	480	
1/29/02	2.64	6.9	7.4	10.0	258	-244	0.40	0.20	0.04	113	6	388	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No:S53
Description: Spring Fletcher Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:18 W80:23:34
Elevation: 1340

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/26/01	ND	8.2	8.0	8.0	244	-239	0.10	0.05	0.07	107	44	411	
11/27/01	ND	7.9	7.6	10.0	88	-73	1.10	0.05	1.00	83	125	228	
12/18/01	0.66	7.4	8.4	8.0	166	-154	0.20	0.05	0.10	118	46	323	
1/29/02	1.44	7.5	8.1	11.0	257	-242	0.20	0.02	0.10	121	51	397	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: P54
Description: Pond Fletcher Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:18 W80:23:37
Elevation: 1320

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/26/01	ND	7.6	7.6	7.0	238	-228	2.30	0.44	0.10	45	11	421	
11/27/01	ND	8.1	7.9	10.0	165	-151	0.30	0.10	0.20	42	34	286	
12/18/01	3.60	7.3	7.9	6.0	122	-110	0.40	0.20	0.20	70	11	279	
1/29/02	2.26	7.2	7.8	10.0	205	-190	0.20	0.06	0.10	97	17	353	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S55
Description: Spring Fletcher Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:11 W80:23:40
Elevation: 1280

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/26/01	ND	7.5	7.4	12.0	248	-242	0.30	0.03	0.09	93	<5	465	
11/27/01	ND	7.6	7.4	13.0	207	-192	0.20	0.04	0.40	99	33	428	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: P56
Description: Pond Kerr Road Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:13 W80:24:19
Elevation: 1270

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
10/30/01	ND	8.1	7.9	10.0	120	-107	<0.30	0.01	0.05	42	<5	206	
11/27/01	ND	8.1	7.8	10.0	81	-68	0.50	0.02	0.80	47	20	149	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S57
Description: Spring Kerr Road Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:14 W80:24:14
Elevation: 1280

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/30/01	ND	8.2	8.1	11.0	240	-226	0.05	0.03	0.10	46	38	352	
11/27/01	ND	7.6	7.6	11.0	44	-32	0.50	0.02	0.30	42	91	109	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S58
Description: Spring Kerr Road Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:51:16 W80:24:08
Elevation: 1320

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/30/01	ND	8.2	8.1	11.0	217	-203	0.04	0.20	0.09	77	<5	309	
11/27/01	ND	7.9	7.9	10.0	114	-102	0.40	0.03	0.30	67	67	184	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No:S59
Description: Spring Kerr Road Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:27 W80:24:07
Elevation: 1330

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
10/30/01	ND	8.1	7.0	11.0	169	-155	<0.03	0.20	0.10	95	62	1488	
11/27/01	ND	7.9	7.8	12.0	174	-162	0.20	0.20	0.04	107	30	1781	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Well 53
Description: Well 53 Over Deep Mine
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:12 W80:24:19
Elevation: 1125

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
3/23/98	1218.70	8.0	8.6	N/A	302	-282	0.72	0.39	0.35	63	9	726	
6/25/98	1222.30	8.0	8.1	N/A	311	-275	0.27	0.48	0.12-	61	6	719	
7/20/98	1220.00	7.8	8.1	N/A	313	-279	0.35	0.34	N/A	63	1	736	
12/7/98	1220.80	7.7	8.1	N/A	313	-313	0.84	0.48	N/A	64	5	734	
3/23/99	1223.10	7.8	8.2	N/A	320	-211	0.74	0.69	N/A	78	0	777	
5/28/99	1220.30	8.3	8.4	N/A	295	-276	0.55	0.60	N/A	65	1	725	
9/29/99	1220.70	7.5	8.0	N/A	315	-254	0.51	0.34	N/A	64	8	745	
11/10/99	1223.00	7.7	8.3	N/A	305	-265	0.54	0.79	N/A	61	2	721	
3/23/00	1223.60	7.9	7.9	N/A	354	-351	1.90	0.70	N/A	86	16	590	
5/17/00	1220.90	7.8	8.0	N/A	364	-361	5.20	0.60	N/A	72	9	650	
8/28/00	1223.00	7.6	7.6	N/A	302	-299	1.00	1.10	N/A	131	<5	560	
10/30/00	1224.00	7.7	7.8	N/A	351	-346	1.50	0.80	N/A	116	<5	410	
3/23/01	1225.00	7.8	7.7	N/A	319	-315	5.20	1.20	N/A	101	17	440	
6/8/01	1224.00	7.9	7.9	N/A	276	-216	1.20	0.70	N/A	78	15	630	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW-N
Description: New Refuse Area Valley Stream
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:33 W80:22:29
Elevation: 1140

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
8/1/01	35.00	N/A	8.0	N/A	139	-125	1.00	0.06	1.10	56	26	360	
10/11/01	23.45	8.0	7.9	17.0	177	-164	0.30	0.30	0.10	79	11	299	
11/29/01	140.51	7.9	7.7	12.0	130	-119	0.20	0.10	0.10	81	<5	277	
12/19/01	364.50	7.4	8.0	8.0	115	-104	0.08	0.08	0.06	77	8	239	
1/28/02	240.48	6.9	7.8	6.0	118	-105	0.20	0.08	0.07	80	<5.0	246	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - O
Description: Kerr Road Valley Stream
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:17 W80:22:21
Elevation: 1200

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/11/01	0.23	8.5	8.1	13.0	202	-190	0.10	0.04	0.10	598	<5	1518	
11/29/01	37.50	8.4	8.0	12.0	130	-119	0.07	0.05	0.01	167	5	808	
12/19/01	68.49	8.1	8.1	6.0	129	-114	0.09	0.07	0.20	110	20	466	
1/29/02	46.15	7.4	8.1	10.0	141	-128	0.10	0.04	0.10	164	<5	676	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - P
Description: Kerr Road Stream Valley at Owen's Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:56:51 W80:25:14
Elevation: 1095

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
8/1/01	71.00	N/A	8.2	N/A	194	-180	0.07	0.04	0.20	49	6	540	
10/11/01	26.80	8.0	8.0	13.0	249	-237	0.10	0.02	0.08	94	<5	389	
11/29/01	245.11	8.4	8.1	12.0	177	-166	<0.03	<0.01	0.06	114	<5	436	
12/19/01	427.97	7.8	8.3	7.0	149	-137	0.09	0.02	0.07	89	<5	284	
1/29/02	443.61	7.8	8.4	9.0	156	-143	0.08	0.03	0.05	85	<5	348	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - Q
Description: Fletcher Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:56:55 W80:23:58
Elevation: 1220

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
10/11/01	4.33	8.1	8.0	14.0	231	-217	0.20	0.20	0.10	70	10	282	
11/30/01	58.50	7.9	7.7	12.0	147	-136	0.30	0.20	0.10	67	10	244	
12/19/01	89.30	7.5	8.0	8.0	143	-130	0.20	0.20	0.10	75	14	206	
1/29/02	69.07	7.3	7.9	8.0	162	-142	0.30	0.10	0.20	93	<5.0	267	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - R
Description: Fletcher Run at Owen's Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:56:50 W80:25:12
Elevation: 1155

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
8/1/01	115.00	N/A	7.9	N/A	193	-184	0.50	0.20	0.40	45	10	450	
10/11/01	1.30	7.4	7.3	11.0	266	-255	0.40	3.00	0.10	30	73	344	
11/30/01	163.69	8.1	7.9	11.0	162	-150	0.30	0.08	0.20	66	23	254	
12/19/01	333.84	7.7	8.2	8.0	163	-150	0.20	0.10	0.20	70	12	242	
1/29/02	185.76	7.4	8.1	10.0	177	-164	0.40	0.10	0.40	75	12	267	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - S
Description: Grinnage Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:30 W80:23:21
Elevation: 1210

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/11/01	1.97	8.1	8.0	12.0	226	-217	0.09	0.05	0.07	79	13	317	
11/30/01	46.00	8.0	7.7	11.0	122	-112	0.20	0.02	0.20	73	<5	205	
12/20/01	96.50	7.2	8.3	5.0	141	-129	0.07	0.03	0.20	78	9	210	
1/29/02	68.98	7.4	8.0	9.0	147	-138	0.20	0.02	0.10	91	<5	264	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - T
Description: Grinnage Run at Owen's Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:55:57 W80:23:32
Elevation: 1110

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/11/01	22.70	8.4	8.3	12.0	230	-219	0.10	0.07	0.07	86	<5	315	
11/30/01	314.83	8.2	7.9	11.0	132	-121	0.30	0.05	0.20	71	16	212	
12/19/01	392.37	7.8	8.2	8.0	119	-117	0.10	0.07	0.10	68	16	203	
1/29/02	236.51	7.7	8.3	9.0	139	-127	0.20	0.06	0.10	82	<5	227	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - U
Description: South Branch of Enlow Fork upstream of unnamed tributary
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:30 W80:22:21
Elevation: 1140

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/11/01	25.20	8.0	7.8	16.0	183	-171	0.10	0.20	0.10	105	5	289	
11/29/01	266.42	8.2	8.0	12.0	112	-103	0.20	0.02	0.09	88	6	230	
12/19/01	456.13	7.6	8.2	8.0	93	-82	0.10	0.03	0.10	83	10	182	
1/28/02	213.73	7.1	7.9	7.0	99	-84	0.30	0.04	0.20	73	6	196	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - V
Description: South Branch of Enlow Fork downstream of unnamed tributary
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:39 W80:22:30
Elevation: 1120

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
1/20/99	5027.23	8.0	7.7	N/A	51	-41	0.51	0.06	0.37	56	3	234	
4/26/99	3231.79	8.1	8.0	N/A	74	-60	0.27	0.03	0.11	44	0	250	
7/9/99	98.75	7.9	8.3	N/A	124	-103	0.35	0.07	0.22	50	5	358	
10/16/99	4.49	7.8	7.9	N/A	112	-90	0.19	0.02	0.12	95	10	434	
2/25/00	2334.07	8.0	8.0	N/A	69	-65	0.08	<0.01	0.20	47	5	240	
5/25/00	3186.91	8.0	8.1	N/A	116	-111	0.30	0.03	N/A	32	7	260	
7/14/00	6.73	7.9	7.9	N/A	135	-132	<0.03	<0.01	<0.04	35	10	320	
10/11/01	11.17	8.3	7.9	12.0	200	-188	0.10	0.10	0.10	107	10	340	
11/29/01	465.83	8.2	8.0	10.0	126	-114	0.10	0.05	0.06	99	7	257	
12/19/01	1003.20	7.6	8.2	8.0	109	-93	0.09	0.06	0.10	94	9	207	
1/28/02	420.22	7.0	8.0	7.0	105	-90	0.30	0.06	0.10	95	<5.0	234	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - W
Description: Time Valley Stream
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:00 W80:22:51
Elevation: 1120

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
8/1/01	42.00	N/A	8.0	N/A	144	-129	1.00	0.05	1.10	72	21	340	
11/30/01	24.00	8.3	8.1	10.0	108	-97	0.20	0.02	0.10	78	<5	235	
12/19/01	44.05	7.7	8.1	6.0	108	-104	0.05	0.01	0.08	78	17	235	
1/28/02	36.55	7.1	7.8	4.0	84	-71	0.20	0.01	0.05	65	<5.0	196	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Greene 1
Description: Well
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:35 W80:22:20
Elevation: 1185

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
9/20/01	ND	7.6	7.6	23.0	179	-167	0.10	<0.01	0.05	33	<5	190	
10/30/01	ND	7.8	7.7	23.0	185	-174	0.06	0.03	0.10	44	8	460	
11/28/01	29.48	7.9	7.9	18.0	194	-184	0.10	0.03	0.07	43	<5	259	
12/20/01	29.82	7.1	7.9	22.0	196	-194	0.30	0.08	0.10	47	8	240	
1/30/02	30.75	6.5	7.5	21.0	173	-159	0.40	0.02	0.06	49	<5	239	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Greene 2
Description: Well
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:35 W80:22:20
Elevation: 1185

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(mmho)	Comments
10/30/01	ND	8.0	7.7	16.0	234	-221	0.10	0.01	0.10	92	<5	336	
11/28/01	39.75	8.1	7.5	13.0	235	-224	0.01	<0.10	0.09	90	<5	309	
12/20/01	30.48	7.0	7.8	12.0	240	-237	0.05	0.01	0.10	91	<5	315	
1/29/02	28.22	6.9	7.5	16.0	227	-213	0.20	0.01	0.03	80	<5.0	311	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Webb 1
Description:Well
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:12 W80:23:18
Elevation: 1465

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/30/01	ND	8.3	8.1	13.0	421	-406	0.10	0.06	0.20	73	<5	466	
11/28/01	ND	8.4	8.3	13.0	418	-407	0.10	<0.01	0.06	69	<5	712	
12/19/01	ND	7.5	8.1	11.0	161	-150	0.06	<0.01	0.20	178	<5	400	
1/30/02	ND	7.0	7.6	14.0	224	-211	0.10	0.01	0.06	113	<5	420	

FORM 8.6A
MONITORING PROGRAM SUMMARY

Monitoring Point No. (4 digits max.)	Description	Flow	Water Elev.	Field pH	Lab pH	Tempera-ture	Alka-linity	Acidity	Iron	Manganese	Aluminum	Sulfate	Sus. Solids	Dis. Solids	Spec. Cond.	Start Date	End Date	Frequency
MW-H Shallow	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-H-Deep	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-I-Shallow	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-I Deep	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-J	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-K	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-L	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-M	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
SW-N	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-O	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-P	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-Q	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-R	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-S	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-T	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-U	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-V	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-W	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
Spring Drain	Spring Collector Drain	*		*	*	*	*	*	*	*	*	*	*	*	*	4	2	Quarterly
Leachate Drain	Leachate Collector Drain	*		*	*	*	*	*	*	*	*	*	*	*	*	4	2	Quarterly

1- Monitoring wells will be installed and monitoring will begin upon approval of the monitoring plan and issuance of the permit
2- Monitoring will continue throughout the life and closure of the facility
3- Monitoring began during October, 2001 and will continue throughout the life and closure of the facility
4- Monitoring will begin when drain system is installed.

ATTACHMENT 1
TEST BORING LOGS

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO. B-1
SHEET 1 OF 3
DATE: START 8/22/01
END 8/22/01
O.G. ELEV. 1487.4

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 237715.6 EAST: 1261779.3
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 34.2 TIME: 0 hrs. DATE: 8/22/01
CHECKED BY: _____ DATE: _____ DEPTH: dry TIME: 530.3 DATE: 9/13/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0	S-1	3 5 9	1.3	87				Silty CLAY w/ Gravel; (cl-ml, a-6); brown and tan; moist; very stiff; -PL; homogeneous; gravel is angular, fine to medium, siltstone fragments	residual siltstone Too many fragments for accurate penetrometer reading on S-1
1.5	A-N								
3.0	S-2	5 15 44	1.4	93					
3.5								Silty, Clayey GRAVEL; (gc-gm, a-2-6); brown and tan; moist to dry; very dense; homogeneous; gravel is angular, fine to coarse, sandstone and siltstone fragments	EL.1483.9 residual siltstone and sandstone
4.5	A-N								
6.0	S-3	32 34 34	1.5	100					
7.5	A-N								
9.0	S-4	24 25 50/0.3	1.3	100					
10.3	A-N								
10.7	R-1		1.9 / 0.0	83 / 0				SANDSTONE, very fine to fine grained; brown, orange-brown and tan; medium hard; moderately weathered; very thinly to thinly bedded, RD=0°-2°; very closely to closely fractured, RD= 0°-90°	EL.1476.7
13.0			9.5	95					
	R-2							0.3' - clay seam at 18.0	EL.1469.4

Boring grouted with cement-bentonite on 9/13/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-1
SHEET 2 OF 3
DATE: START 8/22/01
END 8/22/01
O.G. ELEV. 1487.4

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 237715.6 EAST: 1261779.3
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 34.2 TIME: 0 hrs. DATE: 8/22/01
CHECKED BY: _____ DATE: _____ DEPTH: dry TIME: 530.3 DATE: 9/13/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
20									
21									
22								0.8' - clay seam at 21.6	EL.1465.8
23	23.0		2.8 / 10.0	28 / 100					
24								1.1' - vertical fracture at 23.6	EL.1463.8
25									
26									
27									
28	R-3								
29									
30								3.0' - vertical fracture/broken at 29.6	EL.1457.8
31									
32									
33	33.0		2.7 / 9.0	27 / 90				33.0	EL.1454.4
34								CLAYSTONE; brown to gray; very soft; completely weathered; indistinctly bedded; extremely close to closely fractured, RD= 0°-90°	
35								35.0	EL.1452.4
36								SILTSTONE, sandy; brown and tan; soft; highly weathered; indistinctly bedded; closely fractured, RD=0°-90°	
37								36.5	EL.1450.9
38	R-4							SANDSTONE, fine grained; orange-brown and tan; soft to medium hard; highly to completely weathered; thinly bedded, RD= 0°-2°; extremely close to closely fractured, RD=0°-90°; vertical fractures throughout	
39									

Boring grouted with cement-bentonite on 9/13/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-1
SHEET 3 OF 3
DATE: START 8/22/01
END 8/22/01
O.G. ELEV. 1487.4

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 237715.6 EAST: 1261779.3
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 34.2 TIME: 0 hrs. DATE: 8/22/01
CHECKED BY: _____ DATE: _____ DEPTH: dry TIME: 530.3 DATE: 9/13/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
40									
41									
42									
43.0			0.0	0					
43	R-5		4.9	89					
44									
45									
46									
47									
48.5			4.0	73					
49	R-6		4.5	100					
50									
51									
52									
53.0			0.0	0					
54									
55									
56									
57									
58									
59									

SANDSTONE, fine to medium grained; brown, tan, and gray; medium hard to hard; slightly to moderately weathered; very thinly to thinly bedded, RD=0°-2°; closely to medium fractured, RD= 0°-10° — 40.6 — EL.1446.8

SILTSTONE, sandy, little thinly interbedded shale; orange-brown, brown, tan, and gray; soft to medium hard; moderately weathered; intensely laminated to very thinly bedded, RD=0°-2°; extremely close to closely fractured, RD=0°-90° — 48.5 — EL.1438.9 — 51.0 — EL.1436.4

SHALE; brown, dark gray and gray; soft; highly to slightly weathered; intensely laminated to very thinly bedded, RD=0°-2°; extremely close to closely fractured, RD= 0°-90° — 53.0 — EL.1434.4

End of boring at 50.0

Boring grouted with cement-bentonite on 9/13/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-3
SHEET 1 OF 11
DATE: START 8/23/01
END 8/27/01
O.G. ELEV. 1178.0

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION : OFFSET BASELINE
COORDINATES: NORTH: 238708.5 EAST: 1262042.0
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: DEPTH: WATER: DEPTH: 25.5 TIME: 0 hrs. DATE: 8/27/01
CHECKED BY: DATE: DEPTH: 5.9 TIME: 196.0 DATE: 9/5/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0	S-1	2 2 4	0.9	60	0.75			SILT; (ml, a-4); brown; moist; medium stiff; +PL; homogeneous	
1.5								1.5	EL.1176.5 residual sandstone
2	A-N							Silty, Clayey GRAVEL; (gc-gm, a-2-6); orange-brown, dark brown, and tan; moist; loose; homogeneous; gravel is angular, fine to coarse, sandstone fragments	
3.0									
3	S-2	4 4 2	1.5	100					
4.5									
5	A-N								
6.0									
6	S-3	3 2 3	1.3	87					
7.5									
8	A-N								
9.0								9.0	EL.1169.0
9	S-4	11 18 50/0.4	1.4	100				Clayey GRAVEL; (gc, a-2-6); gray; moist; very dense; homogeneous; gravel is angular, fine to coarse, claystone fragments	
10.4								10.4	EL.1167.6
11	R-1		2.4 / 0.0	92 / 0				SHALE, carbonaceous; dark gray; soft to medium hard; slightly to moderately weathered; intensely laminated, RD=0°-2°; extremely close to closely fractured, RD=0°-90°	EL.1167.1
12								0.4' - limestone at 10.9	
13.0									
13			9.9	99					
14								14.2	EL.1163.8
15								LIMESTONE; gray; hard to very hard; slightly weathered; thinly to medium bedded, RD=0°-2°; closely to medium fractured, RD=0°-30°	
16								16.0	EL.1162.0
17								CLAYSTONE; gray; very soft; highly weathered; indistinctly bedded; closely fractured, Rd=0°-20°	EL.1161.2
18	R-2							16.8	
19								LIMESTONE; gray; hard to very hard; slightly weathered; thinly to medium bedded,, RD=0°-2°; very closely to medium fractured, RD=0°-40°	

Boring grouted with cement-bentonite on 9/13/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-3
SHEET 2 OF 11
DATE: START 8/23/01
END 8/27/01
O.G. ELEV. 1178.0

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238708.5 EAST: 1262042.0
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 25.5 TIME: 0 hrs. DATE: 8/27/01
CHECKED BY: _____ DATE: _____ DEPTH: 5.9 TIME: 196.0 DATE: 9/5/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
20								20.3	EL.1157.7
21								CLAYSTONE; gray; very soft; moderately weathered; indistinctly bedded; very closely to closely fractured, RD=0°-10°	
22								21.7	EL.1156.3
23	23.0		3.6 / 6.8	36 / 68				LIMESTONE, some thinly interbedded claystone; gray and dark gray; very soft to hard; slightly to moderately weathered; thinly bedded, RD=0°-2°; very closely to closely fractured, RD= 0°-20°	
24								24.1	EL.1153.9
25								CLAYSTONE; gray; very soft to soft; highly weathered; indistinctly bedded; extremely close to closely fractured, RD=0°-90°	
26									
27									
28		R-3							
29									
30									
31									
32								32.4	EL.1145.6
33	33.0		0.4 / 9.3	4 / 93				COAL; black; soft; slightly weathered; indistinctly bedded; extremely close to very closely fractured, RD=0°-90°	EL.1145.0
34								33.0	EL.1144.1
35								CLAYSTONE; gray; very soft to soft; moderately weathered; thinly bedded, RD= 0°-5°; very closely to closely fractured, RD= 0°-45°	
36								0.3' - limestone at 33.9 35.5	EL.1142.5
37								SHALE, carbonaceous; dark gray and black; soft to medium hard; slightly weathered; intensely laminated, RD=0°-2°; extremely close to closely fractured, RD 0°-90°	EL.1141.2
38		R-4						36.8	EL.1139.9
39								LIMESTONE; gray; hard to very hard; slightly weathered; thinly bedded, RD=0°-	

Boring grouted with cement-bentonite on 9/13/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-3
SHEET	3 OF 11
DATE: START	8/23/01
END	8/27/01
O.G. ELEV.	1178.0

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238708.5 EAST: 1262042.0
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 25.5 TIME: 0 hrs. DATE: 8/27/01
CHECKED BY: _____ DATE: _____ DEPTH: 5.9 TIME: 196.0 DATE: 9/5/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
40								5°; closely fractured, RD=0°-20° — 38.1	
41								CLAYSTONE; gray; very soft to soft; moderately weathered; thinly bedded, RD= 0°-2°; extremely close to closely fractured, RD=0°-90° — 42.0	EL.1136.0
42								LIMESTONE; gray; hard to very hard; slightly weathered; thinly bedded, RD=0°-2°; closely fractured, RD=0°-30° — 42.8	EL.1135.2
43	43.0		2.2 / 10.0	22 / 100				CLAYSTONE; calcareous; gray; very soft; completely to highly weathered; indistinctly bedded; extremely close to closely fractured, RD= 0°-90° 0.4' - limestone at 44.4 — 47.5	EL.1133.6
44									
45									
46									
47									EL.1130.5
48	R-5							CLAYSTONE, calcareous; gray; medium hard; slightly weathered; thinly to medium bedded, RD=0°-2°; very closely to medium fractured, RD= 0°-20°	
49									
50									
51									
52								0.7' - sandy zone at 52.4	EL.1125.6
53	53.0		2.8 / 9.6	28 / 96					
54									
55									
56									
57								SHALE; gray; medium hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°- 5°; closely fractured, RD= 0°-25° — 57.0	EL.1121.0
58	R-6								
59								— 59.6	EL.1118.4

Boring grouted with cement-bentonite on 9/13/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-3
SHEET 4 OF 11
DATE: START 8/23/01
END 8/27/01
O.G. ELEV. 1178.0

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238708.5 EAST: 1262042.0
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 25.5 TIME: 0 hrs. DATE: 8/27/01
CHECKED BY: _____ DATE: _____ DEPTH: 5.9 TIME: 196.0 DATE: 9/5/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
60								CLAYSTONE, calcareous; gray; medium hard to soft; sightly weathered; thinly bedded, RD=0°-5°; closely to medium fractured, RD=0°-40°;	
61									
62								62.5	EL.1115.5
63.0			2.7 / 6.9	27 / 99				CLAYSTONE; red mottled gray to gray mottled dark gray; soft; slightly to moderately weathered; thinly bedded, RD= 0°-5°; very close to closely fractured, RD= 0°-90°	
63									
64									
65									
66	R-7								
67									
68									
69									
70.0			0.0 / 3.0	0 / 100					
70								70.4	EL.1107.6
71	R-8							SANDSTONE, very fine to fine grained; gray; medium hard to hard; slightly weathered to fresh; very thinly to thinly bedded, RD=0°-2°; closely to widely fractured, RD=0°-10°	
72									
73.0			2.5 / 10.0	83 / 100					
73									
74									
75									
76									
77									
78	R-9								
79									

Boring grouted with cement-bentonite on 9/13/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-3
SHEET 5 OF 11
DATE: START 8/23/01
END 8/27/01
O.G. ELEV. 1178.0

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238708.5 EAST: 1262042.0
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 25.5 TIME: 0 hrs. DATE: 8/27/01
CHECKED BY: _____ DATE: _____ DEPTH: 5.9 TIME: 196.0 DATE: 9/5/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
80									
81									
82									
83.0			9.4 / 9.7	94 / 97					
83									
84									
85									
86									
87									
88	R-10								
89									
90									
91									
92									
93.0			9.1 / 10.0	91 / 100					
93								93.0 SILTSTONE and intensely laminated to very thinly interbedded SANDSTONE, very fine grained, some carbonaceous laminations; gray and dark gray; medium hard to hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°- 2°; closely to widely fractured, RD=0°-10°	EL.1085.0
94									
95									
96									
97									
98	R-11								
99									

Boring grouted with cement-bentonite on 9/13/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-3
SHEET 6 OF 11
DATE: START 8/23/01
END 8/27/01
O.G. ELEV. 1178.0

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238708.5 EAST: 1262042.0
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 25.5 TIME: 0 hrs. DATE: 8/27/01
CHECKED BY: _____ DATE: _____ DEPTH: 5.9 TIME: 196.0 DATE: 9/5/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
100								100.4	EL.1077.6
101								SHALE, carbonaceous, calcareous; dark gray and black; medium hard to hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°- 2°; closely to widely fractured, RD=0°-10°	
102									
103	103.0		9.6 / 10.0	96 / 100					
104									
105									
106									
107									
108		R-12							
109									
110									
111								110.7	EL.1067.3
112								LIMESTONE; gray; hard to very hard; slightly weathered to fresh; thinly bedded, RD=0°-2°; closely to widely fractured, RD= 0°-10°	
113	113.0		9.4 / 10.0	94 / 100					
114									
115									
116									
117									
118		R-13							
119								118.9	EL.1059.1
								CLAYSTONE, calcareous; gray; soft; moderately weathered; thinly bedded, RD=	

Boring grouted with cement-bentonite on 9/13/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-3
SHEET	7 OF 11
DATE: START	8/23/01
END	8/27/01
O.G. ELEV.	1178.0

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE: _____
COORDINATES: NORTH: 238708.5 EAST: 1262042.0
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 25.5 TIME: 0 hrs. DATE: 8/27/01
CHECKED BY: _____ DATE: _____ DEPTH: 5.9 TIME: 196.0 DATE: 9/5/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
120								0°-2°; extremely close to closely fractured, RD=0°-90°	EL.1057.8
120.2								LIMESTONE and thinly interbedded CLAYSTONE, calcareous, little thinly interbedded SHALE; gray and dark gray; soft to hard; slightly weathered; very thinly bedded, RD=0°-2°; very closely to medium fractured, RD=0°-20°	
121									
122									
123.0			5.5 / 10.0	55 / 100					
123									
124									
125									
126									
127									
128	R-14								
129									
130									
131									
132									
132.5								CLAYSTONE, little limestone nodules; gray; medium hard; slightly weathered; indistinctly bedded; closely to widely fractured, RD=0°-45°	EL.1045.5
133.0			4.5 / 10.0	45 / 100					
133									
134									
135									
136									
137									
137.3								SHALE; gray; medium hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°- 2°; closely to widely fractured, RD=0°-10°	EL.1040.7
138	R-15								
139									

Boring grouted with cement-bentonite on 9/13/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-3
SHEET	8 OF 11
DATE: START	8/23/01
END	8/27/01
O.G. ELEV.	1178.0

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION : OFFSET BASELINE
COORDINATES: NORTH: 238708.5 EAST: 1262042.0
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: DEPTH: WATER: DEPTH: 25.5 TIME: 0 hrs. DATE: 8/27/01
CHECKED BY: DATE: DEPTH: 5.9 TIME: 196.0 DATE: 9/5/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
140									
141									
142									
143.0			8.3 / 8.8	83 / 98					
144									
145									
146									
147	R-16								
148									
149									
150									
151									
152.0			3.6	40					
152	R-17		1.0 / 0.7	100 / 70					
153.0			10.0	100					
154									
155									
156									
157									
158	R-18								
159									

Boring grouted with cement-bentonite on 9/13/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-3
SHEET	9 OF 11
DATE: START	8/23/01
END	8/27/01
O.G. ELEV.	1178.0

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238708.5 EAST: 1262042.0
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 25.5 TIME: 0 hrs. DATE: 8/27/01
CHECKED BY: _____ DATE: _____ DEPTH: 5.9 TIME: 196.0 DATE: 9/5/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
160									
161								161.3	EL.1016.7
162								SANDSTONE, fine grained; gray; hard; slightly weathered; very thinly to thinly bedded, RD=0°-5°; medium fractured, RD=0° 20°	
163	163.0		4.1 / 10.0	41 / 100				163.0	EL.1015.0
164								SHALE; gray; medium hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°- 2°; extremely close to closely fractured, RD=0°-5°	EL.1014.0
165								164.0	
166								SANDSTONE, fine grained; gray; hard; slightly weathered; very thinly to thinly bedded, RD=0°-5°; closely to medium fractured, RD=0°20°	EL.1011.5
167								166.5	
168		R-19						SHALE, sandy; gray; medium hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°-2°; closely to medium fractured, RD=0°10°	
169									
170								170.5	EL.1007.5
171								SANDSTONE, fine grained; gray; medium hard; slightly weathered; very thinly to thinly bedded, RD=0°-5°; closely to medium fractured, RD=0°-10°	
172									
173	173.0		10.0 / 10.0	100 / 100				173.0	EL.1005.0
174								SHALE; dark gray; soft to medium hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°-2°; very closely to closely fractured, RD=0°-45°	
175									
176								176.8	EL.1001.2
177								LIMESTONE, argillaceous; gray; hard to medium hard; slightly weathered; thinly bedded, RD=0°-2°; closely fractured, RD= 0°-45°; slickensides on fracture surfaces	
178		R-20							
179									

Boring grouted with cement-bentonite on 9/13/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-3
SHEET	10 OF 11
DATE: START	8/23/01
END	8/27/01
O.G. ELEV.	1178.0

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238708.5 EAST: 1262042.0
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 25.5 TIME: 0 hrs. DATE: 8/27/01
CHECKED BY: _____ DATE: _____ DEPTH: 5.9 TIME: 196.0 DATE: 9/5/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
180									
181									
182								182.5	EL. 995.5
183.0			4.8 / 9.8	48 / 98				CLAYSTONE, calcareous, little limestone nodules; gray; medium hard to hard; slightly weathered; thinly bedded, RD=0°-5°; very closely to widely fractured, RD=0°-45°	
183									
184									
185									
186									
187								187.7	EL. 990.3
188	R-21							SHALE; gray; medium hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°- 2°; closely to widely fractured, RD=0°-10°	
189									
190									
191									
192									
193.0			8.8 / 7.0	88 / 100					
193									
194									
195									
196	R-22								
197									
198									
199									

Boring grouted with cement-bentonite on 9/13/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-3
SHEET 11 OF 11
DATE: START 8/23/01
END 8/27/01
O.G. ELEV. 1178.0

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238708.5 EAST: 1262042.0
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 25.5 TIME: 0 hrs. DATE: 8/27/01
CHECKED BY: _____ DATE: _____ DEPTH: 5.9 TIME: 196.0 DATE: 9/5/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
200 200.0			6.7	96				200.0 End of boring at 200.0	EL. 978.0
201									
202									
203									
204									
205									
206									
207									
208									
209									
210									
211									
212									
213									
214									
215									
216									
217									
218									
219									

Boring grouted with cement-bentonite on 9/13/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-4
SHEET	1 OF 6
DATE: START	9/4/01
END	9/5/01
O.G. ELEV.	1245.5

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 239538.5 EAST: 1261918.8
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 3.3 TIME: 0 hrs. DATE: 9/5/01
CHECKED BY: _____ DATE: _____ DEPTH: 3.6 TIME: 20 hrs. DATE: 9/6/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0	S-1	1 2 1	0.9	60	1.0			Silty CLAY w/ Gravel; (cl-ml, a-6); brown and orange-brown; moist; soft to stiff; -PL to NPL; stratified, 0.1'-0.2'; gravel is rounded to subrounded, fine to medium, sandstone fragments	
1.5	A-N								
3.0	S-2	3 7 6	1.1	73	2.0				
4.5	A-N								
6.0	S-3	5 13 10	1.0	67				Gravelly LEAN CLAY; (cl, a-6); dark gray and brown; moist; medium stiff to very stiff; PL to +PL; stratified, 0.05'-0.2'; gravel is angular to rounded, fine to coarse, sandstone, shale and siltstone fragments	EL.1239.5 Too many fragments for accurate penetrometer reading on S-3
7.5	A-N								
9.0	S-4	4 2 5	1.5	100	1.0				
10.0								Silty CLAY w/ Gravel; (cl-ml, a-6); dark gray; moist; hard; -PL; homogeneous; gravel is angular, fine, shale fragments	EL.1235.5 Not enough sample for penetrometer reading on S-5
10.5	A-N								
12.0	S-5	50/0.4	0.1	25					
12.4	A-N								
13.0	R-1		10.0	100				CLAYSTONE; gray; very soft to medium hard; moderately weathered; thinly bedded, RD=0°-5°; extremely close to closely fractured, RD=0°-90°	EL.1232.5

Boring grouted with cement-bentonite on 9/13/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO. B-4
SHEET 2 OF 6
DATE: START 9/4/01
END 9/5/01
O.G. ELEV. 1245.5

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 239538.5 EAST: 1261918.8
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 3.3 TIME: 0 hrs. DATE: 9/5/01
CHECKED BY: _____ DATE: _____ DEPTH: 3.6 TIME: 20 hrs. DATE: 9/6/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
20									
21									
22									
23	23.0		0.0 / 10.0	0 / 100					
24									
25									
26								26.7	EL.1218.8
27								SILTSTONE, sandy, little very thinly interbedded SHALE; gray; soft to medium hard; slightly weathered; very thinly to thinly bedded, RD=0°-2°; very closely to medium fractured, RD= 0°-20°	
28		R-2							
29									
30									
31									
32									
33	33.0		3.6 / 10.0	36 / 100				33.5	EL.1212.0
34								SHALE; gray; medium hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°- 2°; closely to medium fractured, RD=0°-20°	
35									
36								36.1	EL.1209.4
37								CLAYSTONE; gray; medium hard; slightly weathered; thinly bedded, RD=0°-2°; closely to medium fractured, RD=0°-20°	
38		R-3							
39									

Boring grouted with cement-bentonite on 9/13/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-4
SHEET	3 OF 6
DATE: START	9/4/01
END	9/5/01
O.G. ELEV.	1245.5

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 239538.5 EAST: 1261918.8
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 3.3 TIME: 0 hrs. DATE: 9/5/01
CHECKED BY: _____ DATE: _____ DEPTH: 3.6 TIME: 20 hrs. DATE: 9/6/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
40									
41									
42									
43									
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									
56									
57									
58									
59									
								40.5 SANDSTONE, very fine grained, silty; gray; medium hard to hard; slightly weathered; very thinly to thinly bedded, RD=0°-5°; closely to medium fractured, RD=0°-10°	EL.1205.0
43.0			6.7	67					
			9.7	97				43.5 SILTSTONE, sandy; gray; medium hard; slightly weathered; very thinly to thinly bedded, RD=0°-2°; closely to medium fractured, RD=0°-20°	EL.1202.0
	R-4							48.3 SHALE; gray to red and gray; medium hard; slightly weathered; intensely laminated to very thinly bedded, Rd=0°-2°; very closely to medium fractured, RD=0°-20°	EL.1197.2
53.0			4.3	43				52.7 SANDSTONE, very fine grained, silty, carbonaceous, calcareous; dark gray, black, and gray; medium hard; slightly weathered; very thinly bedded, RD= 0°-5° very closely to closely fractured, RD=0°-20°	EL.1192.8
			9.9	99				53.5 CLAYSTONE; gray; soft; moderately weathered; thinly bedded, RD=0°-5°; extremely close to closely fractured, RD= 0°-90°	EL.1192.0
	R-5							56.7 SANDSTONE, fine to medium grained, calcareous; light gray; slightly weathered to fresh; very thinly to thinly bedded, RD=0°-2°; closely to widely fractured, RD=0°-10°	EL.1188.8

Boring grouted with cement-bentonite on 9/13/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO. B-4
SHEET 4 OF 6
DATE: START 9/4/01
END 9/5/01
O.G. ELEV. 1245.5

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION : OFFSET BASELINE
COORDINATES: NORTH: 239538.5 EAST: 1261918.8
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: DEPTH: WATER: DEPTH: 3.3 TIME: 0 hrs. DATE: 9/5/01
CHECKED BY: DATE: DEPTH: 3.6 TIME: 20 hrs. DATE: 9/6/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
60									
61									
62								62.5	EL.1183.0
63.0			6.4 / 10.0	64 / 100				SHALE; light gray to dark gray; medium hard; slightly weathered; intensely laminated to very thinly beddded, RD=0°-2°; closely to medium fractured, RD=0°-10°	
63									
64									
65									
66									
67									
68	R-6								
69									
70									
71									
72									
73.0			8.6 / 6.6	86 / 100				73.0	EL.1172.5
73								CLAYSTONE; gray; soft; moderately weathered; thinly bedded, RD=0°-5°; extremely close to closely fractured, RD=0°-45°	
74								74.2	EL.1171.3
75								LIMESTONE; gray; hard; slightly weathered; thinly bedded, RD=0°-2°; closely fractured, RD=0°-10°	EL.1170.5
76	R-7							75.0	EL.1169.8
77								COAL; black; medium hard; slightly weathered; indistinctly bedded; very closely fractured, RD=0°-90°	
78								75.7	
79								CLAYSTONE, sandy, carbonaceous; black and dark gray; soft to medium hard; slightly to moderately weathered; thinly bedded, RD=0°-2°; very closely to closely fractured,	
79.6			0.7 / 2.9	11 / 85					

Boring grouted with cement-bentonite on 9/13/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO.	B-4
SHEET	5 OF 6
DATE: START	9/4/01
END	9/5/01
O.G. ELEV.	1245.5

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 239538.5 EAST: 1261918.8
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 3.3 TIME: 0 hrs. DATE: 9/5/01
CHECKED BY: _____ DATE: _____ DEPTH: 3.6 TIME: 20 hrs. DATE: 9/6/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
80								RD=0°-45°	
81	R-8								
82								82.2	EL.1163.3
83.0			0.8	24				LIMESTONE; gray; hard; slightly weathered; thinly bedded, RD=0°-2°; medium fractured, RD=0°-10°	EL.1162.5
83			5.8	100				0.7' - argillaceous zone at 83.0	EL.1161.8
84								83.7	EL.1161.2
85								CLAYSTONE; gray; soft; moderately weathered; thinly bedded, RD=0°-2°; extremely close to very closely fractured, RD=0°-30°	
86	R-9							84.3	
87								LIMESTONE, argillaceous; gray and dark gray; hard to very hard; slightly weathered; thinly bedded, RD=0°-5°; extremely close to closely fractured, RD=0°-90°	
88								88.0	EL.1157.5
88.8			1.3	22				SHALE, little very thinly interbedded LIMESTONE, little carbonaceous laminations; gray and black; medium hard to hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°- 2°; very close to closely fractured, RD=0°-40°	
89			4.2	100					
90									
91	R-10								
92									
93.0			2.0	48					
93			6.5	93					
94									
95								0.3' - coal at 95.3	EL.1150.2
96	R-11								
97									
98									
99								0.5' - limestone at 98.8	EL.1146.7

Boring grouted with cement-bentonite on 9/13/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-4
SHEET 6 OF 6
DATE: START 9/4/01
END 9/5/01
O.G. ELEV. 1245.5

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 239538.5 EAST: 1261918.8
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 3.3 TIME: 0 hrs. DATE: 9/5/01
CHECKED BY: _____ DATE: _____ DEPTH: 3.6 TIME: 20 hrs. DATE: 9/6/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
100 100.0			2.0	29				100.0 End of boring at 100.0	EL1145.5
101									
102									
103									
104									
105									
106									
107									
108									
109									
110									
111									
112									
113									
114									
115									
116									
117									
118									
119									

Boring grouted with cement-bentonite on 9/13/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-5A
SHEET	1 OF 8
DATE: START	9/11/01
END	9/12/01
O.G. ELEV.	1355.5

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 239905.0 EAST: 1261584.1
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 36.3 TIME: 0 hrs. DATE: 9/13/01
CHECKED BY: _____ DATE: _____ DEPTH: 12.0 TIME: 120 DATE: 9/18/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0								See boring B-5 for descriptions	
1									
2									
3									
4									
5									
6									
7	A-N								
8									
9									
10									
11									
12									
13									
14									
15	15.0		8.0	100				15.0	EL.1340.5
16								SHALE, carbonaceous, calcareous; black and dark gray; medium hard; slightly weathered; intensely laminated, RD=0°-20°; very closely to closely fractured, RD=0°-30°	EL.1339.2
17								16.3 CLAYSTONE; gray; very soft to soft; moderately to slightly weathered; indistinctly bedded; very closely to medium fractured, RD=0°-20°	
18									
19	R-1								

Boring located 35' @ 225° from boring B-5, elevation remains the same. Boring grouted with cement-bentonite on 9/18/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-5A
SHEET	2 OF 8
DATE: START	9/11/01
END	9/12/01
O.G. ELEV.	1355.5

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 239905.0 EAST: 1261584.1
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 36.3 TIME: 0 hrs. DATE: 9/13/01
CHECKED BY: _____ DATE: _____ DEPTH: 12.0 TIME: 120 DATE: 9/18/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
23.0			0.0 / 10.0	0 / 100					
	R-2							SANDSTONE, very fine to fine grained; brown; soft to medium hard; moderately weathered; very thinly to thinly bedded, RD=0°-5°; very closely to medium fractured, RD=0°-20°	
27.0									EL.1328.5
33.0			3.0 / 10.0	30 / 100					
	R-3							SHALE; gray and dark gray; very soft to soft; highly weathered; intensely laminated, RD=0°-5°; extremely close to closely fractured, RD=0°-90°	
35.9									EL.1319.6
39.1								CLAYSTONE, calcareous; gray; soft to	EL.1316.4

Boring located 35' @ 225° from boring B-5, elevation remains the same. Boring grouted with cement-bentonite on 9/18/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-5A
SHEET 3 OF 8
DATE: START 9/11/01
END 9/12/01
O.G. ELEV. 1355.5

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 239905.0 EAST: 1261584.1
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 36.3 TIME: 0 hrs. DATE: 9/13/01
CHECKED BY: _____ DATE: _____ DEPTH: 12.0 TIME: 120 DATE: 9/18/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
40								medium hard; slightly weathered; thinly to medium bedded, RD=0°-5°; very closely to medium fractured, RD= 0°-45°	
41									
42									
43.0			2.8 / 10.0	28 / 100					
43									
44									
45									
46									
47									
48	R-4								
49									
50									
51								51.0 SHALE; gray and brown to gray and reddish brown; very soft to soft; moderately to slightly weathered; intensely laminated to very thinly bedded, RD=0°-2°; extremely close to medium fractured, RD=0°-90°	EL.1304.5
52									
53.0			0.0 / 10.0	0 / 100					
53									
54									
55									
56									
57									
58	R-5								
59									

Boring located 35' @ 225° from boring B-5, elevation remains the same. Boring grouted with cement-bentonite on 9/18/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-5A
SHEET	4 OF 8
DATE: START	9/11/01
END	9/12/01
O.G. ELEV.	1355.5

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 239905.0 EAST: 1261584.1
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 36.3 TIME: 0 hrs. DATE: 9/13/01
CHECKED BY: _____ DATE: _____ DEPTH: 12.0 TIME: 120 DATE: 9/18/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
60									
61									
62									
63.0			0.0 / 10.0	0 / 100				63.0 LIMESTONE, argillaceous; gray; medium hard to hard; slightly weathered; thinly bedded, RD=0°-5°; very closely to medium fractured, RD= 0°-20°	EL.1292.5
64									
65									
66									
67								66.9 CLAYSTONE, calcareous; gray; medium hard; slightly weathered; medium bedded, RD=0°-5°; very closely to medium fractured, RD=0°-20°	EL.1288.6
68	R-6								
69									
70								69.9 LIMESTONE, argillaceous; gray; medium hard to hard; slightly weathered; thinly bedded, RD=0°-2°; very closely to medium bedded, RD=0°- 10°; very closely to medium bedded, RD=0°-10°	EL.1285.6
71									EL.1284.5
72								71.0 CLAYSTONE, calcareous; gray; very soft to medium hard; moderately to slightly weathered; thinly bedded, RD=0°-2°; very closely to medium fractured, RD=0°-30°	
73.0			3.5 / 10.0	35 / 100					
74									
75									
76									
77									
78	R-7								
79									

Boring located 35' @ 225° from boring B-5, elevation remains the same. Boring grouted with cement-bentonite on 9/18/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-5A
SHEET 5 OF 8
DATE: START 9/11/01
END 9/12/01
O.G. ELEV. 1355.5

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 239905.0 EAST: 1261584.1
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 36.3 TIME: 0 hrs. DATE: 9/13/01
CHECKED BY: _____ DATE: _____ DEPTH: 12.0 TIME: 120 DATE: 9/18/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
80									
81									
82								81.7 SANDSTONE, fine grained; brown and gray; medium hard to hard; slightly weathered; thinly bedded, RD=0°2°; closely to widely fractured, RD=0°-20°	EL.1273.8
83	83.0		0.8 / 10.0	8 / 100					
84									
85									
86									
87									
88		R-8							
89								1.5' - vertical fracture at 89.1	EL.1266.4
90									
91									
92									
93	93.0		5.6 / 10.0	56 / 100					
94									
95									
96									
97									
98		R-9							
99									

Boring located 35' @ 225° from boring B-5, elevation remains the same. Boring grouted with cement-bentonite on 9/18/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-5A
SHEET	6 OF 8
DATE: START	9/11/01
END	9/12/01
O.G. ELEV.	1355.5

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 239905.0 EAST: 1261584.1
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 36.3 TIME: 0 hrs. DATE: 9/13/01
CHECKED BY: _____ DATE: _____ DEPTH: 12.0 TIME: 120 DATE: 9/18/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
100									
101									
102									
103.0			10.0	100					
103			9.5	100					
104									
105									
106									
107									
108	R-10								
109									
110								109.7 SHALE; gray and dark gray; medium hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°-2°; closely to medium fractured, RD=0°-10°	EL.1245.8
111									
112									
112.5			9.5	100					
113			6.5	100					
114									
115								115.5 LIMESTONE, little thinly interbedded SHALE; gray and dark gray; soft to hard; slightly to moderately weathered; very thinly to thinly bedded, RD=0°-2°; very closely to medium fractured, RD=0°-90°	EL.1240.0
116	R-11								
117									
118									
119.0			2.3	35					
119			4.0	100				119.0 CLAYSTONE, calcareous, little thinly interbedded limestone; dark gray and gray;	EL.1236.5

Boring located 35' @ 225° from boring B-5, elevation remains the same. Boring grouted with cement-bentonite on 9/18/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO. B-5A
SHEET 7 OF 8
DATE: START 9/11/01
END 9/12/01
O.G. ELEV. 1355.5

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 239905.0 EAST: 1261584.1
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 36.3 TIME: 0 hrs. DATE: 9/13/01
CHECKED BY: _____ DATE: _____ DEPTH: 12.0 TIME: 120 DATE: 9/18/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
120								soft to hard; slightly weathered; thinly bedded, RD=0°-5°; medium fractured, RD=0°-45°	
121	R-12							121.0	EL.1234.5
122								SHALE, carbonaceous; dark gray and black; very soft to soft; moderately weathered; intensely laminated to very thinly bedded, RD=0°-2°; extremely close to closely fractured, RD=0°90°	EL.1233.8
123	123.0		0.0 / 10.0	0 / 100				121.7	
124								CLAYSTONE, calcareous, little to trace thinly interbedded LIMESTONE; gray and dark gray; medium hard to hard; slightly weathered; thinly bedded, RD=0°-5°; very closely to medium fractured, RD 0°-20°	EL.1231.5
125								124.0	
126								SHALE; gray; medium hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°- 2°; very closely to medium fractured, RD=0°-10°	
127									
128	R-13								
129									
130									
131								131.6	EL.1223.9
132								CLAYSTONE; gray; medium hard; slightly weathered; thinly bedded, RD=0°-2°; closely to widely fractured, RD=0°-45°; slickensides on fracture surfaces	
133	133.0		5.5 / 10.0	55 / 100					
134									
135									
136									
137									
138	R-14								
139									

Boring located 35' @ 225° from boring B-5, elevation remains the same. Boring grouted with cement-bentonite on 9/18/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO. B-5A
SHEET 8 OF 8
DATE: START 9/11/01
END 9/12/01
O.G. ELEV. 1355.5

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 239905.0 EAST: 1261584.1
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 36.3 TIME: 0 hrs. DATE: 9/13/01
CHECKED BY: _____ DATE: _____ DEPTH: 12.0 TIME: 120 DATE: 9/18/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.6 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
140									
141									
142									
143.0			0.0	0					
143			7.0	100					
144									
145									
146	R-15								
147									
148								148.1	EL.1207.4
149								SANDSTONE, very fine grained; medium hard; slightly weathered; very thinly to thinly bedded, RD=0°-5°; medium fractured, RD=0°-10°	
150.0			1.9	27				150.0	EL.1205.5
150								End of boring at 150.0	
151									
152									
153									
154									
155									
156									
157									
158									
159									

Boring located 35' @ 225° from boring B-5, elevation remains the same. Boring grouted with cement-bentonite on 9/18/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO.	B-6
SHEET	1 OF 6
DATE: START	9/11/01
END	9/12/01
O.G. ELEV.	1383.6

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 240286.8 EAST: 1261330.3
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY Nathaniel Grimm/Triad Engineering
EQUIPMENT USED CME 45 Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 79.3 TIME: 0 hrs. DATE: 9/13/01
CHECKED BY: _____ DATE: _____ DEPTH: 90.0 TIME: 22.5 DATE: 9/14/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0									
1.5	S-1	5 5 6	1.5	100				Gravelly, Silty CLAY; (cl-ml, a-6); brown, tan and orange-brown; moist; stiff; -PL; stratified, 0.05'-0.2'; gravel is angular, fine to coarse, sandstone fragments	Too many fragments for accurate penetrometer readings on S-1, 2, and 3
3.0	A-N							3.0	EL.1380.6
4.5	S-2	6 6 13	1.5	100				LEAN CLAY w/ Gravel; (cl, a-6); brown, tan, and reddish brown; moist; very stiff; NPL; stratified, 0.1'-0.3'; gravel is angular, fine to coarse, sandstone, claystone, shale, and limestone fragments	
6.0	A-N								
7.5	S-3	4 10 10	1.5	100					
8.0	A-N							8.0	EL.1375.6
9.0								Poorly Graded GRAVEL; (gp, a-1-a); brown and gray; dry; very dense; homogeneous; gravel is angular, coarse, limestone fragments	description based on auger cuttings and drill rate
9.8	S-4	39 50/0.3	0.6	75					EL.1374.6
9.0									EL.1373.6
10.0	A-N							Gravelly, Silty Cl AY; (cl-ml, a-6); brown; dry; hard; -PL; gravel is angular, fine to coarse, sandstone fragments	
10.7	R-1		0.4 / 0.0	57 / 0					
10.0									
11	R-2		4.5	90				SANDSTONE, very fine grained; brown; soft; highly weathered; very thinly bedded, RD=0°-2°; extremely close to very closely fractured, RD=0°- 90°	
14.3									EL.1369.3
15.7			0.0	0				SHALE; brown to gray; very soft to soft; moderately to highly weathered; intensely laminated, RD=0°-2°; extremely close to very closely fractured, RD=0°-90°	
16	R-3		5.0	100					
18								0.4' - limestone at 18.2	EL.1365.4
19									
19.0								CLAYSTONE; brown; very soft; completely weathered; indistinctly bedded; extremely	EL.1364.6

Boring grouted with cement-bentonite on 9/14/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-6
SHEET 2 OF 6
DATE: START 9/11/01
END 9/12/01
O.G. ELEV. 1383.6

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 240286.8 EAST: 1261330.3
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY Nathaniel Grimm/Triad Engineering
EQUIPMENT USED CME 45 Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 79.3 TIME: 0 hrs. DATE: 9/13/01
CHECKED BY: _____ DATE: _____ DEPTH: 90.0 TIME: 22.5 DATE: 9/14/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
20								close fractured, RD=0°-180°	
20.7			0.0	0				20.7	EL.1362.9
21			5.0	100				SANDSTONE, fine grained; brown; highly to moderately weathered; thinly bedded, RD=0°-2°; very closely to medium fractured, RD=0°-90° 2.0' - vertical fracture w/ calcite on fracture surfaces at 20.7	
22									
23	R-4								
24									
25									
25.7			3.0	60					
26			5.0	100					
27									
28	R-5								
29								29.2	EL.1354.4
30								SILTSTONE; gray and brown; very soft to soft; highly weathered; very thinly bedded, RD=0°-2°; very closely fractured, RD=0°-90°	EL.1353.6
30.7			3.7	74				30.0	
31			5.0	100				SANDSTONE, fine grained; brown to brown and gray; medium hard; moderately weathered; thinly bedded, RD=0°-2°; closely fractured, RD=0°-10°	EL.1352.1
32									
33	R-6							31.5	
34								SHALE; brown and gray; very soft to soft; completely to highly weathered; intensely laminated to very thinly bedded, RD=0°-2°; extremely close to very closely fractured, RD=0°- 90°	
35									
35.7			0.5	10				1.6' - carbonaceous zone at 35.7	EL.1347.9
36			5.0	100					
37								37.3	EL.1346.3
38	R-7							LIMESTONE; dark gray to gray; medium hard to very hard; moderately to slightly weathered; thinly bedded, RD=0°-5°; very close to medium fractured, RD=0°-90°	
39									

Boring grouted with cement-bentonite on 9/14/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-6
SHEET 3 OF 6
DATE: START 9/11/01
END 9/12/01
O.G. ELEV. 1383.6

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 240286.8 EAST: 1261330.3
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY Nathaniel Grimm/Triad Engineering
EQUIPMENT USED CME 45 Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 79.3 TIME: 0 hrs. DATE: 9/13/01
CHECKED BY: _____ DATE: _____ DEPTH: 90.0 TIME: 22.5 DATE: 9/14/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
40.7	R-8		1.3 / 5.0	26 / 100				CLAYSTONE, calcareous; gray; soft to medium hard; slightly weathered; thinly bedded, RD=0°-2°; very closely to medium fractured, RD=0°-45° (40.3–43.3)	EL.1343.3
45.7	R-9		2.0 / 4.3	40 / 100				LIMESTONE; gray; hard; moderately to slightly weathered; thinly bedded, RD=0°-2°; closely fractured, RD=0°-90° (43.3–43.9)	EL.1340.3
								CLAYSTONE; brown; soft; moderately weathered; thinly bedded, RD=0°-5°; very closely to closely fractured, RD=0°-45° (43.9–45.7)	EL.1339.7
								LIMESTONE; gray; hard; moderately to slightly weathered; thinly bedded, RD=0°-2°; closely fractured, RD=0°-90° (45.7–46.7)	EL.1337.9
50.0	R-10		1.3 / 5.0	30 / 100				CLAYSTONE; gray; medium hard; slightly weathered; thinly bedded, RD=0°-2°; closely fractured, RD= 0°-10° (46.7–47.9)	EL.1336.9
								LIMESTONE, sandy; tan to gray; hard; slightly weathered; thinly bedded, RD=0°-2°; closely fractured, RD=0°-10° (47.9–48.7)	EL.1335.7
								SILTSTONE; brown and orange-brown; soft to medium hard; moderately weathered; thinly bedded, RD=0°- 2°; very closely to closely fractured, RD=0°-90° (48.7–53.4)	EL.1334.9
55.0	R-11		0.0 / 5.0	0 / 100				SHALE; brown and gray; very soft to soft; highly weathered; intensely laminated to very thinly bedded, RD=0°-2°; extremely close to closely fractured, RD=0°-90° (53.4–58.0)	EL.1330.2
								CLAYSTONE; dark gray; very soft to soft; highly weathered; thinly bedded, RD=0°-5°; extremely close to closely fractured, RD=0°-90° (58.0–59)	EL.1325.6
									EL.1324.6

Boring grouted with cement-bentonite on 9/14/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-6
SHEET	4 OF 6
DATE: START	9/11/01
END	9/12/01
O.G. ELEV.	1383.6

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 240286.8 EAST: 1261330.3
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY Nathaniel Grimm/Triad Engineering
EQUIPMENT USED CME 45 Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 79.3 TIME: 0 hrs. DATE: 9/13/01
CHECKED BY: _____ DATE: _____ DEPTH: 90.0 TIME: 22.5 DATE: 9/14/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
60									
60.0			0.0	0				0.2' - limestone at 58.0 — 59.0	
61			4.5	90				SANDSTONE, very fine grained; brown and tan; medium hard; highly weathered; thinly bedded, RD 0°-2°; very closely to closely fractured, RD=0°-90° — 61.5	EL.1322.1
62	R-12							SHALE, carbonaceous; black; very soft; highly weathered; intensely laminated, RD= 0°-2°; extremely close fractured, RD=0°-90° — 62.1	EL.1321.5
63									
64									
65.0			0.0	0				LIMESTONE, little to trace thinly interbedded shale; orange-brown, gray and tan; soft to hard; highly to moderately weathered; thinly bedded, RD= 0°-2°; extremely close to closely fractured, RD= 0°-90° — 67.0	EL.1316.6
65			5.0	100					
66									
67	R-13							CLAYSTONE; brown and gray; soft; highly to moderately weathered; thinly bedded, RD=0°-5° extremely close to medium fractured, RD=0°-90°	
68									
69									
70.0			0.0	0					
70			5.0	100				— 70.6	EL.1313.0
71								SANDSTONE, fine grained; brown and tan; medium hard to hard; moderately to slightly weathered; very thinly to thinly bedded, RD=0°-2°; very closely to medium fractured, RD=0°-90°	
72	R-14								
73									
74									
75.0			1.5	30					
75			5.0	100					
76									
77	R-15								
78									
79									

Boring grouted with cement-bentonite on 9/14/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-6
SHEET 5 OF 6
DATE: START 9/11/01
END 9/12/01
O.G. ELEV. 1383.6

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 240286.8 EAST: 1261330.3
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY Nathaniel Grimm/Triad Engineering
EQUIPMENT USED CME 45 Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 79.3 TIME: 0 hrs. DATE: 9/13/01
CHECKED BY: _____ DATE: _____ DEPTH: 90.0 TIME: 22.5 DATE: 9/14/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
80									
80.0			2.6 / 4.4	52 / 88					
								80.5	EL.1303.1
81								SHALE; brown to dark gray and black; soft to very soft; highly to completely weathered; intensely laminated, RD=0°-2°; extremely close to closely fractured, RD=0°-90°	
82	R-16								
83								4.0' carbonaceous zone at 83.0	EL.1300.6
84									
85.0			0.0 / 4.9	0 / 98					
85									
86									
87								87.0	EL.1296.6
88	R-17							LIMESTONE; gray; hard; slightly weathered; thinly bedded, RD=0°-2°; medium fractured, RD=0°-10°	EL.1295.9
								87.7	
89								CLAYSTONE, calcareous; soft to medium hard; slightly weathered; thinly bedded, RD=0°-5°; very closely to medium fractured, RD=0°-10°	
90.0			0.7 / 4.9	14 / 98					
90								90.5	EL.1293.1
91								LIMESTONE, sandy; light gray; very hard; slightly weathered; thinly bedded, RD=0°-2°; medium fractured, RD=0°-10°	EL.1292.5
92								91.1	
93	R-18							SHALE; light gray; soft to medium hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°-2°; very closely to medium fractured, RD=0°-20°	
94									
95.0			0.9 / 4.4	18 / 88					
95									
96									
97	R-19								
98								98.1	EL.1285.5
99								LIMESTONE; light gray; very hard; fresh; thinly bedded, RD=0°-2°; closely to medium fractured, RD=0°-10°	

Boring grouted with cement-bentonite on 9/14/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO. B-6
SHEET 6 OF 6
DATE: START 9/11/01
END 9/12/01
O.G. ELEV. 1383.6

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 240286.8 EAST: 1261330.3
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY Nathaniel Grimm/Triad Engineering
EQUIPMENT USED CME 45 Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 79.3 TIME: 0 hrs. DATE: 9/13/01
CHECKED BY: _____ DATE: _____ DEPTH: 90.0 TIME: 22.5 DATE: 9/14/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
100 100.0			1.4	28				100.0 End of boring at 100.0	EL.1283.6
101									
102									
103									
104									
105									
106									
107									
108									
109									
110									
111									
112									
113									
114									
115									
116									
117									
118									
119									

Boring grouted with cement-bentonite on 9/14/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-7
SHEET 1 OF 3
DATE: START 8/27/01
END 8/27/01
O.G. ELEV. 1199.8

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION - OFFSET BASELINE
COORDINATES: NORTH: 238740.9 EAST: 1261068.4
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: DEPTH: WATER: DEPTH: 1.5 TIME: 0 hrs. DATE: 8/27/01
CHECKED BY: DATE: DEPTH: 2.8 TIME: 212.8 DATE: 9/5/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0	S-1	4 4 6	1.5	100				Sandy, Silty CLAY w/ Gravel; (cl-ml, a-6); orange- brown, dark brown and tan to gray and dark gray; moist to wet; soft to stiff; NPL to +PL; stratified, 0.1'-0.3'; gravel is angular to rounded, fine, sandstone, siltstone, shale and coal fragments	Too many fragments for accurate penetrometer readings in S-1, 2, 3, 4, 5, and 6
1.5	A-N								
3.0	S-2	1 2 2	1.5	100				Encountered water at 3.0	EL.1196.8
4.5	A-N								
6.0	S-3	2 3 4	1.5	100					
7.5	A-N								
9.0	S-4	2 3 4	1.5	100				LEAN CLAY w/ Gravel; (cl, a-6); gray; moist; medium stiff to hard; -PL to +PL; homogeneous; gravel is angular, fine to coarse, shale and claystone fragments	EL.1190.8
10.5	A-N								
12.0	S-5	13 14 17	1.5	100					
13.5	A-N								
15.0	S-6	50/0.3	0.0	0					
15.3	R-1		5.0	100				CLAYSTONE, sandy, calcareous; gray; soft to medium hard; moderately to highly weathered; thinly bedded, RD=0°-5°; extremely close to closely fractured, RD= 0°-90° 0.3' - limestone at 15.3	EL.1184.5
19.0								LIMESTONE; gray; hard; slightly weathered; thinly bedded, RD=0°-2°;	EL.1180.8 EL.1180.2

Boring grouted with cement-bentonite on 9/13/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO. B-7
SHEET 2 OF 3
DATE: START 8/27/01
END 8/27/01
O.G. ELEV. 1199.8

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238740.9 EAST: 1261068.4
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 1.5 TIME: 0 hrs. DATE: 8/27/01
CHECKED BY: _____ DATE: _____ DEPTH: 2.8 TIME: 212.8 DATE: 9/5/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
20 20.3			0.4	8				closely fractured, RD=0°-10° 19.6	
21	R-2		5.0	100				CLAYSTONE, calcareous; gray; soft to medium hard; moderately weathered; very thinly to thinly bedded, RD=0°-5°; extremely close to closely fractured, RD= 0°-50° 22.5	EL.1177.3
22								LIMESTONE; gray; very hard; slightly weathered; thinly bedded, RD=0°-2°; closely fractured, RD 0°-10° 23.4	EL.1176.4
23								CLAYSTONE, calcareous; gray; medium hard to soft; slightly to moderately weathered; thinly bedded, RD=0°-5°; extremely close to closely fractured, RD= 0°-90° 25.2	EL.1174.6
24								LIMESTONE; gray; hard to very hard; slightly weathered; thinly bedded, RD=0°-5°; closely to medium fractured, RD=0°-20° 28.1	EL.1171.7
25 25.3			1.3	26				CLAYSTONE, calcareous; gray; soft to medium hard; moderately to slightly weathered; thinly bedded, RD=0°-2°; very closely to closely fractured, RD= 0°-45° 29.5	EL.1170.3
26	R-3		5.0	100				LIMESTONE; gray; hard; slightly weathered; thinly bedded, RD=0°-2°; very closely to closely fractured, RD=0°-90° 31.4	EL.1168.4
27								CLAYSTONE, calcareous; gray; soft to medium hard; slightly to moderately weathered; thinly bedded, RD=0°-5°; very closely to closely fractured, RD= 0°-45° 34.0	EL.1165.8
28								LIMESTONE; dark gray; hard; slightly weathered; thinly bedded, RD=0°-2°; very closely to closely fractured, RD=0°-30° 34.6	EL.1165.2
29								CLAYSTONE; gray; soft to medium hard; moderately to slightly weathered; thinly bedded, RD=0°-5°; very closely to closely fractured, RD=0°-50° 36.5	EL.1163.3
30 30.3			3.5	70				COAL; black; soft; slightly weathered; thinly bedded, RD=0°-2°; closely fractured, RD= 0°-10° 37.0	EL.1162.8
31	R-4		5.0	100					
32									
33									
34									
35 35.3			0.8	16					
36	R-5		5.0	100					
37									
38									
39									

Boring grouted with cement-bentonite on 9/13/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-7
SHEET	3 OF 3
DATE: START	8/27/01
END	8/27/01
O.G. ELEV.	1199.8

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238740.9 EAST: 1261068.4
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 1.5 TIME: 0 hrs. DATE: 8/27/01
CHECKED BY: _____ DATE: _____ DEPTH: 2.8 TIME: 212.8 DATE: 9/5/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
40									EL.1159.9
40.3			0.0	0				CLAYSTONE; gray to dark gray; soft to medium hard; moderately to slightly weathered; thinly bedded, RD=0°-5°; very closely to closely fractured, RD= 0°-45°	EL.1158.9
41			5.0	100				39.9	
42								LIMESTONE; gray; hard; slightly weathered; thinly bedded, RD=0°-2°; closely fractured, RD=0°-10°	EL.1157.3
43	R-6							40.9	EL.1156.5
44								CLAYSTONE; gray; soft to medium hard; slightly weathered; thinly bedded, RD=0°-5°; very closely to closely fractured, RD=0°-45°	EL.1155.8 EL.1155.4
45	45.3		0.6	12				42.5	
			3.9	83				COAL; black; soft; slightly weathered; thinly bedded, RD=0°-5°; closely fractured, RD=0°-10°	
46								43.3	
47								LIMESTONE; gray; hard; slightly weathered; thinly beddded, RD=0°-5°; closely fractured, RD=0°-90° 0.3' - vertical fracture at 44.0	EL.1152.6
48	R-7							44.4	EL.1151.7
49								CLAYSTONE, calcareous, little very thinly interbedded LIMESTONE; gray and dark gray; soft to hard; slightly to moderately weathered; very thinly to thinly bedded, RD=0°-5°; very closely to closely fractured, RD=0°-90°	
50	50.0		0.4	9				47.2	EL.1149.8
51								LIMESTONE; gray; hard to very hard; slightly weathered; thinly bedded, RD=0°-2°; closely fractured, RD=0°-10°	
52								48.1	
53								CLAYSTONE; gray; soft to medium hard; moderately to slightly weathered; thinly bedded, RD=0°-2°; very closely to closely fractured, RD=0°-90°	
54								50.0	
55								End of boring at 50.0	
56									
57									
58									
59									

Boring grouted with cement-bentonite on 9/13/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-8
SHEET 1 OF 3
DATE: START 8/29/01
END 8/29/01
O.G. ELEV. 1167.2

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238719.5 EAST: 1262308.2
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 6.5 TIME: 0 hrs. DATE: 8/29/01
CHECKED BY: _____ DATE: _____ DEPTH: 6.0 TIME: 17.5 DATE: 8/30/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0	S-1	2 2 5	1.3	87				Gravelly, Silty CLAY; (cl-ml, a-6); orange-brown, brown and dark brown; moist; medium stiff; NPL; stratified, 0.1'-0.3'; gravel is rounded to subrounded, fine to coarse, sandstone	
1.5	ST-1		1.8	90					
3.5	S-2	5 3 2	1.0	67				Silty, Clayey GRAVEL; (gc-gm, a-2-6); orange-brown and brown; loose; moist to wet; stratified, 0.2'-0.5'; gravel is rounded to subrounded, fine to coarse, sandstone Encountered water at 5.0	EL.1163.7 (3.5)
5.0	A-N								EL.1162.2
6.0	S-3	2 4 5	1.0	67					
7.5	A-N							Silty CLAY w/ Gravel; (cl-ml, a-6); moist; medium stiff to hard;; homogeneous; gravel is angular, fine, shale fragments	EL.1159.9 (7.3)
7.7	R-1		4.9	92				LIMESTONE; gray; hard; slightly weathered; thinly bedded, RD=0°-2°; very closely to closely fractured, RD=0°-90° 0.2' - Claystone at 8.0	EL.1159.5 (7.7) EL.1159.2 EL.1158.4 (8.8)
13.0	R-2		1.0 / 8.7	19 / 87				CLAYSTONE; gray; very soft; highly to completely weathered; indistinctly bedded; extremely close to closely fractured, RD=0°-90°	EL.1157.2 (10.0) EL.1154.6
								LIMESTONE; gray; hard to very hard; slightly weathered; thinly bedded, RD=0°-5°; very closely to closely fractured, RD=0°-90° 0.4' - Argillaceous, medium hard zone at 12.6	EL.1153.5 (13.7) EL.1152.3
								CLAYSTONE, sandy; gray; soft to medium hard; slightly to moderately weathered; very thinly to thinly bedded, RD=0°-2°; extremely close to closely fractured, RD=0°-90°	EL.1150.3 (14.9)
								LIMESTONE, argillaceous; gray and dark gray; medium hard to hard; slightly to moderately weathered; thinly bedded, RD=0°-2°; extremely close to closely fractured	

Boring grouted with cement-bentonite on 9/13/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-8
SHEET	2 OF 3
DATE: START	8/29/01
END	8/29/01
O.G. ELEV.	1167.2

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238719.5 EAST: 1262308.2
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 6.5 TIME: 0 hrs. DATE: 8/29/01
CHECKED BY: _____ DATE: _____ DEPTH: 6.0 TIME: 17.5 DATE: 8/30/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
20								RD=0°-90° 16.9	
21								CLAYSTONE, calcareous, little thinly interbedded LIMESTONE; very soft to hard; moderately to completely weathered; very thinly to thinly bedded, RD=0°-2°; extremely close to closely fractured, RD= 0°-90°	
22									
23	23.0		1.2 / 10.0	12 / 100				23.9	EL.1143.3
24								COAL; black; soft; slightly weathered; very thinly bedded, RD=0°-2°; extremely close to closely fractured, RD=0°-90° 24.5	EL.1142.7
25								CLAYSTONE; gray; very soft to soft; highly to completely weathered; indistinctly bedded; extremely close to closely fractured, RD=0°-90°	
26									
27								27.5	EL.1139.7
28		R-3						LIMESTONE; gray; hard; slightly weathered; thinly bedded, RD=0°-2°; very closely fractured, RD=0°-90° 28.2	EL.1139.0
29								CLAYSTONE; gray; soft; slightly to moderately weathered; very thinly bedded, RD=0°-2°; very closely to closely fractured RD=0°-90° 29.3	EL.1137.9
30									EL.1137.1
31									EL.1136.2
32								SHALE; gray and dark gray; soft; slightly weathered; intensely laminated, RD=0°-2° very closely to closely fractured, RD=0°-90° 30.1	EL.1135.7
33	33.0		0.5 / 9.8	5 / 98				LIMESTONE; gray; hard; slightly weathered; thinly bedded, Rd=0°-2°; very closely to closely fractured, RD=0°-90° 0.3' - vertical fracture at 31.0 31.5	
34									
35								CLAYSTONE, calcareous; gray; very soft to medium hard; moderately to highly weathered; very thinly to thinly bedded, RD=0°-5°; extremely close to closely fractured, RD=0°-90°	
36									
37									
38		R-4							
39									

Boring grouted with cement-bentonite on 9/13/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO. B-8
SHEET 3 OF 3
DATE: START 8/29/01
END 8/29/01
O.G. ELEV. 1167.2

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238719.5 EAST: 1262308.2
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY John McDaniel/Triad Engineering
EQUIPMENT USED Davey-Kent DK90RG Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 6.5 TIME: 0 hrs. DATE: 8/29/01
CHECKED BY: _____ DATE: _____ DEPTH: 6.0 TIME: 17.5 DATE: 8/30/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
43.0			0.0	0				43.0	EL.1124.2
			7.0	100				SHALE; gray; soft to medium hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°-2°; closely fractured, RD=0°-20°	
								45.3	EL.1121.9
	R-5							SANDSTONE, fine grained, little argillaceous laminations; gray; medium hard; slightly weathered; very thinly bedded, RD=0°-2°; closely fractured, RD=0°-20°	
								47.2	EL.1120.0
								CLAYSTONE, calcareous; gray; medium hard; slightly weathered; thinly bedded, RD=0°-5°; closely fractured, RD=0°-20°	EL.1119.2
								48.0	
50.0			1.9	27				SHALE; gray; soft to medium hard; slightly weathered; intensely laminated to very thinly bedded, RD=0°=5°; very closely to closely fractured, RD=0°-30°	EL.1117.2
								50.0	
								End of boring at 50.0	

Boring grouted with cement-bentonite on 9/13/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-10
SHEET 1 OF 2
DATE: START 8/24/01
END 8/24/01
O.G. ELEV. 1138.3

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238850.6 EAST: 1263810.5
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY Nathaniel Grimm/Triad Engineering
EQUIPMENT USED CME 45 Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 15.0 TIME: 0 hrs. DATE: 8/24/01
CHECKED BY: _____ DATE: _____ DEPTH: 17.0 TIME: 500 DATE: 9/14/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.6 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0	S-1	2 2 3	1.5	100				Sandy, Silty CLAY w/ Gravel; (cl-ml, a-6); brown, orange-brown and gray; moist; medium stiff to stiff; +PL; stratified, 0.1'-0.3'; gravel is angular, fine to coarse, coal, sandstone, and shale fragments	Too many fragments for accurate penetrometer readings in S-1 to S-8
1.5	A-N								
3.0	S-2	5 5 4	1.5	100					
4.5	A-N								
6.0	S-3	6 8 6	1.5	100				Silty CLAY w/ Gravel; (cl-ml, a-6); gray and brown; moist to wet; medium stiff to hard; +PL; stratified, 0.1'-0.3'; gravel is rounded, fine to coarse, sandstone, siltstone and shale	EL.1132.3
7.5	A-N								
9.0	S-4	2 3 4	1.5	100					
10.5	A-N								
12.0	S-5	3 2 5	1.5	100					
13.5	A-N								
15.0	S-6	3 5 8	1.5	100				Encountered water at 15.0	EL.1123.3
16.5	A-N								
18.0	S-7	6 8 5	1.5	100					
19.5									

Boring grouted with cement-bentonite on 9/14/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO. B-10
SHEET 2 OF 2
DATE: START 8/24/01
END 8/24/01
O.G. ELEV. 1138.3

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238850.6 EAST: 1263810.5
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY Nathaniel Grimm/Triad Engineering
EQUIPMENT USED CME 45 Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 15.0 TIME: 0 hrs. DATE: 8/24/01
CHECKED BY: _____ DATE: _____ DEPTH: 17.0 TIME: 500 DATE: 9/14/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
20	A-N								
21.0									
21	S-8	11 21 47	1.5	100					
22.5								22.5	EL.1115.8 auger refusal at 22.5
23	R-1		4.7	94				LIMESTONE; gray; hard; moderately weathered; thinly bedded, RD=0°-2°; closely fractured, RD 0°-10°= 23.0	EL.1115.3
24								SHALE; gray to dark gray; soft; moderately weathered; intensely laminated to very thinly bedded, RD=0°-5°; extremely close to closely fractured, RD=0°-90° 0.5' carbonaceous zone at 24.8' 25.3	EL.1113.0
25								LIMESTONE; gray and dark gray; hard; slightly weathered; thinly bedded, RD=0°-5°; closely fractured, RD=0°-90° 0.7' vertical fracture at 25.9' 26.6	EL.1111.7
26								CLAYSTONE; gray; soft; slightly weathered; very thinly to thinly bedded, RD=0°-5°; very closely to closely fractured, RD=0°-45° 27.5	EL.1110.8
27								End of boring at 27.5	
27.5			0.0	0					
28									
29									
30									
31									
32									
33									
34									
35									
36									
37									
38									
39									

Boring grouted with cement-bentonite on 9/14/01.

BKR_E (LD4)
(02/01 Baker)

ENGINEERS FIELD BORING LOG

BORING NO. B-11
SHEET 2 OF 2
DATE: START 8/23/01
END 8/24/01
O.G. ELEV. 1144.8

PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238516.0 EAST: 1263221.7
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY Nathaniel Grimm/Triad Engineering
EQUIPMENT USED CME 45 Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 5.0 TIME: _____ DATE: 8/24/01
CHECKED BY: _____ DATE: _____ DEPTH: 1.0 TIME: 0 hrs. DATE: 8/24/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
21.0			0.0	0					
			3.8	95					
	R-4								
								23.4	EL.1121.4
								COAL; black; soft; slightly weathered; thinly bedded, RD=0°-2°; extremely close to closely fractured, RD=0°-90°	EL.1120.7
25.0			0.0	0				24.1	EL.1119.8
								SHALE; carbonaceous; dark gray; soft; slightly weathered; intensely laminated, RD=0°-2°; very closely to closely fractured, RD=20°-25°	
								25.0	
								End of boring at 25.0	

Boring grouted with cement-bentonite on 9/14/01.

ENGINEERS FIELD BORING LOG

BKR_E (LD4)
(02/01 Baker)

BORING NO.	B-11
SHEET	1 OF 2
DATE: START	8/23/01
END	8/24/01
O.G. ELEV.	1144.8

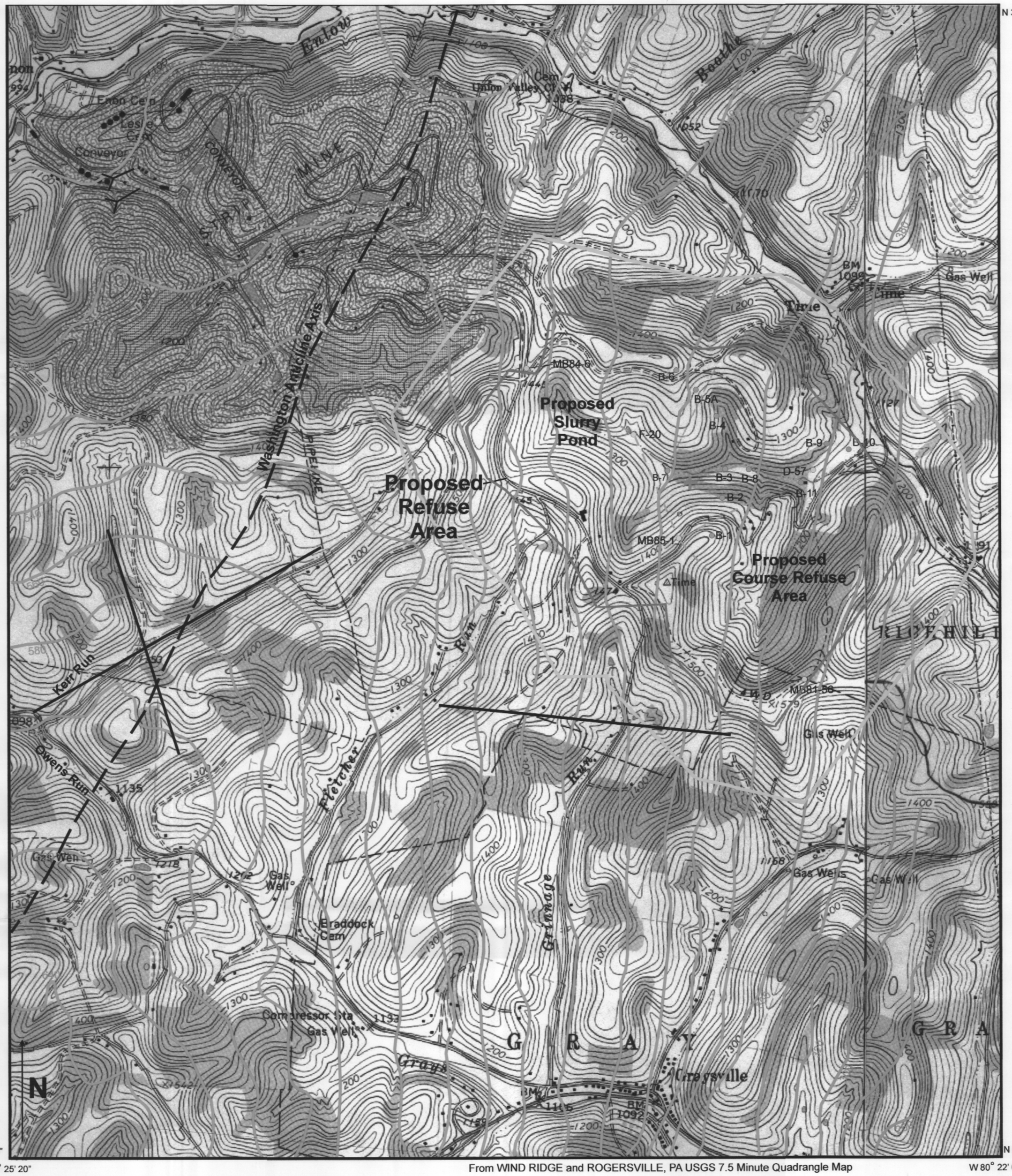
PROJECT NAME Consol - Bailey Mine Refuse Disposal Inv.
LOCATION: Richhill Township
STATION _____ OFFSET _____ BASELINE _____
COORDINATES: NORTH: 238516.0 EAST: 1263221.7
INSPECTOR (SIGNED) Mark Martin DRILLERS NAME/COMPANY Nathaniel Grimm/Triad Engineering
EQUIPMENT USED CME 45 Track Mount
DRILLING METHODS 3-1/4" I.D. H.S. Augers; 1-3/8" I.D. Split Spoon; NQ Core barrel w/ H2O
CASING: SIZE: _____ DEPTH: _____ WATER: DEPTH: 5.0 TIME: _____ DATE: 8/24/01
CHECKED BY: _____ DATE: _____ DEPTH: 1.0 TIME: 0 hrs. DATE: 8/24/01
S.O. NUMBER: 24379-000-0000-inv03 FILE: bailey NOT ENCOUNTERED ☐ INCLINATION (DEGREES): 0

DEPTH (FT.)	SAMPLE NO. AND TYPE/CORE RUN	BLOWS/0.5 FT. ON SAMPLER	RECOVERY (FT.) / RQD (FT.)	RECOVERY (%) / RQD (%)	POCKET PENET or TORVANE (TSF)	USCS / AASHTO	H_2O CONTENT	DESCRIPTION	REMARKS
0	S-1	1 3 3	1.5	100	1.0			SILT; (ml, a-4); brown; moist; medium stiff; +PL; homogeneous	
1.5	ST-1		1.4	93	1.25				
3.0	ST-2		1.7	85	3.25				
4.0								Silty CLAY w/ Gravel; (cl-ml, a-6); brown, dark brown and orange-brown; moist; medium stiff; +PI; stratified, 0.1'-0.3'; gravel is angular, fine to medium, sandstone and siltstone fragments Encountered water at 5.0'	EL.1140.8
5.0	A-N								EL.1139.8
6.0	S-2	WOR 0 7	1.5	100	0.5				
7.5	A-N								
8.0	R-1		2.7	90				LIMESTONE; gray; hard to very hard; slightly weathered; thinly bedded, RD=0°-2°; very closely to closely fractured, RD=0°-2°	EL.1136.8 auger refusal at 8.0' EL.1135.4
9.4								CLAYSTONE; calcareous; gray; very soft; highly weathered; indistinctly bedded; extremely close to very closely fractured. RD=0°-90°	EL.1134.6
11.0			1.1	37					
10.2	R-2		5.0	100				LIMESTONE; little very thinly to thinly interbedded shale; gray and dark gray; medium hard to very hard; slightly weathered; very thinly to thinly bedded, RD=0°-2°; very closely to medium fractured, RD=0°-45°	
16.0			2.6	52					
17.0	R-3		4.5	90				CLAYSTONE; gray and dark gray; very soft to soft; moderately to slightly weathered; very thinly to thinly bedded, RD=0°-5°; very close to closely fractured, RD=0°-45° 0.3' zone of limestone at 18.7'	EL.1127.8

Boring grouted with cement-bentonite on 9/14/01.

W 80° 25' 20" | W 80° 22' 05"

N 39° 58' 40" | N 39° 58' 40"



N 39° 55' 45" | N 39° 55' 45"

W 80° 25' 20" | W 80° 22' 05"

From WIND RIDGE and ROGERSVILLE, PA USGS 7.5 Minute Quadrangle Map

Fracture Traces

260 Coal Contours - Pittsburgh # 8 Coal Seam

Mine Openings

B-3 Geotechnical Test Borings
See Module 8 - Attachment 1 for Boring Logs

MB85-1 Corehole Locations

Lines of Cross Section

Proposed Boundary Line

1000' Perimeter

EXHIBIT 8.2B - HYDROLOGIC DATA MAP
CONSOL PENNSYLVANIA COAL COMPANY
PROPOSED BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY

RICHHILL TOWNSHIP, GREENE COUNTY, PA

0 2000'

Prepared by:
Moody and Associates Inc.

MARCH 15, 2002

From WIND RIDGE and ROGERSVILLE, PA USGS 7.5 Minute Quadrangle Map

- Background Monitoring Points for Proposed New CRDA
- Hydrologic Monitoring Plan Life of Mine Points - See Form 8.6A
- Additional Monitoring Points in Stream Valleys More Than 1000 Feet Outside of Proposed New CRDA
- Monitoring Points - Evaluation of Existing CRDA
- Proposed Boundary Line
- 1000' Perimeter
- PWS
- Borehole

EXHIBIT 8.2A - HYDROLOGIC DATA MAP
CONSOL PENNSYLVANIA COAL COMPANY
PROPOSED BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY

RICHHILL TOWNSHIP, GREENE COUNTY, PA

0 2000'

Prepared by:
Moody and Associates Inc.

MARCH 12, 2002

Module 9: Operations Maps - Surface Mining Activity Sites

9.1 Operations Map(s)

a) **Coverage.** Provide a separate map for each surface mining activity site covering the same area as the corresponding site map provided under 6.2.

b) **Scale.** Each map should be of the same scale as the corresponding site map provided under 6.2.

c) **Title.** Identify the map as "Exhibit 9.1: Operations Map - (Site Name)".

d) **Certification.** Each map must be prepared and certified by a registered professional engineer, a registered professional land surveyor.

e) **Details and information.** Show the site as it will appear during active operations, including the following details and information.

1) Topographic contours at a contour interval of 5 feet or less.

Refer to the Exhibit 9.1 map and the Construction Drawings in Module 21 of this application..

2) Surface permit area boundaries.

Refer to the Exhibit 9.1 map.

3) Property lines - surface and subsurface (key to Module 5).

Refer to the Exhibit 9.1 map. CPCC has mineral ownership within the proposed permit boundary associated with this application.

4) Surface water bodies - streams, lakes, ponds, impoundments, springs, seeps, wetlands, mine discharges, and constructed or natural drains, and:

i) the name or identity of each;

ii) identification of those which are public water supplies;

iii) identification of those which are private water supplies;

iv) identification of those which will be used for monitoring; and

v) barriers and variance areas along intermittent and perennial streams.

Refer to the Exhibit 9.1 map.

5) Water wells, and:

i) name or identification number (key to Form 8.3A).

ii) identification of those which are public water supplies; and

iii) identification of those which will be used for monitoring.

The only wells that need to be reported are those to be used for monitoring. Refer to the Exhibit 9.1 map.

6) Discharge points from the proposed operation.

Refer to the Exhibit 9.1 map.

7) Existing buildings and buildings proposed under this permit, and:

i) identification of all existing buildings keyed to the structure inventory in 5.4;

ii) identification and use of buildings proposed under this application;

iii) barriers around public buildings; and

iv) barriers and waiver distances around dwellings.

Existing buildings within and adjacent to the proposed permit are shown on Exhibit 9.1. None are public buildings.

8) Roads, barriers and variance areas along public roads.

Refer to the Exhibit 9.1 map. Township Road T-611 (Kerr Road) is abandoned.

9) Cemeteries (public and private) or Indian burial grounds.

There are no public or private cemeteries within 1000 feet of or within the proposed permit boundary.

10) Man-made features, including oil, gas and coal-slurry pipelines, electric and telephone lines and water and sewage lines.

Refer to the Exhibit 9.1 map.

11) Oil wells and gas wells, and respective barrier areas.

Refer to the Exhibit 9.1 map.

12) Waste disposal sites (key to Module 7).

There are no waste disposal sites within 1000 feet of or within the proposed permit boundary.

13) Areas where noncoal waste materials will be stored on site. (see 87.136, 89.63 and 90.133)

No noncoal waste materials will be stored on site.

14) Surface-mined areas (key to Module 7). (abandoned and reclaimed)

There are no surface mined areas (abandoned or reclaimed) within 1000 feet of or within the proposed permit boundary.

15) Proposed spoil storage and disposal areas.

No disposal sites other than the existing Bailey Central Mine Complex slurry impoundment borders the proposed site.

16) Existing and proposed coal refuse storage and disposal areas (key to Module 7)

The existing Bailey Central Mine Complex slurry impoundment borders the proposed site on the west as shown on Exhibit 9.1.

17) Dams and embankments, noting those owned or operated by the applicant.

Refer to the Exhibit 9.1 map.

18) Coal and mineral preparation facilities and conveyance systems, noting those owned or operated by the applicant.

Refer to the Exhibit 9.1 map.

19) Underground mine workings, including:
i) mine openings and their uses;

Refer to the Exhibit 9.1 map.

ii) surface areas affected by subsidence; and

Refer to the Exhibit 9.1 map.

iii) if site will be used for coal preparation, coal storage, coal refuse disposal or mine drainage treatment, the extent of underground workings and mine pool beneath the site.

Refer to the Exhibit 9.1 map. The maximum mine pool elevation beneath the proposed permit boundary associated with this permit application will be approximately 390 feet above sea level.

20) Proposed coal ash storage areas.

No coal ash storage areas are proposed.

21) Proposed coal storage areas and extent of lined area.

No coal storage areas are proposed.

22) Proposed soil storage areas (identify topsoil, subsoil, and prime farmland soil horizons)

Refer to Sheets 3 and 4 of Exhibit 21.1, Construction Drawings.

23) Proposed water treatment facilities.

The only proposed water treatment facility is a sedimentation pond. Refer to the Exhibit 9.1 map.

24) Proposed air pollution controls.

No air pollution control structures are proposed. Refer to Module 16.

25) Proposed underground and above ground storage tanks.

There is one above ground fuel storage tank proposed at the new refuse site within the proposed refuse garage. No underground storage tanks are proposed with this application.

26) Erosion and sedimentation control facilities.

Refer to Sheet 36 of Exhibit 21.1, Construction Drawings.

27) Explosives storage areas.

No explosive storage areas are proposed with this permit application.

28) Landslide areas.

Refer to the Exhibit 9.1 map.

29) Prime farmland soils.

Refer to the Exhibit 9.1 map. Culleoka soil (CaB) is identified as a prime farmland soil located in small areas at the ridge tops. These soils have not been used for cropland for 5 out of the last 10 years.

30) Prime farmland soils which will be reconstructed.

Since a negative determination can be justified, a Prime Farmland Reconstruction Plan is not required.

31) Prime farmland soils for which a negative determination will be sought.

A negative determination is being sought for the Culleoka soil (CaB) because: 1) the soils to be affected have not been used historically as cropland for any 5 out of the last 10 years, and 2) the affected area is less than 5 acres and will be used to support mining activities for more than 10 years. See Attachment 17.3.b for a copy of a letter from Consol attesting that parcels containing prime farmlands have not been used as cropland for any 5 out of the last 10 years.

32) Wetland mitigation and replacement sites.

Wetland mitigation and replacement sites are located beyond the 1000 foot boundary required for this mapping. Refer to the Module 15, Section 15.5 for the wetland mitigation and replacement sites.

f) **Additional maps or design schematics on coal refuse disposal sites.** If the site will be used for coal refuse disposal include the following details in addition to those required under section (e) above.

1) The limits of each stage or phase of site development.

2) Proposed underdrains and spring collectors.

3) Proposed leachate collection drains.

4) Proposed mine drainage treatment sludge disposal areas.

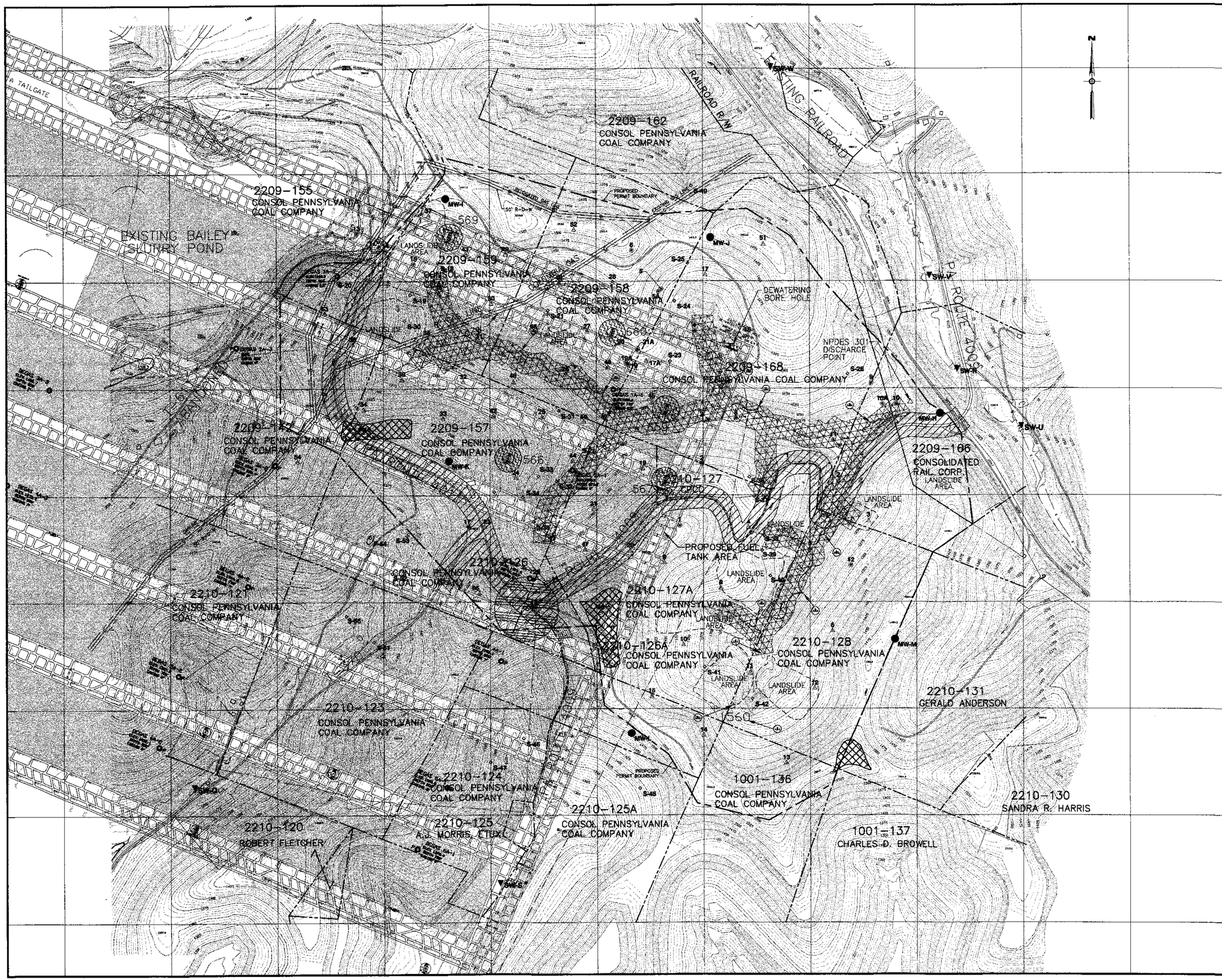
5) Proposed coal processing waste impoundments.

6) Proposed keyway cuts, rock toe buttresses, and other stabilization structures.

7) Construction cross sections (key to Module 21).

Refer to the Construction Drawings attached to Module 21 (Exhibit 21.1).

EXHIBIT 9.1
OPERATIONS MAP



LEGEND

- Proposed Surface Permit Area Boundaries
- Property Line
- Surface Areas Affected By Subsidence (30° Angle of Draw)
- Perennial Stream
- Intermittent Stream
- Pond
- Groundwater Monitoring Well Location — MW-J
- Surfacewater Monitoring Location — SW-V
- Spring Sampling & Inventory Location — S-25
- Spring Location (No Sample)
- Degas Borehole
- Soil Borings
- Test Pits
- Gas Well
- Electric Line
- Existing Wetlands
- Gasline and 50' Right-of-Way
- 300' Dwelling Variance Area
- 100' Road Variance Area
- 125' Gas Well Variance Area (Wells Are Abandoned And Sealed)
- CAB Prime Farmland Soil Location
- 100' Stream Variance/ Barrier Area
- 100' Road Barrier Area
- Landslide Area
- Existing Mine Workings

SOURCES OF INFORMATION

ALTERNATIVE ANALYSIS – BAILEY MINE COMPLEX APPROVED AUGUST 1, 2001. PADEP

USDA NATURAL RESOURCE CONSERVATION SERVICE

WIND RIDGE AND ROGERSVILLE 7-1/2 MINUTE U.S.G.S. QUADRANGLES

COMMONWEALTH OF PENNSYLVANIA
MICHELE STEWART
ENGINEER
PE-029157-E

400 200 0
SCALE IN FEET

Baker
MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

EXHIBIT 9.1
OPERATIONS MAP

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
KLK	GEC	MMS	3/02	AS SHOWN

FILE: MODULE 9.1
I:_consol\24379\drawings\final\

DRAWING NO.

January 22, 2002 3:57:27 p.m. LOGIN NAME : gcarrocci
Drawing: J:\PROJECTS_CONSOL\24379\DRAWINGS\FINAL\MODULE 9-1.DWG-(LAYOUT1)
Attached Xrefs: BDR24360.DWG minemap.DWG
S.O. No.: 24379-0000-ENG03

Module 10: Operation Plan

This Module is designed so that it can be used for new permit applications and permit revision applications. When using it to complete a revision application, the responses may reference the original approved application or be worded to apply specifically to the new activity or site being proposed.

10.1 Description of Operations

a) Provide a description of operations which will take place under this permit.

1) If the operation involves underground mining, describe the method of mining (longwall, room and pillar, etc.); the estimated life of the mine; the type of haulage and underground machinery; the maximum number of working faces; the anticipated annual production in tons; the anticipated underground acreage that will be affected each year; surface activity sites and the activities which will take place at each (coal storage, ventilation, rock dust transport, etc.); the means by which coal will be transported from the operation; and the system that will be used to convey mine drainage to treatment. If mining will re-affect existing workings, identify the company that developed those workings and the time frame during which that mining took place.

Not applicable. Underground operations are not included as part of this permit application.

2) If the operation involves coal preparation, describe the estimated life of the operation; the types of processing equipment used; media used in separation processes; chemical treatment of coal or refuse; source and quality of make-up water; the means by which coal will be transported to and from site; and whether the facilities are designed to recirculate or discharge water from the coal preparation circuit.

Not applicable. Coal preparation is not proposed as part of this permit application.

3) If the operation involves coal refuse disposal:

i) Describe the type of operation (head of hollow fill, cross valley embankment, side hill embankment, ridge embankment, heaped embankment, surface mine backfill, disposal into underground mine workings, etc.); the estimated life of the operation; the type of equipment which will be used to handle and compact refuse; the systems that will be used to monitor, collect, manage and treat runoff and leachate; and any chemical treatment to which refuse will be subjected (surfactants, bactericides, alkalizing agents, etc.)

The new Bailey disposal facility will consist of a slurry impoundment (Coal Refuse Disposal Area No. 3) and coarse coal refuse disposal area (Coal Refuse Disposal Area No. 4). Both structures will be valley fill type structures. Together they will provide the Bailey Mine Complex with approximately 15 years of disposal capacity at projected refuse generation rates.

Coarse coal refuse will be placed in embankments constructed within the slurry impoundment valley at the downstream and upstream ends (eastern and western ends) of the facility to form an impoundment. Three additional saddle dikes will be constructed to form the reservoir area, but these dikes will be constructed of earth embankment material. Excess coarse coal refuse not needed for dam construction, as well as coarse refuse generated during conditions not suitable for adequate compaction, will be disposed within non-structural areas of the coarse coal refuse disposal area. Non-structural areas (composed of unsuitable coarse coal refuse and breaker rock – see Section 7 of the Technical Specifications of Module 21) are areas within the top of the active pile that are more than 250 feet away from the edge of the intermediate and final embankment out-slope.

Fine coal refuse will be placed within the impoundment area by water slurry techniques. Slurry will be discharged along the upstream face of the eastern dam. Water levels within the impoundment will be controlled by a decant pipe that will discharge into the sedimentation pond in conjunction with a pumping system which will recycle pond supernatant to the existing slurry pond and then to the preparation plant.

Coarse coal refuse will be transported from the preparation plant to the disposal facility by belt conveyor. Refer to Sheet 3 and 4 of the Exhibit 21.1 drawings for the proposed conveyor belt alignment. As indicated on Sheet 3 and 4, coarse coal refuse will be discharged from the belt into a refuse bin. Coarse coal refuse will be hauled from the bin to the disposal area by either a scraper or off-highway truck. It will be spread and compacted using the hauling equipment and/or a self propelled sheepsfoot roller or smooth-wheel vibratory roller.

Runoff from coarse coal refuse embankments as well as leachate will be collected and conveyed to the facility sedimentation pond. Runoff will be collected and conveyed to the pond by perimeter ditches. Both of the coal refuse dams will be provided with an internal drainage system to control seepage, and leachate collected by these systems also will be conveyed to the sedimentation pond. Runoff and leachate discharged into the pond will flow through both chambers of the pond before being discharged off-site. Sedimentation pond discharge will be sampled and tested in accordance with NPDES criteria. The hydrologic monitoring plan outlined under Module 8.6 also will be implemented to monitor facility performance.

Based on the NPDES compliance history at the nearby existing Bailey refuse disposal area, chemical treatment of the coal refuse is not proposed.

ii) If the operation does not involve disposal in abandoned, inactive or active underground mine or in abandoned or unreclaimed surface mines, outline the technical, economic and safety considerations prohibiting such disposal.

No abandoned or unreclaimed surface mines are present in the vicinity of the Bailey Mine Complex. Underground disposal was considered but determined to be not feasible. Refer to the Alternatives Analysis Report on file at PADEP, McMurray District office (approved August 1, 2001) for a detailed evaluation of this disposal option.

4) If the operation will involve the discharge of coal processing wastes, underground mine development wastes, coal ash, mine drainage treatment sludge, flue gas desulfurization sludge, or inert stabilizing materials to underground workings:

Describe the nature of the material to be discharged, the system which will be used to convey the material to the point of discharge, and the means of controlling the material within the underground workings.

Not applicable. The operation will not involve the discharge of coal processing wastes, underground mine development wastes, coal ash, mine drainage treatment sludge, flue gas desulfurization sludge, or inert stabilizing materials to underground workings.

5) If the operation will include the use of fly ash or sewage sludge, describe the purpose for which the material will be used and the site(s) on which it will be used.

Not applicable. The operation will not include the use of fly ash or sewage sludge. The only coal ash to be disposed in Coal Refuse Disposal Areas No. 3 and No. 4 will be that generated by the preparation plant thermal dryers. As indicated on Module 20, Form 20.2, it will be an insignificant part of the proposed disposal operation.

10.2 Existing Structures.

a) List all existing structures which will be used in connection with or to facilitate the mining operation. (Existing structures include roads, bridges, culverts, fills, berms, benches, waste banks, discharge structures, diversions, rail loops, rail sidings, rail spurs, refuse areas, shafts, spoil piles, utility lines, terraces, drains, wells, exploration holes, boreholes, barricades, fences, storage areas, mine buildings, tipples, storage facilities, repair facilities, surge ponds, treatment plants, pipelines, conveyors and other man-made structures or areas disturbed by mining activities).

Discharge from the sedimentation pond will be directed to an existing 8-foot diameter culvert under the railroad embankment.

b) Provide the following information for each existing structure:

1) location (map reference);

The culvert location is shown on Sheet 27 of the Exhibit 21.1 drawings.

2) description of current condition;

The culvert is in excellent condition

3) demonstration of compliance with current design and administrative requirements;

Calculations demonstrating the culvert's capacity to pass sedimentation pond discharge are presented in Appendix G of the Module 21 Design Report.

4) if modifications are required to achieve compliance -

   i) design details;

   ii) construction schedule;

   iii) monitoring provisions;

   iv) demonstration that there will be no significant risk to public health or the environment during the reconstruction period.

No modifications to the culvert are required.

10.3 Construction Schedule.

Provide a construction schedule addressing site preparation and facility installation at each surface mining activity site. Identify critical steps where close engineering supervision or certification is required by regulation.

Presented as Sheet 15 of Exhibit 21.1 is a facility staging diagram showing proposed construction periods for each phase of facility development. Initial site preparation for the disposal facility is expected to occur in 2004 and 2005. Coarse coal refuse placement for Area No. 3 dam construction will begin in 2005, near the end of initial site preparation. Slurry placement can begin when the first stage of dam construction is complete. The expected Stage 1 dam completion date is 2006. Coal Refuse Disposal Area No. 4 will be active and available to receive coal refuse during the entire period of Area No. 3 dam construction. When the coal refuse dams are complete, all coarse coal refuse will be disposed in Coal Refuse Disposal Area No. 4. Coal refuse placement at the disposal facility (both areas) is expected to be complete by 2020. Final stages of cap construction (soil cover placement) will occur after coal refuse placement is complete.

The following items require supervision during development of this site:

- *Cutoff trench construction and dam foundation preparation.*
- *Installation of the rock drain and any spring drains.*
- *Installation of the decant pipe.*
- *Construction of the sedimentation ponds which will require certification.*
- *Liner installation (soil and HDPE).*
- *Piezometer installation.*
- *Installation of the dam internal drains.*
- *Installation of dewatering borehole manhole & associated drain, conduit, and outlet pipe protection.*
- *Saddle Dams B, C, and D. Periodic inspection of Main Dam and Saddle Dam A construction will be in accordance with the dam permits and MSHA requirements.*

Federal and State regulations require certification that construction, operation, and maintenance of the slurry pond, sedimentation pond, and associated dams have been conducted in accordance with the approved plan.

10.4 Special Handling of Toxic and Pollution Forming Materials

For each surface mining activity site where earth moving will take place, describe the manner in which toxic or pollution-forming materials will be monitored and handled.

Toxic or pollution-forming materials are not expected to be encountered at the project site during site preparation. Any that may be encountered will be removed and disposed of off site.

10.5 Oil and Gas Wells

Where surface mining activities are proposed to be conducted within 125 feet of any oil or gas well identify the location on Exhibits 6.2, 9.1, and 18.1and provide a description of the activity. Provide a demonstration that the well has been sealed; or describe the measures to be taken to ensure the integrity of the well, ensure access to the well is provided at all times, and provide notice of the proposed activity to the well owner.

Five abandoned gas wells are located within Coal Refuse Disposal Area No. 3 (slurry impoundment site). See Exhibits 6.2, 9.1, 18.1, and Sheet 2 of Exhibit 21.1 for their locations. Documentation that three of the wells (566, 567 and 659) have been sealed is presented as Attachment 10.5. The remaining two gas wells (569 and 660) will be sealed in accordance with the Oil and Gas Act, prior to disposal facility construction.

10.6 Wells, Exploration Holes and Bore Holes

Describe the manner in which, exploration holes, monitoring wells, and exposed underground openings will be cased, sealed or otherwise managed.

Soil borings and test pits were drilled at the project site during 2001 for facility design purposes (refer to Exhibits 6.2 and 21.1). None of these borings penetrated the mine. All were grouted their full length with cement grout.

Three exploration boreholes (F-20, MB-85-1, and MB-85-2) and three degas boreholes (1A-1, 2A-1, and 3A-1) were drilled within Coal Refuse Disposal Area No. 3 at the locations shown on Exhibit 6.2 and Sheet 2 of Exhibit 21.1. The exploration boreholes have been grouted their full length with cement grout. Degas boreholes also have been sealed. Certificates of degas borehole sealing are included as Attachment 10.6.

A mine dewatering borehole located within the Area No. 3 main dam area will remain active during disposal facility development. Access to this borehole will be provided by a 6-foot diameter manhole extended through the dam during coal refuse placement. The outside of the manhole will be lined with PVC as shown on Sheet 37 of Exhibit 21.1 to alleviate downdrag. At the completion of manhole installation, the borehole pump and assembly may be moved to the top of the manhole. If the pump is moved, the mine water conveyance pipe also will be moved and the pipe section through the dam will be grouted for its full length with cement grout.

10.7 Utilities

Where proposed surface mining activities may adversely affect services provided by oil, gas, and water wells; oil, gas, and coal slurry pipelines; railroads; electric and telephone lines; and water and sewage lines, provide a demonstration of the measures which will be taken to minimize these impacts. If excavating will occur within 100 feet of a pipeline, attach a copy of the notification sent to the pipeline owner which describes precautionary measures to be taken (any proposal for conducting mining activities within a pipeline right-of-way or easement must include the written approval of the pipeline owner). (Technical Guidance Document 562-2112-503 titled, Coal Surface Mining and Blasting Near Underground Utility Lines and Pipelines provides additional information. Copies are available through the District Office or on the DEP Homepage (www.dep.state.pa.us) under PUBLIC PARTICIPATION/FINAL TECHNICAL GUIDANCE.)

An existing 6 inch Columbia Gas transmission line crosses the site. CPCC is working with Columbia Gas to relocate this line around proposed limits of work. A letter documenting Columbia Gas' approval for the gas line to be relocated and for CPCC to conduct activities within the existing pipeline right-of-way area will be provided prior to the coal refuse permit approval, as Attachment 10.7.

Two overhead power lines owned by Allegheny Power also cross the project site. CPCC is working with Allegheny Power to relocate these lines around proposed limits of work. A letter documenting Allegheny Power approval for the power lines to be relocated will be provided prior to the coal refuse permit approval, as Attachment 10.7..

10.8 Storage Tanks

If above-ground fixed fuel or chemical storage tanks will be located on a surface mining activity site, identify the location on Exhibit 9.1 and describe the measures which will be taken to prevent adverse impacts of leaks and spills (Note: Underground storage tanks are subject to the requirements of the Storage Tank and Spill Prevention Act).

There is one above ground fuel storage tank proposed at the new refuse site within the proposed refuse maintenance building. No underground storage tanks are proposed with this application. Fuel will be stored in a 15,000 gallon above-ground tank at the Baily Mine Complex Refuse Disposal Areas No. 3 and No. 4 facility at the location shown on the Module 21 Construction Drawings. The tank will have double walls or a secondary containment for control of leaks. It will be situated on a concrete pad to deter infiltration of any spills that may occur during discharge or filling of the tank. Any spills that occur will have absorbing material applied and will be cleaned by CPCC before they migrate from the pad.

10.9 Public Parks and Historic Places

Where the proposed mining or refuse disposal activities may adversely affect any publicly owned park, state forest, state game land, or historic place listed on the National Register of Historic Places, provide a demonstration of the measures which will be taken to minimize or prevent these impacts.

Not applicable. There are no publicly owned parks, state forests, state game lands, or historic place listed on the National Register of Historic Places that will be affected by the refuse disposal activities.

10.10 Fish and Wildlife Protection

Describe measures which will be taken to protect fish and wildlife during the active phase of operations.

The proposed facility design includes measures to reduce uncontrolled discharge to area groundwater and surface water. The facility will be provided with a final vegetated soil cover designed to reduce infiltration and prevent exposure of coal refuse to area wildlife. Disposed coal refuse will be separated from stream base flows and springs by a soil liner. Stream flow and springs will be collected and conveyed under the facility in a system of drains. Runoff from coal refuse will be collected and conveyed to a lined sedimentation pond. Drains installed within the coarse coal refuse will intercept leachate and convey it to the sedimentation pond. Slurry impoundment supernatant will be recycled to the preparation plant, similar to the current operation of the existing Bailey Mine Complex disposal area.

Fletcher Run, a high quality watershed area, will be protected from impacts by the belt conveyor crossing by implementing a design that provides for no discharge of coal refuse contact water to Fletcher Run. The conveyor will cross the top of the watershed. As shown on Sheets 3 and 4 of Exhibit 21.1, runoff below the conveyor belt will be collected and conveyed to a collection sump for sedimentation. The sump will have no discharge but will be pumped to coal Refuse Disposal Area No. 3 instead.

10.11 Sanitary Facilities

If sanitary facilities will be provided, identify their location and describe the means of sewage disposal. If sewage will be treated and discharged to surface water, provide the NPDES permit number.

Not applicable. Sanitary facilities are not included as part of this permit application.

10.12 Fire Hazards/Combustible Materials

a) Identify any material which has a low ignition point or otherwise poses a potential fire hazard that will be stored or disposed of at any surface activity site. Describe the measures and contingency plans which will be used to prevent the sustained combustion of these materials and ensure that they are isolated from coal refuse and exposed coal seams.

Combustible materials and coal refuse generated at the mine are stored separately. Nevertheless, coarse coal refuse delivered to the disposal facility will be visually inspected for combustible materials when it is placed. Any combustible materials that may be present will be removed and will be disposed off site by a private contractor.

b) If coal refuse is present at any surface mining activity site, indicate whether there are any known hot spots or fires present within it. If hot spots or fires are present, describe the actions that have been or will be taken to extinguish these areas, the projected date for completion of those actions, and the monitoring and surveillance measures that will be used to determine the success of remedial actions and detect future problems.

Not applicable. Coal refuse is not currently present at the site proposed with this application.

c) If coal refuse will be disposed of in a fill or embankment under this permit, describe: the method to be used to detect and prevent size segregation of refuse within the pile; the controls which will be implemented to ensure the deposition of refuse in 2-foot layers; the percentage of compaction (% of optimum dry density) which will be achieved utilizing proposed methods and compaction equipment; the methods which will be utilized to ensure that the required degree of compaction will be attained on a routine basis and the person responsible ensuring that compaction requirements are met; and any other methods or techniques which will or can be employed to prevent spontaneous combustion within the pile.

Size segregation can occur if the gradation of the coarse coal refuse varies considerably, if coarser size fragments are segregated, and/or if refuse placement operations cause the refuse to "breakdown" in a non-uniform manner. These concerns have been satisfactorily addressed at the Bailey Central Mine Complex existing coal refuse disposal sites as described below and CPCC intends to implement the same procedures at this facility.

CPCC's coal refuse does not vary significantly in size, but is relatively consistent. Coarse coal refuse will be placed in Disposal Areas No. 3 and No. 4 by off-highway haulage trucks or scrapers and will be spread with the scrapers, a bulldozer, or a self-propelled compactor with a blade. Oversized material requiring disposal, such as breaker rock, will be incorporated into "non-structural" areas of the disposal area as indicated on Sheet 6 of the Construction Drawings appended to the Module 21 Design Report.

Coarse coal refuse placement in Areas No. 3 and No. 4 will be performed in the same manner as the existing Bailey Central Mine Complex coarse coal refuse site. Coarse coal refuse placed at the site will be spread into layers not exceeding two feet in thickness before being compacted. Coarse refuse placed within the impounding structures will be placed in layers having a maximum thickness of 12 inches. Facility operating personnel will be supervised by a foreman who will be responsible for ensuring that the coarse coal refuse is placed in layers meeting the specified thickness requirements.

Coarse coal refuse will be compacted to a minimum dry density of 95% of the maximum dry density value determined in accordance with ASTM D698. Compaction will be achieved using the haulage equipment and/or a self-propelled sheepsfoot roller or smooth-wheel vibratory roller.

Field density testing will be performed on a monthly basis at the new coal refuse disposal site under the direction of Consol Pennsylvania Coal Company engineers. Coal refuse placement and compaction will be as described in Section 7 of technical specifications appended to the Module 21.1 Design Report.

Spontaneous combustion within the coal refuse pile will be prevented or minimized by standard compaction and by covering finished embankment slopes and completed top surfaces of the disposal areas with 24 inches of soil and vegetating them as early as practical. Sections of the disposal facility reaching the final configuration and elevation will be covered with soil as early as practical after the final grade is achieved. Breaker rock to be disposed at the site will be crushed and screened to not only reduce its particle size but for removal of combustible materials as well.

ATTACHMENT 10.5

DOCUMENTATION OF GAS WELL SEALING

ER-OG-6: Rev. 3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF OIL AND GAS REGULATION

Code
Oil & Gas Inspector
Date Approved

CERTIFICATE OF PLUGGING WELL

Consol Pennsylvania Coal Company
☐ Coal Operator ☐ Owner ☐ Lessee
450 Race Track Road
Address
Washington, Pa. 15301
☐ Coal Operator ☐ Owner ☐ Lessee
Address
☐ Coal Operator ☐ Owner ☐ Lessee
Address

COMPLETE ABOVE SECTION IF APPLICABLE

Type of Well: Abandoned
Name of Well Operator: Consol Penn. Coal Company
450 Race Track Road, Washington, Pa. 15301
Address
June 30, 19 86
Date
Richhill
Political Subdivision, Borough, City or Township
Greene County
Farm: Consol (D. G. Rush)
Well (Farm) No. 566 Serial No.

We, the undersigned representatives of the Well Operator certify that we participated in the plugging of the above well, and that the work was started June 11, 19 86, and that the well was plugged as follows:

FILLING MATERIAL AND PLUGS	FROM	TO	Casing and Tubing SIZE	PULLED	LEFT
Cleaned out wellbore 1,200 feet back to surface.					
Pulled 1,067 feet of 2 inch tubing.					
Pulled 1,064 feet of of 10 inch casing.					
Cemented: Bottom Plug: Cemented from 1,200 feet back to 850 feet with 560 sacks of thix cement.					
Slotted the 7 inch to 850 feet back to 700 feet for a degas hole.					
Cemented: Top Plug: Used 560 sacks of 50-50 pox cement and cemented to surface.					

Depth of Coal Seam, If Any
Pittsburgh: 968 feet to 972 feet.

Description of Monument

I certify that the work of plugging and filling said well was completed on the 27th day of June, 19 86 and that the above information is true and accurate.

Consol Pennsylvania Coal Company
(Well Operator)

(Qualified Participant)

PERMIT/REGISTRATION NO. 37-059-22065-P

(Qualified Participant)

PROJECT NO.

(Qualified Participant)

One copy of this certificate to be mailed to each coal operator, lessee, or owner, if any, and one to the Bureau of Oil and Gas Management, upon completion of plugging.

ER-OG-6. Rev. 3/85

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF OIL AND GAS REGULATION

Code
Oil & Gas Inspector
Date Approved

CERTIFICATE OF PLUGGING WELL

Consol Pennsylvania Coal Company
☐ Coal Operator ☐ Owner ☐ Lessee
450 Race Track Road.
Address
Washington, Pa. 15301
☐ Coal Operator ☐ Owner ☐ Lessee
Address
☐ Coal Operator ☐ Owner ☐ Lessee
Address

COMPLETE ABOVE SECTION IF APPLICABLE

Type of Well Abandoned
Name of Well Operator Consol Penn. Coal Co.
450 Race Track Road, Washington, Pa. 15301
Address
June 10, 19 86
Date
Richhill
Political Subdivision, Borough, City or Township
Greene County
Farm Consol (L. D. Morris)
Well (Farm) No. 567 Serial No.

We, the undersigned representatives of the Well Operator certify that we participated in the plugging of the above well, and that the work was started May 27, 19 86, and that the well was plugged as follows:

FILLING MATERIAL AND PLUGS	FROM	TO	Casing and Tubing SIZE	PULLED	LEFT
Cleaned out wellbore to 2,970 feet.					
Pulled 2,970 feet of 3½ inch casing.					
Pulled 1,637 feet of 7 inch casing.					
Set cement plug from 2,970 feet back					
to 1,700 feet.					
Cement: Botton Plug: Used 225 sacks of					
standard cement from 2,970 feet to 1,700			Depth of Coal Seam, If Any		
feet.			Pittsburgh: 938 feet to		
Cement: Top Plug: 685 sacks of thix			942 feet		
cement from 1,550 feet back to surface.					
Cut the 8 inch at 938', 940', 942' in the			Description of Monument		
coal.					

I certify that the work of plugging and filling said well was completed on the 7th day of June, 19 86 and that the above information is true and accurate.

Consol Pennsylvania Coal Company
(Well Operator)

(Qualified Participant)

PERMIT/REGISTRATION NO. 37-059-22090-P

(Qualified Participant)

PROJECT NO.

(Qualified Participant)

One copy of this certificate to be mailed to each coal operator, lessee,or owner, if any, and one to the Bureau of Oil and Gas Management, upon completion of plugging.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF OIL AND GAS REGULATION

Code
Oil & Gas Inspector
Date Approved

CERTIFICATE OF PLUGGING WELL

Consol Pennsylvania Coal Company
☐ Coal Operator ☐ Owner ☐ Lessee
450 Race Track Road
Address
Washington, Pa. 15301
☐ Coal Operator ☐ Owner ☐ Lessee
Address
☐ Coal Operator ☐ Owner ☐ Lessee
Address

COMPLETE ABOVE SECTION IF APPLICABLE

Type of Well: Abandoned

Name of Well Operator: Consol Penn. Coal Co.

450 Race Track Road, Washington, Pa. 15301
Address

October 18, 19 85
Date

Richhill
Political Subdivision, Borough, City or Township

Greene County

Farm: Consol (R.M. Martin)

Well (Farm) No. 659 Serial No. _____

We, the undersigned representatives of the Well Operator certify that we participated in the plugging of the above well, and that the work was started September 09 19 85, and that the well was plugged as follows:

FILLING MATERIAL AND PLUGS	FROM	TO	Casing and Tubing SIZE	PULLED	LEFT
Fished out 8 inch casing below the					
Pittsburgh coal. Cleaned hole out to					
1,600 feet. Set solid cement plug from					
1,600 feet to surface.					
Extreme caving in the hole. Debris					
in wellbore of wood, steel, and other					
junk metal.			Depth of Coal Seam, If Any		
			Pittsburgh: 830 feet		
			to 837 feet		
			Description of Monument		

I certify that the work of plugging and filling said well was completed on the 22nd day of Sept., 19 85 and that the above information is true and accurate.

Consol Pennsylvania Coal Company
(Well Operator)

(Qualified Participant)

PERMIT/REGISTRATION NO. 37-059-22048-P

George R Hou
(Qualified Participant)

PROJECT NO. _____

(Qualified Participant)

One copy of this certificate to be mailed to each coal operator, lessee, or owner, if any, and one to the Bureau of Oil and Gas Management, upon completion of plugging.

ATTACHMENT 10.6

DOCUMENTATION OF DEGAS BOREHOLE SEALING

ER-MR-38:7/91

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF MINING AND RECLAMATION

CERTIFICATE OF BOREHOLE(S) CLOSURE/SEALING PROCEDURE

	BOREHOLE LOCATION
PERMIT NUMBER: 3081073	COUNTY: Greene
PERMITTEE: Consol Pennsylvania Coal Company	TWP: Richhill
NAME OF OPERATION/MINE: Bailey	TOPOGRAPHIC QUAD: Wind Ridge
	PROVIDE PORTION OF APPROPRIATE 7½ MINUTE TOPOGRAPHIC MAP WITH BOREHOLE(S) HIGHLIGHTED.

THE BOREHOLE(S) WAS/WERE SEALED USING THE MATERIAL INDICATED BELOW:

BOREHOLE I.D. #	DESCRIPTION OF FILL MATERIAL OR PLUG	ELEVATION		BOREHOLE DIAMETER	AMOUNT OF FILL MATERIAL (CU. YDS.)	DATE SEALED	POST-CLOSURE DESCRIPTION-INDICATE AMOUNT OF CASING LEFT IN PLACE AND CASED INTERVALS
		SURFACE	COAL				
2A2	Sand and Cement Grout	1404.	442	6.5"	8 yards of grout	8-25-92	Pipe casing left 4' below ground surface
2A1	Sand and Cement Grout	126239	427	6"	7 yards of grout	8-25-92	Pipe casing left 3½' below ground surface

I/WE CERTIFY THAT THE ABOVE INFORMATION IS TRUE AND ACCURATE.

Craig Burda 9-8-92
(Signature PERMITTEE or Representative) DATE

(AND) IF SEALING WORK IS PERFORMED UNDER CONTRACT, GIVE NAME AND ADDRESS OF CONTRACTOR:

NAME: Duncan Bros. Drilling Inc.

ADDRESS: P.O. Box 136
New Galilee, Pa. 16141

James A. Simpson 8/25/92
(Signature CONTRACTOR or REPRESENTATIVE) DATE

Send copies (1) to each of the following:
- Department of Environmental Resources District Mining Office
- Department of Environmental Resources McMurray Office - Deep Mine Permitting

TO: ED SUTER DATE: 12/2/91

RE: BAILEY MINE VENTILATION BORE HOLE STATUS

Dear Ed,

Per your request and letter dated November 20, 1991, below is a list of the ventilation bore holes at Bailey Mine and their current status. If you need any additional information, feel free to give me a call.

INSTALLED			SEALED	PERMITTED/NOT INSTALLED
1A-1	9A-1	5B-2	1A-1	12A-2
1A-2	9A-2	5B-3	3A-1	12A-3
2A-1	9A-3	6B-1	4A-2	13A-1
2A-2	10A-1	6B-2	1B-1	13A-2
2A-3	10A-2	6B-3		13A-3
3A-1	10A-3	7B-1		7B-3 *
3A-2	11A-1	7B-2		8B-3 *
3A-3	11A-2	8B-1		9B-3 *
4A-1	11A-3	8B-2		10B-1
4A-2	12A-1	9B-1		10B-3 *
4A-3		9B-2		
5A-1	1B-1	10B-2		
5A-2	1B-2			
5A-3	2B-1			
6A-1	2B-2			
6A-2	2B-3			
6A-3	3B-1			
7A-1	3B-2			
7A-2	3B-3			
7A-3	4B-1			
8A-1	4B-2			
8A-2	4B-3			
8A-3	5B-1			

* Note: Their are no current plans to install these ventilation holes.

cc Jim Goroncy
cbes02.doc

ATTACHMENT 10.7

UTILITY COMPANY APPROVAL LETTERS

Module 11: Erosion and Sedimentation Controls

Provide the following information for each surface mining activity site. Organize the information by completing separate sets of answers to items 11.1 through 11.3 for each site. Narrative descriptions should reference the information on Exhibit 9.1.

11.1 Erosion & Sedimentation Controls.

a) Provide a narrative description of erosion and sediment controls which will be used during site preparation, operation, and reclamation.

Site erosion and sedimentation (E&S) will be controlled during each phase of facility development by using a system of collection and diversion ditches and sedimentation control structures/devices consisting of ponds, sediment traps and straw bale/silt fence barriers. E&S controls proposed for each phase of construction are discussed below and are shown on the Construction Drawings as part of Module 21.

***Site Preparation**. Site construction will be initiated by installing the sedimentation pond. During this phase of site preparation, E&S will be controlled with sediment traps, sediment barrier, and ditches. Temporary diversion channels and pipes will be used to divert offsite runon away from the work area. The sedimentation pond will provide E&S control during remaining phases of site preparation. Runoff from stockpile areas not draining to the sedimentation pond generally will be passed through a sediment trap. A small section of stockpile area will be controlled with sediment barrier. Sediment barrier also will be used to control construction of the runoff collection sump.*

***Operation**. Runoff from most areas of site operation will be passed through the sedimentation pond. Runoff from the outside face of Saddle Dam A will be discharged into the existing Bailey slurry impoundment (Coal Refuse Disposal Area No. 1). The existing Bailey sedimentation pond will receive runoff from Stockpile Area No. 1 (refer to Module 21 Construction Drawings, sheet 37). Runoff from the Fletcher Run conveyor crossing will be collected by the runoff collection sump and automatically pumped to the slurry impoundment.*

***Reclamation**. Runoff from Coal Refuse Disposal Area No. 4 and a large section of Coal Refuse Disposal Area No. 3 will pass through the sedimentation pond. The slurry impoundment cap design incorporates channels to reduce drainage lengths and thereby reduce erosion. The remaining section of slurry impoundment will discharge into Coal Refuse Disposal Area No. 1. After vegetation is established on the slurry impoundment, when Coal Refuse Disposal Area No. 1 is closed, runoff from Coal Refuse Disposal Area No. 3 will be discharged in the valley immediately south of Coal Refuse Disposal Area No. 1.*

b) Using Form 11.1A, **Diversion/Collection Ditch Data Sheet,** provide detailed design and construction information for all channels and diversions.

See Form 11.1A attached to this Module for detailed design and construction information for proposed channels. Channels designs were based on the following design storm events:

Permanent Collection Channels: 100-year, 24-hour storm
Temporary Diversion Channels: 2-year, 24-hour storm
Temporary Haul Road CollectionChannels: 10-year, 24-hour storm
Temporary Collection Channels in Coal Refuse Disposal Areas: 10-year, 24-hour storm

Design calculations are presented in Appendix G of the Module 21 Design Report.

c) Provide design criteria and capacity calculations for all drainage pipes and culverts, including those which are part of road drainage systems.

See calculations appended to the Module 21 Design Report, for design criteria and capacity calculations for all drainage pipes and culverts proposed as part of this application. The design storm event for permanent culverts is the 100-year, 24-hour storm; 10-year, 24-hour storm for tempoprary culverts.

d) Provide design criteria and capacity calculations for sedimentation control ponds and their discharge structures. (Details regarding pond construction should be addressed under Module 13)

One sedimentation pond having a dual chamber is proposed as part of this operation. The pond will be constructed during initial site preparation and will remain in service throughout the life of the facility. The design storm for the pond is the 100 year, 24 hour storm event. Refer to Module 13 and Attachment 21.1

(Design Report) of this application for pond and pond outlet structure capacity calculations, and for details regarding pond construction.

e) Provide documentation of the capacity of any existing drainage structures which will receive drainage from the site.

Discharge from the sedimentation pond will be directed to an existing 8-foot diameter culvert under the railroad embankment. Calculations demonstrating the culvert's capacity to pass sedimentation pond discharge are presented in Appendix G of the Module 21 Design Report. .

11.2 Diversion Controls

Provide a plan for the collection and conveyance to a natural drainageway of the runoff from upslope undisturbed areas. Provide a separate general design for a temporary highwall diversion which limits the amount of runoff which can enter the pit (where applicable). Include design criteria, capacity calculations, profiles of proposed channel slopes, typical cross sections, required channel linings and applicable details on Form 11.1A.

Diversion channels will be used during construction of the sedimentation pond. Refer to Sheet 29 of Construction Drawings appended to the Module 21 Design Report for ditch alignments and construction details. Channel slopes are presented on Form 11.1A. These channels are temporary and have been designed for the 2-year, 24-hour storm event. Ditch capacity calculations are included in Appendix G of the Module 21 Design Report.

11.3 Haul Roads

a) Provide the following information for each road meeting either of the following criteria:

- a road which will be constructed or improved in order to provide site access; or
- a road which will be used on a regular basis to haul coal, refuse, ash or supplies to or from the site.

All plans and information must be certified by a qualified registered professional engineer.

1) Show the road in plan view on the Exhibit 9.1, including all bridges, culverts and drainage pipes.

Road plan views, culverts, and drainage pipes are shown on Sheets 3 through 12 of Construction Drawings appended to the Module 21 Design Report.

2) Provide cross sections showing construction details, including existing ground, construction materials, and surface grading.

Cross sections are provided on Sheet 34 of Construction Drawings appended to the Module 21 Design Report.

3) Describe the measures which will be used to control and prevent erosion and sedimentation (include proposed spacing of sediment traps, turnouts, culverts, check dams, etc.).

The haul and access roads will be surfaced with aggregate (excluding the internal haul roads which are surfaced with coal refuse) to prevent erosion. Drainage from the haul roads will be directed to the slurry impoundment or sedimentation pond. Roadside ditches will be provided with a suitable lining and culverts discharging road drainage will have rock outlet protection.

4) Describe the type of traffic the road is designed to accommodate.

Site roads have been designed as haul roads.

5) If the road involves the crossing of any intermittent or perennial stream or wetland, check the appropriate block in Module 4 and complete Module 15.

Module 15 is attached and Module 4 has been marked accordingly.

6) Indicate whether a PennDOT highway occupancy permit will be needed. (Note: a copy of the permit must be submitted prior to permit activation).

A highway occupancy permit will be needed from PennDot for State Route 4009 for access to the site. A copy of the highway occupancy permit and approval will be included as Attachment 11.3.a.6 prior to the coal refuse permit approval.

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number:
Coal Disposal Areas No. 3 and No 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By	Telephone Number:	Date:	Sheet 1of 5
JMB		January 2002	
Channel Cross-section Type:			
Type A Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Top Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft /sec.)	cfs	(ft.)	(ft.)	cfs
A-1	12.55	100	4.70	70	24	2.0	0.5	Veg./Syn.	0.06	0	3/3	8.09	1.64	9.85	2.97	40.58	2.5	15	73.58
	12.55	2	4.70	91	27	2.0	0.5	Veg./Syn.	0.06	0	3/3	8.84	1.72	10.30	3.05	40.58	2.5	15	73.58
A-2	6.26					2.0		Veg./Syn.											
A-3	5.33					2.0		Veg./Syn.											
A-4	1.84					2.0		Veg./Syn.											
A-5	3.76					2.0		Veg./Syn.											
A-6	5.57					2.0		Veg./Syn.											
A-7	5.07					2.0		Veg./Syn.											
A-8	3.11					2.0		Veg./Syn.											
A-9	1.72					2.0		Veg./Syn.											
A-10	1.31					2.0		Veg./Syn.											
A-11	2.27					2.0		Veg./Syn.											
A-12	5.89					2.0		Veg./Syn.											
A-13	6.86					2.0		Veg./Syn.											
A-14	7.87					2.0		Veg./Syn.											
A-15	8.33					2.0		Veg./Syn.											
A-16	1.34					2.0		Veg./Syn.											
A-17	2.93					2.0		Veg./Syn.											
A-18	4.65					2.0		Veg./Syn.											
A-19	8.01					2.0		Veg./Syn.											
A-20	6.53					2.0		Veg./Syn.											
A-21	8.00					2.0		Veg./Syn.											
A-22	4.53					2.0		Veg./Syn.											
A-23	2.34					2.0		Veg./Syn.											
A-24	1.50					2.0		Veg./Syn.											
A-25	0.59					2.0		Veg./Syn.											
A-26	12.97	100	1.86	70	25.0	1.0	0.50	Veg./Syn.	0.06	0	3/3	10.82	1.90	11.40	2.31	28.69	2.5	15	52.03
	12.97	2	1.86	91	20.0	1.0	0.50	Veg./Syn.	0.06	0	3/3	9.15	1.75	10.48	2.18	28.69	2.5	15	52.03
A-27	2.30					1.0		Veg./Syn.											
A-28	12.84					1.0		Veg./Syn.											
A-29	6.56					1.0		Veg./Syn.											
A-30	4.25					1.0		Veg./Syn.											
A-31	7.63					1.0		Veg./Syn.											

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number
Coal Disposal Areas No 3 and No. 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By: JMB	Telephone Number:	Date: January 2002	Sheet 2 of 5
Channel Cross-section Type: Type B Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Top Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq ft)	(ft.)	(ft)	(ft./sec)	cfs	(ft.)	(ft.)	cfs
B-1	58.22	100	1.20	70	79	1.0	0.5	Veg./Syn.	0.06	4	3/3	25.82	2.34	18.05	3.06	91.27	3	22	137.45
	58.22	2	1.20	91	82	1.0	0.5	Veg./Syn.	0.06	4	3/3	26.55	2.38	18.29	3.09	91.27	3	22	137.45
B-2	19.79					1.0		Veg./Syn.											
B-3	32.52					1.0		Veg./Syn.											
B-4	29.83					1.0		Veg./Syn.											
B-5	47.79					1.0		Veg./Syn.											
B-6	23.93					1.0		Veg./Syn.											
B-7	35.24					1.0		Veg./Syn.											
B-8	27.65					1.0		Veg./Syn.											
B-9	38.49					1.0		Veg./Syn.											
B-10	20.62					1.0		Veg./Syn.											
B-11	56.38					1.0		Veg./Syn.											

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number
Coal Disposal Areas No. 3 and No. 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By: JMB	Telephone Number	Date: January 2002	Sheet 3 of 5
Channel Cross-section Type: Type C Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Top Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft)	(ft.)	cfs
C-1	27.14	100	3.73	70	52	5.0	0.5	Filter Pnt.	0.03	0	2/2	5.67	1.68	6.74	9.17	82.26	2.5	10	149.14
	27.14	2	3.73	91	73	5.0	0.5	Filter Pnt.	0.03	0	2/2	7.31	1.91	7.65	9.98	82.26	2.5	10	149.14
C-2	7.8					5.0		Filter Pnt.											
C-3	14.16					5.77		Filter Pnt.											
C-4	9.74					7.35		Filter Pnt.											
C-5	22.84					9.18-39.5		Filter Pnt.											
C-6	4.52					5.0		Filter Pnt.											
C-7	9.64					5.0		Filter Pnt.											
C-8	11.31					9.0-38.0		Filter Pnt.											

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number:
Coal Disposal Areas No. 3 and No. 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By: JMB	Telephone Number	Date January 2002	Sheet 4 of 5
Channel Cross-section Type Type D Channel (See Sheet 35)			

Channel I D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Top Channel Width	Q Available
	acres	(yrs)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft)	cfs
D-1	146.2	100	4.97	70	197	11.0-39.0	1.0	Filter Pnt.	0.03	3	2.5/2.5	11.99	1.67	11.36	26.19	290.51	3	18	720.97
	146.2	2	4.97	91	263	11.0-39.0	1.0	Filter Pnt.	0.03	3	2.5/2.5	14.86	1.91	12.55	28.27	290.51	3	18	720.97
D-2	99.13					8.38-36.0		Filter Pnt.											
D-3	64.03					3.62-29.9		Filter Pnt.											
D-4	74.12					8.65 - 21.1		Filter Pnt.											
D-5	42.21					5.39 - 34.2		Filter Pnt.											
D-6	116.33					23.1		Filter Pnt.											
D-7	51.48					11.6		Filter Pnt.											
D-8	1.21					11.6		Filter Pnt.											

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title	Site:	Company:	Permit Number:
Coal Disposal Areas No. 3 and No. 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By: JMB	Telephone Number.	Date: January 2002	Sheet 5 of 5
Channel Cross-section Type: Type E Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard: Channel Depth	With Freeboard: Top Channel Width	With Freeboard: Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
E1	0.18					2.1-40.0		Filter Pnt.											
E2	0.97					2.0-15.0		Filter Pnt.											
E3	1.23					5.0-28.3		Filter Pnt.											
E4	2.41	100	10.9	70	8.0	2.0-31.9	0.5	Filter Pnt.	0.03	0	2/2	1.96	0.99	3.96	11.50	8.19	1.5	6.0	24.16
	2.41	2	10.9	91	6.0	2.0-31.9	0.5	Filter Pnt.	0.03	0	2/2	1.58	0.89	3.56	10.71	8.19	1.5	6.0	24.16
E5	0.75					2.0-35.0		Filter Pnt.											

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title	Site:	Company	Permit Number
Temporary Saddle Dam A Channels	Bailey Central Mine Complex, Coal Disposal Areas 3 & 4	CONSOL	
Prepared By:	Telephone Number:	Date:	Sheet ___ of ___
Greg Heilman, P E.	412-269-6096	Janaury 23, 2002	
Channel Cross-section Type:			

Channel I D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec)	cfs	(ft.)	(ft.)	cfs
T-28	18	10		85	45	2	0.5	Vegetation & Synthetic Mat	0.06	0	2	12.1	2.5	9.8	3.7	47.2	3.0	12.0	76.7
T-29	18.0	10		85	45	20	0.6	Grouted R-4 Riprap	0.045	0	2	4.1	1.4	5.7	11.0	50.9	2.0	8.0	109.7
T-30	62.2	10		75	95	4.0	0.6	R-4 Riprap	0.045	0	2	12.0	2.4	9.8	7.9	100.0	3.0	12.0	162.7
T-31	7.2	10		88	30	25	0.8	Grouted R-4 Riprap	0.045	0	2	2.8	1.2	4.7	10.8	56.9	2.0	8.0	122.6
T-32	19.0	10		75	35	4	0.4	R-3 Riprap	0.035	0	2	5.1	1.6	6.4	6.8	35.0	2.0	8.0	63.1

Notes:
The 10-year design storm is used for temporary collection channels in accordance with Section 2.9.1(2) of the Engineering Manual for Mining Operations.

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number
Temporary Coarse Refuse Channels	Bailey Central Mine Complex, Coal Disposal Areas 3 & 4	CONSOL	
Prepared By:	Telephone Number	Date:	Sheet . . of ___
Greg Heitman, P E.	412-269-6096	Janaury 15, 2002	
Channel Cross-section Type:			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft)	cfs
T-24	13.5	10		80	35	5	0.8	Grouted R-4 Riprap	0.045	0	2	5.7	1.7	6.7	6.1	54 8	2.5	10.0	99.4
"	"	"		"	"	35	1.4	Grouted R-4 Riprap	0.045	0	2	2.8	1.1	4 7	12.7	145 1	2.5	10.0	263.1
T-25	100.7	10		88	285	7	0.5	Fabricform	0.03	0	2.5	17.9	3.0	12.0	15.9	287 0	3.5	14.0	432.9
"	"	"		"	"	35	1.3	Fabricform	0.03	0	2.5	9.8	2.2	8.8	29.1	641 6	3 5	14.0	967.9
T-26	129.0	10		82	290	1.5	1.7	R-4 Riprap	0.035	3	2.5	37.7	3.3	19.6	7.7	590 2	5.0	28 0	760.0
T-27	71.0	10		84	175	1	0.7	Coarse Coal Refuse	0.03	0	2/3	26.8	3.3	16.4	6.5	209 3	4.0	20.0	298.9

Notes:
The 10-year design storm is used for temporary collection channels in accordance with Section 2.9.1(2) of the Engineering Manual for Mining Operations.
Channel T27 is located along the liner and coarse refuse interface. This channel moves continuously as the coarse refuse is being disposed and flows towards Channel T25 or Channel D2.

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title: Temporary Slurry Impoundment Channels	Site: Bailey Central Mine Complex, Coal Disposal Areas 3 & 4	Company: CONSOL	Permit Number
Prepared By: Greg Hellman, P.E.	Telephone Number: 412-269-6096	Date: Janaury 15, 2002	Sheet __ of ___
Channel Cross-section Type:			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
T-12	4 1	10		84	15	5	0.8	Grouted R-4 Riprap	0.045	0	2	3.0	1.2	4.9	5.0	25.5	2.0	8.0	54.8
"	"	"		"	"	35	1.2	Grouted R-4 Riprap	0.045	0	2	1.5	0.8	3.4	10.3	67.4	2.0	8.0	145.1
T-13	18.0	10		91	70	5	1.3	Grouted R-4 Riprap	0.045	0	2	9.6	2.2	8.8	7.3	161.7	3.5	24.5	243.9
"	"	"		"	"	10	1.6	Grouted R-4 Riprap	0.045	0	2	7.4	1.9	7.7	9.4	228.6	3.5	24.5	344.9
T-14	30.6	10		88	105	5	1.4	Grouted R-4 Riprap	0.045	0	2	13.0	2.6	10.2	8.1	243.9	4.0	14.0	348.2
"	"	"		"	"	20	2.0	Grouted R-4 Riprap	0.045	0	2	7.7	2.0	7.9	13.6	487.7	4.0	14.0	487.8
T-15	13.0	10		88	45	5	1.1	Grouted R-4 Riprap	0.045	0	2	6.9	1.9	7.4	6.5	99.4	3.0	10.0	161.7
"	"	"		"	"	35	1.7	Grouted R-4 Riprap	0.045	0	2	3.3	1.3	5.2	13.5	263.1	3.0	10.0	427.8
T-16	19.3	10		84	70	5	1.3	Grouted R-4 Riprap	0.045	0	2	9.6	2.2	8.8	7.3	161.7	3.5	14.0	243.9
"	"	"		"	"	35	2.0	Grouted R-4 Riprap	0.045	0	2	4.6	1.5	6.1	15.1	427.8	3.5	14.0	645.2
T-17	2.1	10		84	10	5	1.0	R-3 Riprap	0.035	0	2	1.8	1.0	3.8	5.4	32.7	2.0	8.0	70.5
T-18	29.0	10		84	90	1.5	0.9	R-3 Riprap	0.035	3	2	15.2	2.1	11.4	5.9	130.8	3.0	15.0	195.6
T-19	11.8	10		80	30	30	0.9	Grouted R-4 Riprap	0.045	0	2	2.6	1.1	4.6	11.5	62.4	2.0	8.0	134.3
T-20	8.9	10		75	20	5	0.5	Vegetation & Synthetic Mat	0.06	0	2	4.7	1.5	6.1	4.3	20.0	2.0	8.0	41.1
T-21	6.2	10		84	25	5	0.6	R-3 Riprap	0.035	0	2	3.7	1.4	5.4	6.8	32.7	2.0	8.0	70.5
T-22	3.3	10		84	15	5	0.9	R-3 Riprap	0.035	0	2	2.5	1.1	4.5	6.0	32.7	2.0	8.0	70.5
T-44	54.0	10		80	115	4	1.2	Grouted R-4 Riprap	0.045	0	2	15.2	2.8	11.0	7.6	218.1	4.0	16.0	311.4

Notes:
The 10-year design storm is used for temporary collection channels in accordance with Section 2.9.1(2) of the Engineering Manual for Mining Operations.

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title: Temporary Haul Road Channels	Site: Bailey Central Mine Complex, Coal Disposal Areas 3 & 4	Company: CONSOL	Permit Number.
Prepared By: Greg Hellman, P.E.	Telephone Number: 412-269-6096	Date: Janaury 14, 2002	Sheet ___ of ___
Channel Cross-section Type:			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
T-10	50.5	10		72	75	2.0	0.5	Veg/Syn Mat	0.06	0	2	17.7	3.0	11.9	4.2	76.7	3.5	14	115 7
T-23	25.8	10		75	55	25	0.5	Grouted R-4 Riprap	0.045	2	2	4.4	1.5	5.9	12.5	55.0	2.0	8	122 6
HR-Type A	43.0	10		72	65	5.0	0.65	R-4 Riprap	0.045	0	2	8.6	2.1	8.3	7.5	80.4	2.75	11	137 4
HR-Type B	5.5	10		80	17	5.0	0.8	R-3 Riprap	0.04	0	2	3.0	1.2	4.9	5.6	28.6	2.0	8	61 7
HR-Type B	"	"		"	"	8.0	0.9	"	"	"	"	2.6	1.1	4.5	6.7	36.2	2.0	8	78.0

Notes:
HR Type A Channels are used for Haul Roads 13, 17, 18, and 19. Calculations are based on Haul Road 18 which is the worst case.
HR Type B Channels are used for all other Haul Roads constructed during initial site preparation. Calculations are based on Haul Road 16 which is the worst case.
The 10-year design storm is used for haul road channels in accordance with PADEP Subchapter D, Section 90.134.

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number:
Sed Pond and Initial Site Prep Temporary Channels	Bailey Central Mine Complex, Coal Disposal Areas 3 & 4	CONSOL	
Prepared By:	Telephone Number:	Date:	Sheet ___ of ___
Greg Heilman, P.E.	412-269-6096	January 14, 2002	
Channel Cross-section Type:			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
T-1	14.5	2		70	10	20	0.7	Grouted R-3 Riprap	0.04	0	2	1.2	0.8	3.1	8.2	19.4	1.5	6	57.3
T-2	14.5	2		70	10	2	0.6	Veg/Curled Wood	0.06	0	2	3.9	1.4	5.6	2.6	12.1	2.0	8	26.0
T-3	8.7	100		70	25	2	0.5	Veg/Curled Wood	0.06	0	2	7.8	2	7.9	3.2	26.0	2.5	10	47.2
T-4	442	2		70	160	1	0.7	Veg/Syn Mat	0.06	3	2	40.4	3.8	18.2	4.0	179.1	4.5	21	235.4
T-5	281	2		70	100	2	0.9	Veg/Syn Mat	0.06	3	2	22.0	2.6	13.6	4.5	131.8	3.5	17	186.5
T-6	149	2		70	70	2	0.9	Veg/Syn Mat	0.06	3	2	14.5	2.1	11.2	4.8	85.9	3.0	15	161.4
T-7	12.0	2		70	10	1	0.9	Veg/Curled Wood	0.06	0	2	5.1	1.6	6.4	2.0	18.4	2.5	10	33.4
T-8	52.0	2		70	25	2	0.5	Veg/Syn Mat	0.06	0	2	7.8	2.0	7.9	3.2	26.0	2.5	10	47.2
T-9	11.6	2		70	10	2	0.6	Veg/Curled Wood	0.06	0	2	3.9	1.4	5.6	2.6	12.1	2.0	8	26.0
T-11	21.5	2		70	12	30	0.7	Grouted R-4 Riprap	0.05	0	2	1.4	0.8	3.4	8.5	19 0	1.5	6	56.1

Notes :
The 100-year design storm was used for Channel T-3 since this channel diverts runon away from the sedimentation pond, which has a 100 year design storm.

ATTACHMENT 11.3.a.6
HIGHWAY OCCUPANCY PERMIT

M-950A (10/93)
Central Permit Office

APPLICATION FOR MINIMUM USE DRIVEWAY

A Minimum Use Driveway is a Residential or Other Driveway Which is Expected to Be Used By Not More Than 25 Vehicles Per Day (i.e. 50 A.D.T.)

READ INSTRUCTIONS ON REVERSE

APPL. NO. 000537

Applicant / Property Owner		
Consol Pennsylvania Coal Company		
Address		
1800 Washington Road		
Post Office		Zip Code
Pittsburgh, PA		15241
Phone	Fee	Check No.
412-831-4000	$25.00	1642464

LOCATION OF PROPOSED DRIVEWAY

County: Greene

Township/Boro: Richhill

Route No.: SR 4009

Name of Nearest Intersection: SR 4013 & SR 4009

Distance to Nearest Intersection in Feet: 3100

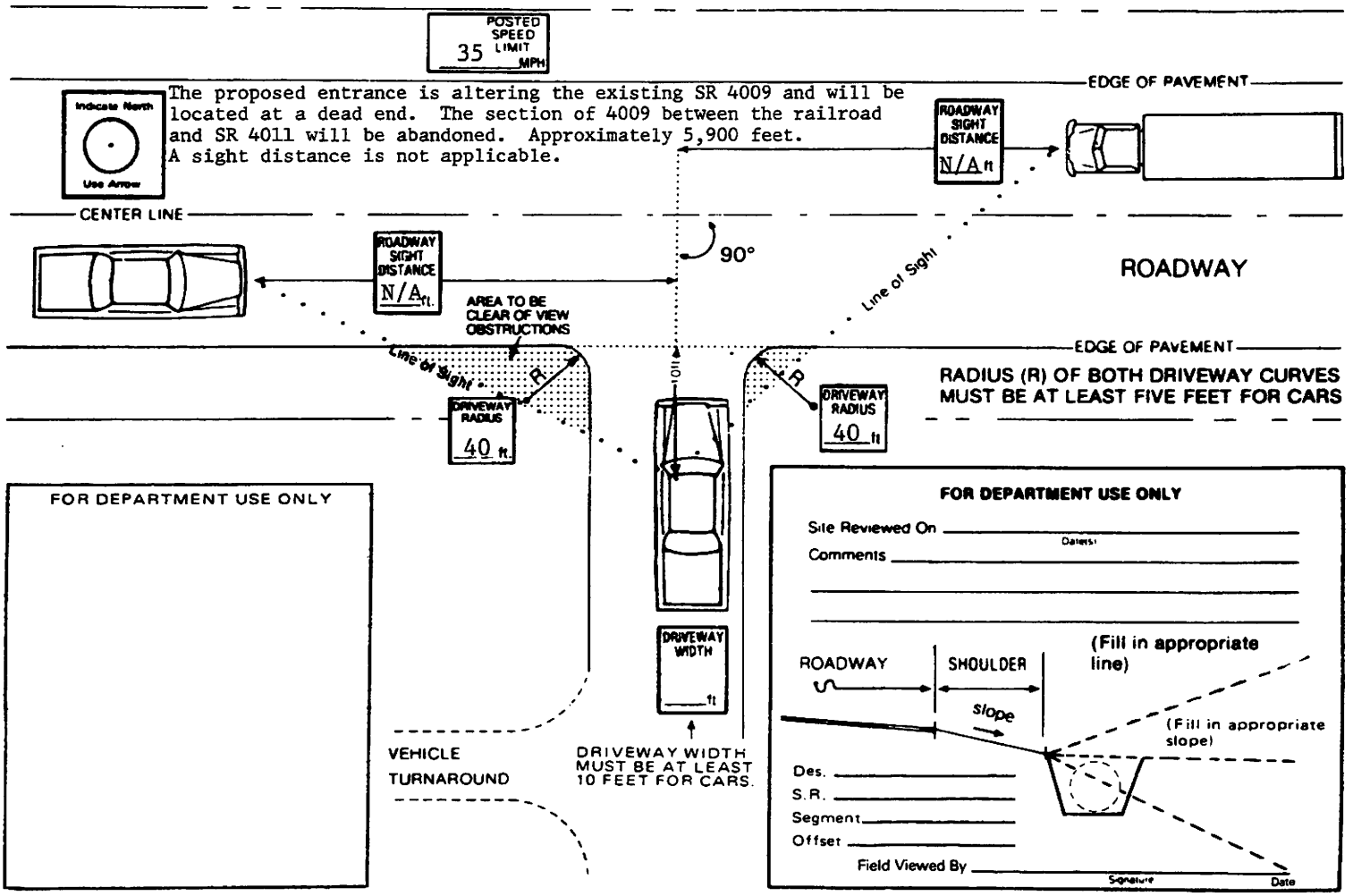
For the purpose of measuring sight distance, the drivers' eye height shall be 3.50 feet above the proposed access surface and highway pavement surface and the vehicles' height shall be 4.25 feet above the proposed access surface and highway pavement surface.

APPLICATION IS MADE TO

☐ CONSTRUCT A NEW DRIVEWAY ☒ ALTER AN EXISTING DRIVEWAY (SR 4009)

DATE WORK SCHEDULED TO BEGIN 2004

DATE WORK SCHEDULED TO BE COMPLETED 2004



Under and subject to all the conditions, restrictions and regulations prescribed by the Pennsylvania Department of Transportation and on the issued Permit, Form M-945P.

The applicant certifies that all statements contained herein are true and correct.

By X [signature] March 22, 2002

SIGNATURE(S) DATE

HAVE YOU READ INSTRUCTIONS ON REVERSE?
HAVE YOU COMPLETED ALL BLANKS?

Module 12: Treatment Systems

Note: 25 Pa. Code §91.23 requires that all plans, reports, and specifications for treatment facilities be prepared by a licensed professional engineer and bear an imprint or legible facsimile of his/her seal. (At least one copy must bear an original seal and signature).

12.1 Discharges.

Complete the attached Form 12.1A - NPDES Information, identifying and describing all proposed discharges to surface waters, which are associated with this operation. The completed form must be certified correct by a person of appropriate title as specified on the form.

See Form 12.1A at the end of this module for NPDES information.

12.2 Waste Streams.

Describe the anticipated volume and quality of water that will be generated by the following sources (address flow rate, flow duration, and periodic increments, as appropriate):

a) drainage from underground workings, include basis for estimate;

Not applicable. No drainage from underground workings will take place as part of this permit application.

b) runoff which will come into contact with coal or other pollutional materials at surface mining activity sites.

Runoff from exposed coarse coal refuse will be collected in perimeter ditches and conveyed to a sedimentation pond before being discharged. Refer to Module 13 for runoff quantity and quality.

The slurry impoundment (Coal Refuse Disposal Area No. 3) will be equipped with a decant pipe for draining excess pond supernatant. However, the decant pipe is not expected to be activated because pond supernatant will be recycled back to the preparation plant for use as make-up water.

c) drainage from underdrains at coal refuse disposal sites.

A system of rock and spring drains will intercept and carry stream/spring flow below the facility liner. A stream flow rate of 23.5 GPM was measured at a point below the disposal facility on November 10, 2001 when flows were not affected by surface runoff.

Internal drains installed within the coarse coal refuse embankments will outlet to perimeter ditches that will discharge into the sedimentation pond. Refer to Appendix G of the Module 21 Design Report for seepage and drain capacity calculations. The quality of this drainage is expected to be similar to that exhibited by flow from embankment internal drains present at the existing Bailey disposal facility.

12.3 Systems Overview.

Describe all treatment systems that will be used to handle mine drainage and other waters requiring treatment prior to discharge. Include design capacity of each system and the projected effluent quality.

No treatment other than sedimentation is proposed. Refer to Module 13 for pond capacity information. Discharge will be in accordance with NPDES criteria. Effluent water quality is expected to be similar to that exhibited by discharge from the existing Bailey disposal facility sedimentation pond.

12.4 Flow Diagrams.

a) Provide a flow diagram for each system described in the preceding section describing sources, flow patterns, flow volumes, and key system components.

Drawings showing the sedimentation pond layout, including channels/drains discharging to the pond, are presented as Sheets 27, 28 and 29 of Exhibit 21.1. Pond details are presented on Sheet 30 of Exhibit 21.1. Channel and pond flow capacities are presented in Module 11 and 13, respectively.

b) For sites where coal preparation, coal refuse disposal, and mine drainage treatment will take place, provide a copy of the Operations Map (Exhibit 9.1) with the following information added or highlighted. Label the map Exhibit 13.4 - Water Handling Plan.

1) The exact location of each outfall.

There is one outfall proposed with this permit application and it is NPDES 301. Refer to the Module 6.1 Location Map for the exact location.

2) Sources of flow to each outfall, (color coded so that all sources contributing to an individual outfall can be identified).

The sources of flow to the outfall are two internal drains, two rock drains, decant pipe and surface water collection channels. Refer to Sheets 3 and 4 of Exhibit 21.1, Construction Drawings.

3) The direction of flow in each collector pipe or channel.

As indicated on Sheets 3 and 4 of Exhibit 21.1, Construction Drawings.

4) Surface water monitoring points.

Refer to Module 6.2, Environmental Resource Map and Module 9.1, Operations Map for the proposed surface water monitoring points.

5) Other mining-related discharges that enter the receiving stream within the mapped area.

Not applicable.

12.5 Chemical Feed Systems.

Describe the equipment that will be used to feed and mix treatment chemicals.

Not applicable. Chemical feed systems are not proposed.

12.6 Settling/Treatment Facilities.

Describe tanks, ponds and other containment facilities that will be used in the treatment process, including their respective volumes, construction, and detention capacities.

Refer to Module 13 and Exhibit 21.1 for sedimentation pond design information.

12.7 Sludge Disposal.

Describe the anticipated volume of sludge that will be generated by each treatment system and the frequency of sludge removal operations. Describe the means of sludge disposal and the disposal site.

Sedimentation pond clean-out is discussed under Module 13.

NPDES No. PA _____
(for Department Use Only

FORM 12.1A NPDES Information

Identify each point of discharge, the receiving stream and the corresponding latitude and longitude.
If none, enter NONE in Column 1.

Discharge Point (001,002, etc.)	Surface Elev.	Source of Discharge (i.e., mine drainage, ring water, surface runoff*, etc.)	Describe Treatment or Other Control Technology Provided	Is Discharge Existing or Proposed?	Description of Discharge		Name of Receiving Stream	Latitude	Longitude
					Average Rate (mgd)	Frequency			
301	1127	Surface runoff	None	proposed	1.4 mgd	daily	Unnamed tributary to Enlow Fork	39°57'32"	80°22'33"

*If discharge is storm induced runoff indicate site drainage area in acres.

The information on the NPDES form must be certified correct by one of the following, as applicable.

a) In the case of corporations, by a principal executive officer of at least the level of vice president, or his duly authorized representative, if such representative is responsible for the overall operation of the facility from which the discharge described in the NPDES form originates.

b) In the case of a partnership, by a general partner.

c) In the case of a sole proprietorship, by the proprietor.

d) In the case of a municipal, state, or other public facility, by either a principal executive officer, ranking elected official, or other duly authorized employee.

I certify that I am familiar with the information contained in the above table, and that to the best of my knowledge and belief such information is true, complete, and accurate.

Dan R. Baker
Printed Name of Person Signing

President
Title

March 22, 2002
Date

Signature

18 U.S. C. Section 1001 provides that:

Whoever, in any matter within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact, or makes or uses any false, fictitious, or fraudulent statements or representations; or makes or uses any false writing or document knowing same to contain any false, fictitious, or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than 5 years, or both.

Module 13: Impoundments

Provide the following information for each impoundment that will be used in operations under this permit. Organize the information by site and facility.

13.1 General.

a) Identify the impoundment so that it can be keyed to Exhibit 9.1.

One sedimentation pond (with two chambers) and one coal refuse slurry impoundment (Coal Refuse Disposal Area No. 3) are proposed with this application. Refer to the Exhibit 9.1, Operation Maps for the impoundment locations and Construction Drawings appended to the Module 21 Design Report.

b) Describe the function of the impoundment.

Slurry Impoundment. *The slurry impoundment will be used for disposal of coal refuse generated by the Bailey Central Mine Complex. Coarse coal refuse will be placed in embankments constructed across the valley to form an impoundment. Fine coal refuse will be pumped into the impoundment area by water slurry techniques. Water levels within the impoundment will be controlled by a decant pipe that will discharge into the proposed sedimentation pond in conjunction with a pumping system which will recycle pond supernatant to the preparation plant on an as needed basis.*

Sedimentation Pond. *The sedimentation pond will receive discharge from the slurry pond and also will be used for site sedimentation control during each phase of facility development.*

c) Attach site-specific cross sections of the impoundment showing: the principal spillway, dewatering pipe, depth of water, crest of emergency spillway, maximum height of embankment, and existing ground. Label the cross-section Exhibit 13.1 – Impoundment Cross-Section.

Refer to Construction Drawings appended to the Module 21 Design Report for cross sections of the impoundments. As indicated on those documents, the slurry impoundment design does not include an emergency spillway.

d) Describe the potential effect of mine subsidence on the impoundment structure.

The slurry impoundment is located directly over underground workings of the Bailey Mine. There are approximately 700 or more feet of cover between the underground workings and the proposed slurry impoundment. Refer to Section 4.9.6 of the Module 21 Design Report for a discussion of potential mine subsidence impacts.

The sedimentation pond location is not underlain by mine workings.

e) If detailed design plans are not included with the initial submittal of this application, indicate when they will be provided. (Note that design plans must be approved by the Department before construction of the structure begins.)

Not applicable. Detailed design plans are included with this submittal. Refer to the Module 21 Design Report and Construction Drawings.

13.2 Detailed Design Plan.

Include a design report, construction plans, construction specifications and Form 13.2A. If the embankment is more than 20 feet in height as measured from the upstream toe of the embankment to the crest of the emergency spillway, or has a storage volume of 20 acre feet or more provide a stability analysis. Plans must be certified by either a qualified registered professional engineer or land surveyor (except in the case of large impoundments (see §89.111), impoundments on coal refuse disposal sites, and impoundments which will be left as part of the postmining land use, where plans must be certified by a qualified registered professional engineer).

Refer to the Module 21 Design Report, Construction Drawings, and Technical Specifications. Also refer to Form 13.2A at the end of this module.

13.3 Compliance with 25 Pa Code Chapter 105.

Indicate whether or not the impoundment meets the criteria for coverage under Chapter 105 -contributory drainage area exceeding 100 acres, water depth exceeding 15 feet (measured by the upstream toe of the dam at maximum storage elevation), or impounding capacity exceeding 50 acre-feet at maximum storage elevation. Applications for Chapter 105 dams are subject to additional application fees (see module 1, section E).

Both impoundments meet the criteria for coverage under Chapter 105. Permit applications for the slurry impoundment Main Dam and Saddle Dams A, B, C, & D and for the sedimentation pond dam have been submitted to PADEP Bureau of Waterways Engineering.

13.4 Groundwater Protection.

a) Describe the quality of water that will be contained in the impoundment.

Slurry Impoundment. *The quality of the slurry pond supernatant is expected to be similar to that of Coal Refuse Disposal Area No. 1, the existing slurry impoundment. An evaluation of the discharges from the existing Coal Refuse Disposal Area No. 1 is discussed in Section 8.1g of Module 8 included as part of this submittal.*

Sedimentation Pond. *During site preparation/development and final stages of disposal area reclamation after soil cover has been placed, the quality of water that will enter the sedimentation pond will consist primarily of stormwater runoff from non-coal refuse areas. During these periods, water quality may contain high levels of sediment until the facility is stabilized with vegetation. During disposal facility operation, runoff from coarse coal refuse and possibly discharge from the slurry pond decant pipe will enter the sedimentation pond. The quality of water in the sedimentation pond during site operation is expected to be similar to that of the existing Bailey disposal facility sedimentation pond. Water quality data for the existing Bailey sedimentation pond are included with NPDES reports on file with PADEP.*

b) Where impounded water has the potential to cause groundwater contamination or to aggravate an existing groundwater problem:

1) describe the type and thickness of materials that will be used to line the bottom and sides of the impoundment;

A two foot thick soil liner exhibiting a maximum permeability of 5 x 10^{-5} cm/sec will be installed as described in Module 14 of this application.

2) show the liner on the cross section drawings in 13.1 and construction drawings in 13.2;

Refer to Construction Drawings appended to the Module 21 Design Report.

3) complete Module 14.

Refer to Module 14 submitted with this application.

13.5 Operation and Maintenance Requirements.

Describe the operation and maintenance requirements for the structure, including:

a) scope and frequency of inspections;

Inspections will be performed as outlined in the Operations and Maintenance Manual appended to the Module 21 Design Report.

b) dewatering of runoff collection ponds following storm events;

The slurry impoundment has been designed to store runoff from the PMF event. Its design includes a decant pipe but Consol plans to pump water from this pond back to the preparation plant for use as process water. Therefore, the slurry impoundment is not expected to discharge.

The sedimentation pond will be equipped with a perforated outlet structure that has been designed to control pond water levels and dewater the pond after storm events. Fifteen rows of thirty four 1-inch in diameter perforations will be located on the riser pipe at El. 1141.5 through El. 1155.5. The lowest row of perforations is located 1.5 feet above the maximum sediment storage level. The maximum dewatering time to the sediment

storage level, assuming the maximum level of water to rise to the emergency spillway crest, is 6.0 days. This dewatering time meets the Department's standard that states dewatering must occur between 2 and 7 days.

c) sludge removal operations;

Accumulations of silt and precipitates will be removed from the sedimentation pond by backhoe or other suitable equipment when the sediment storage level increases above El. 1140.0 or 6.0 feet.

d) maintenance of embankments and liners.

Refer to the Operations and Maintenance Manual appended to the Module 21 Design Report.

e) monitoring

Monitoring of the impoundments effluent will take place at the NPDES discharge point proposed with this application and in accordance with NPDES criteria.

13.6 Removal.

Indicate whether or not the impoundment will be removed during reclamation and, if so, provide a timetable and plans for reclamation of the area.

The sedimentation pond will control sedimentation from areas of final cover placement. This pond will remain as part of the postmining land use until such time that the rock drains discharging to it meet effluent limitations. The five dams constructed to form the slurry impoundment also will remain as part of the postmining land use, but they will not function as dams. The slurry impoundment will be dewatered and covered at the end of its disposal life (estimated to be approximately 15 years) as part of site reclamation.

5500-PM-MR0324 Rev. 4/2001

FORM 13.2A: Impoundment Design and Certification

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Mining and Reclamation

Permittee Consol Pennsylvania Coal Company
Permit No. _____
Pond Coal Refuse Disposal Area No. 3
Township Richhill
County Greene
Engineer/Land Surveyor Michele Stewart – Michael Baker
Date _____

INSTRUCTIONS

Complete first page and submit with permit application. Use both pages to certify completed impoundment.

Sedimentation ponds and other impoundments must be constructed in accordance with the approved permit before any disturbance of the area to be drained into the pond. Impoundment must be inspected during construction under the supervision of, and certified to the Department upon completion of construction by a registered professional engineer or land surveyor.

Any enlargement, reduction in size, reconstruction, or other modification, that may affect the stability or operation must be approved by the Department. Pond must be certified and approved prior to the start of any other mining activities (see reference sheet – page 13 - 4 of this module).

Unless otherwise specified in your permit, use this form for the sedimentation pond and other impoundment certification. Submit 1 original and 2 copies to the appropriate District Mining Office. All information must be provided, otherwise it will be returned for completion.

U.S.G.S. Quadrangle: _____ Location (point of discharge): Latitude _____; Longitude _____ or
Location from ***Bottom Right*** corner of U.S.G.S. Quadrangle: Wind Ridge inches North;15.3 inches West 1.2
HYDROLOGY: Drainage Area 219 acres Design Storm 100 year, PMP, PMP Average Watershed Slope 0.5%
Land Use Reservoir Soil Type Dormont (type C) Curve Number 97 Peak Discharge 3252 cfs

		Permit Application	***As Constructed***
Embankment	Top Width (Minimum)	50 ft	
	Outside Slope (Maximum) (_H: _ V)	2.5H:1V	
	Inside Slope (Maximum)	3.0H:1V	
	Top Elevation	1495.0	
	Bottom Elevation	1200	
	Upstream Toe Elevation	1200	
	Downstream Toe Elevation	1165	
	Amount Allowed for Settlement	0.4 ft	
	Type of Cover	Vegetation	
	Incised Slope (if any)	N/A	
	Inside Slope (Maximum) (_H: _V)	N/A	
	Top Elevation	N/A	
	Bottom Elevation	N/A	
Principal Spillway	Type	None	
	Conduit Diameter (if barrel/riser give both)	N/A	
	Inlet Elevation	N/A	
	Outlet Protection	N/A	
	Spillway Capacity	N/A	
Dewatering Device	Type/Size	22 in HDPE (18.5 in ID)	
	Inlet Elevation	1484.0 (highest inlet)	
	Discharge Regulation (ie., self draining or valved)	Self Draining	
	Discharge Capacity (cubic feet/second)	22.2 cfs	
	Time to Dewater Full Pond	63 days	
Emergency Spillway	Type	None	
	Width	N/A	
	Depth (with 2 feet of freeboard)	N/A	
	Length	N/A	
	Sideslopes	N/A	
	Crest Elevation	N/A	
	Slope	N/A	
	Type of Lining/Protection	N/A	
	Spillway Capacity (provide design calculations)	N/A	
Storage Capacity	Length @ Bottom	1700 ft	
	Width @ Bottom	150 ft	
	Length @ Crest of Emergency Spillway	3250 ft. (@ Elev 1484)	
	Width @ Crest of Emergency Spillway	2500 ft (@ Elev 1484)	
	Volume @ Crest of Emergency Spillway	20794 ac ft (@ Elev 1484)	
	Length @ Crest of Principal Spillway	N/A	
	Width @ Crest of Principal Spillway	N/A	
	Volume @ Crest of Principal Spillway	N/A	

5500-PM-MR0324 Rev. 4/2001

Permittee _____
Permit No. _____
Pond Coal Ref Disp Area No. 3
Twp./County _____
Engineer _____
Date _____

TO BE COMPLETED AFTER CONSTRUCTION

1. Has the facility been constructed at the location shown in the approved permit? ☐ Yes ☐ No

2. Is emergency spillway constructed in original ground? ☐ Yes ☐ No
   And is the type of construction adequate for the required duration and discharge of the design storm? ☐ Yes ☐ No
   If "no" checked, explain.

3. Are the collection channels inlets constructed at the proper locations and located to prevent short-circuiting? ☐ Yes ☐ No

4. Has the pond liner been constructed as outlined in Module 14? (provide liner testing documentation) ☐ Yes ☐ No ☐ N/A

If not constructed as approved, answer the following questions.

5. Is the "as constructed" design capable of meeting the performance standards? ☐ Yes ☐ No
   If "no" checked, explain.

6. Identify any conditions or deficiencies in the facility that need to be corrected.

Construction Inspection

Date of Inspection	Inspected By	Stage of Construction
_____	_____	_____
_____	_____	_____
_____	_____	_____

Supervising Professional Engineer _____

Address _____

_____

Telephone Number _____

I certify that the above-mentioned structure is complete and has been constructed as indicated.

_____
Signature of Professional Engineer/Surveyor Date

SEAL

_____
Registration Number and Expiration Date

_____ _____
Signature of Permittee or Responsible Official Date Title

5500-PM-MR0324 Rev. 4/2001

FORM 13.2A: Impoundment Design and Certification

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Mining and Reclamation

Permittee Consol Pennsylvania Coal Company
Permit No. _____
Pond Sedimentation Pond
Township Richhill
County Greene
Engineer/Land Surveyor Michele Stewart – Michael Baker
Date _____

INSTRUCTIONS

Complete first page and submit with permit application. Use both pages to certify completed impoundment.

Sedimentation ponds and other impoundments must be constructed in accordance with the approved permit before any disturbance of the area to be drained into the pond. Impoundment must be inspected during construction under the supervision of, and certified to the Department upon completion of construction by a registered professional engineer or land surveyor.

Any enlargement, reduction in size, reconstruction, or other modification, that may affect the stability or operation must be approved by the Department. Pond must be certified and approved prior to the start of any other mining activities (see reference sheet – page 13 - 4 of this module).

Unless otherwise specified in your permit, use this form for the sedimentation pond and other impoundment certification. Submit 1 original and 2 copies to the appropriate District Mining Office. All information must be provided, otherwise it will be returned for completion.

U.S.G.S. Quadrangle: _____ Location (point of discharge): Latitude _____; Longitude _____ or
Location from ***Bottom Right*** corner of U.S.G.S. Quadrangle: Wind Ridge inches North; 15.3 inches West 0.1
HYDROLOGY: Drainage Area 455 acres Design Storm 100 year Average Watershed Slope 6%
Land Use soil liner/haul roads Soil Type Dormont (type C) Curve Number 80 Peak Discharge 1259

		Permit Application	***As Constructed***
Embankment	Top Width (Minimum)	15	
	Outside Slope (Maximum) (_H: _ V)	2H:1V	
	Inside Slope (Maximum)	3H:1V	
	Top Elevation	1162	
	Bottom Elevation	1134	
	Upstream Toe Elevation	1134	
	Downstream Toe Elevation	1127	
	Amount Allowed for Settlement	9 inches	
	Type of Cover	vegetation	
	Incised Slope (if any)	N/A	
	Inside Slope (Maximum) (_H: _V)	N/A	
	Top Elevation	N/A	
	Bottom Elevation	N/A	
Principal Spillway	Type	Barrel RCP	
	Conduit Diameter (if barrel/riser give both)	Barrel – 48 inches	
	Inlet Elevation	Barrel – 1132	
	Outlet Protection	fabricform	
	Spillway Capacity	229 cfs @ elev. 1160	
Dewatering Device	Type/Size	Riser – 66 inch CMP	
	Inlet Elevation	Riser - 1156	
	Discharge Regulation (ie., self draining or valved)	Self draining - perforated	
	Discharge Capacity (cubic feet/second)	229 cfs @ elev. 1160	
	Time to Dewater Full Pond	6 days	
Emergency Spillway	Type	Trapezoidal channel	
	Width	20 feet	
	Depth (with 2 feet of freeboard)	4.5 feet	
	Length	475 feet	
	Sideslopes	3H:1V	
	Crest Elevation	1157.5	
	Slope	6.5%	
	Type of Lining/Protection	Fabricform	
	Spillway Capacity (provide design calculations)	337 cfs @ elev 1162	
Storage Capacity	Length @ Bottom	410 feet	
	Width @ Bottom	200 feet	
	Length @ Crest of Emergency Spillway	530 feet	
	Width @ Crest of Emergency Spillway	360 feet	
	Volume @ Crest of Emergency Spillway	66.6 ac-ft	
	Length @ Crest of Principal Spillway	520 feet	
	Width @ Crest of Principal Spillway	350 feet	
	Volume @ Crest of Principal Spillway	60.1 ac- ft	

Permittee _____
Permit No. _____
Pond Sedimentation Pond
Twp./County _____
Engineer _____
Date _____

TO BE COMPLETED AFTER CONSTRUCTION

1. Has the facility been constructed at the location shown in the approved permit? ☐ Yes ☐ No

2. Is emergency spillway constructed in original ground? ☐ Yes ☐ No
   And is the type of construction adequate for the required duration and discharge of the design storm? ☐ Yes ☐ No
   If "no" checked, explain.

3. Are the collection channels inlets constructed at the proper locations and located to prevent short-circuiting? ☐ Yes ☐ No

4. Has the pond liner been constructed as outlined in Module 14? (provide liner testing documentation) ☐ Yes ☐ No ☐ N/A

If not constructed as approved, answer the following questions.

5. Is the "as constructed" design capable of meeting the performance standards? ☐ Yes ☐ No
   If "no" checked, explain.

6. Identify any conditions or deficiencies in the facility that need to be corrected.

Construction Inspection

Date of Inspection	Inspected By	Stage of Construction

Supervising Professional Engineer _____

Address _____

_____

Telephone Number _____

I certify that the above-mentioned structure is complete and has been constructed as indicated.

_____
Signature of Professional Engineer/Surveyor Date

SEAL

_____
Registration Number and Expiration Date

_____ _____
Signature of Permittee or Responsible Official Date Title

Module 14: Liners

14.1 Identify the specific structures to be lined:

Structure	Specific Discharge Rate
Coal Refuse Disposal Area No. 3	*Design Permeability = 5 x 10^{-5} cm/sec*
Coal Refuse Disposal Area No. 4	*Design Permeability = 5 x 10^{-5} cm/sec*
Sedimentation Pond	*Design Permeability = 5 x 10^{-5} cm/sec*

Based on performance of the existing adjacent coal refuse slurry impoundment relative to discharge standards, little or no potential exists for these proposed facilities to degrade groundwater or surface water resources (refer to Module 8.1.g). Consequently a waiver from liner requirements outlined in PADEP Document Number 563-2112-656 is requested for Coal Refuse Disposal Area No. 3 (slurry impoundment) and the sedimentation pond. Infiltration from proposed Coal Refuse Disposal Area No. 3 (Slurry Impoundment), Coal Refuse Disposal Area No. 4 (Coarse Coal Refuse Disposal Area) and Sedimentation Pond will be reduced by careful preparation of the on-site soils to form liners having the design permeability specified above.

14.2 Describe the type of liner to be installed (Soil, Synthetic) (refer to technical guidance 563-2112-656 on liners for impoundments and storage areas for requirements regarding admixed liners) at each structure:

A two-foot thick soil liner exhibiting a maximum permeability of 5 x 10^{-5} cm/sec will be installed as described in Section 14.4 of this module. Liner soil material will be obtained from the project site.
The upstream face of Saddle Dams B, C, and D will be lined with 60 mil textured High Density Polyethylene (HDPE) geomembrane as shown on Sheets 3 and 4 of the Module 21.1 drawings to minimize seepage through the dams.

Site boring and test pit data indicate that site soils vary in thickness from 2 to 15.9 feet and consist primarily of clay with varying amounts of rock fragments. Some horizons include cobble and/or boulder size fragments. Soils that have been visually classified as clay or containing a substantial clay fraction are present at most locations. Laboratory classification tests conducted on representative clay/clayey samples corroborate the visual classifications.

Laboratory test data are appended to the facility Design Report presented with Module 21. Unified soil classifications and corresponding fine fractions and plasticity indices determined from the testing also are presented in Attachment 14.2.5 for comparison with the test pit and test boring data.

Clayey site soils will be used for constructing a 2-foot thick soil liner over the slurry impoundment site (Coal Refuse Disposal Area No. 3), coarse coal refuse disposal area (Coal Refuse Disposal Area No. 4), and sedimentation pond. These soils are expected to exhibit the required permeability after compaction. Module 14.2.a.7 presents a demonstration that sufficient soil liner material is available at the project site. Liner construction, generally will be conducted as described in this module and technical specifications appended to the Design Report (Attachment 21).

a) Provide the following for soil liners:

1) Design thickness;

Two feet.

2) Permeability;

5×10^{-5} cm/sec maximum. Laboratory permeability tests performed on samples of compacted site soils demonstrate that this maximum requirement can be achieved. Four samples were tested as summarized below.

Boring/Test Pit	*Depth*	*% Compaction*	*Permeability*
TP-3	*3.0-5.0*	*94.8*	*2.6E-07 cm/sec*
TP-5	*0.5-2.5*	*95.2*	*2.1E-06 cm/sec*
TP-15	*4.5-9.0*	*95.6*	*6.1E-08 cm/sec*
TP-26	*5.5-7.5*	*95.3*	*3.5E-07 cm/sec*

Refer to laboratory test results appended to the Module 21 Design Report.

3) Water content;

Liner material will be placed at a moisture content not exceeding the range of -2 to +3 percent of the optimum value defined by ASTM Test Method D698 in accordance with Section 15 of Technical Specifications appended to the Design Report. Results of water content determinations performed on representative samples of liner soil borrow material are summarized on Attachment 14.2.5.

4) Soil density/moisture content relationship;

A moisture-density test (ASTM D698) was performed on seven representative samples of the site soils. Results of this testing are appended to the Module 21 Design Report and are summarized on Attachment 14.2.a.7b. They indicate a range in maximum dry density of 92.7 to 111.9 pcf and corresponding optimum water content range of 27.5% to 14.7%. Additional moisture-density tests will be performed at the time of liner installation as discussed under Module 14.4.e.

Soil liner material will be compacted to at least a dry density of 95% of the maximum value determined by ASTM Test Method D698. The required density and water content will be established prior to soil liner installation based on results of laboratory moisture-density and permeability tests. Prior to soil re-compaction, the moisture content will be adjusted as required by sprinkling with water or disking to dry.

5) Atterberg limits;

Soil liner material will exhibit a minimum plasticity index of 10 as determined by ASTM D2487. Classification tests, including Atterberg limit determinations, will be performed at the time of liner installation as discussed under Module 14.4.e. Results of classification tests performed on representative samples of site clay to be used as liner soil are appended to the Module 21 Design Report (Attachment 21) and are summarized in Attachment 14.2.5.

6) Sieve analysis and maximum coarse fragment size;

The grain size distribution for soil liner material will have 100 percent of the particles with a maximum dimension not greater than one inch; and with 50 percent or more passing the No. 200 sieve as determined by ASTM D422. Results of sieve analyses performed on representative samples of site clay to be used as liner soil are appended to the Module 21 Design Report and are summarized in Attachment 14.2.5. Additional sieve analyses will be performed at the time of liner installation as discussed under Module 14.4.e.

7) Location of soil borrow area;

Soil liner material will be soils within the project site that satisfy liner material specifications and are not designated for use as soil cover.

Clayey site soils having 50% or more passing the No. 200 sieve and demonstrating a minimum plasticity index of 10 will be used for liner construction. Attachment 14.2.5 includes a listing of the thickness' of clay encountered by borings and test pits excavated at the project site. Soils having sandstone cobbles or boulders generally were not included in the clay thicknesses reported on Attachment 14.2.5.

Clay soil thickness data presented on Attachment 14.2.5 were used to generate Attachment 14.2.a.7a, a plan of the project site presenting proposed borrow areas and estimated average clay thicknesses within those areas. Estimated average soil (i.e., non-clay) thicknesses also are presented. Demonstration that sufficient clay soils are available for liner as well as cover construction is presented in Attachment 14.2.a.7b. Note that Module 17 demonstrates that sufficient cover soil will be available to finish cover construction after clay soils are removed.

8) Soil processing procedures (if needed); and

Soil processing is expected to consist mainly of moisture conditioning (as required) and compaction. Any processing required to remove over-size particles will be minimal. If over-size particles are present, they will be either removed, or broken down to an acceptable size using earth moving equipment. Roots, other debris, and oversize particles not broken-down to an acceptable size will be removed by hand picking, disking, and/or raking with a rock rake where appropriate.

9) Name and address of testing laboratory.

NOTE: All lab tests are to be conducted on a composite representative sample of the borrow area.

Tests conducted for facility design were performed by Geotechnics of East Pittsburgh, Pennsylvania. Consol has not selected the testing laboratory to be used for construction quality assurance/Quality Control (QA/QC).

b) Provide the following for synthetic liners:

1) Composition and thickness;

60 mil textured HDPE

2) Seam construction;

Refer to Section 18 of the Technical Specifications

3) Permeability;

60 mil HDPE exhibits a permeability of 1 x 10^{-11} cm/sec

4) Manufacturer's recommendations on uses and limitations; (liner must be compatible with impounded material) and

The Manufacturer's recommendations on limitations are that the liner must be chemically compatible with impounded material and the uses are for all liner applications.

5) Manufacturer's recommendations on installation procedures.

Geomembrane will be installed in accordance with Section 18 of the Technical Specifications. These installation procedures represent standard engineering practice.

14.3 Subbase. *Describe the following:*

a) General grading and compaction procedures;

Grading as required to flatten steep areas and rock outcrop areas to provide slopes not steeper than 2H:1V. Soft areas that may be detected (areas where the specified degree of compaction cannot be achieved and/or areas that move, i.e., pump, under the weight of the compaction equipment) will be undercut and replaced with properly compacted embankment material.

Soil liner construction will require grading to: 1) excavate liner soil from designated borrow areas, 2) stockpile the material as needed, and 3) place the material in areas to be provided with soil liner. Soil liner material will be placed in lifts in accordance with technical specifications appended to the Module 21 Design Report (Attachment 21). Stockpile capacities are discussed in Module 17.4.

b) Measures for meeting installation requirements specific to the lining materials; and

The proposed soil liner will require a firm non-yielding subbase. To satisfy this requirement, soft materials present at the liner subgrade (liner subbase) will be detected during liner construction. Soft subbase soils will be undercut and replaced with recompacted soil.

HDPE liner subbase also will be firm and nonyielding, but will have a maximum particle size of 1 inch.

Some underground mine subsidence may occur at the facility. However, the magnitude of subsidence and resulting differential settlements are not expected to be high enough to adversely impact liner performance. More detailed discussion of the subsidence impact analysis is presented in Section 4.0 of Attachment 21, the Design Report.

c) Underdrain system (if applicable).

Networks of rock and spring drains will be installed below Coal Refuse Disposal Areas No. 3 and No. 4 liners as shown on Sheet 3 and 4 of the Exhibit 21.1 drawings.

Rock drains will collect and carry stream base flow (23.5 GPM based on a measurement not affected by surface runoff, i.e., November 10, 2001) below the disposal facility. They will consist of a geotextile-wrapped aggregate and rock underdrain constructed as shown on Sheet 32 of the Exhibit 21.1 drawings. A filter analysis has been conducted to verify compatibility of the aggregate gradations (AASHTO No. 57 and No. 1). This analysis along with drain capacity calculations are presented in the calculation package attached to Module 21, Attachment 21.

Springs encountered at the facility subgrade will be collected and drained to either the valley rock drain as shown on Sheet 3 and 4 of the Exhibit 21.1 drawings, or directly to the perimeter of the facility. Springs encountered at the subgrade of the sedimentation pond also will be collected and carried to a point outside the limits of fill. Individual springs will be collected by a geotextile-wrapped gravel underdrain constructed as indicated on Sheet 32 of the Exhibit 21.1 drawings and Section 4 of the Technical Specifications.

Soil liner will be installed over the rock drain and/or spring drains.

14.4 Installation Plan. *Describe the following:*

a) Construction methods and sequence;

Construction methods proposed for underdrain and liner installation are presented in the Technical Specifications attached to the Module 21 Design Report (Attachment 21). Construction sequencing is summarized below.

COAL REFUSE DISPOSAL AREA NO. 3

Spring collector drains will be installed during this initial stage of site preparation but also may be installed during other stages of site preparation as well.

The facility rock drain will be installed during the initial stage of site preparation prior to grading and liner installation. Rock drain installation will be in accordance with the Exhibit 21.1 drawings and Section 4 of Technical Specifications attached to the Module 21 Design Report (Attachment 21).

The Main Dam and Saddle Dam A liner systems generally will be constructed in two stages corresponding to disposal facility stages. The first stage of liner will cover Stage 1 and Stage 2 dam areas and will be installed during initial site preparation (refer to Sheet 3 of Exhibit 21.1). Liner for the Stage 3 dam areas will be installed during Stage III site preparation. Saddle Dams B, C, and D will be constructed of embankment material and will form the reservoir area liner subgrade at those locations.

Soil liner for areas to receive only fine coal refuse slurry, the reservoir area, also will be installed in stages. The Stage 1 impoundment area and a section of the Stage 2 impoundment area will be installed as part of initial site preparation. Refer to Sheet 3 of Exhibit 21.1. The remaining section of reservoir liner will be installed incrementally as the slurry level rises. Before the slurry level encroaches on the edge of in-place liner, the liner will be extended up the reservoir area side slopes a sufficient distance to prevent liner installation activities from inhibiting disposal operations, and to provide for at least one additional year of slurry disposal.

Saddle dam geomembrane liners will be installed when the saddle dam is constructed. Therefore, incremental construction of these liners is not proposed.

The general sequence of soil liner system installation for each stage will be as follows:

A. Clearing and grubbing within the area to receive liner;

B. Stripping topsoil from within the area.

C. Sampling and testing in-situ soils to be used for liner construction as described under Module 14.4.e to verify conformance with liner material specifications outlined under Module 14.2.a.2, 3, 4, 5, 6;

D. Stripping soil meeting requirements specified for liner material and/or soil cover and stockpiling it at the liner material and soil stockpile areas, respectively;

E. Grading as required to flatten steep areas and rock outcrop areas to provide slopes not steeper than 2H:1V;

F. Installing any spring drains that may be needed;

G. Constructing the soil liner and overlying protective soil cover incrementally. Work will start at the lower elevations and progress to the higher elevations. Liner construction within an area will be initiated by removing soils to be used for soil cover and soils satisfying liner material specifications as determined under Item C (clay). After an area has been stripped of soil and clay as required, the liner will be installed in accordance with Section 15 of the Technical Specifications. Any excess liner material removed from a stage of liner construction will be stored separately within either 1) stockpile areas designated for liner soil, or 2) higher-elevations of the disposal area.

Soft areas of the liner subgrade that may be detected (areas where the specified degree of compaction cannot be achieved and/or areas that move, i.e., pump, under the weight of the compaction equipment) will be undercut and replaced with properly compacted embankment material.

COAL REFUSE DISPOSAL AREA NO. 4

Spring collector drains will be installed during this initial stage of site preparation but also may be installed during other stages of site preparation as well.

Rock drain at the coarse coal refuse disposal area will be installed during the initial stage of site preparation prior to grading and liner installation. Rock drain installation will be in accordance with the Exhibit 21.1 drawings and Section 4.0 of the Technical Specifications attached to the Module 21 Design Report.

Liner for the coarse coal refuse disposal area also will be installed incrementally. Liner for the area to be developed during slurry dam construction will be installed during initial site preparation. Refer to Sheet 4 of the Exhibit 21.1 drawings. The remaining section of coarse coal refuse area liner will be installed incrementally as the lateral extent of coarse coal refuse expands. Before the coarse coal refuse working face encroaches on the edge of in-place liner, the liner will be extended a sufficient distance to prevent liner installation activities from inhibiting disposal operations, and to provide for at least one additional year of disposal.

The general sequence of installation for each increment of liner system will be as described above for Coal Refuse Disposal Area No. 3.

SEDIMENTATION POND

The sedimentation pond liner system will be constructed in one stage during site preparation. Grading will be performed as required to form the pond liner subgrade which is approximately 3 feet below the finished grades shown on Sheet 30 of the Exhibit 21.1 drawings. General sequencing of liner system installation will be as described above for Coal Refuse Disposal Area No. 3. The sedimentation pond liner will be provided with a 1 foot thick cover layer placed in two 6-inch lifts with an orange marker layer.

b) Equipment to be used;

Conventional earth moving equipment, e.g., scraper, bulldozer, roller (sheepsfoot roller for overall compaction and smooth wheel roller for sealing the surface), etc. will be used to construct the facility liner.

c) Procedures for anchoring synthetic lines and constructing seals around protruding piping;

Geomembrane anchor details are presented on Sheet 24 of the Exhibit 21.1 drawings. No pipes will protrude through the geomembrane liners. However, the decant pipe risers and sedimentation pond outlet pipe will penetrate the soil liner that is proposed. At each of these pipe locations, soil liner material will be placed against the protruding pipe and compacted.

d) Procedures for connecting, seaming, or otherwise joining separate components of the liner; and

Soil liner layers will be knit together and the initial liner layer will be knit into the subbase by scarifying the surface of the in-situ soil layer prior to placement of overlying soil.

Geomembrane seaming requirements are presented in Section 18 of the Technical Specifications attached to the Module 21 Design Report (Attachment 21).

e) Quality assurance and quality control procedures.

Quality assurance and quality control procedures proposed for geomembrane liner are outlined in Section 18 of the Technical Specifications attached to the Module 21 Design Report.

Soil liner materials will be sampled and tested prior to their incorporation into the liner to ensure that they meet the material requirements of Module 14.2. The required density and water content will be established prior to soil liner installation based on results of laboratory moisture-density tests. Adequacy

of liner permeability and compaction will be assessed by measuring in-place density, water content, and permeability.

The proposed testing schedule is summarized below. Included are the tests that will be performed and corresponding testing frequencies.

Test	Test Method	Minimum Testing Frequency
Prior to Incorporation Into the Liner*		
Grain Size Distribution	ASTM D422	One test per change in material.
Moisture-Density Relationship	ASTM D698	One test per change in material.
Atterberg Limits	ASTM D4318	One test per change in material.
Water Content	ASTM D2216	One test per change in material.
Field Testing During Installation		
Liner Thickness	Visual Inspection of manually excavated test pit	One determination per acre of completed liner.
In-Place Density	ASTM D2922 D3017, or D1556	One test per acre per lift but at least one per lift and one per day.
Water Content	ASTM D2216	One test per acre per lift but at least one per lift and one per day.
Permeability**	ASTM D5084 (with back pressure)	One determination per acre of completed liner.

* *One test will be performed for every visual change in liner material. Each sample collected for testing will be representative of the full thickness of liner material to be removed.*

** *To be conducted on specimens having a dry density corresponding to 95% of the maximum dry density (higher if required to achieve the desired permeability).*

14.5 Provide a description of the protective cover to be installed to maintain the integrity of the liner. If a protective cover is not proposed, explain why it is not necessary.

The disposal area soil liners will be overlain by 6 inches of soil cover material or 6 inches of coarse coal refuse material. Also, they will be constructed in stages as the disposal facility is developed to reduce the period of time that they are in place before being covered with coal refuse.

The sedimentation pond liner will be overlain by a one-foot thick soil layer that will incorporate an orange geogrid marker layer to prevent damage during cleanout operations.

Geomembrane liners will be embedded within the earthen saddle dams.

14.6 Provide a schedule and procedure for cleaning all impoundments to be lined.

The coal refuse disposal impoundment (Coal Refuse Disposal Area No. 3) will not be cleaned. Accumulations of silt and precipitates will be removed from the sedimentation pond by backhoe or other suitable equipment when the settling volume is reduced below the required level. Sludge will be transported and disposed of in Coal Refuse Disposal Area No. 4.

ATTACHMENT 14.2.5
SUMMARY OF SITE SOILS

ATTACHMENT 14.2.5
SUMMARY OF SITE SOILS RELATIVE TO LINER SOIL REQUIREMENTS

Boring/ Test Pit	Depth	Generalized Visual Description	Top Size (in)	Pass #200 (%)	Plast. Index (%)	Unified Class.	Water Content (%)	Clay Thick. (ft)
TP-1	0-0.7	Topsoil						3.3
	0.7-4.0	Silty Clay w/Grvl size sandst & sh frags	½	87	18	CL	16.4	
	4.0-5.5*	Weathered Sandstone						
TP-2	0-2.0	Topsoil						0
	2.0-7.0*	Clayey Gravel (water @ 4.0)	1½	28	16	GC	20.2	
TP-3	0-0.5	Topsoil						3.5
	0.5-2.0	Silty Clay w/Gravel (colluvium)	¾	82	24	CL	23.4	
	2.0-3.0	Sandstone Cobbles & Bldrs (colluvium)						
	3.0-5.0	Lean Clay (colluvium, wet @5.0)	3/8	97	24	CL	25.0	
	5.0-7.0	Lean Clay w/Grvl (w/ clayst cobs, colluv.)	>1	94	18	CL	26.4	
	7.0-8.0*	Weathered Shale						
TP-4	0-0.8	Topsoil						7.2
	0.8-4.5	Silty Clay	1	77	26	CL	14.9	
	4.5-7.5	Clayey Gravel (gravel size shale frags)	¾	89	24	CL	15.8	
	7.5-8.0*	Weathered Claystone						
TP-5	0-0.5	Topsoil						2.0
	0.5-2.5	Lean Clay (wet)	3/8	90	19	CL	43.9	
	2.5-6.0	Clayey Gravel (shale frags), wet	1	39	15	SC	27.3	
	6.0-7.0*	Weathered Shale						
TP-6	0-0.3	Topsoil						1.0
	0.3-4.0	Silty Clay w/Grvl & Cobble size Sh Frags	>1½	56	18	CL	12.9	
	4.0-5.0*	Lean Clay	#4	96	22	CL	16.7	
TP-7	0-1.5	Topsoil						1.5
	1.5-3.0	Lean Clay (wet)						
	3.0-4.5	Clayey Gravel (water @ 4.0)						
	4.5-5.0*	Weathered Shale						
TP-8	0-0.8	Topsoil						3.2
	0.8-4.0	Lean Clay	#4	96	27	CL	27.1	
	4.0-7.0*	Clayey Gravel, wet (gravel is wthr shale)	3/8	83	9	CL	10.9	
TP-9	0-0.5	Topsoil						1.0
	0.5-5.0	Gravelly Elastic Silt w/cobbles & bldrs)						
	5.0-6.0*	Lean Clay						
TP-10	0-0.5	Topsoil						9.0
	0.5-5.5	Silty Clay (colluvium)						
	5.5-9.5*	Lean Clay, tr gvl (shale frags) tr cobbles						
TP-11	0-0.5	Topsoil						6.5
	0.5-3.0	Silty Clay	1	72	11	CL	17.3	
	3.0-7.0*	Gravelly Lean Clay	¾	85	17	CL	12.5	
TP-12	0-0.5	Topsoil						7.5
	0.5-5.0	Silty Clay w/Gravel (colluvium)	¾	82	25	CL	19.4	
	5.0-8.0*	Clayey Gravel (residual)	¾	75	13	CL	15.3	
TP-13	0-0.5	Topsoil						0
	0.5-7.0	Gravelly Lean Clay w/sandst cob. (colluv)	>1½	45	11	GC	17.1	
	7.0-8.0*	Weathered Sandy Shale						
TP-14	0-0.5	Topsoil						0
	0.5-5.0	Silty Clay w/Gravel & sandst cobs & bldrs	>1½	49	7	GC-GM	13.1	
	5.0-6.0*	Weathered Shale						
TP-15	0-1.3	Topsoil						7.7
	1.3-4.5	Silty Clay (colluvium)	3/8	73	12	CL	17.6	
	4.5-9.0	Lean Clay (moist to wet)	#4	98	27	CH	35.8	
	9.0-9.5*	Weathered Shale						

* Bottom of interval @ top of rock

ATTACHMENT 14.2.5(Cont'd)
SUMMARY OF SITE SOILS RELATIVE TO LINER SOIL REQUIREMENTS

Boring/ Test Pit	Depth	Generalized Visual Description	Top Size (in)	Pass #200 (%)	Plast. Index (%)	Unified Class.	Water Content (%)	Clay Thick. (ft)
TP-16	0-0.8	Topsoil						2.7
	0.8-3.5	Silty Clay w/Gravel (clayst & shale frags)						
	3.5-4.5*	Weathered Sandy Shale						
TP-17	0-0.8	Topsoil						3.2
	0.8-4.0	Silty Clay	3/8	78	22	CL	22.8	
	4.0-5.0*	Gravel (shale frags)						
TP-17A	0-0.7	Topsoil						4.8
	0.7-3.0	Silty Clay		96	28	CH	18.1	
	3.0-5.5*	Gravelly Clay (gravel is clayst frags)	¾	79	19	CL	13.3	
TP-19	0-0.8	Topsoil						3.2
	0.8-4.0	Silty Clay w/Gravel (shale frags)	1	71	19	CL	22.9	
	4.0-8.5*	Weathered Shale (gry-blk)						
TP-20	0-0.5	Topsoil						0.5
	0.5-5.0	Elastic Silt w/gvl-bldr size sh frags (colluv)	>1	52	9	CL	8.4	
	5.0-5.5	Lean Clay	3/8	95	27	CH	18.9	
	5.5-6.0*	Weathered Shale						
TP-21	0-0.3	Topsoil						0
	0.3-7.0*	Elastic Silt w/Gravel & sandst cobs & bldr	>1	55	16	CL	14.1	
TP-21A	0-0.5	Topsoil						8.5+
	0.5-5.5	Silty Clay	3/8	88	21,17	CL	16.1,14.8	
	5.5-9.0	Clayey Gravel (gravel is clayst & sandst)	¾	82	17	CL	13.7	
TP-22	0-1.5	Topsoil						3.5
	1.5-6.5	Silty Clay w/sandst cobbles & boulders	>1	80	17	CL	21.1	
	6.5-8.0	Lean Clay	#10	98	14	CL	22.2	
	8.0-10.0	Clayey Gravel (wet)	½	85	10	CL-ML	17.3	
TP-23	0-0.8	Topsoil						4.7
	0.8-5.5	Silty Clay	#4	97	23	CL	18.9	
	5.5-6.0*	Weathered Limestone						
TP-24	0-1.0	Topsoil						7.0
	1.0-5.5	Silty Clay	½	83	21	CL	25.7	
	5.5-8.0	Lean Clay	¾	71	19	CL	20.4	
	8.0-10.0*	Weathered Shale						
TP-25	0-0.8	Topsoil						3.5
	0.8-2.5	Elastic Silt w/Gravel w/shale cobs & bldrs						
	2.5-6.0*	Lean Clay w/ clayst cobbles & bldrs						
TP-26	0-0.8	Topsoil						6.7
	0.8-5.5	Silty Clay (gravel @ 5.0-5.5)	1	51	13	CL	28.1	
	5.5-7.5	Lean Clay (water @ 5.5)	1	82	16	CL	32.6	
	7.5-8.0*	Weathered Sandy Shale						
TP-27	0-0.8	Topsoil						2.7
	0.8-3.0	Silty Clay	3/8	81	17	CL	17.0	
	3.0-3.5	Lean Clay						
	3.5-5.5*	Weathered Sandy Shale						
TP-28	0-0.8	Topsoil						6.2
	0.8-3.0	Silty Clay w/Gravel (clayst frags)	1	67	19	CL	14.4	
	3.0-5.0	Lean Clay	#4	99	19	CL	18.7	
	5.0-7.0*	Weathered Claystone						
TP-29	0-0.5	Topsoil						6.0+
	0.5-2.5	Silt w/Gravel (shale frags)	1½	74	11	ML	13.1	
	2.5-4.0	Silty Clay	¾	89	32	CH	20.6	
	4.0-6.5	Lean Clay	#4	99	33	CH	33.5	

* Bottom of interval @ top of rock

ATTACHMENT 14.2.5(Cont'd)
SUMMARY OF SITE SOILS RELATIVE TO LINER SOIL REQUIREMENTS

Boring/ Test Pit	Depth	Generalized Visual Description	Top Size (in)	Pass #200 (%)	Plast. Index (%)	Unified Class.	Water Content (%)	Clay Thick. (ft)
TP-30	0-0.5	Topsoil						6.5
	0.5-4.0	Silty Clay w/Gravel (sandst frags)	¾	71	22	CL	17.0	
	4.0-7.0	Lean Clay	½	90	25	CL	16.7	
	7.0-8.0*	Weathered Sandstone						
TP-31	0-0.5	Topsoil						5.5
	0.5-6.0	Silty Clay w/Gravel (shale frags)	¾	60	21	CL	14.0	
	6.0-6.5*	Weathered Shale						
TP-32	0-0.8	Topsoil						0
	0.8-5.0	Silty Clay w/Gravel w sandst cobs & bldrs						
	5.0-8.5*	Weathered Shale						
TP-33	0-1.0	Topsoil						0
	1.0-6.0	Silty Clay w/Grvl to Boulder size Sh Frags	>1	75	22	CL	18.4	
	6.0-8.5*	Weathered Shale						
TP-34	0-0.8	Topsoil						9.2
	0.8-5.5	Silty Clay w/Gravel	¾	80	24	CL	21.9	
	5.5-10.0*	Clayey Gravel (shale frags), wet	¾	63	19	CL	15.4	
TP-35	0-0.8	Topsoil						7.7
	0.8-6.0	Silty Clay w/Gravel (shale frags)	¾	85	24	CL	19.3	
	6.0-8.5	Lean Clay	¾	90	19	CL	25.1	
	8.5-9.0*	Weathered Shale						
TP-36	0-0.5	Topsoil						5.5
	0.5-3.0	Elastic Silt w/Gravel (shale frags)						
	3.0-7.5	Silty Clay w/Gravel (shale frags)						
	7.5-8.5*	Lean Clay w/ Fine Sand						
TP-37	0-0.8	Topsoil						7.7
	0.8-5.0	Silty Clay w/Gravel (sandst frags)	1½	67	20	CL	14.3	
	5.0-6.0	Lean Clay	¾	74	29	CH	27.5	
	6.0-6.5	Black Weathered Shale	1½	74	18	CL	22.2	
	6.5-8.5	Lean Clay	#4	97	29	CH	35.9	
	8.5-9.0*	Weathered Sandstone						
TP-38	0-0.5	Topsoil						0
	0.5-5.0	Silty Clay w/Gravel some cobbles (colluv)	>1	59	17	CL	17.8	
	5.0-6.5	Silty Clay w/Cobbles (residual)	>1	95	29	CH	22.4	
	6.5-7.5*	Weathered Shale						
TP-39	0-0.5	Topsoil						0
	0.5-3.5	Silty Gravel (shale frags) w/Sandst Cobs	>1	51	13	CL	13.9	
	3.5-5.5*	Weathered Shale						
TP-40	0-0.5	Topsoil						8.5
	0.5-2.5	Elastic Silt w/Gravel size Shale Frags	¾	54	16	CL	15.0	
	2.5-6.0	Silty Clay	1	62	18	CL	13.7	
	6.0-9.0*	Lean Clay	½	94	23	MH	23.4	
TP-41	0-0.5	Topsoil						6.5
	0.5-5.5	Silty Clay w/Gravel (shale frags)	¾	75	16	CL	19.2	
	5.5-7.0	Lean Clay	3/8	91	22	CL	23.6	
	7.0-9.0*	Clayey Gravel (shale frags)	1½	37	9	GC	12.0	
TP-42	0-0.8	Topsoil						4.0
	0.8-6.0	Silty Clay w/cobbles & bldrs (sandy sh)						
	6.0-10.0	Lean Clay, tr shale frags	3/8	96	24	CH	24.4	
	10.0-11.0*	Weathered Shale						
TP-43	0-0.8	Topsoil						5.5+
	0.8-4.0	Silty Clay w/Grvl-bldr size sandst frags	>1½	73	13	CL	18.0	
	4.0-9.5+	Lean Clay	#4	96	25	CH-MH	34.7	

* Bottom of interval @ top of rock

ATTACHMENT 14.2.5(Cont'd)
SUMMARY OF SITE SOILS RELATIVE TO LINER SOIL REQUIREMENTS

Boring/ Test Pit	Depth	Generalized Visual Description	Top Size (in)	Pass #200 (%)	Plast. Index (%)	Unified Class.	Water Content (%)	Clay Thick. (ft)
TP-44	0-0.8	Topsoil						2.0
	0.8-5.5	Silty Clay w/Grvl (sh frags) & cob (water 4.5')	>1	82	21	CL	27.2	
	5.5-7.5	Lean Clay	#4	98	22	CL	22.7	
	7.5-8.0*	Weathered Shale						
TP-45	0-0.3	Topsoil						1.5
	0.3-1.0	Gravelly Elastic Silt (gravel is shale frags)						
	1.0-1.5	Topsoil						
	1.5-4.5	Silty Clay w/Gravel (shale frags) w/cobs						
	4.5-6.0	Lean Clay						
	6.0-8.5*	Weathered Shale						
TP-46	0-0.5	Topsoil						3.0
	0.5-1.5	Elastic Silt w/Gravel (sandy shale frags)	¾	69	8	CL	18.2	
	1.5-5.0	Silty Clay w/gravel-bldr size shale frags	>1½	58	19	CL	21.2	
	5.0-8.0	Lean Clay	3/8	96	25	CL	23.4	
	8.0-8.5*	Weathered Shale						
TP-47	0-0.5	Topsoil						6.5
	0.5-7.0	Silty Clay w/Gravel (sandst frags)	3/8	68	18	CL	19.6	
	7.0-9.0*	Weathered Sandstone						
TP-48	0-0.5	Topsoil						0
	0.5-6.5	Elastic Silt w/Gravel & Cobbles	>1	66	16	CL	20.1	
	6.5-10.0+	Silty Clay w/Gravel & Cobbles	>1	76	17	CL	18.8	
TP-49	0-0.5	Topsoil						7.5
	0.5-2.0	Silt	¾	71	14	CL	11.9	
	2.0-5.0	Gravelly Lean Clay	3/8	67	17	CL	10.5	
	5.0-7.0	Lean Clay	3/8	95	26	CL	14.0	
	7.0-8.0	Gravel (clayst frags) w/Clay	3/8	67	12	CL	9.2	
TP-50	0-0.8	Topsoil						1.0
	0.8-9.5	Elastic Silt w/Gravel (shale frags)	>1½	38	10	GC	14.1	
	9.5-10.5	Lean Clay w/Gravel (shale frags)	½	82	19	CL	17.5	
TP-51	0-0.3	Topsoil						0
	0.3-1.0	Silty Clay						
	1.0-1.3*	Weathered Limestone						
TP-52	0-0.3	Topsoil						0
	0.3-2.0*	Weathered Sandstone						
TP-53	0-0.3	Topsoil						4.0
	0.3-5.0	Elast Silt w/Grvl, Cob. & Bldrs (colluvium)	>1	68	7	CL-ML	9.9	
	5.0-9.0*	Lean Clay w/Gravel (shale frags)	3/8	86	18	CL	22.7	
TP-54	0-0.5	Topsoil						4.0
	0.5-4.5	Clayey Gravel (shale frags)	3/8	73	16	CL	16.6	
	4.5-5.5*	Weathered Shale						
TP-55	0-0.8	Topsoil						6.2
	0.8-4.5	Silty Gravel	1½	55	13	CL	12.6	
	4.5-7.0	Lean Clay	#4	94	19	CL	23.6	
	7.0-9.0*	Weathered Claystone						
TP-56	0-0.8	Topsoil						0.8
	0.8-1.6	Silty Clay w/Gravel (shale frags)						
	1.6-4.0*	Weathered Shale						

* Bottom of interval @ top of rock

ATTACHMENT 14.2.5(Cont'd)
SUMMARY OF SITE SOILS RELATIVE TO LINER SOIL REQUIREMENTS

Boring/ Test Pit	Depth	Generalized Visual Description	Top Size (in)	Pass #200 (%)	Plast. Index (%)	Unified Class.	Water Content (%)	Clay Thick. (ft)
B-1	0-3.5	Silty Clay w/Gravel (siltst frags)						3.0
	3.5-10.7*	Silty Clayey Gravel (siltst frags)						
B-2	0-6.0	Silty Clay w/Gravel (siltst frags)						5.5
	6.0-12.0*	Gravelly Silty Clay						
B-3	0-1.5	Silt						0
	1.5-9.0	Silty Clayey Gravel (sandst frags)						
	9.0-10.4*	Clayey Gravel (clayst frags)						
B-4	0-6.0	Silty Clay w/Gravel (sandst frags)						5.5
	6.0-10.0	Gravelly Lean Clay (gvl is sandst, sh, siltst)						
	10.0-13.0*	Silty Clay w/Gravel (shale frags)						
B-5	0-9.5	Silty Clay w/Gravel (rock frags)						9.0
	9.5-12.0	Gravelly Silty Clay (gvl is sandst & shale)						
	12.0-13.0*	Silty Clay w/Gravel (shale frags)						
B-6	0-3.0	Gravelly Silty Clay						5.0
	3.0-8.0	Lean Clay w/Gravel (rock frags)						
	8.0-9.0	Poorly Graded Gravel (rock frags)						
	9.0-10.0*	Gravelly Silty Clay (gravel is sandst frags)						
B-7	0-9.0	Sandy, Silty Clay w/Grvl (water @ 3)						6.3
	9.0-15.3*	Lean Clay w/Gravel (shale & clayst frags)						
B-8	0-3.5	Gravelly Silty Clay	2	27	12	GC	14.4	0
	3.5-7.3	Silty Clayey Gravel (water @ 5.0)						
	7.3-7.7*	Silty Clay w/Gravel						
B-9	0-9.0	Silty Clay w/Gravel (shale frags)						0
	9.0-11.5*	Silty, Clayey Gravel (siltstone frags)						
B-10	0-6.0	Sandy Silty Clay w/Gravel						
	6.0-22.5*	Silty Clay w/Gravel (water @ 15.0)						
B-11	0-4.0	Silt	1	70	17	CL	15.1,23.5	3.5
	4.0-8.0*	Silty Clay w/Grvl (sandst/siltst frag) water 5'						
B-12	0-0.5	Silt						10.9
	0.5-3.0	Silty Clay w/Gravel						
	3.0-6.0	Gravelly, Silty Clay						
	6.0-7.7	Lean Clay w/Gravel						
	7.7-12.0	Silty Clayey Gravel						
	12.0-15.7*	Lean Clay w/Gravel						
B-13	0-9.0	Silty Clay w/Gravel						8.5
	9.0-15.8*	Gravelly Silty Clay						
B-14	0-0.2	Topsoil						8.8
	0.2-12.0	Silty Clay w/Gravel						
	12.0-15.6*	Weathered Siltstone & Sandstone						
B-15	0-15.0	Silty Clay w/Gravel						5.5
	15.0-15.9*	Gravelly Silty Clay						
B-16	0-0.2	Topsoil						5.8
	0.2-3.0	Silty Clay						
	3.0-11.0*	Silty Clay w/Gravel						
B-17	0-0.2	Topsoil						9.8
	0.2-10.0*	Silty Clay						
B-18	0-3.0	Sandy Silt w/Gravel						3.0
	3.0-9.0	Silty Clay w/Gravel						
	9.0-12.0	Lean Clay						
	12.0-12.7*	Clay w/Gravel (wthr shale)						

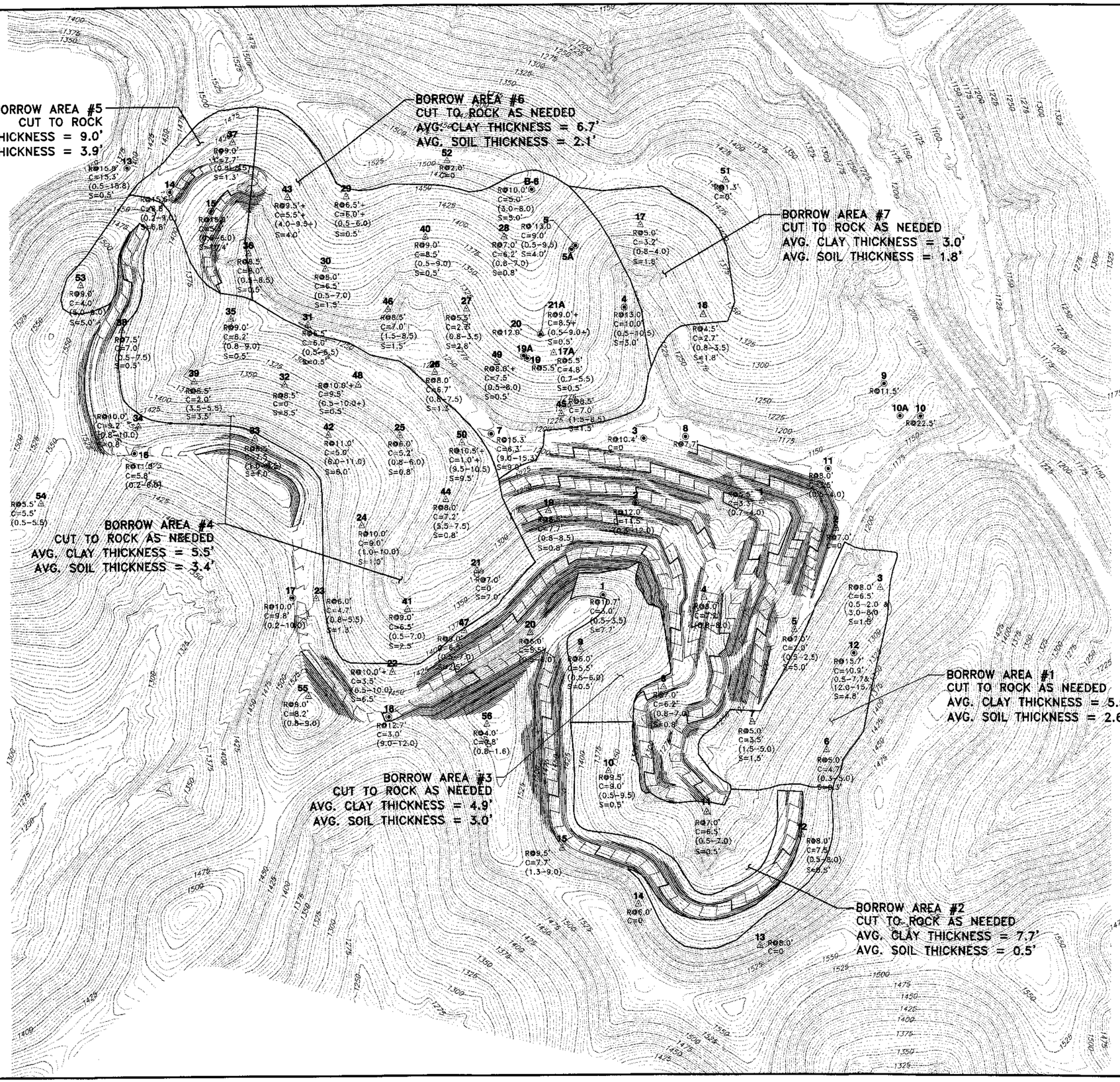
* Bottom of interval @ top of rock

ATTACHMENT 14.2.5(Cont'd)
SUMMARY OF SITE SOILS RELATIVE TO LINER SOIL REQUIREMENTS

Boring/ Test Pit	Depth	Generalized Visual Description	Top Size (in)	Pass #200 (%)	Plast. Index (%)	Unified Class.	Water Content (%)	Clay Thick. (ft)
B-19	0-5.5*	Silty Clay w/Gravel (wthr shale)						5.5
B-20	0-0.5	Topsoil						5.5
	0.5-3.0	Silty Clay						
	3.0-9.0	Silty Clay w/Gravel						
	9.0-9.5	Blk Silty Clay (wthr carb. shale)						
	9.5-12.0	Sandy Silt w/Gravel						
	12.0-15.0	Silty Clay w/Gravel						
	15.0-18.0	Silty Clay w/Gravel						
	18.0-21.2*	Sandy Silty Clay w/Gravel						

* Bottom of interval @ top of rock

ATTACHMENT 14.2.a.7a
CLAY BORROW AREA PLAN



LEGEND

5 △ TEST PIT LOCATION

12 ⊙ BORING LOCATION

R@7.0' DEPTH TO BEDROCK

C=2.0' CLAY THICKNESS

(0.7–5.5) CLAY LOCATION

S=7.0' AVAILABLE THICKNESS OF SOIL BORROW

MICHELE STEWART
ENGINEER
PE-029157-E

GRAPHIC SCALE

300 0 150 300 600

(IN FEET)
1 inch = 300 ft.

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

ATTACHMENT 14.2.a.7a
BORROW AREA PLAN

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
MMS	JMB		01/02	AS SHOWN

FILE: BORROWMOD14&17A

January 22, 2002 4:50:05 p.m. LOGIN NAME : gcarroci
Drawing: J:\PROJECTS_CONSOL\24379\DRAWINGS\FINAL\BORROWMOD14&17A.DWG-(BORROW-CONSTRUCTION SET)
Attached Xrefs: BDR24356.DWG B01.DWG
S.O. No.: 24379-000-0000

ATTACHMENT 14.2.a.7b
SUMMARY OF CLAY (LINER SOIL) QUANTITIES

ATTACHMENT 14.2.a.7b

BAILEY CENTRAL MINE COMPLEX
NEW COAL REFUSE DISPOSAL FACILITY
SUMMARY OF CLAY (LINER SOIL) QUANTITIES: BORROW VS REQUIRED

CLAY (LINER SOIL) BORROW SUMMARY

Clay Source	Area* (S.F.)	Average Clay Thickness (Ft.)	Available Clay Quantity (C.Y.)
# 1	965,808	5.5	196,739
# 2	976,676	7.7	278,534
# 3	460,654	4.9	83,600
# 4	3,335,839	5.5	679,523
# 5	556,686	9.0	185,562
# 6	3,307,450	6.7	820,738
# 7	681,226	3.0	75,692
TOTAL AVAILABLE			**2,320,386**
TOTAL W/SHRINK			**2,095,309**

CLAY REQUIREMENT

	Area* (S.Y.)	Clay Thickness (Ft.)	Required Clay Quantity (C.Y.)
2' Clay Liner	1,811,325	2.0	1,207,550
1' Clay Cover	1,779,473	1.0	593,158
TOTAL NEEDED			**1,800,708**

* Areas have not been increased to account for terrain since proposed slopes will approximate existing ground slopes. Not increasing plan areas to account for terrain over estimates cover clay/soil requirements since the slurry impoundment cover is relatively flat.

SHRINK CALCULATION

Boring/Test Pit	Depth	In-Place Dry Density (pcf)	Max Dry Density (pcf)	Dry Density @ 95% Comp. (pcf)
B-11	1.5-3.0	111.2		
		99.2		
	3.0-5.0	96.9		
		97.1		
B-8	1.5-3.5	114.7		
		107.1		
TP-3	3.0-5.0		102.5	97.4
TP-5	0.5-2.5		99.3	94.3
TP-8	0.8-4.0		102.1	97.0
TP-15	4.5-9.0		92.7	88.1
TP-24	5.5-8.0		111.9	106.3
TP-26	5.5-7.5		105.3	100.0
TP-35	6.0-8.0		110.4	104.9

Estimated Shrink **9.7%**

Note: Shaded values used to calculate shrink.

March 2002

24379-000-0000

COAL REFUSE DISPOSAL PERMIT APPLICATION

For
Bailey Central Mine Complex
Coal Refuse Disposal Areas No. 3 and No. 4
And
Sedimentation Pond

Greene County, Pennsylvania

VOLUME 2

Prepared for

Consol Pennsylvania Coal Company
Pittsburgh, Pennsylvania

Prepared by

Baker

Michael Baker Jr., Inc.
Coraopolis, Pennsylvania

CONSOL PENNSYLVANIA COAL COMPANY
BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4

COAL REFUSE DISPOSAL PERMIT APPLICATION

CONTENTS

VOLUME 1

Module 1	Application
Module 2	General Information
Module 3	Ownership/Compliance Information
Module 4	Areas Where Mining is Prohibited or Restricted
Module 5	Property Interests/Right of Entry
Module 6	Environmental Resource Maps
Module 7	Geologic Information
Module 8	Hydrology
Module 9	Operation Maps – Surface Activity Sites
Module 10	Operation Plan
Module 11	Erosion and Sedimentation Controls
Module 12	Treatment Systems
Module 13	Impoundments
Module 14	Liners

VOLUME 2

Module 15	Streams/Wetlands
Module 16	Air Pollution and Noise Control
Module 17	Soils/Prime Farmland
Module 18	Land Use/Reclamation/Fish and Wildlife
Module 19	Reclamation Schedule and Cost Information
Module 20	Coal Refuse/Coal Ash – Sources and Properties
Module 21	Coal Refuse Construction Plans
	Exhibit 21.1 Design Report

VOLUME 3 AND 4

Appendix A – Drawings

VOLUME 5

Appendix B – Technical Specifications
Appendix C – Operations and Maintenance Manual
Appendix D – Test Boring Records, Test Pit Records, and Field Permeability Test Results
Appendix E – Laboratory Test Results
Appendix F – PADEP Module 7 – Geological Information

VOLUME 6, 7 AND 8

Appendix G – Calculations
Module 24 Special Protection Waters
Module 28 Blasting Plan

Module 15: Streams/Wetlands

15.1 Surface Activities Within 100 Feet of a Stream

If surface mining activities, including haul road crossings, are proposed within 100 feet of any intermittent or perennial stream provide the following information: (Note: Variance request must be included in the proof of publication.)

a) Name and location of the stream; and location, length, and acreage disturbed by the proposed activities: (Identify the location of the proposed activities on Exhibits 9.1 and 18.1);

Coal Refuse Disposal Areas No. 3 and No. 4 and associated sedimentation pond will be located within the valley of an unnamed tributary to Enlow Fork of Wheeling Creek and the valley of a major side branch to that tributary. The project site is situated primarily in Richhill Township and a minor part in Gray Township both in Greene County, Pennsylvania. The site is located approximately 3,300 feet south of the intersection of State Routes 4009 (Grinnage Road) and 4013 (Dogtown Road) and is bordered on the west by the existing slurry impoundment for CPCC's Bailey Central Mine Complex. Refer to Figure 1 of Attachment 15.1.

Development of the sites for coal refuse disposal will encroach on 13,198 feet of perennial and intermittent stream channel - 9,898 feet within the mainstream valley and 3,300 feet within the major side branch valley. Refer to Exhibits 6.2 and 9.1.

b) A narrative giving a description and the purpose and justification of the proposed activities;

Consol Pennsylvania Coal Co. is proposing to construct a new slurry impoundment (Coal Refuse Disposal Area No. 3) and new coarse coal refuse disposal area (Coal Refuse Disposal Area No. 4) for disposal of coal refuse generated by the Bailey Central Mine Complex. Existing disposal areas that currently service the mine complex are nearing full capacity.

c) A hydrologic and hydraulic analysis which shall include: data on size, shape and characteristics of the watershed; the size and frequency of the design storm; the hydraulic capacity of any structures; the hydraulic capacity of the channel upstream and downstream; and, where flooding is a problem, flood damage and backwater analysis;

Hydrologic and hydraulic analyses developed for the disposal facility and sedimentation pond designs include details of watershed size, shape and characteristics. These analyses are presented in Appendix G of the Module 21 Design Report.

Stream base flow will be carried under the disposal facilities in a rock drain constucted along the same approximate alignment as the stream channels. Refer to Appendix G of the Module 21 Design Report for calculations demonstrating the capacity of the rock drain and drain outlet pipes.

Hydrologic and hydraulic analyses for the slurry impoundment, sedimentation pond, and channels that will carry storm flows within the watershed are included in Appendix G of the Module 21 Design Report. Design Storms for these structures are presented in the Design Report calculations as well as report narrative.

d) A description of the character of the stream bed and banks, and a profile of the stream for a reasonable distance above and below the proposed site showing bed slopes, normal and flood water surfaces; and a description of the riparian vegetation;

Refer to the Biological Resources report presented as Attachment 15.1 for a description of the character of the stream bed and banks and a description of the riparian vegetation. No stream sections will extend above the proposed site. The stream section immediately below the site is the invert of an existing culvert under the railroad embankment. The slope of this culvert is 2.1%. Calculations showing the capacity of this culvert are included in Appendix G of the Module 21 Design Report.

e) A plan and typical cross sections showing stream channel and existing ground, activities proposed, barriers to be maintained, and normal and flood water surfaces;

Plans and cross sections showing the existing stream channel, existing ground, and proposed activity are include in the Module 21 Construction Drawings. Stream barrier and variance areas are shown on Exhibit 9.1.

f) Where a bridge or culvert is proposed provide the following information:

1) Plans and details showing the location, type, size, and height of the structure;

2) Calculations showing the hydraulic capacity of the structure;

3) A profile of the stream bed for a reasonable distance above and below the proposed location showing normal and flood water surface elevations and backwater effects of the structure;

4) Cross sections upstream, downstream, and at the proposed location of the structure showing normal and flood water surface elevations and other topographic features, elevations, etc., necessary for an appraisal of the hazard potential of the structure;

5) A narrative description of the construction methods and sequence including water handling during construction, and erosion and sedimentation controls;

6) Indicate if the structure will be temporary or permanent (include plans for removal of temporary structures.)

No bridges or culverts are proposed. Stream base flow will be carried under the disposal facilities in a rock drain constructed along the same approximate alignment as the stream channels. Refer to Appendix G of the Module 21 Design Report for calculations demonstrating the capacity of the rock drain and drain outlet pipes.

g) A characterization of the existing water quality and quantity of the stream, including downstream water uses and 25 PA Code Chapter 93 Protected Water Use Classification.

Both unnamed tributaries are classified as Warm Water Fishery (WWF, 25 PA code chapter 93). Within the site the streams are used for cattle grazing and for wildflife water supply. Downstream of the site is a culvert carrying the stream under the railroad. Below the culvert, the stream serves as a water source for area wildlife.

Stream flow rate and water quality data are presented in Forms 8.3B and 8.4A.

15.2 Stream Relocation and Channel Changes

If the proposed surface activities involve a relocation or channel change of a stream provide the information outlined in (a) through (g) below. All plans for stream relocations and channel changes must be certified by a qualified registered professional engineer. (Note: Stream variance request must be included in the proof of publication.)

a) Name and location of stream and location and length of the proposed channel change (identify the location of the proposed activities on Exhibits 9.1 and 18.1);

Refer to Module 15.1.a.

b) A narrative giving a description and the purpose and justification of the proposed relocation or channel change;

Refer to Module 15.1.b.

c) A characterization of the resident aquatic community, a description of the riparian vegetation and an assessment of the probable hydrologic consequences of the proposed activities on the water quality and quantity, and the resident aquatic communities. Provide the name(s), address(es) and telephone number(s) of the individual(s) responsible for the collection and analysis of this data and provide a description of the methodologies used to collect and analyze the data;

Refer to the Biological Resources report presented as Attachment 15.1 for a characterization of the resident aquatic community, a description of the riparian vegetation, and a description of methodologies used to collect and analyze the data. This report was prepared by:

Dale E. Pike, PhD and Bradford B. Owen Jr., PhD
Pike Environmental Consulting
784 Craynes Run Road
Waynesburg, PA 15370-2766
(724) 627-9691

Hydrologic performance of the proposed facility is expected to be at least the same as that of the existing Bailey Central Mine Complex disposal facility, especially since the hydrogeologic setting of both sites are similar. In fact, performance of the proposed facility should exceed that of the existing facility since the proposed facility, unlike the existing facility, will be provided with an on-site soil liner. More detailed discussion of expected water quality impacts from Coal Refuse Disposal Areas No. 3 and No. 4 are presented in Module 8.

Proposed Coal Refuse Disposal Areas No. 3 and No. 4, like the existing Bailey disposal facility, are not expected to adversely impact water quantity. Stream base flow will be carried under the disposal areas in a rock drain and site runoff ultimately will be discharged into the unnamed tributary after passing through the sedimentation pond. Proposed site development will not increase but should decrease flood flows; runoff will be controlled by the slurry impoundment and sedimentation ponds. CPCC plans to recycle slurry impoundment supernatant to the preparation plant, through the existing disposal facility. Based on CPCC's experience at the existing disposal facility, recycling of process water should have no detrimental impact on downstream water quantity.

CPCC proposes to mitigate the impacts of the stream loss by implementing the attached mitigation plan (Attachment 15.2.c). This plan proposes to fund the enhancement of fish and wildlife habitat in a nearby watershed in Greene County and to fund biological monitoring of these habitat improvements to mitigate stream losses. Mitigation will begin prior to site development and will continue concurrent with Stage I development. The mitigation plan provides for stream monitoring to document improvement levels that are achieved. Remedial action will be initiated for this mitigation plan if improvement goals outlined in the plan have not been achieved within 5 years.

d) A hydrologic and hydraulic analysis which includes;

1) Data on size, shape and characteristics of the watershed;

2) The size and frequency of the design storm;

3) The hydraulic capacity of the proposed replacement channel;

4) The hydraulic capacity of the stream channel upstream and downstream of the proposed relocation or channel change.

Refer to Module 15.1.c.

e) A stream profile for the existing and proposed channel for a reasonable distance upstream, downstream and within the proposed change, showing bed slopes, pool-riffle ratios, normal and flood water surfaces, and existing obstructions;

A profile of the main unnamed tributary and the major side branch tributary is presented as Attachment 15.2.e Stream conditions are described in the Biological Resources Report (Attachment 15.1). Pool-riffle ratios are not applicable.

f) A detailed plan and cross sections of the existing and proposed channel upstream, downstream and within the proposed channel change showing the limits and configuration of the proposed activities, dimensions, channel linings, and normal and flood water surfaces;

Refer to the Construction Drawings presented in Module 21.

g) A description of the construction methods and sequence including: water handling during construction, erosion and sedimentation controls, and measures to be taken to prevent adverse impacts to water quality and quantity, water users and the aquatic communities, and measures for environmental enhancement if practicable.

Refer to the Construction Drawings presented in Module 21.

h) A characterization of the existing water quality and quantity of the stream, including downstream water uses and 25 PA Code Chapter 93 Protection Water Use Classification.

Refer to Module 15.1.g.

15.3 Wetland Related Information. Provide the name, address, and phone no. of person conducting the wetland delineation.

a) Complete Form 15A to provide inventory and classification information on all wetlands which occur on or within the permit area of surface mining activity sites. In completing the form, answer "yes" or "no" to the following questions as they pertain to each wetland.

Exceptional Value Wetland Characteristics

1) Does the wetlands serve as habitat for flora and fauna listed as "threatened" or "endangered" under the Endangered Species Act of 1973, or Wild Resource Conservation Act, Fish and Boat Code, or Game and Wildlife Code?

2) Is the wetland hydrologically connected to or located within 1/2 mile of another wetland which serves as habitat of "threatened" or "endangered" species, and does it serve to maintain the habitat in that wetland?

3) Is the wetland located in or along the floodplain of a wild trout stream (as designated by the Pennsylvania Fish and Boat Commission), or the floodplain of a tributary to a wild trout stream?

4) Is the wetland located in or along the floodplain of a stream listed as exceptional value (under Chapter 93) or the floodplain of a tributary to an exceptional value stream?

5) Is the wetland within the corridor of a waterway which has been designated as a wild or scenic river in accordance with the Wild and Scenic Rivers Act of 1968 or the PA Scenic Rivers Act?

6) Is the wetland part of, or located along, an existing public or private drinking water supply and does it maintain the quality or quantity of the drinking water supply?

7) Is the wetland located in an area designated by the Department as "natural" or "wild" area within state forest, game or park lands?

8) Is the wetland located in an area designated as a Federal Wilderness Area under the Wilderness Act or the Federal Eastern Wilderness Act of 1975?

9) Is the wetland located in an area designated as a National Natural Landmark by the Secretary of the Interior under the Historic Sites Act of 1935?

NOTE: If a "yes" response is indicated for any question in (1) through (9) above, the wetlands would be "exceptional value"(as defined in 25 PA Code Section 105.17) and a demonstration must be made that the requirements of subsection (a) of 25 PA Code Section 105.18(a) have been met (See copy of Section 105.18(a) at the end of this Module).

Wetland Functions

10) Does the wetland serve natural biological functions, including food chain production; general habitat; and nesting, spawning, rearing or resting sites for aquatic or land species?

11) Does the wetland provide areas for study of the environment, or as sanctuaries or refuges?

12) Does the wetland aid in, or maintain natural drainage characteristics, natural water filtration processes, current (flow) patterns or other environmental characteristics?

13) Does the wetland serve as a storage area for flood and storm waters, or does it shield other areas from erosion or storm damage?

14) Does the wetland provide recharge to local streams that maintains minimum baseflows?

15) Does the wetland serve as a prime natural discharge area where surface water and groundwater are directly connected?

16) Does the wetland aid in the prevention of pollution?

17) Is the wetland used for, or does it provide the opportunity to be used for recreation?

15.4 Wetland Impact Analysis/Assessment

a) Describe the alternatives to the proposed surface mining activities that have been considered to avoid or minimize impacts on wetlands. An alternative analysis should include alternatives to the proposed surface mining activities, including alternative locations, routings or designs to avoid adverse impacts on the wetlands (i.e. relocating spoil/topsoil storage areas, rerouting haul roads).

Refer to the Alternatives Analysis that was submitted for this project to PADEP McMurray District Mining Office and approved on August 1, 2001.

b) Discuss whether any of the alternatives considered in (a) are practical to achieve the basic purposes of the project taking into account availability, cost, technology and logistics of the other possible project sites which would not affect wetlands?

Wetland impacts at the site are unavoidable. Refer to the Alternatives Analysis that was submitted for this project to PADEP McMurray District Mining Office and approved on August 1, 2001.

c) If any wetlands will be directly affected, provide the following:

1) Identify the wetland and the areal extent of the impact.

All of the wetlands listed on Form 15A will be completely impacted and removed by the proposed activities. Figure 2 of Attachment 15.1 shows the location and approximate extent of the existing wetland areas.

2) Submit a cross-sectional view showing the wetland and the proposed disturbed area.

Cross sectional views of valley bottom areas where the wetlands are located are included with the Module 21 Construction Drawings

3) Explain how the proposed activities will directly affect the hydrology, functions and values of the wetlands.

i) If the proposed surface mining activities will affect less than 1.0 acre of wetland and the wetland is not an exceptional value wetland (in accordance with 25 PA Code Section 105.17), provide a description and probable degree of impact to the wetland functions and values which will be impacted by the proposed mining activities. NOTE: If a "yes" response is indicated for any question in 15.3 (a)(1)-(9), the wetlands would be exceptional value (as defined in Section 105.17).

ii) If the proposed surface mining activities will affect 1.0 or more acres of wetlands or may affect an exceptional value wetland, provide a detailed assessment of the wetland functions and values identified in 15.3 (a)(10)-(17). Provide extent or degree of impact to each function and value.

A detailed assessment of wetland functions is included in Attachment 15.5. As indicated by that report and the Attachment 15.1 report, very few of the Area No. 3 wetlands are in

a natural state and most have been highly disturbed by cattle traffic. Wetland areas encompassing springs and seeps serve as groundwater discharge areas. Proposed construction provides for spring and seep flow to be intercepted and carried under the project site in an underdrain. Erosion and sedimentation and flood control provided by the wetlands will be replaced by proposed facilities detailed in the Module 21 Construction Drawings.

d) If any wetlands will be indirectly affected by surface mining activities (e.g. altering the wetland hydrology):

1) Identify the wetland and provide an estimate of the total wetland acreage affected. Describe the functions or values to be impacted and the degree of impact.

2) Provide a description of how the proposed surface mining activities will indirectly affect the wetlands' functions and values.

No indirect wetland impacts are anticipated.

e) Indicate whether the cumulative impact of the proposed and anticipated surface mining activities result in a major impairment of the wetland resource in the general area, provide an explanation of the determination and identify any contacts with state or federal agencies involved in making the determination.

Cumulative impacts of the proposed surface mining activities will not result in a major impairment of wetland resources in the general area. Any wetland impacts will be mitigated/replaced as described in Module 15.5. The proposed activity will be primarily contained within the watershed of the two unnamed tributaries. Recharge contributed by wetlands and streams within the project site to areas downstream will be maintained by discharge from the proposed sedimentation pond.

f) Where a wetland's hydrology is at risk of being altered by underground coal extraction, as determined by the assessment under Module 8.5, information concerning wetland delineation ad functions must be provided as outlined in Sections 15.3 and 15.4 of this module.

Not Applicable.

15.5 Wetland Mitigation/Replacement. (Sites where less than 0.5 acres of wetland is affected may qualify for mitigation options provided under the Pennsylvania Wetland Replacement Project. Contact the DEP permitting office for details.)

a) If wetland mitigation measures or wetland replacement are proposed, address the following items:

1) Identify the wetlands where mitigation measures will be employed, wetlands that will be replaced, and sites where replacement wetlands will be constructed along with the respective area of each.

2) Provide a plan for mitigation/replacement following the guidelines in the DEP's technical guidance document, entitled "Design Criteria for Wetlands Replacement". (This guidance is available from DEP's Bureau of Water Quality Protection, Post Office Box 8465, Harrisburg, Pennsylvania 17105-8465, telephone 717-787-2666 or through the Department's web site under Technical Guidance # 363-0300-001.

3) Show all affected wetlands, mitigation areas, and replacement sites on Exhibit 9.1; and, in addition, show replacement sites on Exhibit 18.1.

4) Provide a wetlands functions and values comparison of current vs. replacement wetland acreage. In the case of mitigation, a comparison of the known wetlands functions and values and degree of impact to each must be compared to the functions and values of the proposed mitigation site when completed. This comparison of "currently existing" to "probable replacement" allows for a basis of the 1:1 replacement ratio.

Refer to the Attached Wetland Mitigation Plan (Attachment 15.5) for descriptions of affected wetlands and replacement wetlands, including a comparison of functions and values. Affected wetlands also are shown on Exhibit 9.1 and 18.1.

NOTES: At a minimum, wetland replacement must be at a 1:1 ratio (replacement acres:affected acres), although the Department may require the ratio to exceed 1:1 based on the functions and values of the wetlands to be affected.

Wetland replacement sites will generally not be approved unless the site is located within the same general area as the existing wetland to be be replaced.

FORM 15A - WETLAND INVENTORY

Surface Site I.D.	Wetland I.D.	Acreage (acres)	Provide a positive (Y) or negative response (N) to each question under 15.3 as it applies to each wetland. (Column numbers correspond to question numbers).																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Area No. 3	S-1	0.055	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-2	0.008	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-3	0.067	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-4	0.209	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	N	Y	N
	S-5	0.050	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-6	0.022	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-7	0.090	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-8		N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-9	0.020	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-10	0.435	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-11	0.048	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-12	0.004	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-13	0.048	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-14	0.021	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-15	0.080	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-16	0.031	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-17	0.009	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-18	0.045	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	S-19	0.012	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	Total	**1.254**																	

Surface Site I.D.	Wetland I.D.	Acreage (acres)	Provide a positive (Y) or negative response (N) to each question under 15.3 as it applies to each wetland. (Column numbers correspond to question numbers).																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Area No. 4	R-1	0.026	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	R-2	0.009	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	R-3	0.014	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	R-4		N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	R-5	0.004	N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	R-6		N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	R-7		N	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	Y	Y	N
	Total	**0.053**																	

ATTACHMENT 15.1

BIOLOGICAL RESOURCES REPORT

BIOLOGICAL RESOURCES

OF

THE PROPOSED BAILEY MINE REFUSE

AND SLURRY VALLEYS,

GREENE COUNTY, PENNSYLVANIA

By

Dale E. Pike, Ph.D.

and

Bradford B. Owen Jr., Ph.D.

for

Consol Pennsylvania Coal Company

August 8, 2001

INTRODUCTION

Consol Pennsylvania Coal Company is planning to develop new coal refuse disposal and slurry impoundment facilities for the Bailey Mine in the valley of an unnamed tributary to Enlow Fork of Wheeling Creek southeast of the mine's existing facilities (Figure 1). The site consists of the mainstem of the unnamed tributary where the slurry impoundment will be constructed and a major side branch of that tributary in which coal refuse will be disposed. Biological evaluations were made of each valley during May and June, 2001 to locate and delineate wetlands, determine the length of non-ephemeral stream channels that could be impacted by construction and to informally assess aquatic macroinvertebrate populations of the project sites.

METHODS

Each valley was walked to locate wetlands in the floodplain. All tributary drainages were walked to their sources, since wetlands are often located in spring or seep origins of tributaries. Terraces and slumps at the elevation of the tributary sources were checked for possible wetlands.

The mainstream channel in each valley and all of its tributaries were walked to determine where flows became ephemeral. Prior to the visits there had been a period of rain heavy enough to wash out leaf litter normally found in ephemeral channels during the spring, making the distinction between ephemeral and non-ephemeral channels difficult. Therefore, portions of channels with defined substrates and the presence of aquatic organisms normally requiring at least subsurface flow to complete their lifecycles were considered non-ephemeral. The intermittent and perennial portions of the stream channels were measured and lengths recorded.

Macroinvertebrates were collected from the main stem of each valley and selected points in the tributaries. In the main stem streams composite samples were made from stream segments than appeared to have similar substrates and flows. Where major tributaries entered the main stem new composite samples were taken. A total of five samples were collected from each valley (Figure 1). Collections were made with a D-frame kick-net and by hand picking specimens from leaf-packs and stream substrates. The samples were preserved and returned to the lab for sorting

of specimens from sample debris and identification to the lowest practical taxon. Identifications were made with the aid of taxonomic keys found in Merritt and Cummins (1996); Peckarsky, et al. (1990); Stewart and Stark (1993) and Jezerinac, et al. (1995).

Each valley was surveyed in the field in detail according to the Routine Wetland Determination methods of the Army Corps of Engineers Manual (Environmental Laboratory, 1987). Jurisdictional wetlands were staked by the author and surveyed by Blue Mountain Engineering. Plant identification was primarily according to Strausbaugh and Core (undated) with assistance from other plant guides, and nomenclature was updated according to the synonymy in Reed (1997). Plant indicator categories were taken from the Revision of the National List of Plant Species that Occur in Wetlands (ibid). Soils were classified according to the soil survey of Greene and Washington Counties (U.S. Dept. of Agriculture et al., 1983) and their hydric classification was according to the list of hydric soils of the United States (U. S. Dept. of Agriculture, 1991). Detailed field data and the plant indicator categories are summarized on the attached "Standard Data Form 1" from the Army Corps of Engineers Manual (Environmental Laboratory, 1987). Locations of jurisdictional wetlands are shown in Figure 2.

RESULTS – JURISDICTIONAL WETLANDS

REFUSE VALLEY

With few exceptions, the wetlands of the refuse valley were streamside or seep areas with relatively heavy forest cover.

Wetland R-1 is a small wetland (0.026acres) resulting partly from ATV traffic. It had an inundated area about two meters square, while the rest of the wetland varied from saturated soils to dryer areas, resulting in a variety of plants being common. *Bidens frondosa* was dominant around the inundated area, while *Poa trivialis* and *Glyceria striata* dominated the spring flora in surrounding areas.

Wetlands R-2 and R-3 are relatively small somewhat marginal streamside and seep wetlands (0.009 and 0.014 acres, respectively). Wetland R-3 has a number of *Lindera benzoin*, typical of much of the flood plain in this area.

0.033

Wetland R-4 is a somewhat larger streamside wetland, with shallow soils over gravel. Its spring flora was dominated by *Poa trivialis* while *Impatiens capensis* (as in all future references, could be *I. Pallida* – couldn't be determined in spring collections) was appearing likely to be the late season dominant.

Wetland R-5 is a very small seep wetland (0.004 acres) in heavy forest, and its spring flora was dominated by *Carex prasina*, with *Impatiens capensis* likely to become the late season dominant. Wetlands R-6 and R-7 are two spring-seep wetlands at the headwaters of the Refuse Valley. Both are in heavy forest cover, but had different dominant spring herbs. Carex prasina dominated Wetland R-6, while Impatiens capensis dominated Wetland R-7.

0.012 0.004

SLURRY VALLEY

Jurisdictional wetlands of the Slurry Valley varied greatly in size, cover and plant composition. The valley was only partially wooded and most of it was heavily impacted by cattle grazing.

Wetlands S-1 and S-2 are small (0.055 and 0.008 acres, respectively) wetlands recently created by the adjacent railroad embankment. Both are in completely open areas and are heavily dominated by *Typha latifolia* with lesser amounts of other wetland and transitional species. These are low quality wetlands.

Wetland S-3 is another small wetland (0.067 acres) in an open area, with spring vegetation dominated by grasses with a few sedges and other taxa mixed in.

Wetland S-4 is a fairly large wetland (0.209 acres) in a mostly open area. It has areas with almost an inch of water standing between vegetation clumps, but the majority of this wetland is a wet meadow with soil saturation a few inches below the surface. A great variety of herbs grow

in this wetland, with some areas dominated in the spring by *Glyceria striata* and others by *Typha latifolia* or *Poa trivialis.* Late season vegetation will find *Aster puniceus*, *Carex* species and *Polygonum sagittatum* becoming the dominants in most of the areas where spring grasses were dominant.

Wetland S-5 is a small wetland (0.050 acres) that includes a small pooled area and surrounding wet areas dominated by a sparse cover of *Glyceria striata, Bidens frondosa* and a few other taxa. This wetland appears to be the result of an old channel that has been abandoned by the stream, while still maintaining water by virtue of a nearby seep.

Wetland S-6 is a seep area (0.022 acres) in a power line right of way. Having almost no cover it supports a dense herbaceous layer dominated by *Polygonum hydropiperoides* and *Carex frankii*, with a large spring season representation of *Poa trivialis*. *Impatiens capensis* and *Bidens frondosa* will likely dominate some of the wetland in late season.

Wetlands S-7 and S-8 are streamside areas heavily impacted by cattle. Most of the soils were dug up and much of the vegetation either grazed or mashed by cattle. Wetland 7 was dominated by in the spring sampling by a mixture of *Leersia virginica, Bidens frondosa* and *Poa trivialis*. Wetland S-7 is a seep area near Wetland S-6 that was dominated by *Poa trivialis* and *Pilea pumila* in the spring sampling. Late season vegetation will be dominated by *P. pumila* and possibly *Polygonum hydropiperoides.* 0.09 0.013

Wetland S-9 (0.020 acres) is an area where the stream spread over a large flat area and created an island of gravely soils that supported some wetland vegetation. *Poa trivialis* and *Pilea pumila* dominated the spring vegetation and again late season vegetation will likely be dominated by *P. pumila* and *Polygonum hydropiperoides.*

Wetland S-10 is the largest wetland of the Slurry Valley (0.435 acres). It encompassed a large relatively flat wet meadow with some areas saturated to the surface, grading to transitional areas. Spring vegetation was dominated by a number of grasses and sedges and smooth rush, depending on the specific area.

Wetland S-11 is a small wetland (0.048 acres) in an open area below an abandoned pond. Its spring flora was dominated by *Carex frankii* with the grasses *Bromus inermis* and *Glyceria striata* also very common. *B. inermis* is a UPL rated grass that dominated the adjacent grazed pasture and despite its rating seemed to be thriving in the wetland environment – possibly because it withstands grazing better than its would – be competitors.

Wetland S-12 is a tiny (0.004 acres) wetland at the headwaters of a small tributary. It was heavily impacted by cattle and had spring vegetation dominated by *Poa trivialis* with *Polygonum hydropiperoides* likely to dominate latter in the season.

Wetland S-13 is a wet area (0.048 acres) within the old abandoned and breached impoundment. A small area of standing water was surrounded by mud flats with sparse vegetation dominated in the spring by *Poa trivialis* and a few wetland plants with *Bromus inermis* again quite common.

Wetland S-14 is a small seep area (0.021 acres) adjacent to the main stream. It was an open area dominated by two sedges and smooth rush, despite the heavy grazing by cattle.

Wetlands S-15 and S-16 are areas (0.080 and 0.031 acres, respectively) very heavily disturbed by cattle loafing, with much of the vegetation destroyed and soils a mass of deep hoof prints. Wetland S-15 was in an area partially shaded by a *Craetagus* thicket. It had scattered vegetation often dominated by *Bidens frondosa.* Wetland S-16 was mostly bare mud with a scattering of plants, *Pilea pumila* being the most abundant.

Wetlands S-17, S-18 and S-19 are headwater wetlands (0.009, 0.045 and 0.012 acres, respectively) that were in mostly open areas. Despite the heavy grazing by cattle, a variety of vegetation remained, with each area having its own dominant wetland plant, but all areas again having a fair amount of *Bromus inermis* that had invaded from adjacent pasture.

RESULTS—AQUATIC RESOURCES

Spring fed streams in southwest Pennsylvania often have perennial or intermittent flows for a short distance from their source and then become ephemeral to some point downstream where flows once again become at least intermittent. This was the case encountered in the drainages visited during this investigation.

Figure 1 shows the non-ephemeral stream channels in the project area. From the existing Bailey Railroad grade culvert upstream through the valley that is the site of the proposed slurry disposal facility approximately 9898 feet of non-ephemeral stream channel were identified. The valley proposed for coarse refuse disposal had about 3300 feet of non-ephemeral stream channel from its confluence with the main stem channel to its headwaters.

Substrates were quite variable over the entire length of stream investigated. No effort was made to quantitatively characterize stream substrates, but it was noted that there were areas of fine substrates in the headwater and some downstream sections of the streams. Large stretches of channel had gravels and cobble size materials. Shortly after stream measurements and macroinvertebrate collections were made the project area experienced an extremely heavy storm event resulting in major scouring of streambeds in the drainage. Gravel and finer size materials were washed out and deposited across the valley floodplain. Larger size materials were repositioned in the streambed with a large percentage of the aquatic biota disturbed or likely destroyed.

The slurry disposal valley is currently used for cattle grazing resulting in stream banks and some riparian areas being heavily damaged. Several areas used for resting or congregation within the floodplain are devoid of vegetation and have soils churned up due to cattle activity. The proposed refuse disposal valley has not been recently grazed, but sections of the streambed have been disturbed by four-wheelers crossing or running in the stream channel.

Macroinvertebrate survey results for the proposed slurry impoundment and refuse disposal valleys are presented in Tables 1 and 2, respectively. Sampling of aquatic organisms was qualitative, so the Tables only show the presence of a particular taxon at a sampling station. The streams in both valleys had relatively diverse aquatic communities consistent with those found in southwest Pennsylvania. The larger number of taxa found in the proposed slurry impoundment valley is probable due to that stream being larger and providing more habitat types than the smaller valley proposed for coal refuse disposal.

CONCLUSIONS

Both the Refuse and Slurry valleys had a number of small wetlands associated with the streams in each valley - typical of southwestern Pennsylvania watersheds. The Refuse Valley contained seven discrete Jurisdictional Wetlands totaling only 0.102 acres, while the Slurry Valley contained 19 Jurisdictional Wetlands totaling 1.259 acres. The wetlands of the Refuse Valley were mostly very small streamside or seep wetlands under heavy woodland cover. Most were relatively undisturbed natural wetlands of the sort commonly seen associated with stream origins and flood plains in southwestern Pennsylvania. Wetlands of the Slurry Valley ranged from wet meadows to headwater seep wetlands. Only Wetlands S-1 to S-3 were not impacted by cattle traffic and grazing. Very few of the Slurry Valley wetlands were in a natural state and most were so highly disturbed that it is difficult to say what the natural vegetation should have been.

The macroinvertebrate fauna of the streams in the proposed project site were typical of small streams in this part of Pennsylvania. Many of the stream channels had been disturbed to some degree. The Refuse Valley had some disturbance from four-wheeler traffic, while the stream channel in the Slurry Valley was heavily impacted by pastured cattle. The aquatic biota of the latter stream, relative to a similar size stream in an un-grazed valley, is probably reduced in numbers of individuals, if not in numbers of taxa, due to cattle activity. In addition, extremely heavy late spring rains had washed out or repositioned most substrates in both valleys impacting the aquatic communities at least for the short term.

REFERENCES

Environmental Laboratory. 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87. U. S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

Jezerinac, Raymond F., G. Whitney Stocker and Donald C. Tarter. 1995. The Crayfishes (Decapoda: Cambaridae) of West Virginia. Ohio Biol. Surv. Bull. New Series Vol. 10 No. 1. x + 193 p.

Merritt, Richard W. and Kenneth W. Cummins. 1996. An Introduction to the Aquatic Insects of North America. 3rd Ed. Kendall/Hunt Publishing Company. 862 p.

Peckarsky, Barbara L., Pierre R. Fraissinet, Marjory A. Penton and Don J. Conklin, Jr. 1990. Freshwater Macroinvertebrates of Northeastern North America. Cornell University Press. 442 p.

Reed, P. B., Jr. 1997. Revision of the national list of plant species that occur in wetlands. U.S. Dept. of Interior, Fish and Wildlife Service. January 15, 1997. 462pp.

Stewart, Kenneth W. and Bill P. Stark. 1993. Nymphs of North American Stonefly Genera (Plecoptera). University of North Texas Press. 460 p.

Strausbaugh, P. D., and E. L. Core. Undated. Flora of West Virginia. Seneca Books, Inc. Grantville, WV. 1079 pp.

U. S. Department of Agriculture Soil Conservation Service, and Pennsylvania State University . 1983. Soil survey of Greene and Washington Counties, Pennsylvania. 93pp. plus maps.

U. S. Department of Agriculture Soil Conservation Service. 1991. Hydric soils of the United States. U.S. Dept. Of Agriculture Misc. Publ. No. 1491. Unpaged.

Table 1. Macroinvertebrates Collected From the Proposed Slurry Impoundment Site, Bailey Mine, Greene County, Pennsylvania, June 4, 2001

Taxon	STA 1	STA 2	STA 3	STA 4	STA 5
Oligochaeta					
Enchytraeidae			✔	✔	
Lumbriculidae	✔		✔	✔	✔
Bivalvia					
Pisidium	✔				✔
Gastropoda					
Fossaria					✔
Gyraulus	✔				
Physella	✔	✔			✔
Ephemeroptera					
Ameletus			✔		
Baetis	✔	✔	✔		
Eurylophella	✔				
Stenonema	✔	✔	✔	✔	✔
Odonata					
Cordulegaster	✔	✔		✔	
Plecoptera					
Amphinemura	✔	✔	✔	✔	✔
Beloneuria	✔	✔			✔
Diploperla		✔			
Isoperla	✔	✔	✔	✔	✔
Hemiptera					
Microvelia		✔		✔	

Table 1. Macroinvertebrates Collected From the Proposed Slurry Impoundment Site, Bailey Mine, Greene County, Pennsylvania, June 4, 2001 (continued)

Taxon	STA 1	STA 2	STA 3	STA 4	STA 5
Trichoptera					
Chimarra					✔
Eocosmoecus		✔			
Ironoquia				✔	
Lepidostoma				✔	
Limnephilidae (pupa)					✔
Limnephilus	✔	✔			
Neophylax		✔		✔	✔
Lepidoptera					
Acentria			✔		
Coleoptera					
Agabetes				✔	✔
Hydrobius					✔
Hydroporus		✔			✔
Laccobius				✔	✔
Stenus		✔			
Megaloptera					
Nigronia	✔				
Diptera					
Brachypremna	✔	✔		✔	✔
Chironomidae	✔	✔	✔	✔	✔
Chrysops				✔	
Dicranota				✔	
Limnophila		✔			
Pedicia				✔	
Scatella	✔				
Tipula	✔	✔		✔	✔

Table 1. Macroinvertebrates Collected From the Proposed Slurry Impoundment Site, Bailey Mine, Greene County, Pennsylvania, June 4, 2001 (continued)

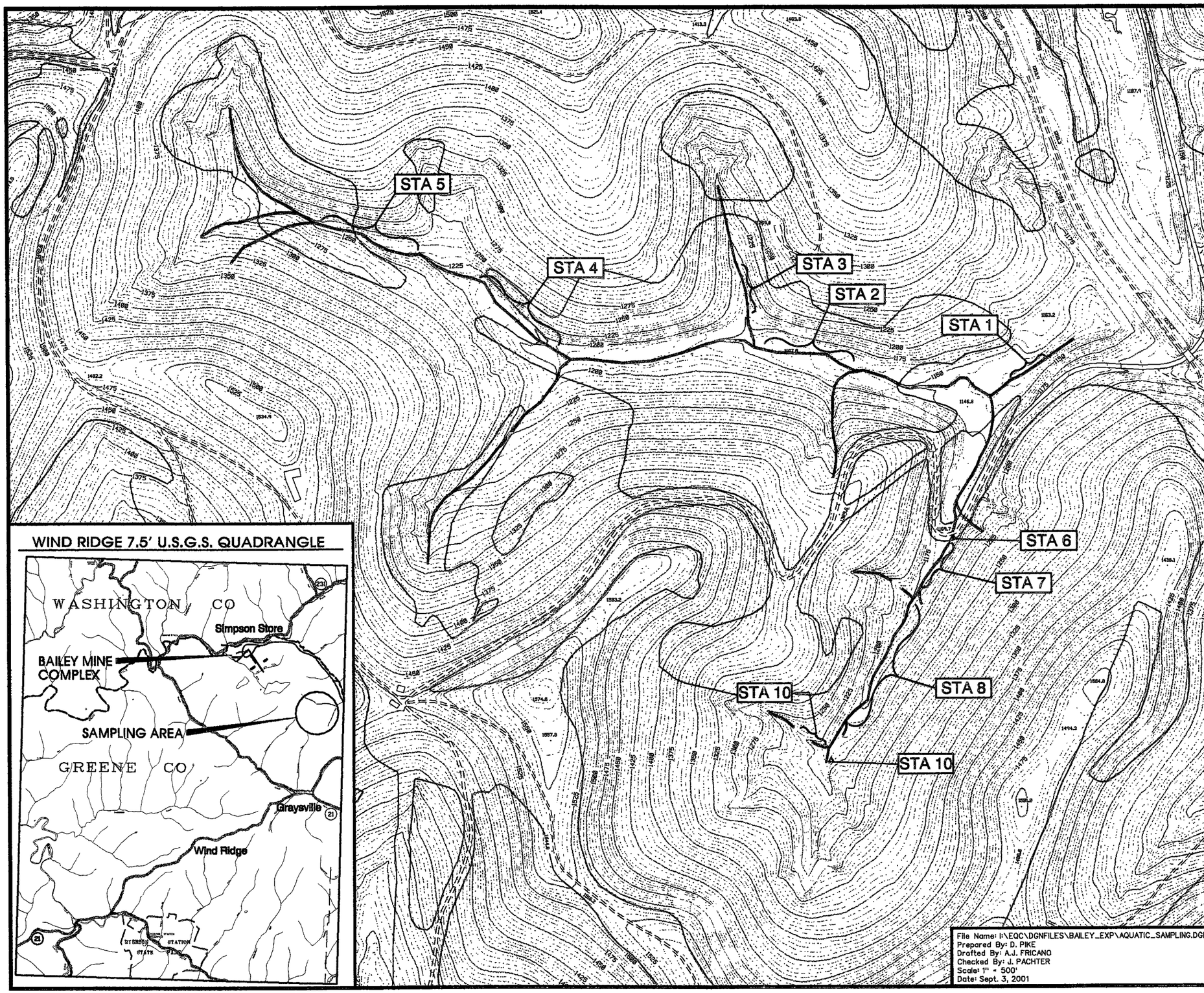
Taxon	STA 1	STA 2	STA 3	STA 4	STA 5
Amphipoda					
Crangonyx	✔				
Decapoda					
♀ *Cambarus*					✔
juv. *Cambarus*	✔	✔			✔
Total Taxa	19	21	9	17	19

Table 2. Macroinvertebrates Collected From the Proposed Refuse Disposal Site, Bailey Mine, Greene County, Pennsylvania, May 22, 2001

Taxon	STA 6	STA 7	STA 8	STA 9	STA 10
Oligochaeta					
Lumbriculidae			✔		
Ephemeroptera					
Ephemerella	✔	✔			✔
Paraleptophlebia	✔		✔		✔
Stenacron	✔	✔	✔		
Stenonema	✔				
Plecoptera					
Amphinemura	✔	✔			✔
Diploperla	✔	✔	✔		
Diura		✔			
Isoperla	✔	✔	✔	✔	✔
Peltoperla	✔		✔	✔	✔
Sweltsa		✔			
Trichoptera					
Diplectrona	✔	✔	✔	✔	
Ironoquia		✔			
Lepidostoma		✔			
Pycnopsyche			✔	✔	

Table 2. Macroinvertebrates Collected From the Proposed Refuse Disposal Site, Bailey Mine, Greene County, Pennsylvania, May 22, 2001 (continued)

Taxon	STA 6	STA 7	STA 8	STA 9	STA 10
Coleoptera					
Anchytarus				✔	
Megaloptera					
Nigronia	✔		✔	✔	
Diptera					
Chironomidae		✔			✔
Chrysops	✔				
Cryptolabis	✔			✔	
Limnophila	✔	✔		✔	✔
Pedicia				✔	✔
Pseudolimnophila				✔	
Tipula		✔	✔		
Amphipoda					
Crangonyx		✔			
Decapoda					
Cambarus bartonii		✔	✔		
juv. *Cambarus*	✔	✔		✔	
Total Taxa	14	15	11	11	8



NON-EPHEMERAL STREAM

STA 3 AQUATIC SAMPLING STATION

PRELIMINARY PRINT
Subject To Revision

Figure 1

AQUATIC SAMPLING AND NON-EPHEMERAL STREAM SEGMENTS OF THE PROPOSED BAILEY MINE REFUSE AND SLURRY DISPOSAL VALLEYS GREENE COUNTY, PA

Scale: 1" = 500'

0 500' 1,000'

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Refuse Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No R-1** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Poa trivialis***	**FACW**
2.		8. ***Glyceria striata***	**OBL**
3.		9. ***Bidens frondosa***	**FACW**
Saplings/shrubs		10 ***Aster puniceus***	**OBL**
4.		11. ***Carex lurida***	**OBL**
5.		12. ***Scirpus microcarpus***	**OBL**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **N5/**
Gleyed: Yes **X**; No____. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, gleyed, saturation**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 3 inches**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **+3 to -3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils and an area of inundation**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: [signature]

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Refuse Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No R-2** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Impatiens capensis***	**FACW**
2.		8. ***Pilea pumila***	**FACW**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Leersia virginica***	**FACW**
4.		11. ***Ranunculus recurvatus***	**FAC**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No___.Basis: ***I. Capensis* (FACW) totally dominated the vegetation**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes **X** No_____
Mottled: Yes **X**; No____. Mottle color: **5YR 5/6**; Matrix color: **10YR 5/2**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low matrix chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0-4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **Soils saturated to near surface**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____

Determined by: Bradford B. Owen

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Refuse Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No R-3** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Poa trivialis***	**FACW**
2.		8. ***Pilea pumila***	**FACW**
3.		9. ***Impatiens capensis***	**FACW**
Saplings/shrubs		10. ***Leersia virginica***	**FACW**
4. ***Lindera benzoin***	**FACW-**	11. ***Polygonum virginianum***	**FAC**
5. ***Acer negundo***	**FAC+**	12. ***Ranunculus recurvatus***	**FAC**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Most abundant plants rated FACW**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **2.5YR 5/8**; Matrix color: **10YR 6/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **4-6 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No___. Basis: **Saturation to 4-6 inches, mottles and low chroma soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____

Determined by: Bradford B. Brown

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Refuse Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No R-4** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Poa trivialis***	**FACW**
2.		8. ***Impatiens capensis***	**FACW**
3.		9. ***Lysimachia nummularia***	**FACW-**
Saplings/shrubs		10. ***Aster punicius***	**OBL**
4. ***Lindera benzoin***	**FACW-**	11. ***Leersia virginica***	**FACW**
5.		12. ***Ranunculus recurvatus***	**FAC**
6.		13. ***Carex prasina***	**OBL**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Most abundant plants are rated FACW**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **10YR 3/2**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low soil chroma and saturation to near surface**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0-3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **Soils saturated to near surface**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____

Comments:_____.

Determined by: Bradford B. Powers

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Refuse Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No R-5** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Impatiens capensis***	**FACW**
2.		8. ***Carex prasina***	**OBL**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Cardomine rotundifolia***	**OBL**
4. ***Acer negundo***	**FAC+**	11. ***Leersia virginica***	**FACW**
5. ***Lindera benzoin***	**FACW-**	12. ***Pilea pumila***	**FACW**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are rated FACW or OBL**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes___ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **N3/**
Gleyed: Yes **X**; No____. Other indicators: **saturation to near surface**
Hydric soils: Yes **X**; No____. Basis: **Soil color, gleyed, saturation to near surface**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0.5-3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **Soils saturated to near surface**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford B. Clauer

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Refuse Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No R-6** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Carex prasina***	**OBL**
2.		8. ***Impatiens capensis***	**FACW**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Pilea pumila***	**FACW**
4.		11. ***Leersia virginica***	**FACW**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **All common plants are rated OBL or FACW**.

Soil
Series and phase: **Dormont-Culleoka silt loams** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **5YR 4/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, saturation to near surface**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0-3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **Saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____

Determined by: Bradford B Clemens

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Refuse Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No. R-7** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Impatiens capensis***	**FACW**
2.		8. ***Poa trivialis***	**FACW**
3.		9. ***Carex prasina***	**OBL**
Saplings/shrubs		10 ***Pilea pumila***	**FACW**
4.		11. ***Laportea canadensis***	**FAC**
5.		12. ***Cryptotaenia canadensis***	**FAC**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____
Hydrophytic vegetation: Yes **X**; No____. Basis: **dominant vegetation is FACW or OBL**

Soil
Series and phase: **Dormont-Culleoka silt loams** On hydric soils list? Yes____; No **X**.
Mottled: Yes____; No **X**. Mottled color:_____; Matrix color: **5PB 5/1**
Gleyed: Yes **X**; No____. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Gleyed, saturated soil**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 - 2 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **Soils saturated to surface or near-surface**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Typical headwater seep wetland**

Determined by: Bradford D. Clemens Jr

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-1** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Typha latifolia***	**OBL**
2.		8. ***Carex lurida***	**OBL**
3.		9. ***Carex vulpinoidea***	**OBL**
Saplings/shrubs		10. ***Agrimonia parviflora***	**FACW**
4.		11. ***Carex granularis***	**FACW+**
5.		12. ***Carex frankii***	**OBL**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **N5/**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, saturation**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **1-4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes **X**; No____.

Normal Circumstances: Yes____ No **X**.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **This wetland appears to have resulted from adjacent railroad construction**.

Determined by: Bradford B. Clauser

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-2** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Typha latifolia***	**OBL**
2.		8. ***Carex scoparia***	**FACW**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Mentha spicata***	**FACW+**
4.		11. ***Impatiens capensis***	**FACW**
5.		12. ***Agrimonia parviflora***	**FACW**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: ***T. Latifolia* (OBL) totally dominated**

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **N5/**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, saturation**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 3 inches**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **+3 to -3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils and an area of inundation**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford B. Clemens Jr.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-3** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Glyceria striata***	**OBL**
2.		8. ***Leersia virginica***	**FACW**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Impatiens capensis***	**FACW**
4.		11. ***Carex lurida***	**OBL**
5.		12. ***Carex frankii***	**OBL**
6.		13. ***Polygonum sagittatum***	**OBL**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **5YR 5/6**; Matrix color: **5N/**
Gleyed: Yes **X**; No____. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **gleyed**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0-4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____

Determined by: Bradford [illegible]

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-4** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Glyceria striata***	**OBL**
2.		8. ***Typha latifolia***	**OBL**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Onoclea sensibilis***	**FACW**
4.		11. ***Aster puniceus***	**OBL**
5.		12. ***Carex lurida***	**OBL**
6.		13. ***Carex laevivaginata***	**OBL**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **5YR 5/6**; Matrix color: **10YR 5/2**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles, saturation**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 1 inch**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **+1 to -3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils and an some inundation**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford B. Clancy

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-5** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Glyceria striata***	**OBL**
2.		8. ***Bidens frondosa***	**FACW**
3.		9. ***Cardamine rotundifolia***	**OBL**
Saplings/shrubs		10. ***Poa trivialis***	**FACW**
4.		11. ***Carex frankii***	**OBL**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Sparsely vegetated by FACW and OBL plants**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **5YR 5/8**; Matrix color: **10YR 5\1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles, saturation**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 4 inches**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **+4 to -4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils and an area of inundation**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford H Lanny

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-6** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Polygonum hydropiperoides***	**OBL**
2.		8. ***Carex frankii***	**OBL**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Impatiens capensis***	**FACW**
4.		11. ***Leersia oryzoides***	**OBL**
5.		12. ***Carex vulpinoidea***	**OBL**
6.		13. ***Bidens frondosa***	**FACW**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **N5/**
Gleyed: Yes **X**; No____. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Gleyed, saturation**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: [signature]

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-7** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Leersia virginica***	**FACW**
2.		8. ***Bidens frondosa***	**FACW**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Impatiens capensis***	**FACW**
4.		11. ***Glyceria striata***	**OBL**
5.		12. ***Pilea pumila***	**FACW**
6.		13. ***Carex vulpinoidea***	**OBL**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **N4/**
Gleyed: Yes **X**; No____. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Gleyed, saturated**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 1 inches**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **+1 to -3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils and very minor inundation**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes____ No **X**.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Very heavily impacted by cattle**.

Determined by: Bradford B. Chung Jr.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-8** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Poa trivialis***	**FACW**
2.		8. ***Pilea pumila***	**FACW**
3.		9. ***Impatiens capensis***	**FACW**
Saplings/shrubs		10. ***Leersia virginica***	**FACW**
4. ***Fraxinus americana***	**FACU**	11. ***Polygonum hydropiperoides***	**OBL**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **83**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant herbs are all rated FACW or OBL; only a few saplings of F. Americana**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **10YR 4/2**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, saturation**

Hydrology
Inundated: Yes____; No____. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Spring - seep area**.

Determined by: [signature]

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-9** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Poa trivialis***	**FACW**
2.		8. ***Pilea pumila***	**FACW**
3.		9. ***Leersia virginica***	**FACW**
Saplings/shrubs		10. ***Polygonum hydropiperoides***	**OBL**
4.		11. ***Onoclea sensibilis***	**FACW**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Dormont-Culleoka silt loam** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **2.5YR 4/8**; Matrix color: **10YR 5/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles, saturation**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____

Determined by: [signature]

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-10** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Glyceria striata***	**OBL**
2.		8. ***Carex lurida***	**OBL**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Juncus effusus***	**FACW+**
4.		11. ***Pilea pumila***	**FACW**
5.		12. ***Carex vulpinoidea***	**OBL**
6.		13. ***Carex stipata***	**OBL**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Dormont-Culleoka silt loam** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **10YR 5/6**; Matrix color: **10YR 5/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 6 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford B. Olmsy

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-11** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Carex frankii***	**OBL**
2.		8. ***Bromus inermis***	**UPL**
3.		9. ***Glyceria striata***	**OBL**
Saplings/shrubs		10. ***Poa trivialis***	**FACW**
4.		11. ***Carex vulpinoidea***	**OBL**
5.		12. ***Carex stipata***	**OBL**
6.		13. ***Mentha piperita***	**FACW+**

% of species that are OBL, FACW, and/or FAC: **86**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Most plants are all rated FACW to OBL; *B. innermis* is an invader from adjacent pasture**.

Soil
Series and phase: **Dormont-Culleoka silt loam** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color:_____; Matrix color: **N5/**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **3 to 6 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils; soil colors**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes____ No **X**.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Area heavily impacted by cattle**

Determined by: [signature]

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-12** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Poa trivialis***	**FACW**
2.		8. ***Polygonum hydropiperoides***	**OBL**
3.		9. ***Bromus inermis***	**UPL**
Saplings/shrubs		10. ***Carex frankii***	**OBL**
4.		11. ***Polygonum cespitosum***	**FACU-**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **60**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: ***P. trivialis* (FACW) was the total dominant**

Soil
Series and phase: **Dormont-Culleoka silt loam** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **10YR 5/6**; Matrix color: **10YR 5/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No____. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Spring-seep area heavily impacted by cattle**.

Determined by: Bradford B. Adams Jr.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-13** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Poa trivialis***	**FACW**
2.		8. ***Bromus inermis***	**UPL**
3.		9. ***Eleocharis* sp.**	**OBL?**
Saplings/shrubs		10. ***Carex frankii***	**OBL**
4.		11. ***Phalaris arundinacea***	**FACW**
5.		12. ***Polygonum hydropiperoides***	**OBL**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **83**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **All plants are all rated FACW to OBL except for B. inermis which invaded from adjacent heavily grazed meadow.**

Soil
Series and phase: **Dormont-Culleoka silt loam** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **2.5YR 4/8**; Matrix color: **10YR 5/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 1 inch**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **+1 to 3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils and an area of inundation**
Atypical situation: Yes **X**; No____.

Normal Circumstances: Yes____ No **X**.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **This wetland is the remnants of a partially drained manmade pond**

Determined by: Bradford A. Clum

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-14** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Carex vulpinoidea***	**OBL**
2.		8. ***Carex frankii***	**OBL**
3.		9. ***Juncus effusus***	**FACW+**
Saplings/shrubs		10. ***Eupatorium perfoliatum***	**FACW+**
4.		11. ***Bromus inermis***	**UPL**
5.		12. ***Polygonum hydropiperoides***	**OBL**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **83**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL; *B. inermis* is an invader from adjacent pasture**.

Soil
Series and phase: **Dormont-Culleoka silt loams** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **5YR 5/1**; Matrix color: **10YR5/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes___; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 - 4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Area is heavily impacted by cattle**.

Determined by: Bradford B. Clough

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-15** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Bidens frondosa***	**FACW**
2.		8. ***Poa trivialis***	**FACW**
3.		9. ***Polygonum hydropiperoides***	**OBL**
Saplings/shrubs		10. ***Echinochloa crus-galli***	**FACU**
4.		11. ***Bromus inermis***	**UPL**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **60**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: Dormont-Culleoka silt loam On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **7.5Y 6/6**; Matrix color: **10YR 6/2**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Area is very heavily impacted by cattle; little vegetation remaining**.

Determined by: Bradford B. Clemmy

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-16** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Pilea pumila***	**FACW**
2.		8. ***Leersia virginica***	**FACW**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Polygonum cespitosum***	**FACU-**
4.		11.	
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **75**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are rated FACW**.

Soil
Series and phase: Dormont-Culleoka silt loams On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **5YR 4/6**; Matrix color: **10YR 6/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 - 3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Area is so heavily impacted by cattle that few plants survive**.

Determined by: Bradford B. Lewis Jr

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-17** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Mentha piperita***	**FACW+**
2.		8. ***Bromus inermis***	**UPL**
3.		9. ***Agrominia parviflora***	**FACW**
Saplings/shrubs		10. ***Carex vulpinoidea***	**OBL**
4.		11. ***Polygonum hydropiperoides***	**OBL**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **80**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are rated FACW to OBL except for *B. inermis* which invaded from adjacent pasture**.

Soil
Series and phase: Dormont-Culleoka silt loam On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **7.5YR 5/8**; Matrix color: **10YR 5/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Area impacted by cattle**

Determined by: [signature]

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-18** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Polygonum hydropiperoides***	**OBL**
2.		8. ***Bromus inermis***	**UPL**
3.		9. ***Carex frankii***	**OBL**
Saplings/shrubs		10. ***Veronica americana***	**OBL**
4.		11. ***Juncus effusus***	**FACW+**
5.		12. ***Carex vulpinoidea***	**OBL**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **83**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL, excepting *B. inermis* which invaded from adjacent pasture**.

Soil
Series and phase: **Dormont-Culleoka silt loam** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **10YR 5/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, saturation**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Area impacted by cattle grazing**.

Determined by: [signature]

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-19** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Carex vulpinoidea***	**OBL**
2.		8. ***Bromus inermis***	**UPL**
3.		9. ***Scirpus cyperinus***	**FACW+**
Saplings/shrubs		10. ***Carex frankii***	**OBL**
4.		11. ***Agrimonia parviflora***	**FACW**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **80**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are rated FACW to OBL, except for B. inermis which invaded from adjacent pasture**.

Soil
Series and phase: **Dormont-Culleoka silt loam** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **7.5YR 4/6**; Matrix color: **10YR 6/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **1 - 4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Area is impacted by cattle**.

Determined by: Bradford B. Clemens

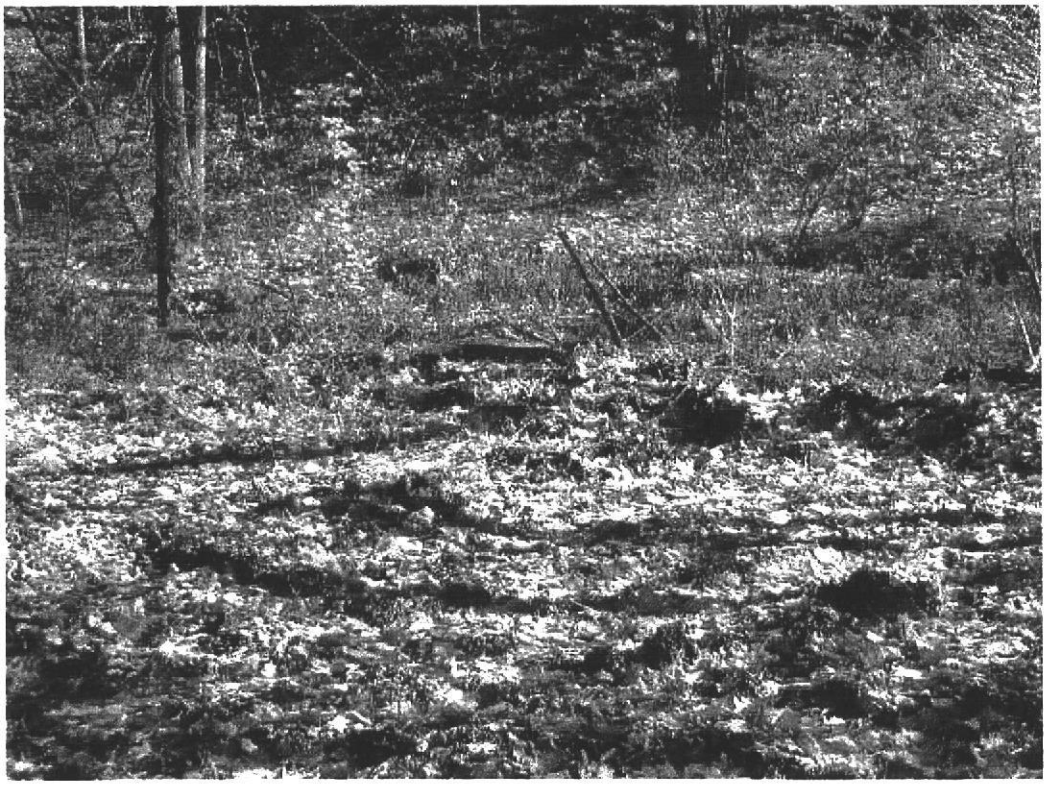


Figure 1. Wetland R-1 in proposed refuse disposal site.

Figure 2. Wetland R-2 in proposed refuse disposal site.

Figure 3. Wetland R-3 in proposed refuse disposal site.

Figure 4. Wetland R-4 in proposed refuse disposal site.

Figure 5. Wetland R-5 in proposed refuse disposal site.

Figure 6. Wetland R-6 in proposed refuse disposal site.

Figure 7. Wetland R-7 in proposed refuse disposal site.

Figure 8. Wetland S-1 in proposed slurry disposal site.

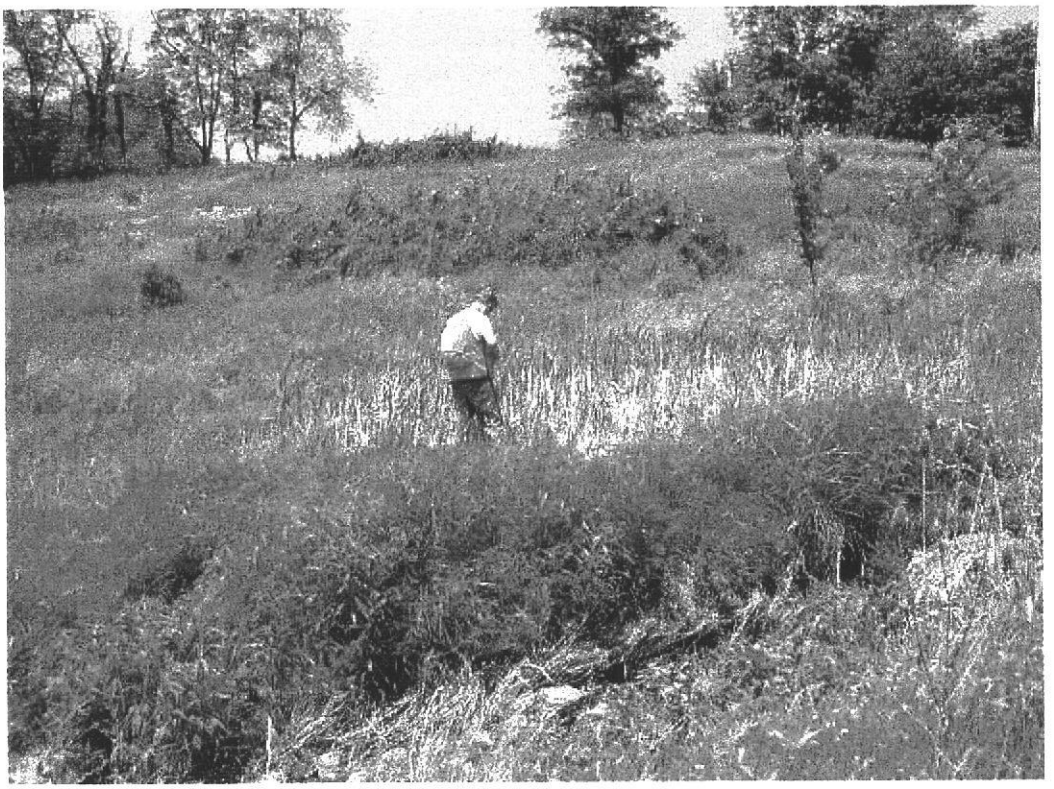


Figure 9. Wetland S-2 in proposed slurry disposal site.

Figure 10. Wetland S-3 in proposed slurry disposal site.

Figure 11. Wetland S-4 in proposed slurry disposal site.

Figure 12. Wetland S-5 in proposed slurry disposal site.

Figure 13. Wetland S-6 in proposed slurry disposal site.

Figure 14. Wetland S-7 in proposed slurry disposal site.

Figure 15. Wetland S-8 in proposed slurry disposal site.

Figure 16. Wetland S-9 in proposed slurry disposal site.

Figure 17. Wetland S-10 in proposed slurry disposal site.

Figure 18. Wetland S-11 in proposed slurry disposal site.

Figure 19. Wetalnd S-12 in proposed slurry disposal site.

Figure 20. Wetland S-13 in proposed slurry disposal site.

Figure 21. Wetland S-14 in proposed slurry disposal site.

Figure 22. Wetland S-15 in proposed slurry disposal site.

Figure 23. Wetland S-16 in proposed slurry disposal site.

Figure 24. Wetland S-17 in proposed slurry disposal site.

Figure 25. Wetland S-18 in proposed slurry disposal site.

Figure 26. Wetland S-19 in proposed slurry disposal site.

Figure 27. Stream channel of the proposed slurry/refuse disposal valley just above existing railroad grade.

Figure 28. Stream segment in proposed slurry valley just above confluence with stream from proposed refuse valley.

Figure 29. Typical stream segment in middle portion of proposed slurry disposal valley.

Figure 30. Typical stream segment in upper portion of proposed slurry disposal valley.

Figure 31. Lower portion of stream in proposed refuse disposal valley.

Figure 32. Typical stream segment in middle portion of proposed refuse disposal valley.

Figure 33. Typical stream segment in one of the forks at the upper portion of the proposed refuse disposal valley.

ATTACHMENT 15.2.C

STREAM MITIGATION PLAN

Mitigation Proposal for Bailey Coal Refuse Disposal Site, Greene County, Pennsylvania

Prepared by

The Partners for Fish and Wildlife
California University of Pennsylvania

January 2002

Biological and Environmental Sciences Department and
The Foundation for California University of Pennsylvania
California University of Pennsylvania
California, PA 15419

Executive Summary

CONSOL Energy Inc., (CONSOL) is proposing to fill in 2.5 miles of stream in Greene County, Pennsylvania with coal refuse from its Bailey Central Preparation Plant. As required by law, CONSOL must mitigate for their environmental impact to surrounding streams. CONSOL proposes to fund the enhancement of fish and wildlife habitat in a nearby watershed(s) in Greene County (yet to be determined) and to fund biological monitoring of these habitat improvements to mitigate these losses. Mr. José Taracido, the Partners for Fish and Wildlife Farmland Habitat Program Management Supervisor, will oversee the restoration portion of this project. Restoration will include wetland creation, restoration, and protection, native grassland planting, and border-edge cutting. In addition, streambank fencing will be used to improve streambank stability and to improve water quality. The project will be similar to, but separate from, the Farmland Habitat Restoration Project being directed by California University of Pennsylvania's Partners for Fish and Wildlife Program. Dr. David Argent, Assistant Professor of Biology at California University of Pennsylvania, will assist with the biomonitoring portion of this project. Responses to habitat improvements within the watershed will be documented by examining plant, fish, and aquatic invertebrate communities in restored portions of the watershed before and after restoration, and by comparing the same parameters in restored and unrestored portions of the watershed. Water samples will also be collected during the project. The restoration/protection program will be considered successful if measured biological variables improve or do not decline over pre-restoration values. California University of Pennsylvania will conduct the watershed restoration and direct monitoring activities with funding from CONSOL. Funding provided by CONSOL will be administered by the Foundation for California University of Pennsylvania. The project will commence in April 2004 and will be completed with the submission of a final report in August 2009.

Objectives

1. To mitigate the loss of fish and wildlife habitat that will occur as result of the new Bailey coal refuse disposal area.
2. To restore, protect, and create fish and wildlife habitat
3. To monitor environmental changes in plants, fish, and macroinvertebrates in response to habitat enhancement
4. To collect water samples before, during and after restoration activities have occurred.

Scope of Activity

Part I – Restoration Activity

Conservation easements for maintaining a riparian buffer

1. We will develop and maintain landowner contacts to participate in this habitat restoration program (April 2004 – December 2004). Participants will sign an agreement with us to permit restoration activities to occur and to grant us access to their property for biomonitoring work.

2. We will protect streams, wetlands, and spring developments within the watershed with the use of streambank fencing on agriculturally impacted properties. This will include approximately 12.5 miles of fencing with 2 crossings per mile of stream (to be completed by November 2005). maintenance of fencing?

3. We will establish 20 border-edge cuts on farms throughout the watershed (to be completed by winter 2005). This is a complimentary management tool used in conjunction with grass planting that creates soft edges for wildlife species to transition between established habitats. The number and size are determined by the amount of grasses planted and the availability of timber on the property to be restored.

4. We will assist CONSOL with the planting of grasses on the reclamation site to increase wildlife habitat. This will include native warm-season grasses that will mimic pasture and hayfield habitats frequently used by wildlife. Seeding will be included, as part of CONSOL's reclamation of the refuse area and costs for this activity will be negotiated as the reclamation work unfolds.

5. We will assist CONSOL with maintenance seeding to ensure proper establishment of native grasses (Timing and need will vary depending upon success of initial seeding and progress with the development of the reclamation site).

Part II – Bio monitoring (to be completed by 2009):

1. We will assess the impacts of restoration by determining plant, fish, wildlife, and macroinvertebrate communities before and after restoration, and in both restored and unrestored portions of the watershed. Initial assessments will occur before restoration activity has begun. (August 2004 - May 2009).

2. We will continue monitoring until May 2009 on 100-m stream sections - one section for each of the restored and protected streams. Additionally, an equivalent number of unrestored and unprotected stream sections of similar stream order, plant composition, and surrounding land-use will serve as controls. These 100-m stream sections will serve as the experimental units for all analyses.

3. Water samples will be collected by California University of Pennsylvania, but a third-party will perform testing of water samples as yet to be named.

4. Fish and macroinvertebrate populations will be surveyed during the spring (March - June), summer (July - September) and fall (October - December). Fish will be sampled using backpack electro-shocking equipment with a three-pass depletion and macro-invertebrate populations will be sampled using both kick nets and Hess-samplers (3 samples per section). These sampling techniques will permit abundance estimates to be made for both fish and macroinvertebrates. Fish and macroinvertebrates will be identified to the lowest possible taxa, enumerated, and a reference collection maintained at California University of Pennsylvania.

5. The plant community will be sampled to determine herbaceous and woody plant cover and richness. Percent ground cover will be estimated using green-line and/or point sampling techniques and plant samples will be collected to establish a reference collection. Woody plant cover will be assessed using a densitometer to estimate percent overhead cover along our 100-meter reach.

The biological variables discussed above will be compared before and after stream protection and restoration occurs. The same variables will also be compared between protected/restored sites and those that are not protected/restored. Standard statistical procedures will be used to evaluate the data.

Part III – Schedule*

April 2004 – December 2004

Site surveys; Project planning (hire staff, order equipment etc.); Landowner contact and sign-up in designated area(s)

August 2004 – August 2005

Initiate pre-restoration biomonitoring activities.

May 2005 – June 2005

Continue biomonitoring work.

May 2005 – October 2005

Implement part 3 of management plan. Continue biomonitoring work following parts 2 and 3 of biomonitoring plan.

November 2005 – December 2005

Complete part 4 of restoration activity and continue with biomonitoring activity.

December 2005 – June 2009

Continue with post - restoration surveys (water quality, plants, fish, and invertebrates), following parts 2 and 3 of biomonitoring plan. We will assist CONSOL with planting of native grasses on the refuse area as ~~part of the reclamation to increase wildlife habitat~~ (this activity will commence at a time as yet to be determined over the life of the mining/reclamation activity). Costs for this activity will be negotiated as the reclamation work unfolds.

it is already required for ins of to stabilize refuse

Annual reports will be submitted to CONSOL on 30 June of each year and seasonal reports will be available to CONSOL September, January, and April.

August 2009

We will submit a final report to CONSOL.

* Should inclement weather deter completion of restoration activities by the timeline outlined – work will be completed as soon as possible. Also, we reserve the right to extend the timing of restoration activities beyond those above to complete activities in an appropriate season and in an appropriate fashion. No

Part IV – Project Administration and Responsibility

Dr. David G. Argent and Mr. José Taracido will direct the Project with funding from CONSOL. Mr. Taracido will oversee the fieldwork and management of field crews and Dr. Argent will oversee the monitoring portion of this project. Administration of project funds will be through the Foundation for California University of Pennsylvania, and the office for this program will be housed at California University of Pennsylvania. CONSOL agrees to complete the outlined project to the best of its ability. Should a landowner leave the program or remove habitat restorations, CONSOL Resources will restore other areas to maintain the amount of restoration discussed in this proposal for the life of the coal refuse disposal site being mitigated.

Part V – Environmental Impacts of Proposed Project and Mitigation

Losses

1. Several thousand feet of stream (including annual and perennial) will be lost through filling in the streams in the proposed coal refuse disposal valley.

Benefits

1. Degraded streams, wetlands, and spring developments in the watershed will be restored and protected improving water quality and fish and wildlife habitat.

2. Native grasslands will be restored throughout the watershed, providing habitat for numerous wildlife species and acting as a bio-filter for agricultural run-off to riparian areas. This restoration technique is used in conjunction with streambank fencing to

provide habitat for the whole watershed, not just the stream because agricultural effects will be seen outside of the corridor and it is important to address them in the restoration plan.

3. Border-edge cuts will provide shrub land habitats for numerous wildlife species, many of which are declining in Pennsylvania.

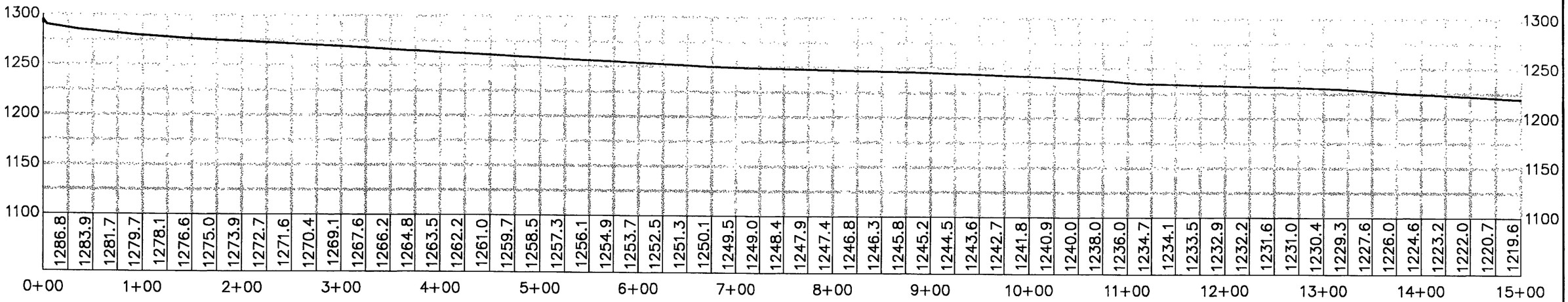
4. Improved landowner cooperation and satisfaction with conservation efforts and CONSOL.

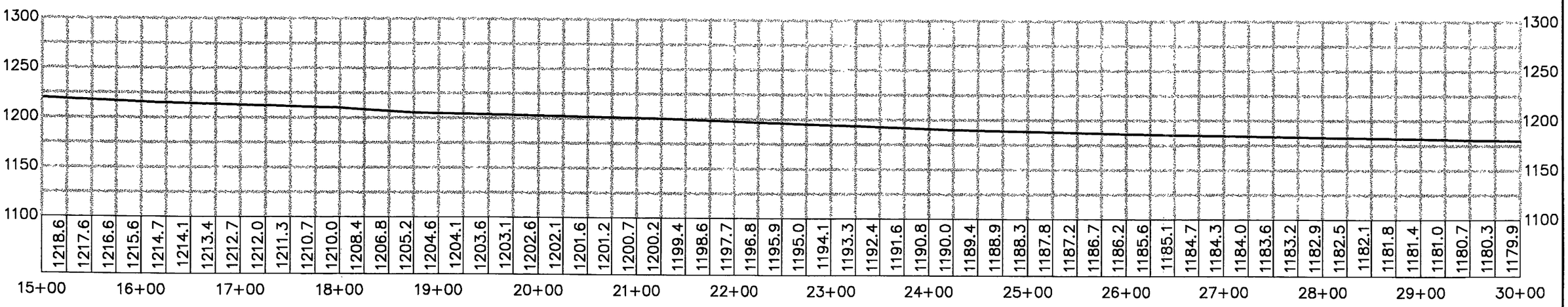
5. Data on impacts of watershed restoration project.

6. Educational opportunities for students at California University of Pennsylvania who will have access to all data collected in support of this mitigation for thesis work.

ATTACHMENT 15.2.e

STREAM PROFILES





100 50 0 100

SCALE IN FEET

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY
CONSOL PENNSYLVANIA COAL COMPANY

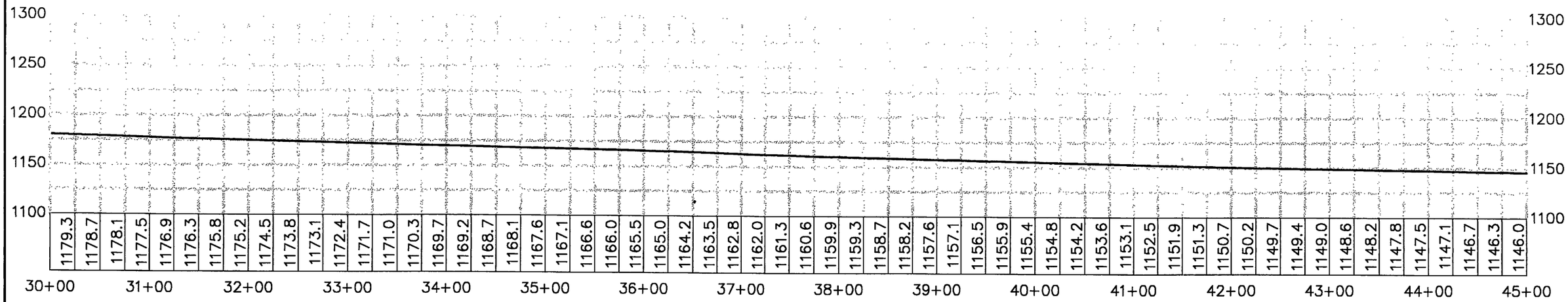
UNAMED TRIBUTARY AREA NO. 3

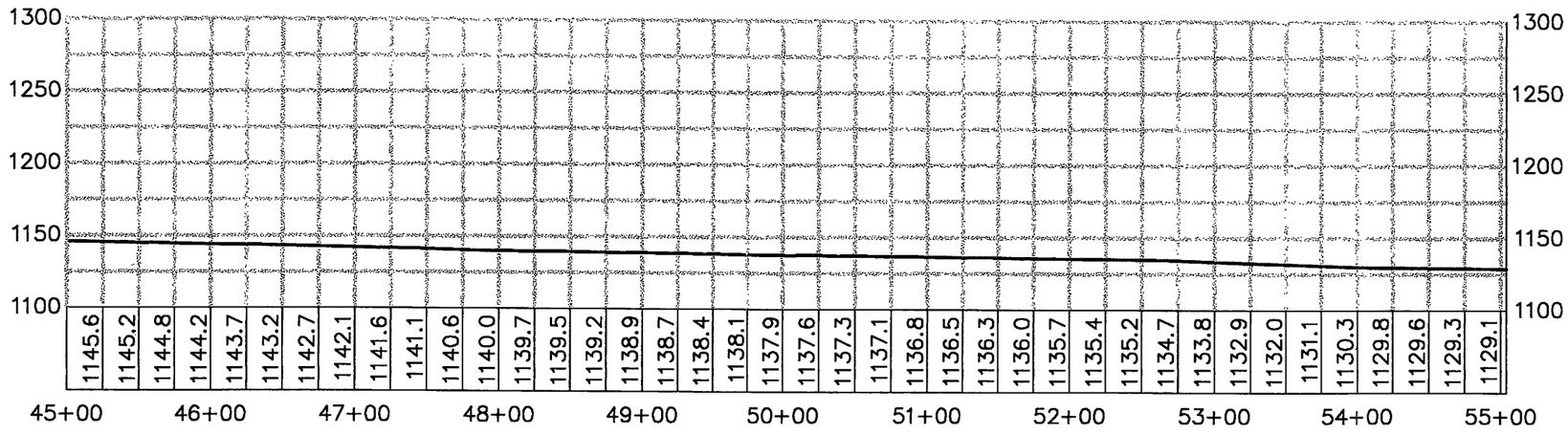
PROFILE SHEET 1 OF 2

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	MMS	01/02	AS SHOWN

FILE: STREAM PROFILES

k:_consol\24379\drawings\final\





100 50 0 100

SCALE IN FEET

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY
CONSOL PENNSYLVANIA COAL COMPANY

UNAMED TRIBUTARY AREA NO. 3

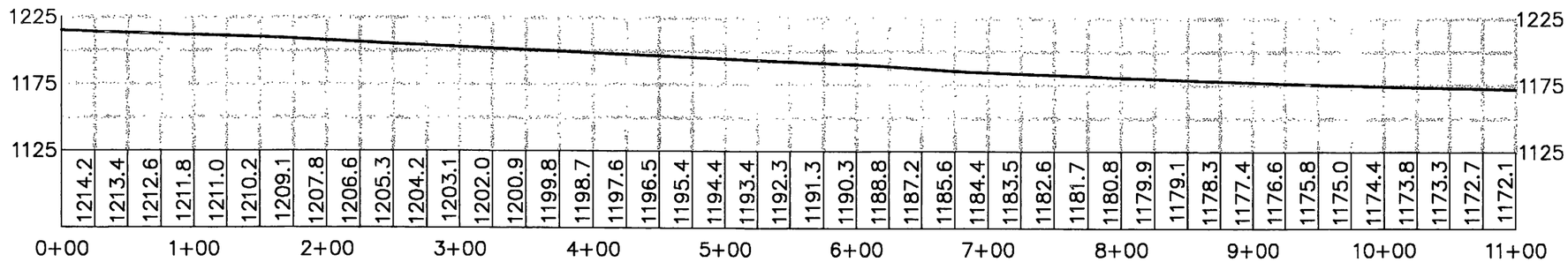
PROFILE SHEET 2 OF 2

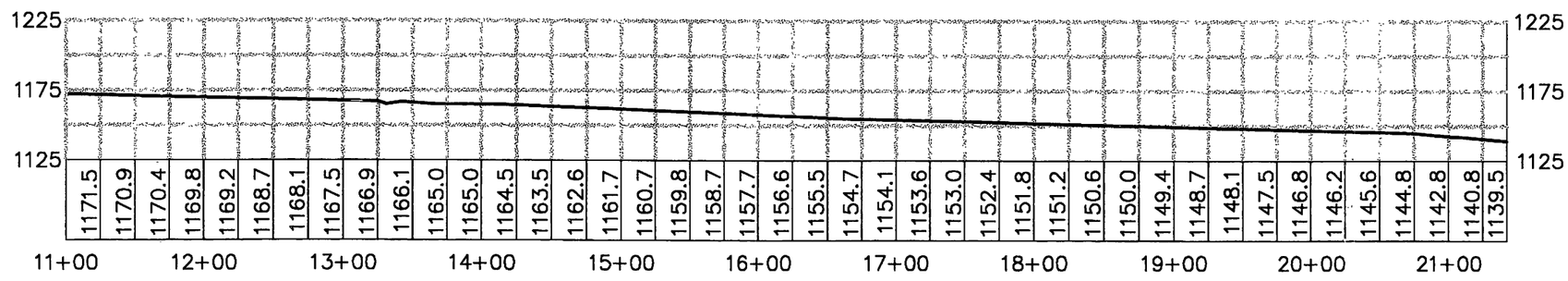
DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	MMS	01/02	AS SHOWN

FILE: STREAM PROFILES
k:_consol\24378\drawings\final\

ATTACHMENT 15.5

WETLAND MITIGATION PLAN





100 50 0 100

SCALE IN FEET

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6300 mbakerjr.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY
CONSOL PENNSYLVANIA COAL COMPANY

UNAMED TRIBUTARY AREA NO. 4

PROFILE

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	MMS	01/02	AS SHOWN

FILE: STREAM PROFILES

ATTACHMENT 15.5

WETLAND MITIGATION PLAN

WETLAND MITIGATION FOR

BAILEY MINE SLURRY AND REFUSE HOLLOWS

GREENE COUNTY, PENNSYLVANIA

Prepared for

Consol Pennsylvania Coal Company

by

Bradford B. Owen Jr., Ph.D.
Timothy Fullerton, P.E.
Dale E. Pike, Ph.D.

December 22, 2001

INTRODUCTION

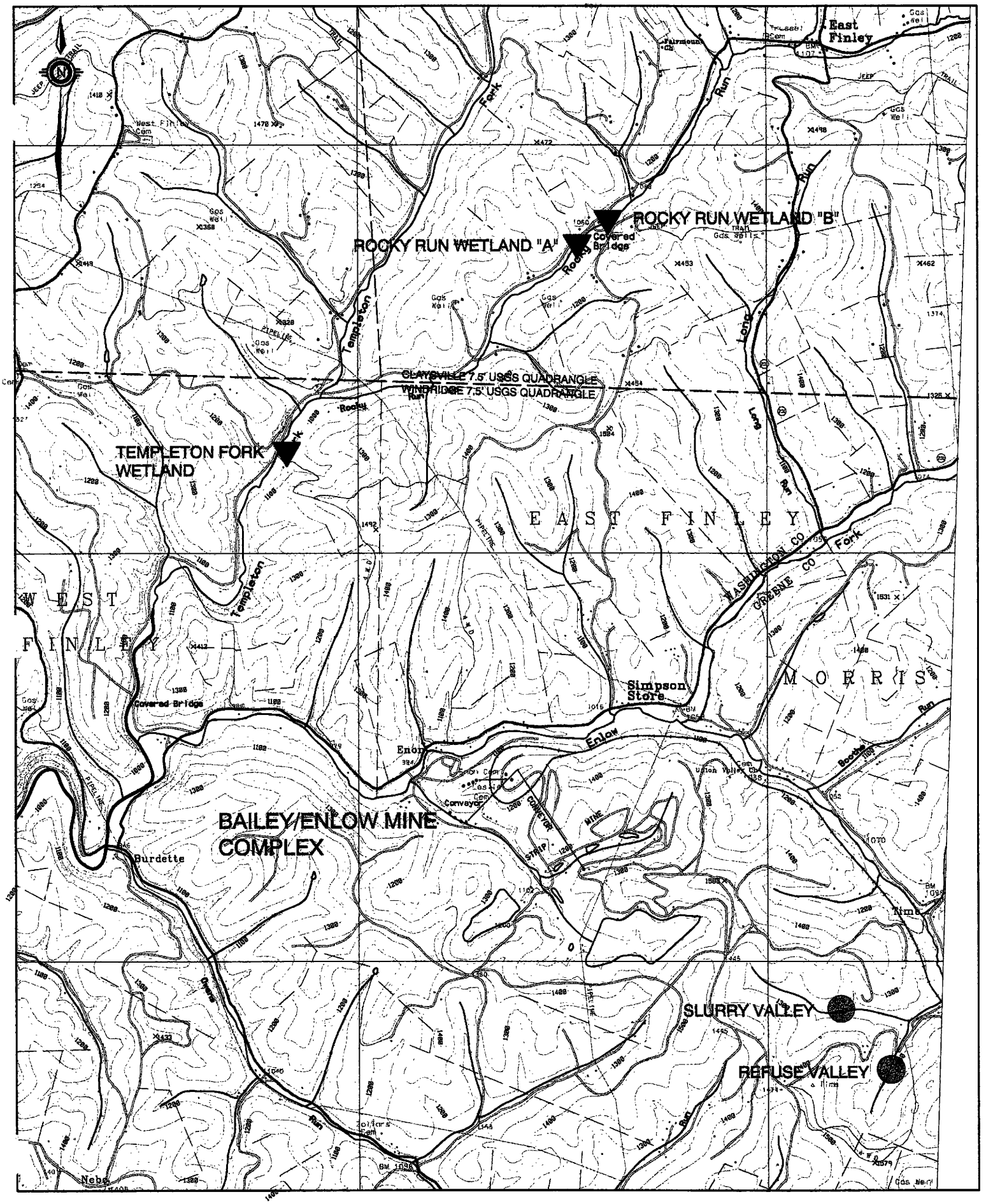
Consol Pennsylvania Coal Company has proposed the use of two adjacent valleys for the disposal of coarse coal refuse and fine coal refuse from the Bailey Central Preparation Plant, hereafter referred to as the "refuse valley" and "slurry valley;"(locations shown in Figure 1). These two valleys were surveyed for wetlands in June, 2001. A total of 0.102 acres of wetlands were found in the proposed refuse disposal valley and 1.361 acres were found in the proposed slurry disposal valley. Thus a total loss of 1.462 acres would have to be mitigated. The following report details the wetlands that would be lost in the proposed disposal valleys and proposes mitigation for these losses at a ratio of 1:1.5 by enhancing three new wetlands created by recent longwall mining-related subsidence in the nearby Rocky Run and Templeton Fork watersheds (locations shown in Figure 1).

unacceptable

METHODS

The wetlands of the proposed slurry and refuse valleys, as well as the newly created wetlands the Rocky Run and Templeton Fork watersheds were surveyed in the field in detail according to the Routine Wetland Determination methods of the Army Corps of Engineers Manual (Environmental Laboratory, 1987). Plant identification was primarily according to Strausbaugh and Core (undated) with assistance from other plant guides and nomenclature was updated according to the synonymy in Reed (1997). Plant indicator categories were taken from the Revision of the National List of Plant Species that Occur in Wetlands (ibid). Soils were classified according to the soil survey of Greene and Washington Counties (U.S. Dept. of Agriculture et al., 1983) and their hydric classifications were checked in the list of hydric soils of the United States (U. S. Dept. of Agriculture, 1991). Detailed field data and the plant indicator categories for Jurisdictional Wetlands were summarized on "Standard Data Form 1" from the Army Corps of Engineers Manual (Environmental Laboratory, 1987). These forms and photographs of each wetland are included in Appendices A - D.

Wetlands of the proposed slurry and refuse valleys were delineated in July, 2001, while final delineation of the subsidence - created wetlands was postponed until fall, 2001 in order to allow wetland plants to become well established, especially in the Rocky Run wetlands which were essentially new as of the 2001 growing season.



Scale: 1" = 3,000'

0 3,000' 6,000'

Figure 1 - CONSOL PENNSYLVANIA COAL COMPANY
BAILEY MINE
SUBSIDENCE CREATED WETLANDS

RESULTS

WETLANDS OF THE PROPOSED REFUSE VALLEY

With few exceptions, the wetlands of the refuse valley (Figure 2, Appendix A) were small streamside or seep areas with relatively heavy forest cover. Seven Jurisdictional Wetlands were delineated, totaling 0.102 acres.

Wetland R-1 is a small wetland (0.026 acres) resulting partly from ATV traffic. It had an inundated area about two meters square, while the rest of the wetland varied from saturated soils to dryer areas, resulting in a variety of plants being common. *Bidens frondosa* was dominant around the inundated area, while *Poa trivialis* and *Glyceria striata* dominated the spring flora in surrounding areas.

Wetlands R-2 and R-3 are relatively small somewhat marginal streamside and seep wetlands (0.009 and 0.014 acres, respectively). Wetland R-3 supported a number of *Lindera benzoin*, typical of much of the flood plain in this area.

Wetland R-4 is a somewhat larger streamside wetland, with shallow soils over gravel. Its spring flora was dominated by *Poa trivialis* while *Impatiens capensis* (as in all future references, could be *I. Pallida* – couldn't be determined in spring collections) was appearing likely to be the late season dominant.

Wetland R-5 is a very small seep wetland (0.004 acres) in heavy forest, and its spring flora was dominated by *Carex prasina*, with *Impatiens capensis* likely to become the late season dominant.

Wetlands R-6 and R-7 are two spring-seep wetlands at the headwaters of the refuse valley. Both are in heavy forest cover, but had different dominant spring herbs. *Carex prasina* dominated Wetland R-6, while *Impatiens capensis* dominated Wetland R-7.

WETLANDS OF THE PROPOSED SLURRY VALLEY

Most of the Jurisdictional Wetlands of the slurry valley (Figure 3, Appendix B) were also streamside or seep areas, but they varied greatly in size, cover and plant composition. This valley

was only partially wooded and most of it was heavily impacted by cattle grazing. Nineteen Jurisdictional Wetlands were delineated, totaling 1.361 acres.

Wetlands S-1 and S-2 are small (0.055 and 0.008 acres, respectively) wetlands recently created by the adjacent railroad embankment. Both are in completely open areas and were heavily dominated by *Typha latifolia* with lesser amounts of other wetland and transitional species.

Wetland S-3 is another small wetland (0.067 acres) in an open area, with early season vegetation dominated by grasses with less abundant sedges and a few other taxa.

Wetland S-4 is a fairly large wetland (0.209 acres) in a mostly open, streamside area. It has areas with almost an inch of water standing between vegetation clumps, but the majority of this wetland is a wet meadow with soil saturation a few inches below the surface. A great variety of herbs grow in this wetland, with some areas dominated in the spring by *Glyceria striata* and others by *Typha latifolia* or *Poa trivialis.* Late season vegetation will find *Aster puniceus*, *Carex* species and *Polygonum sagittatum* becoming the dominants in most of the areas where spring grasses were dominant.

Wetland S-5 is a small wetland (0.050 acres) that includes a small pooled area and surrounding wet areas dominated by a sparse cover of *Glyceria striata, Bidens frondosa* and a few other taxa. This wetland appears to be the result of an old channel that has been abandoned by the stream, while still maintaining water by virtue of a nearby seep.

Wetland S-6 is a seep area (0.022 acres) in a power line right of way. Having almost no overstory cover, it supported a dense herbaceous layer dominated by *Polygonum hydropiperoides* and *Carex frankii*, with a large spring season representation of *Poa trivialis*. *Impatiens capensis* and *Bidens frondosa* will likely dominate some of the wetland in late season.

Wetlands S-7 and S-8 are small streamside areas heavily impacted by cattle. Most of the soils were dug up and much of the vegetation either grazed or trampled by cattle. Wetland S-7 (0.090 acres) was dominated in the spring sampling by a mixture of *Leersia virginica, Bidens frondosa* and *Poa trivialis*. Wetland S-8 is a seep area near Wetland S-7 that was dominated by *Poa trivialis* and *Pilea pumila* in the spring sampling. Late season vegetation will be dominated by *P. pumila* and possibly *Polygonum hydropiperoides.*

Wetland S-9 (0.020 acres) is an area where the stream spread over a large flat area and created an island of gravely soils that supported some wetland vegetation. *Poa trivialis* and *Pilea pumila* dominated the spring vegetation and again late season vegetation will likely be dominated by *P. pumila* and *Polygonum hydropiperoides.*

Wetland S-10 is the largest wetland of the slurry valley (0.435 acres). It encompassed a large relatively flat, wet meadow with some areas saturated to the surface, grading to transitional areas. Spring vegetation was dominated by a number of grasses and sedges and smooth rush, depending on the specific area.

Wetland S-11 is a small wetland (0.048 acres) in an open area below an abandoned pond. Its spring flora was dominated by *Carex frankii,* with the grasses *Bromus inermis* and *Glyceria striata* also very common. *B. inermis* is a UPL rated grass that dominated the adjacent grazed pasture and despite its rating, it seemed to be thriving in the wetland environment – possibly because it withstands grazing better than its competitors.

Wetland S-12 is a tiny (0.004 acres) wetland at the headwaters of a small tributary. It was heavily impacted by cattle and had spring vegetation dominated by *Poa trivialis* with *Polygonum hydropiperoides* likely to dominate later in the season.

Wetland S-13 is a wet area (0.048 acres) within the abandoned and breached impoundment. A small area of standing water was surrounded by mud flats with sparse vegetation dominated in the spring by *Poa trivialis* and a few wetland plants with *Bromus inermis* again quite common.

Wetland S-14 is a small seep area (0.021 acres) adjacent to the main stream. It was an open area dominated by two sedges and smooth rush, despite the heavy grazing by cattle.

Wetlands S-15 and S-16 are areas (0.080 and 0.031 acres, respectively) very heavily disturbed by cattle, with much of the vegetation destroyed and soils a mass of deep hoof prints. Wetland S-15 was in an area partially shaded by a *Craetagus* thicket. It had scattered vegetation often dominated by *Bidens frondosa.* Wetland S-16 was mostly bare mud with a scattering of plants, *Pilea pumila* being the most abundant.

Wetlands S-17, S-18 and S-19 are headwater wetlands (0.009, 0.045 and 0.012 acres,

respectively) that were in mostly open areas. Despite the heavy grazing by cattle, a variety of vegetation remained, with each area having its own dominant wetland plant, but all areas again having a fair amount of *Bromus inermis* that had invaded from adjacent pasture.

SUBSIDENCE - CREATED WETLANDS

Subsidence has created several wetlands by lowering land relative to the water table and/ or adjacent stream. This report describes three such wetlands that are proposed to be enhanced for mitigation for the loss of wetlands due to the proposed construction of the slurry and refuse disposal areas in the valleys discussed above. The three newly created wetlands are less than four miles from the proposed disposal valleys and are all within a short distance of each other, near the confluence of Rocky Run and Templeton Fork in southern Washington County (Figure 4). Once mitigated, the three wetlands together will constitute a significant net increase in valuable wetland habitat (open water and emergent wetland habitat) that is currently a scarce resource in this region. Two are within sight of each other and adjacent to Rocky Run, and one is adjacent to Templeton Fork close to the confluence of Rocky Run and Templeton Fork.

Rocky Run Wetland A

The extensive wetland created by recent subsidence under Rocky Run contains a variety of habitats ranging from pooled areas up to about four feet in depth to wet meadows (Figure 5; also see photographs in Appendix C). Since the wetland was a result of subsidence in late 2000, wetland vegetation was in successional stages during the 2001 sampling year. Plant abundance for this growing season was heavily influenced by propagule availability. The wetland communities will undoubtedly look somewhat different after a few more growing seasons as certain species out compete others. Due to the newness of this wetland, final delineation was not done until the end of this first growing season. Although the following descriptions are based on several visits to the area during the 2001 growing season, the final delineation was done on October 1, 2001. In order to better describe the variety of habitats created, the wetland was divided into six areas which are separately described below and shown in photographs in Appendix C. Five of the habitats are also described on "Data Form 1"in Appendix C. The sixth area, the area of open water, generally lacked emergent vegetation and therefore was not separately described on a Data Form 1. A number of plants that were never dominant or abundant in any one of the areas described below were nevertheless found scattered throughout

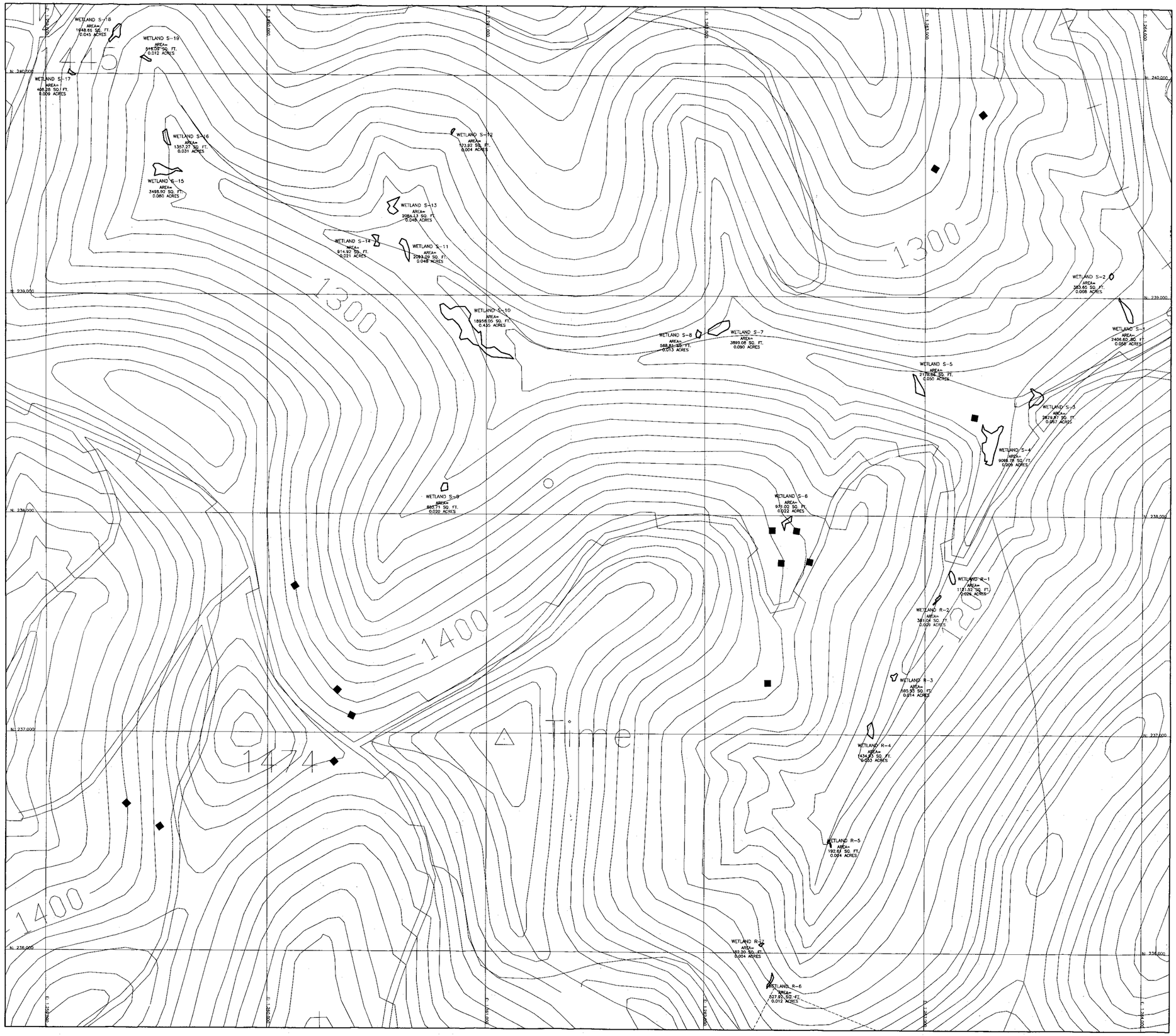


Figure 2

JURISDICTIONAL WETLANDS OF THE PROPOSED BAILEY MINE REFUSE AND SLURRY DISPOSAL VALLEYS.
Greene County, PA

0' 150' 300' 450'

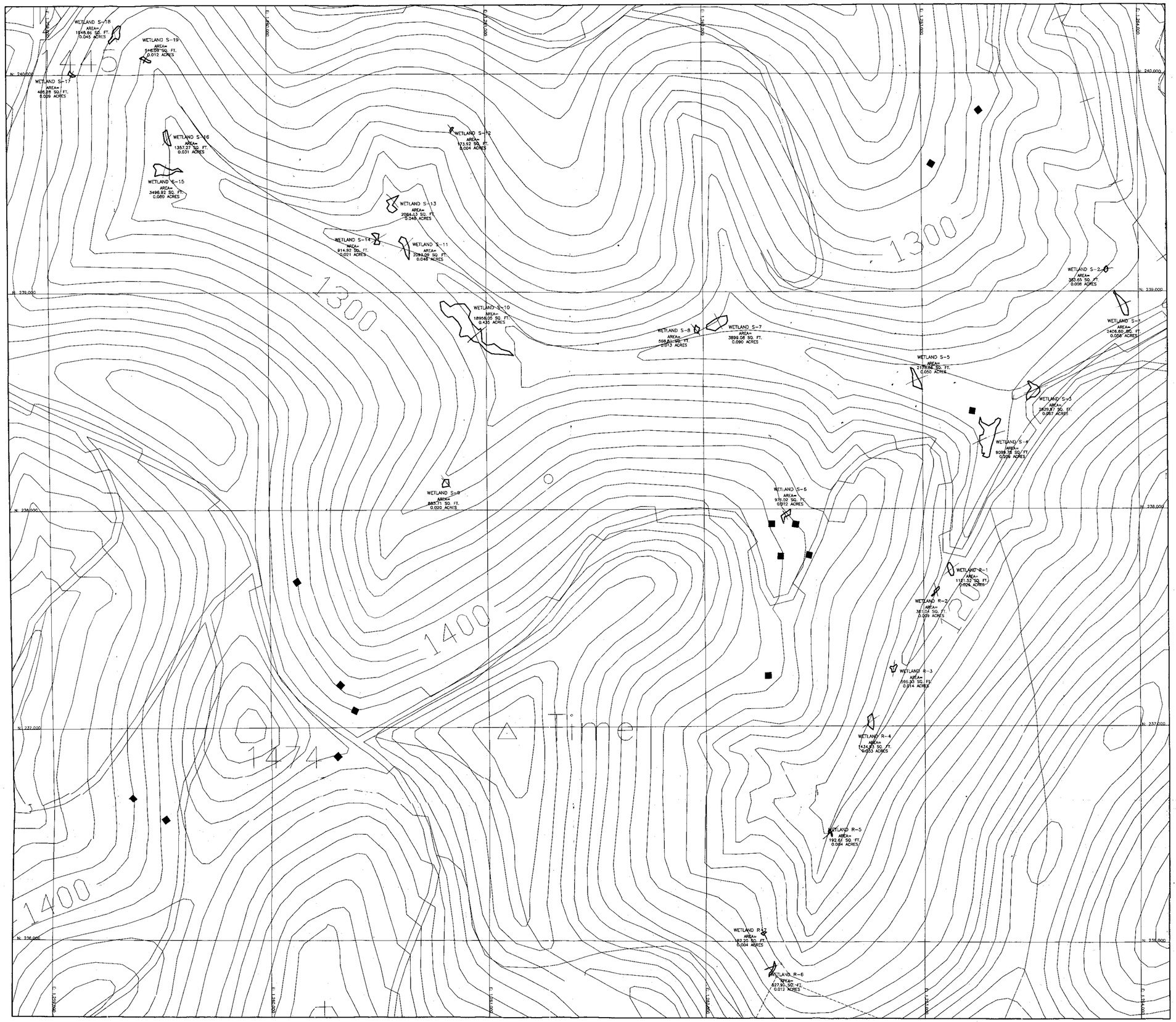


Figure 3

JURISDICTIONAL WETLANDS OF THE PROPOSED BAILEY MINE REFUSE AND SLURRY DISPOSAL VALLEYS.
Greene County, PA

0' 150' 300' 450'

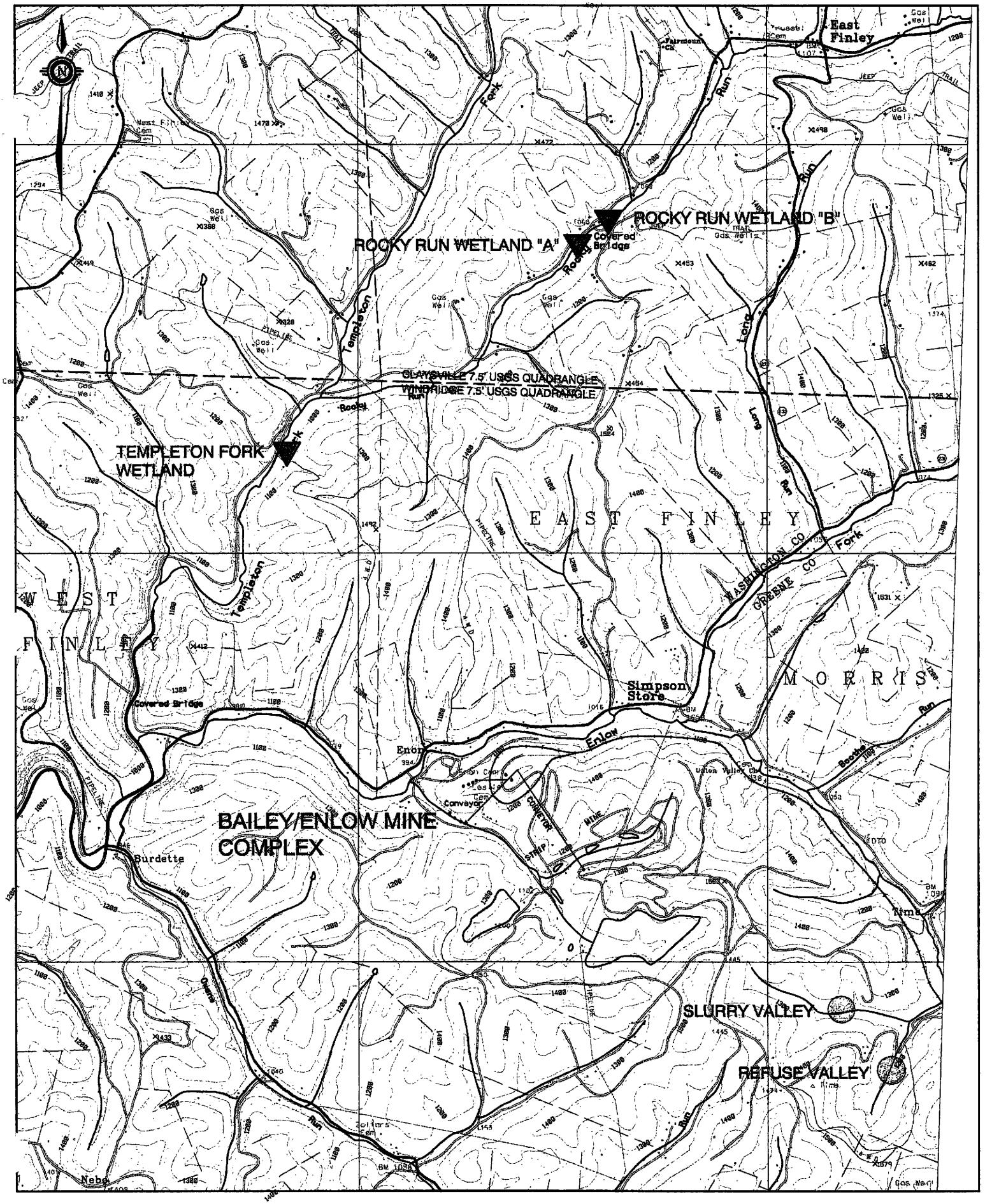
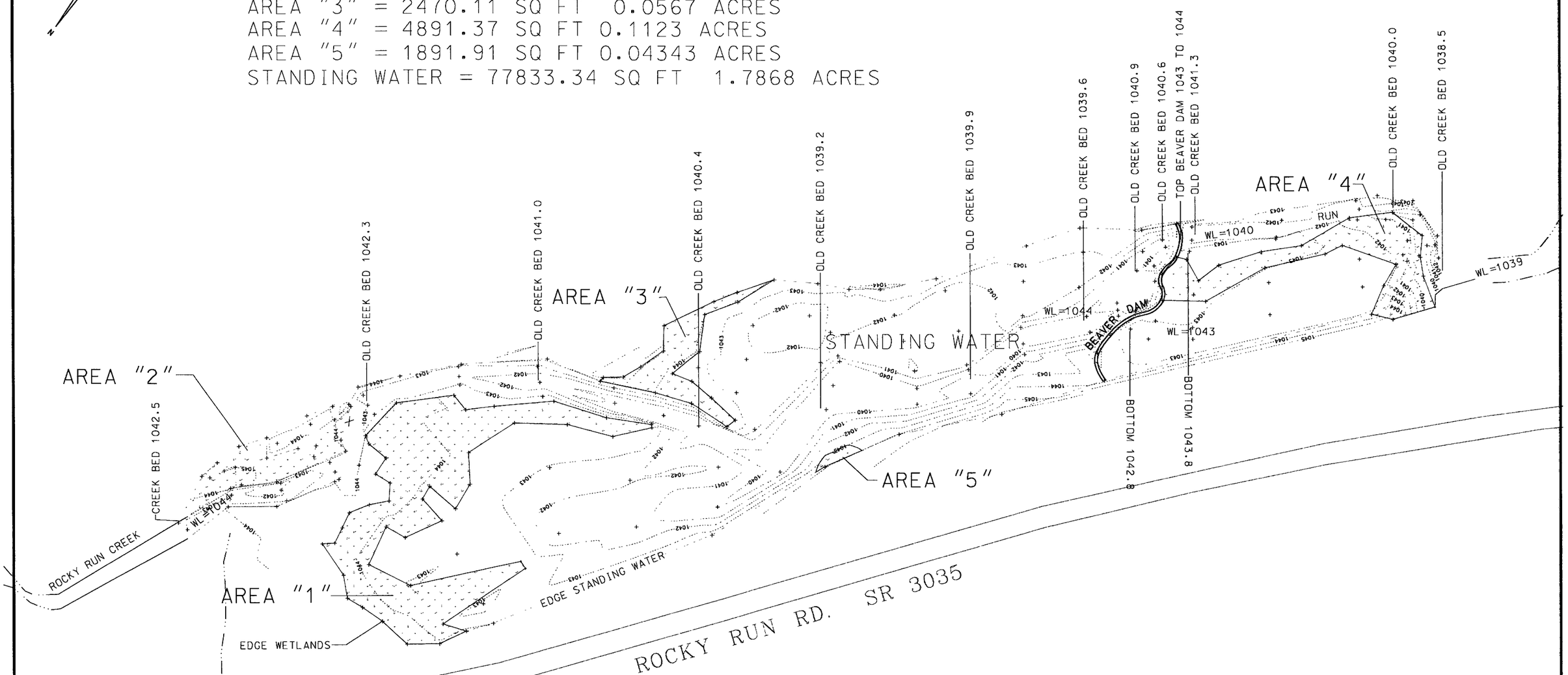


Figure 4 - CONSOL PENNSYLVANIA COAL COMPANY
BAILEY MINE
SUBSIDENCE CREATED WETLANDS

JURISDICTIONAL WETLANDS AS
CONFIRMED BY BRADFORD B. OWEN JR.
10/23/2001 AND REVISED 11/26/2001
AREA "1" = 12103.70 SQ FT 0.2779 ACRES
AREA "2" = 2467.77 SQ FT 0.0567 ACRES
AREA "3" = 2470.11 SQ FT 0.0567 ACRES
AREA "4" = 4891.37 SQ FT 0.1123 ACRES
AREA "5" = 1891.91 SQ FT 0.04343 ACRES
STANDING WATER = 77833.34 SQ FT 1.7868 ACRES



CONSOL PENNSYLVANIA COAL COMPANY	PROJECT NO.
ROCKY RUN WETLAND A PROPOSED WETLAND CREATION GREENE COUNTY, PENNSYLVANIA	DATE 12/2001 SCALE 1" = 70'
	FIGURE 5

the wetland and contributed to the biodiversity (Table 1). These plants will become more, or less abundant as the wetland matures over the next few years. It must be kept in mind that the following description of the wetland are as it was observed in late 2001, and that the extensive damming by beavers was partially responsible for the size of the impounded area (this will be discussed later in the section on mitigation).

Area 1 - an extensive area heavily dominated by *Phalaris arundinacea* at the northeastern, upstream end of the created wetland. Much of the area was an almost monoculture of *P. arundinacea* and a good proportion of this area was inundated up to six inches. At the outer dryer fringes of this wetland area *Dichanthelium clandestinum* and *Agrimonia parvifloria* dominated. Towards the southern part of this area there were less densely vegetated mud flats which had large stands of *Eragrostis hypnoides*, *Polygonum* spp. and scattered individuals of *Cyperus strigosus*, *Mimulus ringens* and *Verbena urticifolia* (the latter, rated FACU, may not persist as this wetland matures).

Area 2 - an area adjacent to area 1 and on the banks of the original stream channel. Much of this area was also somewhat dominated by *P. arundinacea*, but a fairly large area was more sparsely vegetated and contained a mixture of *Polygonum* species *M. ringens, V. urticifolia* and scattered clumps of *E. hypnoides*. As above, peripheral areas were heavily populated with *A. parviflora* and *D. clandestinum.*

Area 3- wetlands on the southern edge of the old stream channel, containing one large peninsula extending out into the open water areas of the created wetland. Much of this area was somewhat open and relatively sparsely vegetated with newly established herbs. *Ludwigia palustris* and *M. ringens* were the most common of the taller vegetation and lower vegetation included patches of *E. hypnoides* and *Polygonum* species. Somewhat less abundant were *P. Arundinacea, Cyperus strigosus* and *Leersia oryzoides*.

Area 4 - is a very complex part of this wetland, containing beaver structures and land ranging from inundated to borderline wetlands. A great diversity of plants were found in this area, and only a fraction of them are shown in Appendix A. There were no dominant taxa, although *P. sagittatum* was perhaps the most widespread plant at this time of year. Plants that were relatively common in this area but not listed in Appendix A include *Eupatorium perfoliatum*, Carex cf. *prasina, Mimulus ringens, Cyperus strigosus, Juncus*

Table 1. Common plants of the subsidence created Rocky Run A Wetland as of October 1, 2001.

Taxon	Overall abundance (1 - 4)*	Wetland rating
Dichanthelium clandestinum	2	FAC+
Leersia virginica	3	FACW
Phalaris arundinacea	1	FACW
Muhlenbergia frondosa	4	FAC
Agrostis stolonifera	4	FACW
Eragrostis hypnoides	2	OBL
Cyperus strigosus	3	FACW
Eleocharis obtusa	3	OBL
Scirpus tabernaemontani	3	OBL
Carex cf. prasina	4	OBL
Acoris calamis	4	OBL
Juncus effusus	4	FACW+
Polygonum sagittatum	2	OBL
Polygonum hydropiperoides	2	OBL
Phytolacca americana	4	FACU+
Agrimonia parviflora	3	FACW
Impatiens capensis	4	FACW
Ludwigia palustris	3	OBL
Epilobium coloratum	3	FACW+
Lysimachia nummularia	3	FACW-
Verbina urticifolia	3	FACU
Lycopus unifloris	4	OBL
Mentha spicata	4	FACW+
Mimulus ringens	4	OBL
Eupatorium perfoliatum	4	FACW+

* 1 is most abundant, or dominant in at least one area, while 4 is scattered and least common.

effusus and along the edges of the delineated area, *Dichanthelium clandestinum*. This area may change as beaver activities change, and only a portion of this area is expected to remain wetland over the longterm without mitigation.

Area 5 - is a very small area along the northwestern shore of the inundated portion of the wetland. It had been heavily grazed by deer by the time it was sampled and thus the common grass species could not be identified. Other common species included a mixture of wetland and non-wetland species.

Area 6 - is the open water habitat resulting from the subsidence and subsequent flooding by Rocky Run. The original stream channel of Rocky Run is not visible due to the inundation from subsidence and beaver dams. This area had a few patches of emergents, the most prominent being the fairly extensive shoreline of "area 1" which had *P. arundinacea* growing in up to 4 - 6 inches of water. The only other plant commonly seen was *Lemna minor*, which was present in protected areas of the open water habitat.

Despite the newness of this wetland, a viable and complex hydrophytic community had developed in the full one year growing season. Furthermore, a number of wetland dependant animal species used the wetland habitats in 2001. When first visited in the spring, inundated areas, especially those associated with emergent growth of *Phalaris arundinacea*, were so heavily used by American toads that the water was virtually boiling with activity and breeding pairs were barely a foot apart. At this same time a Canada goose was occupying a nest in the same area, ducks were heard, but not seen and redwing blackbirds were in abundance. Beaver activity was quite evident, and their embankments in Area 4 caused the area of inundation to be even greater than it would have been due to the recent subsidence alone. During later visits to the wetland, ducks were again heard, an unidentifiable shorebird was seen at a distance foraging in shallows, a great blue heron was seen feeding in the wetland and kingfishers were seen cruising the open waters. Numerous trails and footprints showed that deer used the area heavily (Area 5 described above was one point of deer entry to the open water and was heavily grazed).

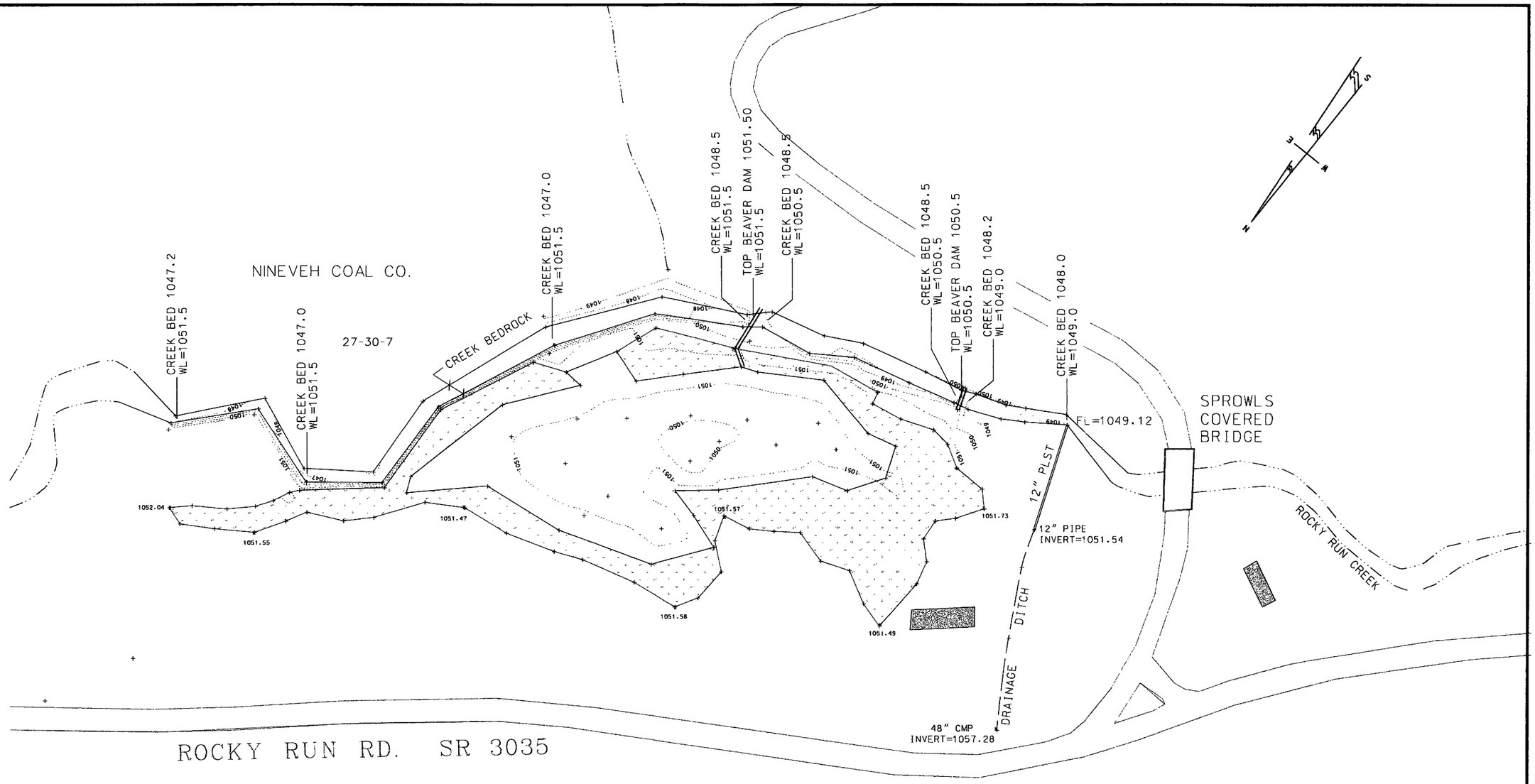
We did not sample the open water habitat for fish or macroinvertebrates, but it is certain that both have taken advantage of this habitat that is relatively scarce in the region. The area will serve as a nursery area for certain fish species and the deeper water habitat should allow certain sport fish (bass especially) to thrive. Amphibians other than the American toad either are or will be using

the area - wood frogs, spring peepers, green frogs, leopard frogs and bullfrogs are expected to reproduce in this habitat. Macroinvertebrates preferring the wetland or lentic conditions will proliferate - in particular it is expected that dragonflies will abound, as was evidenced by the large number of adults seen in the summer.

Rocky Run Wetland B

This wetland was within sight of Rocky Run Wetland A, being just above the Sprowls Covered Bridge (Figure 6; also see photographs in Appendix D). It has an extensive area of shallow standing water (0.531 acres) as well as a sizeable wet fringe (0.496 acres). Subsidence occurred during the 2001 growing season, not allowing a typical wetland community to become fully established to date. However, a number of wetland plants did become abundant in the short growing season. Most of the wetland is in a floodplain field that was previously used for hay production and for parking during the annual Covered Bridge Festival. Much of the delineated area is currently covered with shallow water - up to about 1.5 feet deep. This wetland also was influenced by beavers and three separate dams that were built on Rocky Run caused the water to impound to even greater depths than would have resulted from subsidence alone. The delineation discussed below and shown in Appendix B (the data were combined onto one Data Form 1 since the wetland had not matured enough to separate plant communities) is based on water levels at the end of November 2001, and thus describes a system partially dependant on the beaver impoundments.

Open water area - the largest habitat in this wetland as of November, 2001 was the area of shallow water, which was somewhat dominated by *Phalaris arundinacea* and *Ranunculus hispidis*. *Typha latifolia, Juncus effusus* and *Leersia oryzoides* were also abundant and were seen to be increasing in importance as the growing season progressed. Other hydrophytic species were also moving in and it is expected that if the current water levels continue *R. hispidis* will largely be displaced by other taxa such as *T. Latifolia*. However, if the current level of muskrat activity is maintained, *T. Latifolia* may be controlled and other less palatable rush, bulrush and sedge species may become dominant. The November sampling revealed the presence of a number of non-wetland species that had grown to maturity in 2001 (such as *Rumex crispis* and *Prunella vulgaris*), but these taxa will not be present next year if water levels are maintained.



70 0 70 140

SCALE IN FEET

CONSOL PENNSYLVANIA COAL COMPANY	PROJECT NO.
ROCKY RUN WETLAND B PROPOSED WETLAND CREATION GREENE COUNTY, PENNSYLVANIA	DATE 12/2001 SCALE 1" = 70'
	FIGURE 6

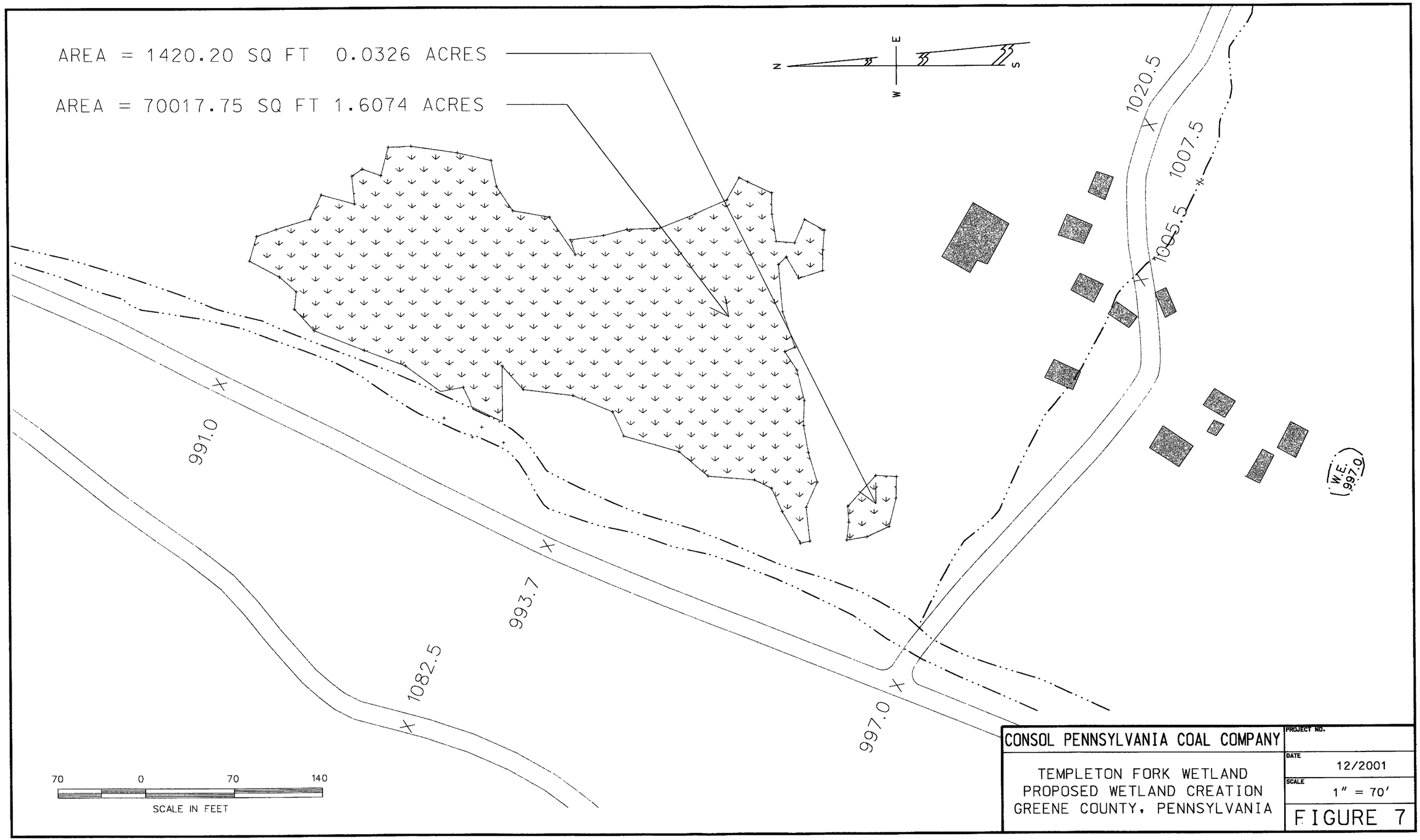
Emergent and wet meadow areas - most of the shore transitional area surrounding the open water of this wetland and extending upstream for a short distance is currently dominated by *R. hispidis* and *P. arundinacea*. Several plants which had undoubtedly been important when the field was dryer, such as *Dactylis glomerata,* still were alive in these areas of saturated soils, but will be replaced by hydrophytes within another growing season if the water levels are maintained.

Because of the very limited growing season, this wetland was not nearly as well developed as Rocky Run Wetland A. However, a number of hydrophytes were becoming established by the end of the growing season, and soils had already developed hydric characteristics. If the current water levels are maintained, next growing season's vegetation will undoubtedly be more like that of Wetland A. The proximity of Rocky Run and its supply of wetland propagules assures that a more typical wetland will develop next year. There was some evidence that despite the newness of the wetland, it was already being used by some animals. A few amphibians were seen in the water in late fall and there was ample evidence of heavy muskrat and beaver use. There was an active muskrat hutch in the middle of the inundated part of the wetland and evidence of a lot of recent cutting of vegetation, especially cattails. Beaver were also actively cutting and building in and around the wetland.

Templeton Fork Wetland

The Templeton Fork wetland was more typical of the wetlands of the region. It was primarily a wet meadow wetland with only very limited areas with any inundation, and those were dried up by October (Figure 7). Unlike the Rocky Run wetlands there was no direct connection with the stream, instead, this wetland was the result of subsidence bringing much of the land down to the permanent water table. The barn in the corner of the field that this wetland developed in, and evidence that this field was used for hay production prior to subsidence lend credence that most, if not all of this wetland was created from subsidence in 1994 when the area was undermined. The ages of the willows and sycamores that have colonized parts of the wetland provide further evidence of its age.

Although far from uniform, this wetland didn't have the dramatically different zones that were present in the Rocky Run A wetland. This was due to the lack of significant open water habitat as well as the length of time that the wetland had to develop. A few young black willows and



CONSOL PENNSYLVANIA COAL COMPANY	PROJECT NO.
TEMPLETON FORK WETLAND PROPOSED WETLAND CREATION GREENE COUNTY, PENNSYLVANIA	DATE 12/2001 SCALE 1" = 70'
	FIGURE 7

sycamores were present in one small area towards the southeastern edge of the wetland, but the vast majority of this wetland had only herbaceous growth. There was one fairly sizeable area towards the center of the wetland that was dominated by *Typha latifolia* and a small area adjacent to Templeton Fork was dominated by *Phalaris arundinacea*, but most of the wetland was densely vegetated by a diverse mixture of herbaceous plants, the most abundant of which in this late part of the growing season was *Polygonum sagittatum*. Plant communities were well developed in this wetland and are likely to remain much the same over the next few years, unlike the communities of the newly formed Rocky Run wetlands which were dominated in some areas by pioneer species. Table 2 lists the plants most commonly seen in this wetland in order of their relative abundance as of October 1, 2001.

Wildlife use of this wetland was more limited than that of the newly formed Rocky Run wetlands due to the lack of any significant open water or emergent areas. Redwing blackbirds were common in the spring and later in the season there were obvious signs of muskrat use. Non - wetland species such as whitetail deer and various birds also use this wetland, and probably to a much greater degree than when it was a managed field.

FUNCTIONS AND VALUES OF THE ORIGINAL AND MITIGATION WETLANDS

Wetlands are multiple value systems and unfortunately the most valuable products of wetlands are public amenities that often have no value to the property owner. Currently popular systems of valuation of wetlands tend to stress the importance of use by fish and game species, physical attributes such as wetland contributions to the hydrologic cycle, control of flooding, water quality, and human uses. There are three wetland assessment methods that are currently accepted by many wetland scientists and regulatory authorities. The first, and probably still the most universally applicable assessment method was the "Wetland Evaluation Technique" (WET) developed by Adamus et al. (1987). This method of assessment evaluates the following wetland functions:

Ground water recharge
Ground water discharge
Floodflow alteration
Sediment stabilization
Sediment and toxicant retention
Aquatic diversity and abundance

Table 2. Common plants of the subsidence Templeton Fork Wetland as of October 1, 2001.

Taxon	Overall abundance (1 - 4)*	Wetland rating
Typha latifolia	1	OBL
Dichanthelium clandestinum	3	FAC+
Leersia virginica	4	FACW
Leersia oryzoides	2	OBL
Phalaris arundinacea	1	FACW
Eragrostis hypnoides	4	OBL
Cyperus strigosus	4	FACW
Cyperus esculentus	3	FACW
Eleocharis obtusa	3	OBL
Scirpus tabernaemontani	4	OBL
Scirpus cyperinus	2	FACW+
Carex sp. 1	2	-
Carex sp. 2	3	-
Juncus effusus	2	FACW+
Polygonum sagittatum	2	OBL
Polygonum hydropiperoides	2	OBL
Ranunculus hispidus	4	FAC
Agrimonia parviflora	2	FACW
Impatiens capensis	4	FACW
Ludwigia palustris	3	OBL
Epilobium coloratum	4	FACW+
Lycopus unifloris	4	OBL
Mentha spicata	3	FACW+
Mimulus ringens	4	OBL
Eupatorium perfoliatum	4	FACW+

* 1 is most abundant, or dominant in at least one area, while 4 is scattered and least common.

Nutrient removal or transformation
Recreation
Product export
Uniqueness and heritage
Wildlife diversity and abundance

These functions are valued in terms of social significance, and the technique can be used to evaluate any wetland. WET allows a rapid assessment of wetland functions and values and assesses the suitability of wetland habitat for waterfowl and other water dependent vertebrates and invertebrates. A second wetland evaluation technique, EMAP, was developed primarily to evaluate wetland condition, where "condition" is defined as the state of a set of characteristics which are associated with wetlands and which are valued by society. It evaluates biological diversity, harvestable productivity, flood reduction and shoreline protection, groundwater conservation and water quality improvement.

A third wetland evaluation technique, the hydrogeomorphic or HGM technique was developed by the US Army Corps of Engineers to evaluate wetlands using similar criteria as those of WET to assess the degree to which a wetland functions in comparison to regional reference wetland functions. .

WET is the technique best suited to provide an analysis of all wetlands in a region of interest, as opposed to both EMAP and HGM, which only allow comparisons within wetland classes. Thus, for the purposes of the subject analysis WET functions have been considered (Table 3).

The wetlands to be replaced have minimal functions (Table 3) except for groundwater discharge (many were actual seep areas or produced by seeps). The value of this function may be questioned in this area of abundant springs and seeps. The mitigation wetlands will probably not function as either groundwater discharge or recharge areas, since their presence is determined by their interception of existing water tables, with no discharge of the intercepted water. Floodflow alteration is not very effective in headwater wetlands as compared to downstream wetlands (Mitch and Gosselink, 1993). None of the wetlands will be particularly effective in sediment stabilization (this is more a function of shoreline wetlands). Sediment and toxicant retention will probably only be significant in the mitigation wetlands where flood flow of Rocky Run and Templeton Fork will likely overtop the stream banks at least annually and allow the wetlands to trap sediments. Nutrient removal or transformation will not occur to a significant degree except

Table 3. Estimates of WET functions for the Slurry Valley Wetlands, Refuse Valley Wetlands, and the three proposed Mitigation Wetlands.*

Function	R-1...R-7	S-1....S-19 except S-4	S-4	Mitigation Wetlands
Ground water recharge	0	0	0	0
Ground water discharge	2	2	0	0
Floodflow alteration	1	1	2	3
Sediment stabilization	0	0	0	1
Sediment and toxicant retention	1	1	1	2
Aquatic diversity and abundance	0	0	0	3
Nutrient removal or transformation	1	1	2	2
Recreation	0	0	0	2
Product export	0	0	0	0
Uniqueness and heritage	0	0	0	0
Wildlife diversity and abundance	1	1	1	3

* 0 = no significant function
1 = minimal function
2 = moderate function
3 = high function

in the downstream mitigation wetlands where flooding will allow some deposition and residence time in a significant area of wetland; the upstream refuse and slurry valley wetlands will not likely
receive significant nutrients under natural conditions (currently, however, the wetlands of the slurry valley do receive a lot of nutrients due to heavy cattle grazing). None of the refuse or slurry valley wetlands offer any significant recreation, product export, uniqueness or heritage.

The most significant function in terms of capabilities of wetlands in this region are their ability to offer aquatic habitat and foster wildlife use. The small upland wetlands of the refuse and slurry valleys have virtually no standing water even in the wettest seasons and thus have little to no aquatic diversity and abundance. By contrast, the proposed mitigation wetlands will have significant open shallow water habitat that will foster biotic diversity of organisms not usually found in the adjacent lotic and upland habitats. This is evidenced in Rocky Run Wetland A, where aquatic life has already successfully moved into a wetland less than a year old, as discussed above. Similarly, wildlife is not visibly using the small headwater wetlands of the refuse and slurry valleys, but is already using the new wetlands created by subsidence, even before mitigation.

Since it is evident that the slurry and refuse valley wetlands cannot begin to offer the functions and values that the proposed mitigation wetlands will, we have not attempted to produce a more formal model comparing the functions. In addition, it would be difficult to accurately rate particular functions before the mitigation wetlands are in place and fully functional. However, as shown in the following pages, we feel safe in saying that the mitigation wetlands will produce functions of considerably greater value to society than the small headwater wetlands of the refuse and slurry valleys.

MITIGATION PLANS

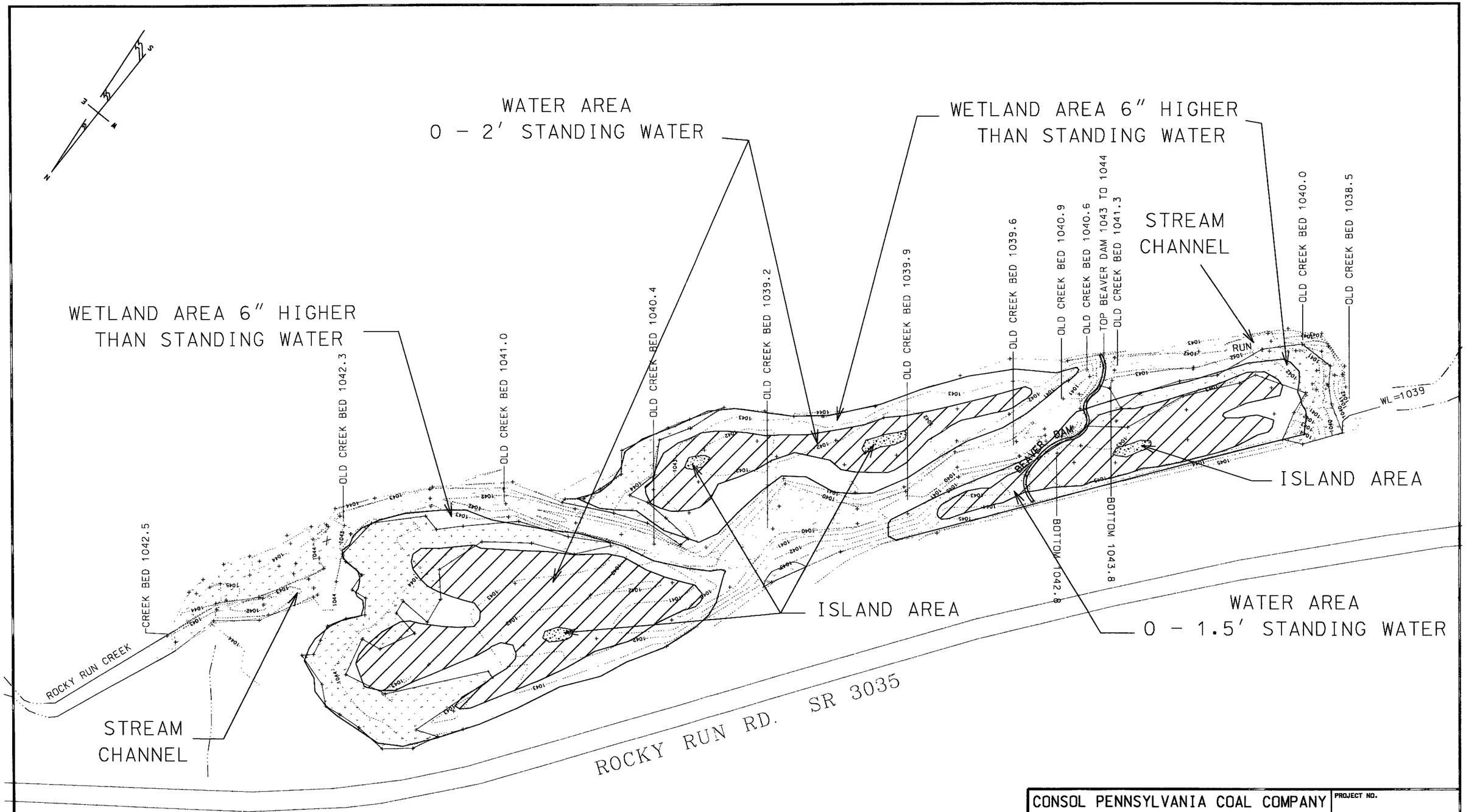
The overall philosophy of our plan is to enhance the three newly created subsidence wetlands to 1) make them permanent and 2) provide habitat that will foster the maximum possible diversity of aquatic and wildlife species, and 3) make them naturally fit into the regional landscape. In order to do this each wetland will be generally modified to provide a combination of open shallow water habitat with islands and a complex shoreline with a surrounding area of emergent, wet meadow and transitional habitat. Gradients will be gentle, allowing ecotones to develop and

making the wetlands blend into the landscape (Mitsch and Cronk 1992). These wetlands have already been more or less established prior to our proposed modifications, and with the exception of Rocky Run Wetland B, they already have extensive naturally established hydrophytic communities that are obviously best suited to the area. Therefore, revegetation will be unnecessary except possibly in Wetland B. This wetland has some hydrophytic vegetation established, but to enhance the revegetation after the completion of mitigation earthwork, the "seed bank method" will be used. This commonly accepted practice uses freshly removed soils, preferably from nearby wetlands to provide a source of hydrophyte propagules best suited to the area. Wetland soils have been found to hold from 21,455 to 42,615 seeds per square meter of the top 10 cm of soil (van der Valk and Davis 1978). As discussed by numerous authors in Kusler and Kentula (1990) and other references, it is advantageous to revegetate with indigenous species, or at least to supply soils with the necessary tubers, seeds and other propagules as opposed to planting species which may or may not compete well with local plants - a common cause of constructed wetland failure. The following discussion also draws upon engineering discussions in Dunne et al., 1998, Interagency Workgroup on Wetland Restoration, 2001, USDA 1992 and Hayes et al., 2000.

ROCKY RUN WETLAND A

This new subsidence wetland (Figure 5) is artificially large due to several beaver dams. The purpose of this plan is to essentially keep this wetland intact by contouring the site such that it will remain wet after the beavers have left the area. The final mitigated wetland area will be a little smaller than the current beaver-enhanced size, due to Rocky Run being returned to its original channel. Additional features such as a more complex shoreline and several islands have been included in this plan in order to encourage aquatic biota and wildlife diversity and production.

The proposed modification to Rocky Run Wetland A is shown in Figure 8. The final wetland areas would be: open water - 0.77 acres; islands - 0.018 acres; emergent and wet meadow - 0.852 acres. To achieve the configuration of open shallow water habitat, islands and surrounding emergent wetland habitat, shallow observation wells would be established prior to construction of the wetland to provide ground water level information to assist in determining the necessary final elevations. It is proposed to drain the large open water area from the existing wetland by breaching the existing beaver dams, pumping water from the pool area during low flow



CONSOL PENNSYLVANIA COAL COMPANY	PROJECT NO.
ROCKY RUN WETLAND A PROPOSED WETLAND CREATION GREENE COUNTY, PENNSYLVANIA	DATE 12/2001
	SCALE 1" = 70'
	FIGURE 8

conditions, or by using a siphon to drain water from the pool area. After the area is drained sufficiently for access by low ground pressure equipment, the area would be contoured to provide for the deeper standing water areas, islands and higher wetland areas. Slope transitions of the ground surface will be gentle and variable from 3H:1V to as gradual as 20H:1V. As much of the existing wetland soils as possible would be used on site for the contouring, but it is estimated there will be 1000 cubic yards of waste soils would be suitably disposed of offsite at an approved area. Evidenced by the vibrant growth of wetland vegetation that was seen during the delineation, the existing wetland soils should have a more than adequate propagule availability to establish native wetland vegetation to recolonize the areas.

It is felt that disturbance to the area could be kept to a minimum by the use of smaller low ground pressure equipment, limiting movement of the equipment to small areas at a time and the use of proper erosion and sediment control techniques during construction. It would be proposed to perform this work during low flow conditions. Detailed specifications, plans and cross sections would be required for the contractor to perform this work. These specifications would address items such as soil excavation, hauling and placement methods, dewatering, allowable work dates and construction sequence. The specifications, construction sequence and best methods for performing this work have not been detailed for this report, but will be provided to the PADEP for approval prior to construction initiation.

After construction of the project is completed, initial site conditions will be documented to provide baseline information, which the site can be evaluated against during the subsequent monitoring phase. A monitoring program would be implemented during the initial years of the wetland development (see below). During this time, disturbance to the site will be avoided unless necessary to correct any obvious problems. The shallow observation wells established during the construction of the wetland would continue to provide ground water level information during the wetland monitoring phase.

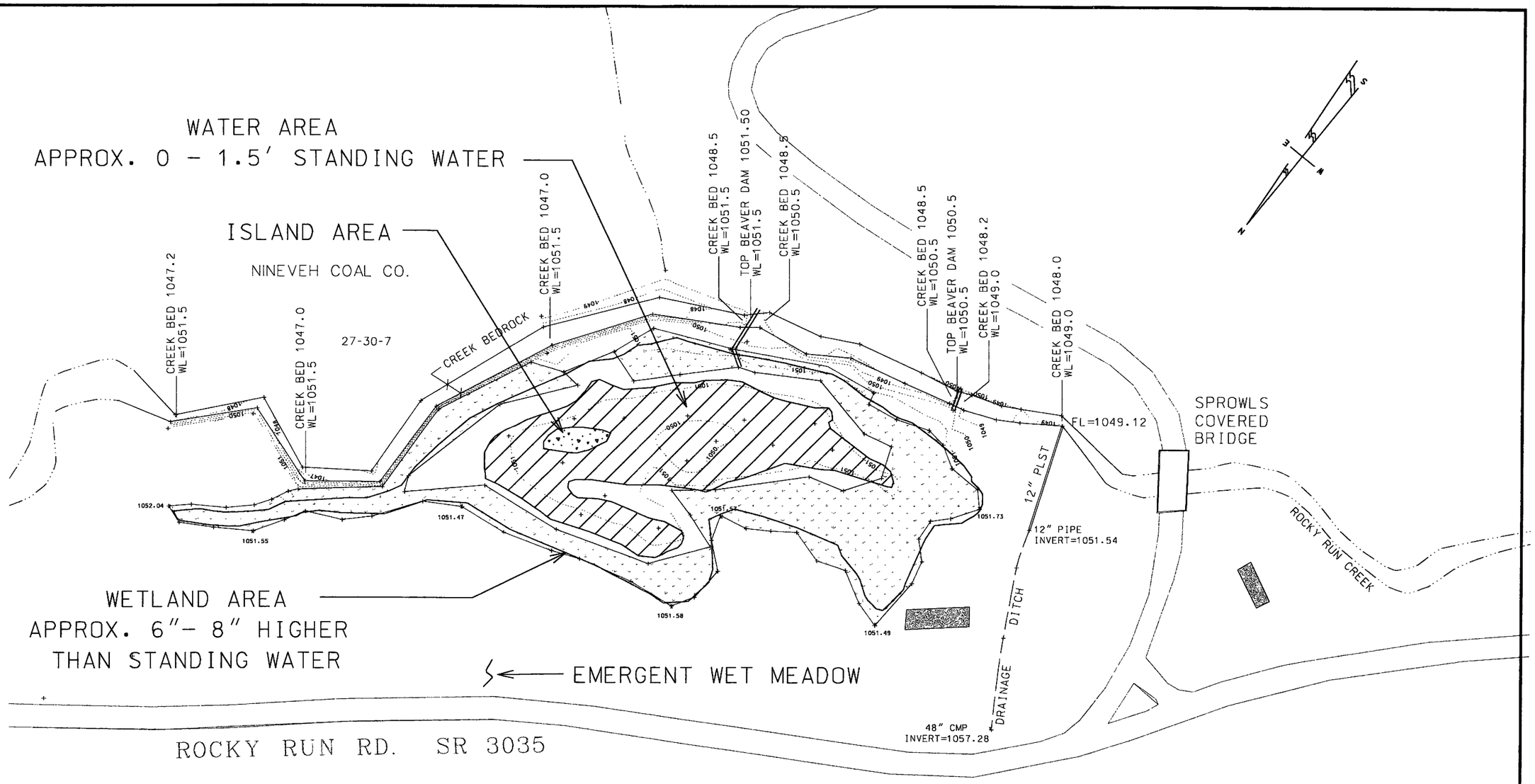
Judging from the wetland vegetation that has developed in one growing season (see above descriptions), there will be no need to seed or plant this wetland after earthwork in completed. This wetland developed in the flood plain of Rocky Run and because of this there is obviously a good supply of viable hydrophyte propagules.

ROCKY RUN WETLAND B

This new subsidence wetland (Figure 6) is also artificially large due to several beaver dams. The purpose of this plan is to essentially keep the same wetland area by contouring the site such that it will remain wet after the beavers have left the area. Additional features such as a more complex shoreline and an island have been included in this plan in order to encourage aquatic biota and wildlife diversity and abundance.

Figure 9 shows the proposed modifications for Rocky Run Wetland B. The final size of this wetland would be: open water - 0.342 acres; island - 0.013 acres; emergent and wet meadow - 0.563 acres. To achieve the configuration of open shallow water habitat, islands and surrounding emergent wetland habitat, shallow observation wells would be established prior to construction of the wetland to provide ground water level information to assist in determining the necessary final elevations. Wetland soils will be brought into Rocky Run Wetland area B to provide the seed, organics and root mat that will expedite the propagation of diverse hydrophytic plant communities. An estimated 700 cubic yards of soils will be imported from the Templeton Fork Wetland (see following section) in order to provide about a four inch depth of hydric soils in the disturbed areas. Some of the existing soils (as well as an unknown amount of fill material that has been placed in the area) will require removal to allow for the desired open water areas and higher wetland areas before the imported wetland soils are brought into the site. The imported wetland soils will be loosely placed and firmed to a depth of about four inches (see above discussion of seed banks), but will not be compacted or rolled. Once placed, no equipment or vehicle access will be permitted on the area. A variety of gentle slopes will be created for transition between the different areas. It is proposed that the existing beaver dams be breached and the area dewatered of standing water before the work would begin. During construction, any areas of the stream bank that have been breached into the wetland area by beaver activity will be plugged with earth fill to eliminate direct connection between the stream water and the wetland area. Low ground pressure equipment would be used for work within the wetland creation area and movement will be limited to small areas to minimize disturbance.

After contour grading is completed and the wetland soils placed, the drainage ditch from the unnamed tributary to Rocky Run, which is located to the west of the proposed wetland area, will be diverted into the newly created wetland to provide additional water to the site. As previously discussed, detailed plans, specifications and construction sequence will be required to perform



70 0 70 140

SCALE IN FEET

CONSOL PENNSYLVANIA COAL COMPANY	PROJECT NO.
ROCKY RUN WETLAND B PROPOSED WETLAND CREATION GREENE COUNTY, PENNSYLVANIA	DATE 12/2001 SCALE 1" = 70'
	FIGURE 9

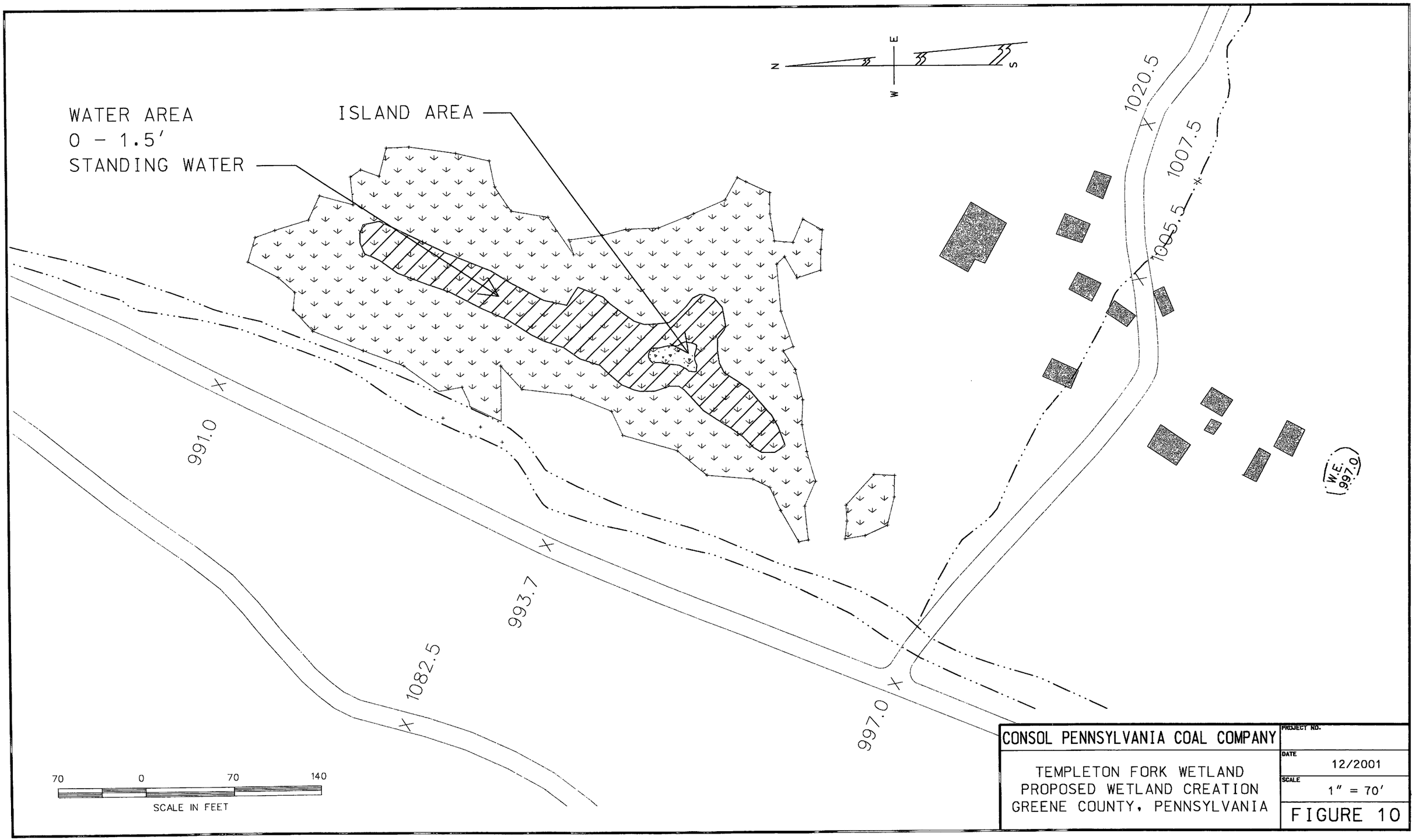
this work. The specifications will be provided to the PADEP for approval prior to construction initiation. The specifications should focus on the quick placement of the excavated Templeton Fork wetland soils so as not to expose the soils to excess drying or the need for stockpiling. Excess drying or exposure may destroy the seed bank, cause premature germination of the seed bank, or cause premature establishment of vegetative propagules.

As with Rocky Run Wetland A, a wetland monitoring program would be implemented after construction and the shallow observation wells established during construction would be used to monitor ground water levels (see discussion below).

TEMPLETON FORK MITIGATION WETLAND

This subsidence wetland (Figure 7) is well established after almost eight years of existence. The purpose of this plan is to keep the same wetland area but provide increased habitat diversity by developing an open water area. A complex shoreline and an island have been included in this plan in order to encourage aquatic biota and wildlife diversity and abundance.

Figure 10 shows the proposed modification to the Templeton Fork Wetland. The final size of this wetland would be: open water - 0.322 acres; island - 0.014 acres; emergent and wet meadow - 1.03 acres. Unlike the Rocky Run Wetland A and B areas, the Templeton Fork wetland is not influenced by any beaver dams, which will make construction of the proposed open water area easier. To achieve the configuration of open shallow water habitat and islands, shallow observation wells would be established prior to construction of the wetland to provide ground water level information to assist in determining the necessary final elevations. To achieve the desired contouring, low ground pressure equipment will be used to excavate up to 1.5 ft. of material from the existing wetland. The equipment operating area will be limited to the outline of the proposed open water area, so that no disturbance to the wetland area outside the open water will occur (except for a construction entrance access to the south, which will be reclaimed to approximate original conditions after the excavation is completed). An estimated 700 cubic yards of wetland soils removed from the Templeton Fork wetland will be immediately transported and placed at the Rocky Run Area B wetland as described above. The well-established vegetation from this wetland will provide for a good seed base to establish vegetation in the newly created Rocky Run Wetland B Area. Any excess wetland soils that are not used at the Rocky Run Wetland B Area will be suitably disposed of offsite at an approved area. The



CONSOL PENNSYLVANIA COAL COMPANY	PROJECT NO.
TEMPLETON FORK WETLAND PROPOSED WETLAND CREATION GREENE COUNTY, PENNSYLVANIA	DATE 12/2001 SCALE 1" = 70'
	FIGURE 10

specifications, construction sequence and best methods for this work have not been detailed for this report, but will be given to the PADEP for approval prior to construction initiation.

As previously discussed, detailed plans, specifications and construction sequence will be required to perform this work. The specifications will include schedules that allow the immediate placement of the removed wetland soils in the contoured areas of Rocky Run Wetland B, as discussed above. After excavation of the wetland soils from the Templeton Fork area, as-built conditions will be documented as baseline information for evaluation of the site during the subsequent monitoring phase. Proposed monitoring will include water levels in the monitoring wells installed prior to construction.

POST - CONSTRUCTION MONITORING

Post construction monitoring plans will be submitted to PADEP for approval prior to construction. There will be three monitoring plans; one to monitor hydrology , one to monitor vegetation success and one to monitor wildlife use. The hydrologic monitoring plan will consist of periodic monitoring of the observation wells installed prior to construction. This will continue until there is sufficient evidence that the wetlands are successful under varied natural hydrologic conditions. Should there be a need to further modify the wetlands to change water or saturation levels, the monitoring well data will provide the necessary information for designing such modifications.

Monitoring wetland success will be based on two elements. First, vegetation will be monitored annually to assess the species and community composition of each wetland and its components, as well as to estimate the cover density or plant productivity. This monitoring plan will be similar to the one used at Consol's successful Kirby Shaft wetland replacement, where vegetation quadrats were permanently located and monitored annually for species composition, relative abundance and density. Second, wildlife use of the wetlands will be monitored by field observations conducted during appropriate seasons.

CONCLUSIONS

Typical of southwestern Pennsylvania watersheds, both the refuse and slurry valleys had a number of small headwater wetlands associated with the streams in each valley. The refuse valley contained seven discrete Jurisdictional Wetlands totaling only 0.102 acres, while the slurry valley contained 19 Jurisdictional Wetlands totaling 1.259 acres. The wetlands of the refuse valley were mostly very small streamside or seep wetlands under heavy woodland cover. Most were relatively undisturbed natural wetlands of the sort commonly seen associated with stream origins and headwater flood plains in southwestern Pennsylvania and due to their sizes and headwater placement, they had low levels of wetland functions and values. Wetlands of the slurry valley ranged from wet meadows to headwater seep wetlands. Only wetlands S-1 to S-3 were not impacted by cattle traffic and grazing. Very few of the slurry valley wetlands were in a natural state and most were so highly disturbed that it is difficult to say what the natural vegetation should have been. As discussed above only wetland S-4 was judged to have more than very minimal wetland functions and values.

Due to the proximity of the three proposed mitigation wetlands, their inclusion of significant open shallow water habitat, the diversity of wetland habitats provided and their downstream watershed positions, they stand to provide a significant addition of this regionally scarce resource in southwestern Pennsylvania. Once wetland communities are reestablished in the mitigated wetlands, they will provide a much higher level of wetland functions and values than the wetlands they will replace. At a ratio of 1:1.5, the mitigation wetlands will also greatly exceed the required replacement, with a total of 4.198.acres to mitigate the proposed loss of 1.361 acres of wetlands (a ratio of over 3:1). Furthermore, the success of the proposed mitigation wetlands is highly likely in view of the current post subsidence levels of wetland vegetation development and wildlife use.

REFERENCES

Adamus, P. R., E. J. Clairain Jr., R. D. Smith and R. E. Young. 1987. Wetland evaluation technique (WET). Volume II. Technical Report Y-87. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.

Dunne, K. P. A., A. M. Rodrigo and E. Samanns. 1940. Engineering specification guidelines for wetland plant establishment and subgrade preparation. Technical Report WRP-RE-19. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.

Environmental Laboratory. 1987. Corps of Engineers Wetland Delineation Manual. Technical Report Y-87. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.

Hayes, D. F., T. J. Olin, J. C. Fischenich and M. R. Palermo. 2000. Wetlands engineering handbook. Technical Report WRP-RE-21. U.S. Army Corps of Engineers, Engineer Research and Development Center.

Interagency Workgroup on Wetland Restoration (U.S.EPA, NOAA, U.S.ACOE, U.S.FWS and NRCS). Draft document May 2001. An introduction to wetland restoration, creation and enhancement.

Kusler, J. A. and M. E. Kentula. 1990. Wetland creation and restoration: the status of the science. Island Press. Washington, D.C. 591pp.

Mitsch, W. J., and J. K. Cronk. 1992. Creation and restoration of wetlands: some design considerations for ecological engineering. In Advances in Soil Science. R. Lal and B. A. Stewart, eds., vol. 17: Soil Restoration. Springer-Verlag, New York. Pp 217-259.

Mitsch, W. J., and J. G. Gosselink. 1993. Wetlands.Van Nostrand Reinhold, New York, NY. 722pp.

Novitski, R. P. 1994. EMAP-Wetlands: A program for assessing wetland condition. In Mitsch, W. J. ed. Global Wetlands: Old World and New. Elsevier, New York, NY. pp 697-709.

Reed, P. B., Jr. 1997. Revision of the national list of plant species that occur in wetlands. U.S. Dept. of Interior, Fish and Wildlife Service. January 15, 1997. 462pp.

Strausbaugh, P. D., and E. L. Core. Undated. Flora of West Virginia. Seneca Books, Inc. Grantville, WV. 1079 pp.

U. S. Department of Agriculture Soil Conservation Service. 1992. Engineering field handbook, Chapter 13, Wetland restoration, enhancement or creation.

U. S. Department of Agriculture Soil Conservation Service, and Pennsylvania State University . 1983. Soil survey of Greene and Washington Counties, Pennsylvania. 93pp. plus maps.

U. S. Department of Agriculture Soil Conservation Service. 1991. Hydric soils of the United States. U.S. Dept. Of Agriculture Misc. Publ. No. 1491. Unpaged.

van der Valk, A.G. and C.B Davis. 1978 The role of seed banks in the revegetation dynamics of prairie glacial marshes. Ecology 59(2): 322-335.

APPENDIX A

Data Forms and Photographs of the Jurisdictional Wetlands of the Proposed Bailey Mine Refuse Valley

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Refuse Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No R-1** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Poa trivialis***	**FACW**
2.		8. ***Glyceria striata***	**OBL**
3.		9. ***Bidens frondosa***	**FACW**
Saplings/shrubs		10 ***Aster puniceus***	**OBL**
4.		11. ***Carex lurida***	**OBL**
5.		12. ***Scirpus microcarpus***	**OBL**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **N5/**
Gleyed: Yes **X**; No____. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, gleyed, saturation**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 3 inches**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **+3 to -3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils and an area of inundation**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford B Rhen Jr

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Refuse Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No R-2** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Impatiens capensis***	**FACW**
2.		8. ***Pilea pumila***	**FACW**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Leersia virginica***	**FACW**
4.		11. ***Ranunculus recurvatus***	**FAC**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No___.Basis: ***I. Capensis* (FACW) totally dominated the vegetation.**

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes **X** No_____
Mottled: Yes **X**; No____. Mottle color: **5YR 5/6**; Matrix color: **10YR 5/2**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low matrix chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0-4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **Soils saturated to near surface**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford B Clean Jr

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Refuse Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No R-3** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Poa trivialis***	**FACW**
2.		8. ***Pilea pumila***	**FACW**
3.		9. ***Impatiens capensis***	**FACW**
Saplings/shrubs		10. ***Leersia virginica***	**FACW**
4. ***Lindera benzoin***	**FACW-**	11. ***Polygonum virginianum***	**FAC**
5. ***Acer negundo***	**FAC+**	12. ***Ranunculus recurvatus***	**FAC**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Most abundant plants rated FACW**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **2.5YR 5/8**; Matrix color: **10YR 6/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **4-6 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No___. Basis: **Saturation to 4-6 inches, mottles and low chroma soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford B Clauer Jr

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Refuse Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No R-4** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Poa trivialis***	**FACW**
2.		8. ***Impatiens capensis***	**FACW**
3.		9. ***Lysimachia nummularia***	**FACW-**
Saplings/shrubs		10. ***Aster punicius***	**OBL**
4. ***Lindera benzoin***	**FACW-**	11. ***Leersia virginica***	**FACW**
5.		12. ***Ranunculus recurvatus***	**FAC**
6.		13. ***Carex prasina***	**OBL**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Most abundant plants are rated FACW**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **10YR 3/2**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low soil chroma and saturation to near surface**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0-3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **Soils saturated to near surface**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____

Comments:_____.

Determined by: Bradford B Elmer Jr

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Refuse Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No R-5** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Impatiens capensis***	**FACW**
2.		8. ***Carex prasina***	**OBL**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Cardomine rotundifolia***	**OBL**
4. ***Acer negundo***	**FAC+**	11. ***Leersia virginica***	**FACW**
5. ***Lindera benzoin***	**FACW-**	12. ***Pilea pumila***	**FACW**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are rated FACW or OBL**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes___ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **N3/**
Gleyed: Yes **X**; No____. Other indicators: **saturation to near surface**
Hydric soils: Yes **X**; No____. Basis: **Soil color, gleyed, saturation to near surface**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0.5-3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **Soils saturated to near surface**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford B. Allen Jr.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Refuse Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No R-6** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Carex prasina***	**OBL**
2.		8. ***Impatiens capensis***	**FACW**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Pilea pumila***	**FACW**
4.		11. ***Leersia virginica***	**FACW**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **All common plants are rated OBL or FACW**.

Soil
Series and phase: **Dormont-Culleoka silt loams** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **5YR 4/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, saturation to near surface**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: 0-3 inches
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **Saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____

Determined by: Bradford B. Clauer Jr

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Refuse Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No. R-7** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Impatiens capensis***	**FACW**
2.		8. ***Poa trivialis***	**FACW**
3.		9. ***Carex prasina***	**OBL**
Saplings/shrubs		10 ***Pilea pumila***	**FACW**
4.		11. ***Laportea canadensis***	**FAC**
5.		12. ***Cryptotaenia canadensis***	**FAC**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____
Hydrophytic vegetation: Yes **X**; No____. Basis: **dominant vegetation is FACW or OBL**

Soil
Series and phase: **Dormont-Culleoka silt loams** On hydric soils list? Yes____; No **X**.
Mottled: Yes____; No **X**. Mottled color:_____; Matrix color: **5PB 5/1**
Gleyed: Yes **X**; No____. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Gleyed, saturated soil**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 - 2 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **Soils saturated to surface or near-surface**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Typical headwater seep wetland**

Determined by: Bradford B. Bauer Jr

APPENDIX B

Data Forms and Photographs of the Jurisdictional Wetlands of the Proposed Bailey Mine Slurry Valley

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-1** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Typha latifolia***	**OBL**
2.		8. ***Carex lurida***	**OBL**
3.		9. ***Carex vulpinoidea***	**OBL**
Saplings/shrubs		10. ***Agrimonia parviflora***	**FACW**
4.		11. ***Carex granularis***	**FACW+**
5.		12. ***Carex frankii***	**OBL**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **N5/**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, saturation**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **1-4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes **X**; No____.

Normal Circumstances: Yes____ No **X**.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **This wetland appears to have resulted from adjacent railroad construction**.

Determined by: Bradford B Owen Jr

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-2** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Typha latifolia***	**OBL**
2.		8. ***Carex scoparia***	**FACW**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Mentha spicata***	**FACW+**
4.		11. ***Impatiens capensis***	**FACW**
5.		12. ***Agrimonia parviflora***	**FACW**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: ***T. Latifolia* (OBL) totally dominated**

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **N5/**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, saturation**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 3 inches**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **+3 to -3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils and an area of inundation**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford B Guerin Jr

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-3** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Glyceria striata***	**OBL**
2.		8. ***Leersia virginica***	**FACW**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Impatiens capensis***	**FACW**
4.		11. ***Carex lurida***	**OBL**
5.		12. ***Carex frankii***	**OBL**
6.		13. ***Polygonum sagittatum***	**OBL**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **5YR 5/6**; Matrix color: **5N/**
Gleyed: Yes **X**; No____. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **gleyed**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0-4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford B Owen Jr

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-4** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Glyceria striata***	**OBL**
2.		8. ***Typha latifolia***	**OBL**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Onoclea sensibilis***	**FACW**
4.		11. ***Aster puniceus***	**OBL**
5.		12. ***Carex lurida***	**OBL**
6.		13. ***Carex laevivaginata***	**OBL**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **5YR 5/6**; Matrix color: **10YR 5/2**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles, saturation**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 1 inch**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **+1 to -3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils and an some inundation**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford B Clauser Jr

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-5** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Glyceria striata***	**OBL**
2.		8. ***Bidens frondosa***	**FACW**
3.		9. ***Cardamine rotundifolia***	**OBL**
Saplings/shrubs		10. ***Poa trivialis***	**FACW**
4.		11. ***Carex frankii***	**OBL**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Sparsely vegetated by FACW and OBL plants**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **5YR 5/8**; Matrix color: **10YR 5\1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles, saturation**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 4 inches**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **+4 to -4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils and an area of inundation**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford B. Rivers Jr.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-6** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Polygonum hydropiperoides***	**OBL**
2.		8. ***Carex frankii***	**OBL**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Impatiens capensis***	**FACW**
4.		11. ***Leersia oryzoides***	**OBL**
5.		12. ***Carex vulpinoidea***	**OBL**
6.		13. ***Bidens frondosa***	**FACW**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **N5/**
Gleyed: Yes **X**; No____. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Gleyed, saturation**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford D. Clausen Jr.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-7** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Leersia virginica***	**FACW**
2.		8. ***Bidens frondosa***	**FACW**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Impatiens capensis***	**FACW**
4.		11. ***Glyceria striata***	**OBL**
5.		12. ***Pilea pumila***	**FACW**
6.		13. ***Carex vulpinoidea***	**OBL**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **N4/**
Gleyed: Yes **X**; No____. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Gleyed, saturated**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 1 inches**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **+1 to -3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils and very minor inundation**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes____ No **X**.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Very heavily impacted by cattle**.

Determined by: Bradford B. Brown Jr.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-8** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Poa trivialis***	**FACW**
2.		8. ***Pilea pumila***	**FACW**
3.		9. ***Impatiens capensis***	**FACW**
Saplings/shrubs		10. ***Leersia virginica***	**FACW**
4. ***Fraxinus americana***	**FACU**	11. ***Polygonum hydropiperoides***	**OBL**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **83**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant herbs are all rated FACW or OBL; only a few saplings of F. Americana**.

Soil
Series and phase: **Fluvaquents, loamy** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **10YR 4/2**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, saturation**

Hydrology
Inundated: Yes____; No____. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Spring - seep area**.

Determined by: Bradford B. Ellwein

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-9** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Poa trivialis***	**FACW**
2.		8. ***Pilea pumila***	**FACW**
3.		9. ***Leersia virginica***	**FACW**
Saplings/shrubs		10. ***Polygonum hydropiperoides***	**OBL**
4.		11. ***Onoclea sensibilis***	**FACW**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Dormont-Culleoka silt loam** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **2.5YR 4/8**; Matrix color: **10YR 5/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles, saturation**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford B. Owen Jr.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-10** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. *Glyceria striata*	**OBL**
2.		8. *Carex lurida*	**OBL**
3.		9. *Poa trivialis*	**FACW**
Saplings/shrubs		10. *Juncus effusus*	**FACW+**
4.		11. *Pilea pumila*	**FACW**
5.		12. *Carex vulpinoidea*	**OBL**
6.		13. *Carex stipata*	**OBL**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: **Dormont-Culleoka silt loam** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **10YR 5/6**; Matrix color: **10YR 5/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 6 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments:_____.

Determined by: Bradford B Clauser Jr

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-11** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Carex frankii***	**OBL**
2.		8. ***Bromus inermis***	**UPL**
3.		9. ***Glyceria striata***	**OBL**
Saplings/shrubs		10. ***Poa trivialis***	**FACW**
4.		11. ***Carex vulpinoidea***	**OBL**
5.		12. ***Carex stipata***	**OBL**
6.		13. ***Mentha piperita***	**FACW+**

% of species that are OBL, FACW, and/or FAC: **86**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Most plants are all rated FACW to OBL; *B. innermis* is an invader from adjacent pasture**.

Soil
Series and phase: **Dormont-Culleoka silt loam** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color:_____; Matrix color: **N5/**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **3 to 6 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils; soil colors**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes____ No **X**.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Area heavily impacted by cattle**.

Determined by: Bradford J. Clemens Jr.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-12** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Poa trivialis***	**FACW**
2.		8. ***Polygonum hydropiperoides***	**OBL**
3.		9. ***Bromus inermis***	**UPL**
Saplings/shrubs		10. ***Carex frankii***	**OBL**
4.		11. ***Polygonum cespitosum***	**FACU-**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **60**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: ***P. trivialis* (FACW) was the total dominant**

Soil
Series and phase: **Dormont-Culleoka silt loam** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **10YR 5/6**; Matrix color: **10YR 5/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No____. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Spring-seep area heavily impacted by cattle**.

Determined by: Bradford B. Clemens

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-13** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Poa trivialis***	**FACW**
2.		8. ***Bromus inermis***	**UPL**
3.		9. ***Eleocharis* sp.**	**OBL?**
Saplings/shrubs		10. ***Carex frankii***	**OBL**
4.		11. ***Phalaris arundinacea***	**FACW**
5.		12. ***Polygonum hydropiperoides***	**OBL**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **83**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **All plants are all rated FACW to OBL except for B. inermis which invaded from adjacent heavily grazed meadow.**

Soil
Series and phase: **Dormont-Culleoka silt loam** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **2.5YR 4/8**; Matrix color: **10YR 5/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 1 inch**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **+1 to 3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils and an area of inundation**
Atypical situation: Yes **X**; No____.

Normal Circumstances: Yes____ No **X**.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **This wetland is the remnants of a partially drained manmade pond**.

Determined by: Bradford B. Blume Jr

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-14** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Carex vulpinoidea***	**OBL**
2.		8. ***Carex frankii***	**OBL**
3.		9. ***Juncus effusus***	**FACW+**
Saplings/shrubs		10. ***Eupatorium perfoliatum***	**FACW+**
4.		11. ***Bromus inermis***	**UPL**
5.		12. ***Polygonum hydropiperoides***	**OBL**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **83**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL; *B. inermis* is an invader from adjacent pasture**.

Soil
Series and phase: **Dormont-Culleoka silt loams** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **5YR 5/1**; Matrix color: **10YR5/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 - 4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Area is heavily impacted by cattle**.

Determined by: Bradford B. Owen Jr.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-15** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Bidens frondosa***	**FACW**
2.		8. ***Poa trivialis***	**FACW**
3.		9. ***Polygonum hydropiperoides***	**OBL**
Saplings/shrubs		10. ***Echinochloa crus-galli***	**FACU**
4.		11. ***Bromus inermis***	**UPL**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **60**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL**.

Soil
Series and phase: Dormont-Culleoka silt loam On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **7.5Y 6/6**; Matrix color: **10YR 6/2**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Area is very heavily impacted by cattle; little vegetation remaining**.

Determined by: Bradford L. Ames Jr.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-16** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Pilea pumila***	**FACW**
2.		8. ***Leersia virginica***	**FACW**
3.		9. ***Poa trivialis***	**FACW**
Saplings/shrubs		10. ***Polygonum cespitosum***	**FACU-**
4.		11.	
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **75**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are rated FACW**.

Soil
Series and phase: Dormont-Culleoka silt loams On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **5YR 4/6**; Matrix color: **10YR 6/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 - 3 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Area is so heavily impacted by cattle that few plants survive**.

Determined by: Bradford B. Ruen Jr.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number: _____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township: _____ Range: _____
Date: **July 20, 2001** Plot No.: **Wetland No S-17** Section: _____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Mentha piperita***	**FACW+**
2.		8. ***Bromus inermis***	**UPL**
3.		9. ***Agrominia parviflora***	**FACW**
Saplings/shrubs		10. ***Carex vulpinoidea***	**OBL**
4.		11. ***Polygonum hydropiperoides***	**OBL**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **80**. Other indicators: _____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are rated FACW to OBL except for *B. inermis* which invaded from adjacent pasture**.

Soil
Series and phase: Dormont-Culleoka silt loam On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **7.5YR 5/8**; Matrix color: **10YR 5/1**
Gleyed: Yes____; No **X**. Other indicators: _____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water: _____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 4 inches**
Other indicators: _____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland _____
Comments: **Area impacted by cattle**.

Determined by: Bradford B. Oliver Jr.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-18** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Polygonum hydropiperoides***	**OBL**
2.		8. ***Bromus inermis***	**UPL**
3.		9. ***Carex frankii***	**OBL**
Saplings/shrubs		10. ***Veronica americana***	**OBL**
4.		11. ***Juncus effusus***	**FACW+**
5.		12. ***Carex vulpinoidea***	**OBL**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **83**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are all rated FACW to OBL, excepting *B. inermis* which invaded from adjacent pasture**.

Soil
Series and phase: **Dormont-Culleoka silt loam** On hydric soils list? Yes____ No **X**
Mottled: Yes____; No **X**. Mottle color:_____; Matrix color: **10YR 5/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, saturation**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 to 4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Area impacted by cattle grazing**.

Determined by: Bradford B. Clinger Jr.

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company** Application Number:_____ Project Name: **Bailey Mine Slurry Valley**
State: **PA** County: **Greene** Legal Description: Township:_____ Range:_____
Date: **July 20, 2001** Plot No.: **Wetland No S-19** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Carex vulpinoidea***	**OBL**
2.		8. ***Bromus inermis***	**UPL**
3.		9. ***Scirpus cyperinus***	**FACW+**
Saplings/shrubs		10. ***Carex frankii***	**OBL**
4.		11. ***Agrimonia parviflora***	**FACW**
5.		12.	
6.		13.	

% of species that are OBL, FACW, and/or FAC: **80**. Other indicators:_____.
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant plants are rated FACW to OBL, except for B. inermis which invaded from adjacent pasture**.

Soil
Series and phase: **Dormont-Culleoka silt loam** On hydric soils list? Yes____ No **X**
Mottled: Yes **X**; No____. Mottle color: **7.5YR 4/6**; Matrix color: **10YR 6/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **1 - 4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **saturated soils**
Atypical situation: Yes____; No **X**.

Normal Circumstances: Yes **X** No____.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **Area is impacted by cattle**.

Determined by: Bradford B. Deem Jr.

APPENDIX C

Data Forms and Photographs of the Subsidence Created Rocky Run Wetland A

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company**. Application Number:_____ Project Name: **Bailey Mine Mitigation**
State: **PA** County: **Washington** Legal Description: Township:_____ Range:_____
Date: **October 1, 2001** Plot No.: **Rocky Run Subsidence Wetland A** Section: **1**

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Phalaris arundinacea***	**FACW**
2.		8. ***Polygonum sagittatum***	**OBL**
3.		9. ***Eragrostis hypnoides***	**OBL**
Saplings/shrubs		10. ***Polygonum hydropiperoides***	**OBL**
4.		12. ***Dichanthelium clandestinum***	**FAC+**
5.		13. ***Agrimonia parviflora***	**FACW**
6.		14. ***Scirpus tabernaemontani***	**OBL**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant taxon is FACW; next three most abundant are OBL.**

Soil
Series and phase: **Newark Silt Loam** On hydric soils list? Yes____; No **X**.
Mottled: Yes **X**; No____. Mottled color: **2.5YR 4/8**; Matrix color: **N5/**
Gleyed: Yes____; No **X**. Other indicators: **root channel staining**
Hydric soils: Yes **X**; No____. Basis: **Low matrix color, mottles, root channel staining**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **Portions of areas dominated by *Phalaris Arundinacea* were up to 4-6 inches deep.** Saturated soils: Yes **X**; No___. Depth to saturated soil: **0-6 inches** Other indicators: **Soil indicators listed above**
Wetland hydrology: Yes **X**; No____. Basis: **Several visits throughout the season indicate almost constant inundation levels** Atypical situation: Yes **X**; No____.

Normal Circumstances: Yes____ No **X**.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **This is a portion of a new wetland created from mine subsidence**

Determined by: Bradford L. Ehrenfeld

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company**. Application Number:_____ Project Name: **Bailey Mine Mitigation**
State: **PA** County: **Washington** Legal Description: Township:_____ Range:_____
Date: **October 1, 2001** Plot No.: **Rocky Run Subsidence Wetland A** Section: **3**

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Ludwigia palustris***	**OBL**
2.		8. ***Mimulus ringens***	**OBL**
3.		9. ***Eragrostis hypnoides***	**OBL**
Saplings/shrubs		10. ***Polygonum hydropiperoides***	**OBL**
4.		11. ***Cyperus strigosus***	**FACW**
5.		12. ***Leersia virginica***	**FACW**
6.		13. ***Phalaris arundinacea***	**FACW**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____
Hydrophytic vegetation: Yes **X**; No____. Basis: **Most abundant plants are all rated OBL**

Soil
Series and phase: **Newark Silt Loam** On hydric soils list? Yes____; No **X**.
Mottled: Yes **X**; No____. Mottled color: **2.5YR 5/1**; Matrix color: **2.5YR 4/8**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma matrix and mottles**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 6 inches at edges**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 - 6 inches**
Other indicators: **Streamside location, likely seasonally flooded** Wetland hydrology: Yes **X** No____.
Basis: **Several visits throughout the season indicate almost constant inundation levels**
Atypical situation: Yes **X**; No____.

Normal Circumstances: Yes____ No **X**.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **This is a portion of a new wetland created from mine subsidence**

Determined by: Bradford [illegible]

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company**. Application Number:_____ Project Name: **Bailey Mine Mitigation**
State: **PA** County: **Washington** Legal Description: Township:_____ Range:_____
Date: **October 1, 2001** Plot No.: **Rocky Run Subsidence Wetland A** Section: **5**

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Ludwigia palustris***	**OBL**
2.		8. ***Phytolacca americana***	**FACU+**
3.		9. **unidentifiable Graminae**	**-**
Saplings/shrubs		10. ***Cyperus strigosus***	**FACW**
4.		11. ***Agrimonia parviflora***	**FACW**
5.		12. ***Dichanthelium clandestinum***	**FAC+**
6.		13.	

% of species that are OBL, FACW, and/or FAC: **66**. Other indicators:_____
Hydrophytic vegetation: Yes **X**; No____. Basis: **Marginally hydrophytic; couldn't identfy common grass due to heavy deer grazing.**

Soil
Series and phase: **Newark Silt Loam** On hydric soils list? Yes____; No **X**.
Mottled: Yes **X**; No____. Mottled color: **2.5YR 4/8**; Matrix color: **10YR 4/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma matrix and mottles**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 6 inches at edges**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 - 6 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **Several visits throughout the season indicate almost constant inundation levels**
Atypical situation: Yes **X**; No____.

Normal Circumstances: Yes____ No **X**.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **This is a portion of a new wetland created from mine subsidence**

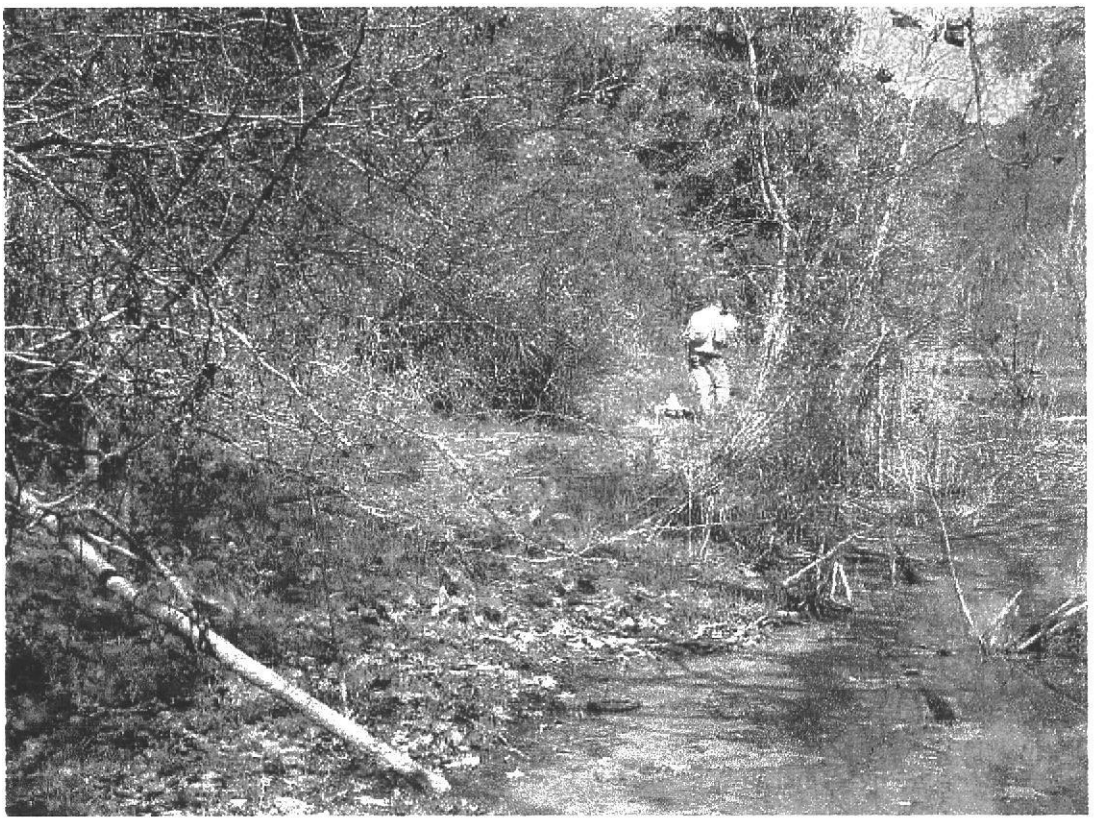
Determined by: Bradford Olmes Jr

AREA 1 - LOOKING WEST FROM EASTERN END

AREA 3 IN FOREGROUND LOOKING NORTHEAST TOWARD AREA 2 TO THE RIGHT OF FLAG

AREA 2 – LOOKING SOUTHWEST

AREA 4 – LOOKING NORTHEAST



AREA 5 – LOOKING NORTHEAST

APPENDIX D

Data Forms and Photographs of the Subsidence Created Rocky Run Wetland B

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company**. Application Number:_____ Project Name: **Bailey Mine Mitigation**
State: **PA** County: **Washington** Legal Description: Township:_____ Range:_____
Date: **October 1, 2001** Plot No.: **Rocky Run Subsidence Wetland B** Section: **1**

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Ranunculus hispidis***	**FACW+**
2.		8. ***Phalaris arundinacea***	**FACW**
3.		9. ***Juncus effusus***	**FACW+**
Saplings/shrubs		10. ***Leersia oryzoides***	**OBL**
4.		11. ***Typha latifolia***	**OBL**
5.		12. ***Rumex crispis***	**FACU**
6.		13. ***Eleocharis obtusa***	**OBL**

% of species that are OBL, FACW, and/or FAC: **86**. Other indicators:_____
Hydrophytic vegetation: Yes **X**; No____. Basis: **Dominant species are FACW to OBL**

Soil
Series and phase: **Newark Silt Loam** On hydric soils list? Yes____; No **X**.
Mottled: Yes____; No **X**. Mottled color:_____; Matrix color: **10YR 4/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma (despite young age of wetland)**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **0 - 1.5 feet**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **surface**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **inundation observed in late summer and fall**
Atypical situation: Yes **X**; No____.

Normal Circumstances: Yes____ No **X**.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **This wetland was created by mine subsidence and further enhanced by beaver dams**

Determined by: Bradford G. Oliver Jr

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company**. Application Number:_____ Project Name: **Bailey Mine Mitigation**
State: **PA** County: **Washington** Legal Description: Township:_____ Range:_____
Date: **October 1, 2001** Plot No.: **Rocky Run Subsidence Wetland B** Section: **2**

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1.		7. ***Phalaris arundinacea***	**FACW**
2.		8. ***Ranunculus hispidis***	**FACW+**
3.		9. ***Leersia oryzoides***	**OBL**
Saplings/shrubs		10. ***Dactylis glomerata***	**FACU**
4.		11. ***Prunella vulgaris***	**FACU+**
5.		12. ***Carex* sp 1**	**-**
6.		13. ***Carex* sp 2**	**-**

% of species that are OBL, FACW, and/or FAC: **66**. Other indicators:_____
Hydrophytic vegetation: Yes **X**; No____. Basis: **The two dominant taxa were FACW and FACW+**

Soil
Series and phase: **Newark Silt Loam** On hydric soils list? Yes____; No **X**.
Mottled: Yes____; No **X**. Mottled color:_____; Matrix color: **10YR 4/1**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma (despite young age of wetland)**

Hydrology
Inundated: Yes____; No **X**. Depth of standing water:_____
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 - 4 inches**
Other indicators:_____
Wetland hydrology: Yes **X**; No____. Basis: **Appears to have shallow soil saturation for much of growing season**
Atypical situation: Yes **X**; No____.

Normal Circumstances: Yes____ No **X**.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments: **This wetland was created by mine subsidence and further enhanced by beaver dams**

Determined by: Bradford B Queen Jr

AREAS 1 AND 2, LOOKING NORTHEAST FROM SOUTHWESTERN END OF WETLAND

AREA 1 IN MIDDLE LOOKING NORTHEAST; *TYPHA LATIFOLIA* AND *JUNCUS EFFUSUS*

AREA 2 AT NORTHEASTERN END, LOOKING NORTHEAST

OVERVIEW OF BOTH HABITATS LOOKING SOUTH

APPENDIX E

Data Forms and Photographs of the Subsidence Created Templeton Fork Wetland

DATA FORM 1
WETLAND DETERMINATION

Applicant Name: **Consol Pennsylvania Coal Company**. Application Number:_____ Project Name: **Bailey Mine Mitigation**
State: **PA** County: **Washington** Legal Description: Township:_____ Range:_____
Date: **October 1, 2001** Plot No.: **Templeton Fork Subsidence Wetland** Section:_____

Vegetation [list the three dominant species in each vegetation layer (5 if only 1 or 2 layers)]. Indicate species with observed morphological or known physiological adaptations with an asterisk.

Species	Indicator Status	Species	Indicator Status
Trees		Herbs	
1. ***Salix nigra***	**FACW+**	7. ***Polygonum sagittatum***	**OBL**
2. ***Platanus occidentalis***	**FACW-**	8. ***Phalaris arundinacea***	**FACW**
3.		9. ***Typha latifolia***	**OBL**
Saplings/shrubs		10. ***Carex sp***	-
4.		11. ***Cyperus esculentus***	**FACW**
5.		12. ***Juncus effusus***	**FACW+**
6.		13. ***Ludwigia palustris***	**OBL**

% of species that are OBL, FACW, and/or FAC: **100**. Other indicators:_____
Hydrophytic vegetation: Yes **X**; No____. Basis: **Identifiable taxa are OBL or FACW**

Soil
Series and phase: **Huntington silt loam** On hydric soils list? Yes____; No **X**.
Mottled: Yes **X**; No____. Mottled color: **7.5YR 5/1**; Matrix color: **2.5YR 4/8**
Gleyed: Yes____; No **X**. Other indicators:_____
Hydric soils: Yes **X**; No____. Basis: **Low chroma, mottles**

Hydrology
Inundated: Yes **X**; No____. Depth of standing water: **up to 3 inches in limited areas**
Saturated soils: Yes **X**; No____. Depth to saturated soil: **0 - 6 inches**
Other indicators: **Adjacency to Templeton Fork and elevation assure some flooding**
Wetland hydrology: Yes **X**; No____. Basis: **Saturated soils and inundation in some places**
Atypical situation: Yes **X**; No____.

Normal Circumstances: Yes____ No **X**.
Wetland Determination: Wetland **X**; Nonwetland_____
Comments : **This is a wetland created by subsidence of flood plain field**

Determined by: Bradford B Clausen Jr

CENTER OF WETLAND LOOKING NORTHEAST; *TYPHA LATIFOLIA* AND *SCIRPUS CYPERINIS* IN BACKGROUND WITH *PHALARIS ARUNDINACEA* DOMINATING FOREGROUND

CLOSER TO SOUTHWESTERN EDGE LOOKING NORTHEAST; *JUNCUS EFFUSUS*, *CAREX* SPP., *PHALARIS ARUNDINACEA* AND *TYPHA LATIFOLIA* IN FOREGROUND

NEAR SOUTHWESTERN END LOOKING NORTHEAST; AREA OF *TYPHA LATIFOLIA* DOMINANCE RIGHT WITH AREA OF *PHALARIS ARUNDINACEA* DOMINANCE IN FOREGROUND

Module 16: Air Pollution and Noise Control

16.1 Facility Description.

a) Will coal be crushed, screened, blended, or beneficiated as part of this operation?

Coal will not be crushed, screened, blended, or beneficiated as part of this application.

b) Indicate the amount of minerals processed under this operation.

Not applicable. No minerals will be processed under this operation.

Note: Facilities processing more than 200 tons per day, 50,000 tons per year, or facilities with thermal dryers require separate Air Quality Permits which must be obtained through the Department's Regional Air Quality office.

16.2 Dust Control Plan.

Describe the practices to be used to control fugitive dust at the following facilities and areas.

a) Access and haul roads.

During site preparation activities when haul roads are constructed, dust development will be controlled by watering on an as-needed basis, and by establishing vegetation on areas reaching final grade. During facility operation, a water truck will be used to control fugitive dust from access and haul roads.

b) Loading and unloading areas.

Coarse coal refuse loading and unloading operations are not expected to create a fugitive dust problem because of the material's coarse nature and moist condition. These areas will be watered on an as-needed basis to control fugitive dust.

c) Crushing and sizing equipment.

Not applicable. Crushing and sizing equipment is not proposed as part of this application.

d) Conveyors.

Coarse coal refuse is not expected to present a dust control problem during transport because of its coarse nature and moist condition. The belt conveyor will be covered and the area surrounding the conveyor will be watered on an as-needed basis to control fugitive dust.

e) Stockpiles

The coarse coal refuse is not expected to present a dust control problem because of its coarse nature and moist condition when placed. Embankment areas reaching final grade will be vegetated.

16.3 Noise Control Plan.

Describe the measures that will be taken to prevent noise from becoming a nuisance to local residents at the following sites.

a) Mine ventilation fans.

b) Coal processing sites.

c) Other mine-related facilities (e.g., vacuum pumps, air compressors)

Not applicable. No mine ventilation fans, coal processing sites, or similar mine related facilities are proposed with this permit application.

Module 17: Soils / Prime Farmland

If more than one surface mining activity site is proposed under this application, provide a separate set of maps and responses for each site.

17.1 Soils Map

Provide a USDA soils map which shows the following:

a) the boundaries of the proposed permit area;

b) Prime farmland soils.

Presented as Attachment 17.1 is a USDA soils map showing boundaries of the proposed permit area. CaB soils located within small ridge top areas have been identified by the USDA Natural Resources Conservation Service as prime farmland soils.

17.2 Soils Data

a) List each of the soil series and phases present within the proposed permit area. Provide the results of any borings or test pits made to determine soils depths.

SERIES	*PHASE*	*DESCRIPTION*
Culleoka (Ca)	*CaB* *CaC* *CaD*	*3 to 8 percent slopes* *8 to 15 percent slopes* *15 to 25 percent slopes*
Dormont (Do)	*DoB*	*3 to 8 percent slopes*
	DoC	*8 to 15 percent slopes*
Dormont-Culleoka assoc. (Dt)	*DtD*	*15 to 25 percent slopes*
	DtF	*25 to 50 percent slopes*
Fluvaquents (Fa)	*not applicable*	
Guernsey (Ge)	*GeB*	*3 to 8 percent slopes*
Weikert-Culleoka	*WeB*	*3 to 8 percent slopes*

Records of borings and test pits excavated at the project site are appended to the Module 21 Design Report.

b) Identify the thickness of topsoil present within the proposed permit area.

During subsurface investigations performed in August and September of 2001, test borings revealed topsoil depths ranging from 0.3 foot to a maximum depth of 1.5 feet.

c) If the area has no topsoil or has been previously surface mined, identify the material that will be used as final cover and provide information, including a chemical analysis, demonstrating that the material is capable of supporting the vegetation specified in the reclamation plan. (Borrow areas are required to be mapped at Module 18, section 18.1.e.25.)

Not applicable. Topsoil blankets the project site and will be removed and stockpiled for construction of the one foot thick soil cover component of the final cover. During site preparation, additional soil will be removed from soil borrow areas as needed for use as soil cover. Presented as Attachment 14.2.7a is a plan of the project site presenting proposed borrow areas and estimated average soil thicknesses within those areas. Presented as Attachment 17.2.c is demonstration that sufficient soils are available for cover construction as well as construction of the liner protective cover.

The bottom layer of the two-foot thick final cover will be comprised of soil placed and compacted so as to be equivalent to liner material. This layer will have a thickness of one foot. Liner material for final cover construction will be obtained from the project site. Demonstration that sufficient liner material is available for cover construction is presented in Module 14.

17.3 Prime Farmland

a) Indicate whether there are any soils within the proposed permit area classified by USDA Natural Resources Conservation Service (NRCS) as prime farmland soils. Provide a certification by the NRCS indicating that the findings of the prime farmland investigations are correct.

CaB at the ridge top areas classify as a prime farmland soil. Refer to the Soils Map presented as Attachment 17.1 and Attachment 17.3.a, the USDA Natural Resources Conservation Service letter regarding site prime farmland soils.

b) Indicate whether a negative determination is requested for those soils within the proposed permit area which have been designated by NRCS as prime farmland soils.

A negative determination is requested because: 1) the soils to be affected have not been used as cropland for any 5 out of the last 10 years, and 2) the affected area is less than 5 acres and will be used to support mining activities for more than 10 years. Presented as Attachment 17.3.b is a copy of a letter from CPCC, the owner of parcels having prime farmland soils, attesting that the parcels in question have not been used for cropland for any 5 of the last 10 years. The original letter was submitted with the Phase I Alternatives Analysis Report.

c) Indicate whether a negative determination is requested for those soils within the proposed area which have been identified as non prime farmland soils based on a USDA Soil Survey. If not explain why.

A negative determination is requested for those soils within the proposed area, which have been identified as non prime farmland soils.

17.4 Soil Handling Plan.

a) Provide a plan for removal, storage and redistribution of topsoil and subsoil. The plan must address specific measures to be used in reconstruction of prime farmland soils at sites where prime farmland reconstruction is required. Include the method and type of equipment to be used for handling of soil horizons or combinations of horizons.

Topsoil and subsoil to be used for final cover construction and construction of liner protective cover will be removed from the disposal area as part of site preparation. Topsoil/soil stripping generally will be conducted in stages corresponding with facility liner construction. It will include stripping the area to approximate depths shown on Attachments 14.2.7a, or the bottom of the topsoil/organic layer, whichever is deeper. Soil identified as liner soil will either be stockpiled or directly incorporated into the facility liner. Topsoil and other soil will be either stockpiled or directly placed on areas of exposed coal refuse that have reached final grade.

Topsoil and subsoil to be used as cover will be placed in a stockpile to be developed on existing Coal Refuse Disposal Area No. 1 as shown on Sheet 37 of the Module 21.1 drawings. Additional temporary stockpiles will be developed around the proposed disposal facilities at the locations shown on Sheet 3 in the Module 21.1 drawings. The capacity of Stockpile No. 1 (1,512,000 cy) will be sufficient to store the total quantity of material needed for final cover construction (1,186,400 cy). Stockpile Nos. 2 and 3 will contain sufficient capacity to allow staging of excess clay and soil material removed from the area on which liner is being placed. This material will then be used during future liner installations. The total capacity of Stockpile Nos. 2 and 3 are 100,700 cy and 74,500 cy, respectively.

Soil cover will be installed incrementally as areas reach final grade. Installation will be accomplished using conventional earth moving equipment.

b) If the B and C horizons will be segregated and replaced as subsoil, identify the thickness in inches of the B and C horizons to be removed, segregated and replaced.

B horizon soil and possibly some C horizon soil will be stripped and stockpiled with the topsoil for use as soil cover. B and C horizon soils will not be segregated.

c) If proposing substitute material for the B and/or C horizons, identify what material will be used and provide test results demonstrating that this material will ensure revegetation and soil productivity. Include methods

of collection and analysis and names, addresses and telephone numbers of person(s) responsible for collection and analysis.

17.5 Additional Requirements For Sites With Prime Farmland Soils.

a) Provide available agricultural school studies or other scientific data for areas with comparable soils, climate and management that demonstrate that the proposed method of reclamation will achieve equivalent or higher levels of crop yields after mining than existed before mining.

b) Provide documentation that the Soil Handling Plan(s) prepared under 17.4 and the study results referenced in (a) above were reviewed and approved by the local District Conservationist of the NRCS. Include all comments provided by that office.

Not applicable. A negative determination is being requested for prime farmland soils present at the project site; therefore, the areas will not be reclaimed as prime farmlands. The area will be reclaimed to a wildlife habitat.

ATTACHMENT 17.1

SOILS MAP

LEGEND

Ca	-	Culleoka Silt Loam
Do	-	Dormont Silt Loam
Dt	-	Dormont-Culleoka Silt Loams
Fa	-	Fluvaquents, loamy
Ge	-	Guernsey Silt Loam
We	-	Weikert-Culleoka Complex

MODULE 17.1 SOILS MAP
COAL REFUSE SITE NO. 3 AND 4
SOIL SURVEY SHEET Nos. 105 and 106

CONSOL PENNSYLVANIA COAL COMPANY
BAILEY MINE COMPLEX

Scale: 1" = 1320' S.O. No.: 24379
Date: Jan. 2002 File: Soilsmap.doc

MICHAEL BAKER, JR., INC.

Baker

Consulting Engineers
BEAVER, PENNSYLVANIA

ATTACHMENT 17.2.c

SOIL BORROW SUMMARY OF SOIL QUANTITIES

ATTACHMENT 17.2.c

BAILEY CENTRAL MINE COMPLEX
NEW COAL REFUSE DISPOSAL FACILITY
SUMMARY OF SOIL QUANTITIES: BORROW VS REQUIRED

SOIL BORROW SUMMARY

Soil Source	Area* (S.F.)	Average Soil Thickness (Ft.)	Available Soil Quantity (C.Y.)
# 1	965,808	2.6	93,004
# 2	976,676	0.5	18,087
# 3	460,654	3.0	51,184
# 4	3,335,839	3.4	420,069
# 5	556,686	3.9	80,410
# 6	3,307,450	2.1	257,246
# 7	681,226	1.8	45,415
TOTAL			**965,414**
TOTAL W/SHRINK			**871,769**
EXCESS CLAY			**294,601**
TOTAL AVAILABLE			**1,166,370**

SOIL REQUIREMENT

	Area* (S.Y.)	Soil Thickness (Ft.)	Required Soil Quantity (C.Y.)
0.5' Soil (Liner Prot. Cov)	1,811,325	0.5	301,888
1' Soil Cover	1,779,473	1.0	593,158
TOTAL NEEDED			**895,045**

* Areas have not been increased to account for terrain since proposed slopes will approximate existing ground slopes. Not increasing plan areas to account for terrain over estimates cover clay/soil requirements since the slurry impoundment cover is relatively flat.

SHRINK CALCULATION

Boring/Test Pit	Depth	In-Place Dry Density (pcf)	Max Dry Density (pcf)	Dry Density @ 95% Comp. (pcf)
B-11	1.5-3.0	111.2		
		99.2		
	3.0-5.0	96.9		
		97.1		
B-8	1.5-3.5	114.7		
		107.1		
TP-3	3.0-5.0		102.5	97.4
TP-5	0.5-2.5		99.3	94.3
TP-8	0.8-4.0		102.1	97.0
TP-15	4.5-9.0		92.7	88.1
TP-24	5.5-8.0		111.9	106.3
TP-26	5.5-7.5		105.3	100.0
TP-35	6.0-8.0		110.4	104.9

Estimated Shrink **9.7%**

Note: Shaded values used to calculate shrink.

ATTACHMENT 17.3.a

USDA NATURAL RESOURCES CONSERVATION SERVICE LETTER

USDA-NATURAL RESOURCES CONSERVATION SERVICE
93 E. High Street
Greene County Office Bldg., Room 213
Waynesburg, PA 15370
724-627-5821

April 28, 2000

Gregory P. Hynes, P. E.
Michael Baker Jr., Inc.
Box 280, 4301 Dutch Ridge Road
Beaver, PA 15009-0280

Dear Mr. Hynes:

I have reviewed the information provided for the location of a new coal refuse disposal area for the operation of the Consol PA Coal Company's, Bailey Mine, located in Greene and Washington Counties. The prime farmland determination request is for five alternative sites that are being considered. According to the information and maps provided, there is a prime farmland soil, CaB, located on all of the five sites being considered, with location #5 having the smallest portion.

This determination was completed by review of the information provided and using the current soil survey for Greene-Washington counties. If you need further assistance please feel free to contact me.

Sincerely,

Susan C. Funka-Petery

Susan C. Funka-Petery
Supvry. District Conservationist

"An Equal Opportunity Employer"

ATTACHMENT 17.3.b

LETTER FROM OWNER OF PARCELS HAVING PRIME FARMLAND

CONSOL ENERGY™

Consol Pennsylvania Coal Company
Group 1
172 Route 519 • P.O. Box 355
Eighty Four, PA 15330

phone: 724/206-2005
fax: 724/206-2007

June 21, 2001

Mr. Craig A. Burda. Mining Engineer
Department of Environmental Protection
McMurray District Office
3913 Washington Road
McMurray, PA 15317

Re: New Coal Refuse Disposal Area Project
Bailey Mining Complex
Consol Pennsylvania Coal Company (CPCC)
Richhill Township, Greene County

Dear Mr. Burda:

Please be advised that Consol Pennsylvania Coal Company, the owner of the tracts collectively called Site 4 for the above-referenced project, attests that these parcels contained in the proposed coal refuse disposal area have not been used for cropland for any five (5) of the past ten (10) years. Should you have any questions regarding this letter, please feel free to contact Jonathan M. Pachter at (412) 831-4679.

Sincerely,

Larry W. Hull

Larry W. Hull
Vice-President

Module 18: Land Use/Reclamation/Fish and Wildlife

Complete this Module to address each surface mining activity site which will be covered by this permit. If a permit will cover several surface activity sites, provide a separate set of maps, cross sections and responses for each. etc.

18.1 Land Use and Reclamation Maps - Surface Mining Activity Sites.

a) **Coverage.** Provide a separate map for each surface mining activity site covering the same area as the corresponding site map in Exhibit 6.2 and 9.1.

b) **Scale.** Each map must be clear, accurate, easily read. Scale should match Exhibits 6.2 and 9.1.

c) **Title.** Identify each map as "Exhibit 18.1: Land Use/Reclamation Map - [site name]."

d) **Certification.** Each map must be prepared and certified by a registered professional engineer, a registered professional land surveyor.

e) **Details and information.** Show all the following features and details as they occur within or pertain to the area shown on the map.

1) Postmining contours at an interval of 5 feet or less.

Refer to the final site layout, Sheet 10 and 11 of Exhibit 21.1, Construction Drawings.

2) Permit boundaries.

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module.

3) Property lines.

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module.

4) Bodies of surface water. Map all features listed at 9.1(e)(4).

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module.

5) Buildings (distinguish any which are activity-related and will remain as part of the postmining land use). Show any barriers or variances.

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module. No buildings are proposed. Refuse bins and conveyors are proposed but will not remain as part of the postmining land use.

6) Man-made features (including pipelines, power lines, telephone lines, rail lines, rights-of-way, etc.).

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module.

7) Roads which will remain after reclamation (identify those which are activity-related and will remain as part of the postmining land use).

Refer to Sheet 10 and 11 of Exhibit 21.1, Construction Drawings..

8) Wells which will be left a part of the postmining land use.

No wells, other than those to be used for monitoring, will be left a part of the post mining land use.

9) Wells and boreholes which will be used for monitoring during reclamation.

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module.

10) Areas where prime farmland will be reconstructed.

Prime farmland reconstruction is not proposed. A negative determination is being requested for prime farmland soils located within the permit boundary.

11) Erosion and sedimentation controls that will be used during reclamation and any which will remain as part of the postmining land use.

Refer to Exhibit 21.1, Construction Drawings. The proposed sedimentation pond will control sedimentation from areas of final cover placement. This pond will remain as part of the postmining land use. Runoff from stockpile areas also will be controlled with sediment traps. The traps will be removed at the end of final reclamation.

12) Existing land uses (by area).

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module.

13) Proposed postmining land uses (by area).

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module.

14) Dams or impoundments which will remain as part of the postmining land use.

The proposed sedimentation pond and dam will remain as part of the postmining land use. The five dams constructed to form the Area No. 3 slurry impoundment also will remain as part of the postmining land use, but they will not function as dams. The slurry impoundment (Coal Refuse Disposal Area No. 3) will be dewatered and covered as part of site reclamation. Refer to Sheet 11 of Exhibit 21.1.

15) Areas which will not be restored to approximate original contour.

Only the soil stockpile areas are expected to be restored to approximate original contour. Other areas within the proposed permit boundary will be graded to the contours shown on Sheets 11 and 12 of Exhibit 21.1.

16) Areas in which final slopes will exceed 20 degrees.

Sedimentation pond, slurry impoundment, and coarse coal refuse area outslopes between benches will exceed 20 degrees.

17) Drainage pattern.

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module.

18) Vegetative cover types to be established (key to seed mixture number, woody plant mixture number and cropping group number in 18.5)

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module. Also refer to Item 18.5 of this module.

19) Excess spoil disposal areas.

Refer to Sheets 11 and 12 of Exhibit 21.1, Construction Drawings for the final limit of coal refuse in Coal Refuse Disposal Areas No. 3 and No. 4.

20) Facilities for protection or enhancement of fish and wildlife.

Erosion and sedimentation control will enhance and protect fish and wildlife during the operation. Upon reclamation of the site the proposed planting plan will enhance the area for wildlife.

21) Oil wells and gas wells. (Show barriers and variance areas)

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module.

22) Cemeteries.

There are no public or private cemeteries within 1000 feet of or within the proposed permit boundary.

23) Areas where sewage sludge or coal ash will be applied as soil amendments.

Not applicable. There are no areas where sewage sludge or coal ash will be applied as a soil amendment.

24) Cross section lines (key to 18.2)

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module for the cross section lines. Refer to Sheets 13 and 14 of Exhibit 21.1 for the cross sections.

25) Soil borrow areas.

Soil liner and cover material will be obtained from within the proposed permit boundary. Refer to Attachment 14.2.7a for their locations.

26) Wetland replacement sites.

Refer to Module 15.

18.2 Cross Sections

Provide a set of cross sections illustrating the extent of surface disturbance and regrading which will occur at the site. Title the cross sections "Exhibit 18.2 - Cross Sections - [Site Name]." The cross sections must show the original ground surface, the surface as it will appear during active operations, and the surface as it will appear following reclamation. At least one cross section must also be provided for each area where the original ground surface or final graded surface will exceed 20 degrees. (Cross sections need not be provided for coal refuse disposal areas, if construction drawings showing similar details are provided under Module 21).

Refer to cross sections included with the Exhibit 21.1 construction drawings.

18.3 Pre-mining Land Use

a) Identify the present uses of each land use area within the permit area. If the use of the land has changed within the last 5 years, also identify the use of the land prior to the change. If the land has been previously mined, identify the use before it was mined. (Key land uses to Exhibit 18.1)

Land within the proposed permit area is a combination of essentially vacant forestland, brushland, and grassland that is accessed by area wildlife. A portion of the property is leased by CPCC to a local farmer for grazing cattle. CPCC can discontinue this lease at any time. The areas are well established and vegetated and indicate no change in land use within the past 5 years.

b) Giving consideration to soil and foundation characteristics, topography, vegetative cover and the hydrology of the area, identify other uses each land use area is capable of supporting.

The proposed coal refuse disposal site is located on moderately to steep slope areas. The site is suitable for building development; however, it is most suitable for its current use as described under 18.3.a.

c) For any cropland, pastureland or land occasionally cut for hay or commercial forest, identify the productivity expressed as average yield of food, fiber, forage or wood products. Use yield data or estimates for similar sites based on current data from the U.S. Department of Agriculture or Pa. Department of Agriculture.

None of the areas proposed to be used in this permit revision application are currently used for cropland or as managed pastureland cut for hay.

d) For land within and adjacent to the permit area, identify existing land uses and land use classifications under local law.

No laws or ordinances regarding land use classifications exist in Richhill or Gray Townships. At the county level (Greene County), no laws or ordinances exist classifying land use, however, a countywide plan exists classifying the area as agriculture.

e) Describe the characteristics (e.g. thickness, erodability, and drainage) of each soil type present within the area to be affected by surface mining activities.

Information presented in the USDA publication entitled "Soil Survey of Greene and Washington Counties Pennsylvania" (September 1983) indicate that soil types blanketing the site have the following characteristics.

The Culleoka silt Loam (CaB, CaC and CaD) is approximately 28 inches thick and consists of an 11-inch dark brown silt loam surface layer, a 14-inch yellowish brown silty clay loam, and a 3-inch yellowish brown very shaley silt loam. The hazard of erosion of this soil is severe to very severe. Although the permeability for this soil is moderately rapid, sloping topography provides for rapid runoff. Consequently, drainage of this soil could be classified as moderate.

The Dormont Silt Loam (DoB and DoC) is approximately 78 inches in depth. The surface layer is 12 inches thick and consists of dark brown silt loam. The subsoil consists of yellowish brown silty loam and silty clay loam. This layer is 42-inches thick. The substratum is 24-inches thick and consist of mottled, brown silty clay. The erodibility of this soil can be severe. Moderate to steep slopes and slow to moderately slow permeability result in medium to rapid drainage. Runoff is characterized as rapid.

The Dormont-Culleoka Silt Loam (DtD and DtF) is a soil complex consisting of 11 to 12 inches of dark brown silt loam overlying yellowish brown silty and clayey loams. Based on USDA soil survey data, soil thickness ranges from 28 to 78 inches. Due to the steep slopes, the hazard for erosion is very severe for both the Dormont and Culleoka soil types. In addition, drainage is typically rapid.

The Fluvaquent (Fa) is a soil having a surface layer of black to brown silt loam or loam. The subsoil is mottled loam to silty clay. The substratum is silt loam to sand. The hazard of erosion of this soil is slight. Drainage of the soil is poor and the permeability is moderate. Drainage is very slow.

The Guernsey Silt Loam (GeB) is approximately 42 inches thick and consists of a 10-inch yellowish brown silt loam, an 8-inch yellowish brown silty clay loam and silty clay, and a 24-inch mottled yellowish brown and light brownish gray clay and silty clay. The hazard of erosion of this soil is moderate. Drainage of the soil is also moderate and the permeability is slow or moderately slow.

The Weikert-Culleoka Complex (WeB) is a unit consisting of shallow and moderately deep, well drained silt loam on uplands. The subsoils are shaly silt loam. Shale bedrock reportedly is at a depth of 19 to 28 inches. These soils have moderately rapid permeability and runoff is rapid. The hazard of erosion is very severe.

18.4 Postmining Land Use

a) For each premining land use area in 18.3, identify the postmining land use to which the land will be restored, how each land use is to be achieved and the necessary support activities which may be needed to

achieve the land use. In addition, if the postmining land use is pastureland, describe the detailed management plans to be implemented. (Key the postmining land uses to Exhibit 18.1)

After the disposal facility is closed, the permit area will be returned to a grassland by covering the coal refuse and establishing vegetation. The reclaimed refuse area can then be accessed by wildlife. The proposed seed mixture is presented in the revegetation section below. Refer to Exhibit 18.1, Land Use/Reclamation Maps.

b) For each premining land use area in 18.3, discuss the manner in which other potential uses under 18.3(b) were considered in determining the selected postmining land use. Include consideration given to surface owner plans, and applicable state and local land use plans and programs.

Because the area is rural, there is no unfulfilled demand for land that is suitable for building development. Therefore, that future land use was not considered. With the proposed land use, crest areas of the reclaimed coal refuse disposal facility could again be used for grazing cattle if CPCC desires to re-establish such leasing practices.

c) Describe the measures which will be taken during the reclamation and postmining phase of operation to develop aquatic and terrestrial habitat. If enhancement measures are not proposed explain why enhancement is not practical.

The stream/wetland mitigation plan proposed under Module 15 provides for implementation of measures that will develop and enhance aquatic and terrestrial habitat at the proposed mitigation sites. In addition, the vegetation plan proposed for the disposal area includes plants desirable for wildlife habitat. During reclamation, measures will be implemented to reduce erosion and sedimentation of the unnamed tributary and Enlow Fork as discussed in Module 11 of this application.

d) Identify each building, road, impoundment or other structure which will be developed, improved, or used under this permit and which will remain following reclamation. Also describe its role in the postmining land use.

- For each impoundment that will remain, provide information to demonstrate that: the quality of impounded water will be suitable for the intended use; the level of water and size of impoundment will be sufficient to support the intended use; the impounded water will be safely accessible; adjacent water supplies will not be adversely impacted; and the impoundment will be compatible with the postmining land use.

No buildings or structures will remain other than the sedimentation pond. The pond will remain for treatment of seepage that is expected to continue for a period after disposal facility closure. When the seepage can be discharged without treatment, the pond will be eliminated. Refer to Module 13 for sedimentation pond design information. The pond will be operated during the post closure period in the same manner as during the active phase of disposal facility operation. No treatment other than sedimentation is expected to be required based on performance of the existing Bailey sedimentation ponds. Discharge from the pond will be conducted in accordance with discharge limitations.

e) Indicate whether or not the proposed land use is compatible with local zoning and land use restrictions.

No laws or ordinances regarding land use classifications or restrictions exist in Richhill and Gray Township. At the county level (Greene County), no laws or ordinances exist classifying land use, however, a countywide plan exists classifying the area as agriculture. The proposed land use of grassland accessible to area wildlife is compatible with the surrounding land use. Since CPCC is returning the site to its premining land use, no violation with local zoning and land use restriction is expected.

f) Provide the comments concerning proposed land uses from the legal or equitable owner of the land surface.

The legal owner of land within the proposed permit boundary (CPCC) has no comment concerning the proposed postmining land use.

g) If an alternative land use is proposed, provide the following information:

1) A notarized written statement from the owner of the surface (landowner) requesting that the alternative land use be approved and including his comments.

2) A description of the land uses in the surrounding area.

3) The written comments of the government agency or planning commission with statutory responsibilities for land use policies and plans.

4) Any zoning or land use ordinance approval.

5) Plans showing the feasibility of the alternative land use related to projected land use trends and markets and a schedule showing how the proposed use will be developed and achieved.

6) If land or buildings are being dedicated to a public agency to be used for public facilities, a letter of commitment from the agency.

7) Documentation showing that the alternative land use will be practicable with respect to private financial capability for completion of the proposed use.

8) Plans to ensure the stability, drainage, and configuration necessary for the intended use of the site.

9) Measures to mitigate adverse effects on fish, wildlife and related environmental values.

Not applicable. An alternative land use is not proposed.

18.5 Revegetation

Soil Test Plan

a) Provide a soil test plan for determining plant nutrients and soil amendments required to establish vegetation and achieve the approved postmining land use.

The primary objective of the soil testing plan will be to secure a sample which is representative of a large volume of soil material.

Prior to redistribution of topsoil, soil tests will be conducted to determine the required nutrients to be added to ensure a successful revegetation plan.

Sample preparation will be limited to air-drying and breaking up the larger particles with a mortar and pestle. Final preparation will be the responsibility of the testing laboratories.

To determine whether on-site materials may conceivably provide an acceptable final cover, the following minimum specifications are given:

Texture: Acceptable materials will be composed of not more than 20% coarse fragments larger than three inches in any dimension.

Toxicity: pH shall be greater than 4.0 and calcium carbonate deficiency shall be less than 5.0 tons per thousand tons of material as indicated by acid-base account. This condition shall prevail at least within the uppermost 18-inches of material to be used as a seedbed.

Fertilizer will conform with applicable state and federal laws. Commercial fertilizer consisting of a 10-20-20 analysis will be used for areas to be planted with grass. Fertilizer will be of uniform composition and furnished in standard containers. These containers, in accordance with applicable state and federal laws,

will be clearly marked with the following information:

a. Weight.
b. Name of plant nutrients.
C Guaranteed nutrient percentages.

Fertilizer rates will be formulated from soil test results or shall be the application rate established as acceptable during soil stockpile seeding..

Lime to be used will be pulverized agricultural limestone conforming with Section 804.2(a)1 of PADOT Specifications. The lime rate will be formulated from soil test results or, in the absence of soil testing, a rate of 2 tons/acre will serve as a preferred minimum.

b) Temporary Cover. Provide the following information for each seed mixture to be used for temporary cover: (Note: Key to 18.1)

1)

Seed Mixture No.	Seed Mixture (Species)	Rate of Appl. (lbs./acre)	Seed Quality (Min. % Germ.)	(Min. % Purity)
A	*Perennial Ryegrass*	*40*	*98*	*98*
B	*Winter Wheat*	*180*	*85*	*98*
C	*Winter Rye (Aroostook Rye)*	*168*	*85*	*98*

2) Use.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

3) Method(s) of seeding.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

4) How seedbed will be prepared for planting.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

5) Type(s) of mulch to be used and rate(s) of application.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

c) Permanent Cover. Provide the following information for each seed mixture to be used for permanent cover: (Note: Key to Exhibit 18.1)

1)

Seed Mixture No.	Seed Mixture (Species)	Rate of Appl. (lbs./acre)	Seed Quality (Min. % Germ.)	(Min. % Purity)
Level to Nearly *<u>Level Areas</u>*				
A	*Perennial Ryegrass*	*25*	*90*	*98*
B	*Switchgrass*	*40*	*60*	*Pure Live Seed*
C	*Birdsfoot Trefoil*	*15*	*80*	*98*

Slopes				
A	*Perennial Ryegrass*	*25*	*90*	*98*
B	*Tall Fescue*	*60*	*85*	*98*
C	*Switchgrass*	*15*	*60*	*Pure Live Seed*

2) Use.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

3) Method of seeding.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

4) How seedbed will be prepared for planting.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

5) Type(s) of mulch to be used and rate(s) of application.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

d) Woody Plants. For areas that will also be planted with woody plants, provide the following: (Note: Key to Exhibit 18.1)

1) Woody Plant Mixture No. Woody Plant Species No./ac.

2) Method of planting.

3) If the area is to be planted for wildlife habitat, identify the grouping and distribution of the plants and the type of wildlife habitat to be created.

Not applicable. Woody plants are not included in the seeding of this permit area.

e) Cropland. For areas that will be planted to crops (agronomic or horticultural), identify the crops to be grown and the management plans to achieve the crop yield standards. (Note: Key to Exhibit 18.1)

Not applicable. Crop planting is not proposed within this permit area.

f) Measurement Techniques. Specify the technique to be used to evaluate the success of revegetation. If cropland is the proposed postmining land use, specify the technique for determining crop yields. Describe the remedial measures to be employed should the minimum standards of success for reclamation not be initially met.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

18.6 Fish and Wildlife (Protection/Enhancement Plan)

a) State whether or not any threatened or endangered species and/or critical habitats of these species (include species listed or proposed and habitats listed by the U.S. Department of the Interior under the Endangered Species Act of 1973) have been identified within or adjacent (within 1000 feet) to the proposed surface activity site. If it has, identify the species and habitat area and include within your response to (c) and (d) information specific to the species and habitats identified.

There are no known threatened or endangered species within or adjacent to (within 1000 feet of) the limits of the proposed permit area. Refer to the PNDI search form and the responses from the Pennsylvania Fish and Boat Commission and the Pennsylvania Game Commission presented as Attachment 18.6.

b) State whether or not any habitats of unusually high value (e.g., wild trout streams, wetlands, riparian areas, cliff/caves supporting raptors, areas offering special shelter or protection) have been identified within or

adjacent (within 1000 feet) to the proposed surface mining activity site. If it has, identify the habitat area and include within your response to (c) and (d) information specific to the habitat identified.

There are no habitats of unusually high value identified within or adjacent to (within 1000 feet of) the limits of the proposed permit area. Refer to the PNDI search form and the responses from the Pennsylvania Fish and Boat Commission and the Pennsylvania Game Commission as Attachment 18.6.

c) Describe the measures which will be taken to avoid or minimize adverse impacts to fish and wildlife resources.

The site was designed to minimize the acreage necessary to construct the proposed facilities, and the design incorporates erosion and sedimentation controls to minimize adverse impacts on streams and associated aquatic life. Erosion and sedimentation controls will be implemented before and during operations and during reclamation activities. The site will be well vegetated after the life of the disposal facility has expired.

d) Describe the measures which will be taken to enhance fish and wildlife resources.

The wetland/stream mitigation plan proposed in Module 15 provides for enhancement of area aquatic and wildlife habitat. Also, the vegetation plan proposed for the disposal facility final cover includes plants desirable for wildlife habitat as an enhancement measure.

e) If no enhancement measures are identified in (d) above, explain why enhancement is not practicable.

See item d above.

EXHIBIT 18.1
LAND USE / RECLAMATION MAP

ATTACHMENT 18.6
PNDI SEARCH FORM AND RESPONSE

3630-FM-WQ0037 Rev. 9/98

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY PROTECTION
BUREAU OF WATERWAYS ENGINEERING

PNDI Screening
Reviewer N62137 gg
Date 7/22/02
Phone No. 412-442-4308

SUPPLEMENT NO. 1
PENNSYLVANIA NATURAL DIVERSITY INVENTORY SEARCH FORM

This form provides site information necessary to perform a computer screening for species of special concern listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, the Pennsylvania Fish and Boat Code or the Game Code. Records regarding species of special concern are maintained in a computer data base called the "Pennsylvania Natural Diversity Inventory" (PNDI). This screening represents the most up to date PNDI data and may not reflect actual field conditions. Results of this PNDI search are valid for one year.

Please complete the information below, attach an 8½" x 11" photocopy (DO NOT REDUCE) of the portion of the U.S.G.S. Quadrangle Map that identifies the project location and outlines the approximate boundaries of the project and mail to the appropriate regional office or the delegated County Conservation District prior to completing a Chapter 105 environmental assessment or any other DEP permit application. (SEE REVERSE SIDE FOR LIST OF OFFICES AND ADDRESSES).

NAME: Greg Hynes

ADDRESS: Michael Baker Jr., Inc.
4301 Dutch Ridge Road
Beaver, Pa. 15009

PHONE: 724 495-4273

COUNTY: Greene

TWP./MUNICIPALITY: Richhill & Gray Townships

U.S.G.S. 7½ Minute Quadrangle
Wind Ridge

PROJECT DESCRIPTION AND SIZE (Briefly describe entire area relevant to your project, including acreage.)
Coal Refuse Disposal Site(s)
-Alternatives Analysis

Approx. Center of Area

North (Up) 13.50 inches
West (to the left) 3.35 inches

INDICATE PROJECT LOCATION TO THE NEAREST ONE TENTH INCH MEASURING FROM THE EDGE OF THE MAP IMAGE FROM THE LOWER RIGHT CORNER.

SCREENING RESULTS - Follow the directions of the checked block.

☒ No potential conflicts were encountered during the PNDI computer screening. Include this form with your environmental assessment or permit application submission.

☐ Potential conflicts were resolved with (FAS/PNDI staff person on _____, 19__) Include this form with your environmental assessment or permit application submission.

☐ Potential conflicts must be resolved by contacting the following natural resource agencies checked below. Please provide a copy of this form along with a brief description of your project to the following agency for consultation and recommendations.

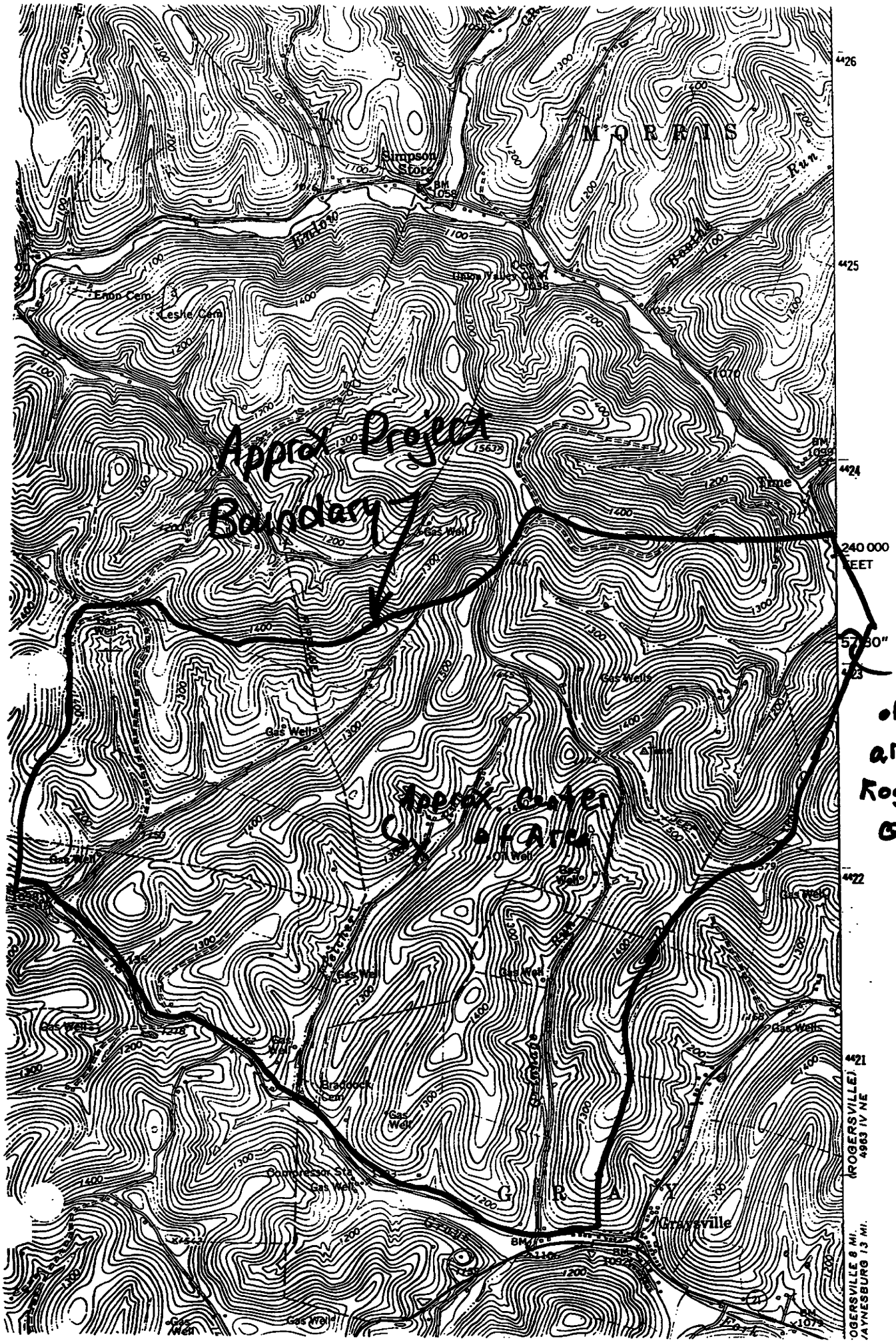
PLEASE CONTACT:

☐ Dept. of Conservation and Natural Resources
Bureau of Forestry/FAS/PNDI
P.O. Box 8552
Harrisburg, PA 17105
717-787-3444

☐ Mr. Andrew L. Shiels
PA Fish & Boat Commission
450 Robinson Lane
Bellefonte, PA 16823
814-359-5113

☐ Mr. Denver A. McDowell
PA Game Commission
2001 Elmerton Ave.
Harrisburg, PA 17110-9797
717-783-8743

Include this form and the agency's written recommendation with your environmental assessment or permit application submission.


Approx. Project Boundary
Approx. Center of Site
Small portion of project area on Rogersville Quad
MORRIS
Simpson Store
Eaton Cem.
Leslie Cem.
Time
Gas Well
Gas Wells
Oil Well
Braddock Cem.
Compressor Sta.
GRAY
Grayville
240 000 FEET
(ROGERSVILLE)
4963 IV NE
ROGERSVILLE 8 MI.
MAYNESBURG 1.3 MI.

BUREAU OF FISHERIES

Delano R. Graff, Director
(814) 359-5154
FAX: (814) 359-5153

DIVISION OF FISHERIES MANAGEMENT

Richard A. Snyder, Chief
(814) 359-5110
FAX: (814) 359-5153

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA FISH & BOAT COMMISSION
450 Robinson Lane
Bellefonte, PA 16823-9620

IN REPLY REFER TO
SIR# 4782

The following inquiries were performed for the same search area by Killam Associates.

July 14, 2000

KILLAM ASSOCIATES
Edward M. Davis
Morocco Building
651 South Center Avenue
Somerset, PA 15501-2511

Dear Mr. Davis:

RE: Species Impact Review - Rare, Candidate, Threatened and Endangered Species
Consol Pennsylvania Coal Co.
Richhill Township, Greene County, Pennsylvania

I have examined the map accompanying your recent correspondence which shows the location for the proposed above referenced project.

Presently, none of the fishes, amphibians or reptiles we list as endangered or threatened are known to occur at or in the immediate vicinity of this study area.

To allow faster processing of Species Impact Reviews (SIRs) in the future, we are requesting that the attached form be completed and returned to this office together with other relevant project information. Please make copies of the attached form and use with all future project reviews. If you have received, and in fact are using the new form, disregard the above request. Please note that the PFBC conducts Species Impact Reviews **only for reptiles, amphibians, fishes, and aquatic invertebrates.** Reviews concerning other natural resources must be submitted to other appropriate agencies. In any future correspondence with us regarding this specific project, please refer to the SIR number above. Thank you in advance for your cooperation.

Sincerely,

Andrew L. Shiels

Andrew L. Shiels, Leader
Nongame and Endangered Species Unit

hb

Encl. (1)

COMMONWEALTH OF PENNSYLVANIA

PENNSYLVANIA GAME COMMISSION

2001 ELMERTON AVENUE
HARRISBURG, PA 17110-9797

ADMINISTRATIVE BUREAUS:

ADMINISTRATION	717-787-5670
AUTOMOTIVE AND PROCUREMENT DIVISION	717-787-6594
LICENSE DIVISION	717-787-2084
PERSONNEL DIVISION	717-787-7836
WILDLIFE MANAGEMENT	717-787-5529
INFORMATION & EDUCATION	717-787-6286
LAW ENFORCEMENT	717-787-5740
LAND MANAGEMENT	717-787-6818
REAL ESTATE DIVISION	717-787-6566
MANAGEMENT INFORMATION SYSTEMS	717-787-4076

July 20, 2000

Mr. Edward M. Davis
Environmental Specialist
Killam Associates
Morocco Building
651 South Center Avenue
Somerset, PA 15501-2511

In re: Consol Pennsylvania Coal Company
Potential coal refuse disposal facility
Richland Township, Greene County, PA

Dear Mr. Davis:

This is in reference to your letter requesting information relative to the above project.

We have completed an office review and determined that except for occasional individuals, this project should not affect any endangered or threatened species of bird or mammal recognized by the Pennsylvania Game Commission.

This response relates only to endangered or threatened species. It does not address other concerns of the Pennsylvania Game Commission. If, in the normal review process, it is determined that the project may impact critical or unique habitats such as wetlands, wintering areas, or nesting cover, etc., you may be requested to conduct additional studies.

For your convenience, please find attached, a copy of the United States Department of Interior's National Wetlands Inventory Map. Based on a map reconnaissance of the project area, your project may encroach upon wetlands. Any encroachment in wetlands will require permits from the Pennsylvania Department of Environmental Resources under the Dam Safety and Encroachment Act, Section 105, and the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act.

If you have any questions on the above, please contact me directly at 717-783-1728.

Very truly yours,

William A. Capouillez, PG
Section Oil/Gas and Mineral Development
Bureau of Land Management

WAC/pfb

cc: File
GRC
Kepler

COMMONWEALTH OF PENNSYLVANIA
FISH AND BOAT COMMISSION

24379-000-0000-ARK

A. This form provides the site information necessary to perform a computer search for species of special concern listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, the Pennsylvania Fish and Boat Code or the Wildlife Code.

B. Complete the information below and mail to:

cc: CF, PF, GPH

Andrew L. Shiels
Herpetology, Endangered Species and Triploid Grass Carp Coordinator
PA Fish and Boat Commission
450 Robinson Lane
Bellefonte, PA 16823
(814) 359-5113

mailed Pa F+B and PNDI forms on 3/15/00 G

C. This form and accompanying maps should be sent to the above address for environmental reviews that only concern reptiles, amphibians, fishes and aquatic invertebrates. Reviews for other natural resources must be submitted to other appropriate agencies.

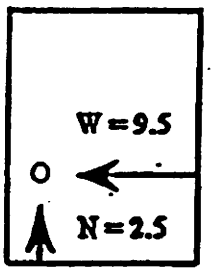
D. The absence of recorded information from our files does not necessarily imply actual conditions on site. Future field investigations could alter this determination. The information contained in our files is routinely updated. A review is valid for one year.

Please print or type
Applicant's Name: Greg Hynes Company: Michael Baker Jr., Inc.
Address: 4301 Dutch Ridge Road
Beaver, Pa. 15009 Phone (8:00 AM to 4:00 PM): 724-495-427
Project Description: Coal Refuse Disposal Site-Alternatives Analysis
Co: Greene Twp/Municipality: Richhill and Gray Townships

Name of the United States Geological Survey (U.S.G.S.) 7.5 Minute Quadrangle Map Where project is located:
Wind Ridge, Pa. Project size (in acres): 2,000

Indicate the location of approximate project center on the U.S.G.S. Quad map by measuring in inches (to nearest one-tenth) from the lower right corner of the actual U.S.G.S. Quad map.

- North (Up) 13.50 inches
- West (to the left) 3.35 inches



(Example, not to scale)

Use only one form for each proposed project or location. Attach an 8.5" by 11" photocopy (DO NOT REDUCE) of the section of the U.S.G.S. Quadrangle Map which identifies the project location and outlines the approximate boundaries of the project.

FOR PFBC USE ONLY

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850

June 15, 2000

Mr. Edward M. Davis
Killam Associates
Morocco Building
651 South Center Avenue
Somerset, PA 15501-2511

Dear Mr. Davis:

This responds to your letter of May 10, 2000, requesting information about natural resource areas of special concern, and federally listed and proposed species in the vicinity of the proposed coal refuse disposal facility to be located in Richhill Township, Greene County, Pennsylvania. The following comments are provided pursuant to the Fish and Wildlife Coordination Act (48 Stat. 401, 16 U.S.C. 661 *et seq.*) and the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

Except for occasional transient species, no federally listed or proposed threatened or endangered species under our jurisdiction are known to occur within the project impact area. Therefore, no biological assessment or further Section 7 consultation under the Endangered Species Act will be required with the Fish and Wildlife Service. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered. A compilation of certain federal status species in Pennsylvania is enclosed for your information.

Based on our office review of project information provided and map reconnaissance (i.e., County Soils maps and/or National Wetland Inventory maps), wetlands may occur within the boundaries of the proposed project. Work in wetlands requires permits from the Pennsylvania Department of Environmental Protection (DEP) and/or the Army Corps of Engineers (Corps). We suggest you contact the DEP and the Corps at the addresses listed below for information on permit requirements.

Pennsylvania Department of
Environmental Protection
Division of Rivers and
Wetlands Conservation
P.O. Box 8554
Harrisburg, PA 17105-8554

District Engineer, Pittsburgh
U.S. Army Corps of Engineers
Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222

By copy of this letter, we are informing these agencies of the proposed project.

This response relates only to endangered and threatened species under our jurisdiction and a preliminary review for wetlands, based on an office review of the proposed project's location. No field inspection of the project area has been conducted by this office. Therefore, we suggest contacting a qualified consultant to evaluate your site for potential wetland impacts.

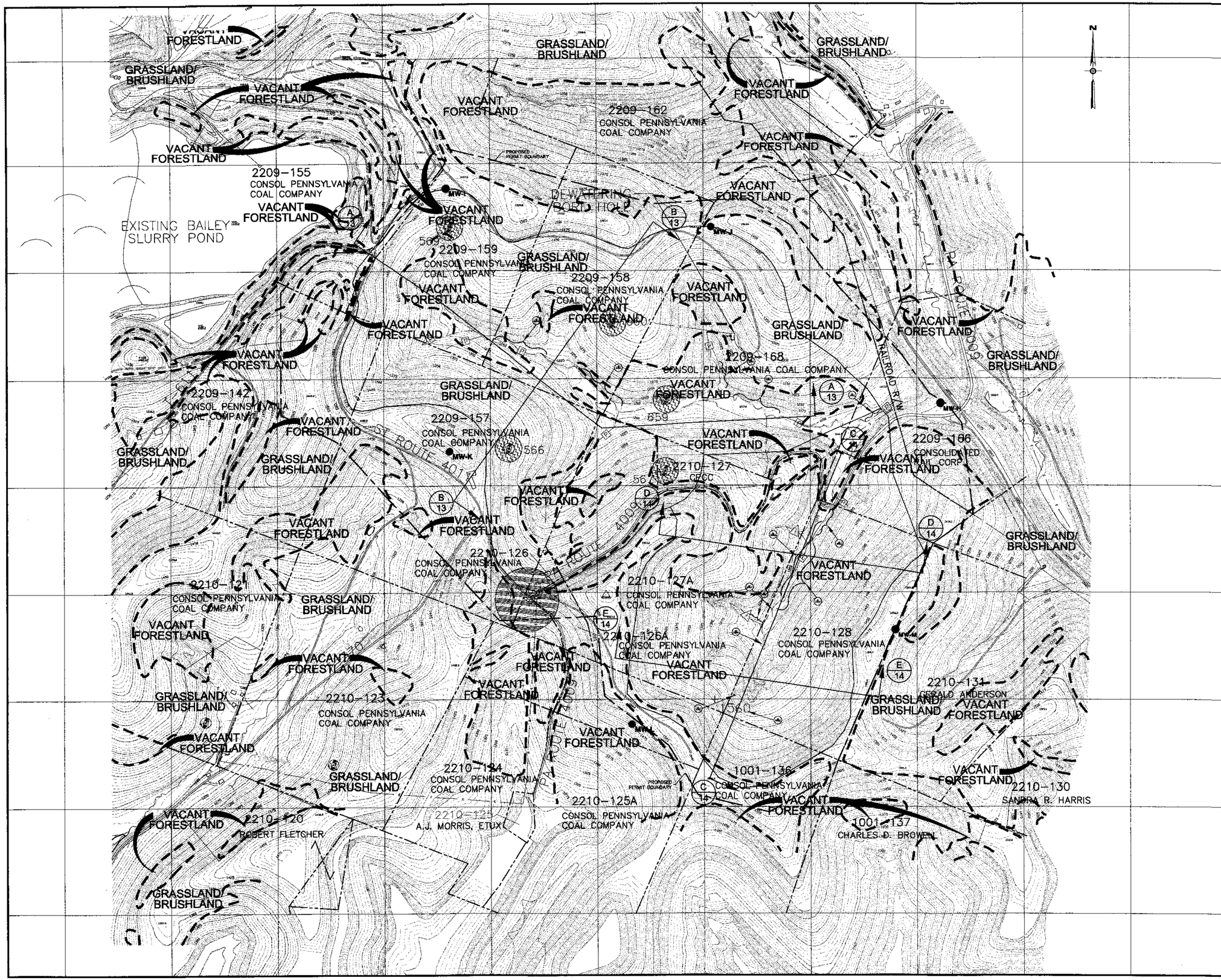
For information regarding State resources of special concern, including State-listed endangered and threatened species, please contact the Pennsylvania Game Commission (birds and mammals; State Game Lands), the Pennsylvania Fish and Boat Commission (fish, reptiles, amphibians and aquatic invertebrates; trout streams), the Pennsylvania Department of Conservation and Natural Resources (PNDI; plants and plant sanctuaries; State Forests; State Parks; Natural Areas; State Wild and Scenic Rivers) and the Department of Environmental Protection (Special Protection Watersheds; Wetlands).

If we can be of further assistance, please contact Michael McCarthy of my staff at 814-234-4090.

Sincerely,

for David Densmore
Supervisor

Enclosure



LEGEND

- Proposed Surface Permit Area Boundaries
- Property Line
- Perennial Stream
- Intermittent Stream
- Pond
- Groundwater Monitoring Well Location — MW-J
- Gas Well
- Existing Wetlands
- Gasline and 50' Right-of-Way
- Electric Line
- 300' Dwelling Variance
- 125' Gas Well Variance Area (Wells Are Abandoned And Sealed)
- CROSS SECTION LINE — A/13 A/13

NOTE:
ALL AFFECTED LAND PROPOSED WITH THIS APPLICATION, TO BE RETURNED TO GRASSLAND WITH WILDLIFE ACCESS. REFER TO ITEM 18.5 OF MODULE 18 FOR VEGETATIVE COVER TYPES.

MICHELE STEWART
ENGINEER
PE-059157-E

400 200 0 400
SCALE IN FEET

Baker
MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

EXHIBIT 18.1
LAND USE/RECLAMATION MAP

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
KLK	GEC	MMS	3/02	AS SHOWN

FILE: MODULE 18.1
k:_consol\24379\drawings\final\

DRAWING NO.

January 22, 2002 3:51:51 p.m. LOGIN NAME : ccarroll
Drawing: K:\PROJECTS\CONSOL\24379\DRAWINGS\FINAL\MODULE 18-1.DWG-(LAYOUT1)
Attached Xrefs: ccb_title.DWG BDR24369.DWG
S.O. No.: 24379-000-0000-ENG03

Module 19: Reclamation Schedule and Cost Information

19.1 Structure Demolition

Complete Form 19.1 to identify and describe: each structure which will be constructed or used under this permit; its intended fate upon completion of operations; and the demolition costs. Demolition costs may be taken from Table 19A or based on actual contractor's demolition cost estimates for the structure in question. If contractor's estimates are used, at least 2 estimates (signed by the contractor on company letterhead) must be obtained and included with this module.

(Note that Form 19.1 is intended to show a running tally of all structures which are or ever were included under the permit. New structures proposed under permit revisions should be added to the list. Demolished structures should be retained on the list along with their actual dates of demolition.)

Refer to Form 19.1 included at the end of this module for all structures associated with this coal refuse disposal facility permit application.

19.2 Site Reclamation

Complete Form 19.2 to identify each surface activity site which will be developed or used under this permit, its anticipated date of reclamation, and the estimated cost to reclaim it to the proposed postmining land use. Use Table 19C to calculate surface reclamation costs.

Refer to Form 19.1 included at the end of this module for all structures associated with this coal refuse disposal facility permit application.

19.3 Sealing Mine Openings and Ventilation Holes

Complete Form 19.3 to identify each mine opening and ventilation hole which will be developed or used under this permit, the type of seal to be used, the anticipated date of sealing and the estimated cost of sealing. Sealing costs may be taken from Table 19B or based on actual contractor's cost estimates for sealing the opening or ventilation hole in question. If contractor's estimates are used, at least 2 estimates (signed by the contractor on company letterhead) must be obtained and included with this module.

(Note that Form 19.3 is intended to show a running tally of all openings and ventilation holes which are or ever were included under the permit. New openings and ventilation holes proposed under permit revisions should be added to the list. Sealed openings and ventilation holes should be retained on the list along with their actual dates of sealing.)

No mine openings or ventilation holes are proposed with this permit application.

19.4 Mine Drainage Treatment

Provide the following information for the mine drainage treatment facilities which presently serve or are proposed to serve this operation.

a) The design capacity of the treatment facilities.

b) The current costs of operation and maintenance on an annual basis.

c) The date of construction or last major renovation.

d) The capital cost of the facility in current dollars.

(Note that these figures will not be factored into the required bond amount unless the Department determines that there is a potential for a postmining discharge which must be treated or managed. The regulations require that mine designs be planned to prevent such discharges from occurring.)

No mine drainage treatment facilities are proposed with this permit application.

Table 19A
Default Values For Calculating Structure Demolition Costs

Wooden structures	\$.35 per ft^3 of useable volume*
Building with minimal internal supports and no fixed machinery	\$.35 per ft^3 of useable volume*
All other buildings and tipple structures	\$.70 per ft^3 of useable volume*
Belts and conveyors	\$1.00 per lineal ft.

*Useable volume = floor area x ceiling (or rafter) height

Table 19B
Default Values for Calculating Sealing Costs

Opening	Type of Seal		Reclamation Cost
Boreholes	Solid Concrete	I.D. 12" or less	\$1,500
		I.D. more than 12"	\$2,000
Shaft (not intended to be sealed water-tight)	50' of inert fill random fill to surface, mounded	d* is 100' or less	\$9,000
		d* is 100' to 200'	\$14,000
		d* is 200' to 300'	\$19,000
		d* exceeds 300'	\$24,000
Shaft (intended to be sealed water-tight)	Concrete bulk-head/plug and backfilled material	d* is 100' or less	\$16,000
		d* is 100' to 200'	\$21,000
		d* is 200' to 300'	\$27,000
		d* exceeds 300'	\$35,000
Drift or slope	Single bulkhead, water-tight, no hydraulic heal		\$5,000
	Solid concrete plug, water-tight, hydraulic head on seal		\$9,000
	Remotely placed water-tight seal		\$10,000
	Air seal, permits discharge of mine water		\$5,000

d* means the total depth of the shaft.

Table 19C
Reclamation Costs

Permit Application Type	Reclamation Cost/Ac.
Coal Refuse Disposal	\$1000
Coal Preparation Plant	\$3000
Bituminous Underground Mine	\$3000

FORM 19.1 Structure Demolition

Structure	Construction Material	Dimensions (l-w-h) (ft.)	Volume (ft3)	Construction Date*	Demolition Date*	Postmining Use (if Applicable)	Demolition Cost
Coal Refuse Bin #1	steel	30x30x60	54,000	2005 (P)	2020 (P)	N/A	$37,800
Coal Refuse Bin #2	steel	30x30x60	54,000	2005 (P)	2020 (P)	N/A	$37,800
Coal Refuse Bin #3	steel	30x30x60	54,000	2005 (P)	2020 (P)	N/A	$37,800
Belt conveyor	steel	11,400 linear feet	N/A	2005 (P)	2020 (P)	N/A	$11,400
Slurry pipeline	HDPE	6,000 linear feet	N/A	2005 (P)	2020 (P)	N/A	$6,000
Maintenance Building	Steel/concrete	40x80x30	96,000	2005 (P)	2020 (P)	N/A	$67,200

*** Indicate (P) for proposed, (A) for actual.**

FORM 19.2 Surface Area Reclamation

Site	Acreage	Date Opened*	Date Reclaimed*	Estimated Cost of Reclamation
Bailey Mine Complex proposed Coal Refuse Site	556.6	3rd quarter 2005 (P)	2020 (P)	$556,600

*** Indicate (P) for proposed, (A) for actual.**

Module 20: Coal Refuse/Coal Ash - Sources and Properties

This module must be completed if coal refuse disposal will take place under the permit. If coal ash will be deposited along with the refuse, appropriate responses must be provided under this module and Module 25.

*State regulations require that certain technical aspects of refuse site design be prepared and certified by a registered professional engineer. See Chapter 90, Sections 90.39, 90.112(b)(1), 90.124.

20.1 Identification of sources

Complete Form 20.1 identifying all sources of the coal refuse which will be disposed of on site, and the types of refuse which will come from each source. If coal ash will be mixed with the refuse also identify the source(s) and type(s) of ash.

Refer to Form 20.1 located at the end of this module.

20.2 Type(s) and amount(s) of incoming coal refuse and coal ash

Complete Form 20.2 identifying the types and amounts of coal refuse and coal ash which will be received on a daily basis.

Refer to Form 20.2 located at the end of this module.

20.3 Chemical properties of coal refuse

a) If leachate characteristics can be determined by analyzing the drainage from an existing site where the material is being deposited, provide an analysis of the drainage for : pH, alkalinity, acidity, total iron, total manganese, total aluminum, sulfates, and specific conductance (in micromho's per liter corrected to 25°C).

The refuse to be deposed of at the newly proposed facility will be the same as currently being disposed of at the existing Bailey Mine Complex Refuse No. 1 facility, resulting in similar discharges. Refer to Section 8.1g of Module 8 of this application for an evaluation of discharges from the existing coal refuse facility.

b) If leachate characteristics cannot be determined by analyzing drainage from an existing site, provide an acid-base account of the refuse produced at the preparation plant or an acid-base account of all strata including coal which will be removed from the mine. Use the method described in Field and Laboratory Methods Applicable to Overburden and Mine Soils, (Sobek, et. al. 1978), published by U.S. E.P.A. (EPA-600/2-78-054).

Since refuse is generally known to be highly variable in sulfur content and potential acidity generated, several samples of each source of coal refuse must be collected and analyzed. Include original laboratory data sheets with the application.

Not applicable. Chemical properties of drainage from the existing Bailey Mine Complex coal refuse disposal site are representative of expected leachate from the proposed site.

20.4 Chemical properties of coal ash

Complete Module 25.

Not applicable. Beneficial use of coal ash is not proposed. The only coal ash to be disposed in Coal Refuse Disposal Areas No. 3 and No. 4 will be that generated by the preparation plant thermal dryers. As indicated on Form 20.2, it will be an insignificant part of the proposed disposal operation.

20.5 Physical properties of coal refuse (and coal ash)

Include a physical analysis of the coal refuse, including the % moisture, maximum dry density, optimum moisture content, grain size distribution, coefficient of friction, and cohesion.

- If ash will be deposited along with the refuse, include physical analyses on 0:100, 25:75, 50:50, 75:25, and 100:0 mixtures of refuse to ash.

Coarse Coal Refuse: *Physical and engineering properties of the coarse coal refuse are presented in Section 3.0 and Appendix E of the Design Report attached to Module 21.*

Fine Coal Refuse: *The only physical property used for design was a density of 40 pcf. This in-situ density value is based on sounding data developed for the existing facility. It was appended to the approved Alternatives Analysis Report. Zero shear strength was assigned to this material for stability calculations.*

Breaker Rock and Thermal Dryer Ash: *The presence of these materials at the quantities reported will not significantly impact facility performance. They will be disposed in non-structural embankment areas as indicated on the Module 21Construction Drawings.*

FORM 20.1 SOURCES OF COAL REFUSE AND ASH

Source Mine, Preparation Plant, or Ash Generator	Coal Seams From Which Coal Refuse Is Derived	Type of Material Received From Source (Mine Rock, Breaker Rock, Coarse Refuse, Slurry, Filter Cake, Fly Ash, Bottom Ash)
Bailey Central Mine Complex	*Pittsburgh Coal Seam*	*Coarse Coal Refuse, Fine Coal Refuse Slurry, Breaker Rock, and Fly Ash and Bottom Ash from the Thermal Dryers.*

FORM 20.2
TYPES AND AMOUNTS OF INCOMING COAL REFUSE AND COAL ASH

Material Type	Amount (TPD or GPD)	Moisture Content (%)
Mine Rock	None	
Breaker Refuse	894 TPD	0%-Amts are reported on dry basis
Coarse Refuse	14,731 TPD	" "
Slurry *(Fine Coal Refuse)*	2992 TPD	" "
Filter Cake	None	
Fly Ash and Bottom Ash	204 TPD	" "

Module 21: Coal Refuse Construction Plans

All cross sections and information submitted under this Module must be prepared by or under the direction of a qualified registered professional engineer or qualified geologist with assistance from experts in related fields. All submitted materials must be certified by the engineer who prepared them or directed their preparation.

21.1 Design Cross Sections.

a) Provide a minimum of one longitudinal and one lateral cross section through the highest and lowest elevations of the disposal area. Key the cross sections to Exhibit 9.1. Identify the cross sections as "Exhibit 21.1 - Refuse Disposal Area Cross Sections", and show the following details:

1) Original ground profile.

2) Final grade profile.

3) Terraces.

4) Roads.

5) Ditches

6) Ponds

7) Streams

8) Underdrains

9) Leachate collection drains.

10) Final cover thickness.

11) Liners (See Module 14)

Cross sections have been prepared for each dam, the sedimentation pond, and each disposal facility. Refer to the Design Report that is included as Exhibit 21.1. Cross sections are included in the construction drawings presented in Appendix A.

21.2 Pile Construction Characteristics

a) Describe the following dimensions and slopes as they apply to the constructed fill.

1) Maximum vertical thickness of the pile.

Coal Refuse Disposal Area No. 3: 350 feet

Coal Refuse Disposal Area No. 4: 475 feet

2) Maximum prepared slope of the land surface (%).

Coal Refuse Disposal Area No. 3 and No. 4: 50%

3) Maximum grade along the side slopes of the pile (%)

Coal Refuse Disposal Area No. 3 and No. 4: 40%

4) Maximum grade of the top of the pile (%).

Coal Refuse Disposal Area No. 3: 5%

Coal Refuse Disposal Area No. 4: 3%

5) Maximum grade of the face slope of the pile (%).

Coal Refuse Disposal Area No. 3 and No. 4: 33% with terraces, 40% between terraces

6) If the slopes of the pile will be terraced, include the following:

i) Grade of reverse slope (%);

Coal Refuse Disposal Area No. 3 and No. 4: 5%

ii) Width of the terraces;

Coal Refuse Disposal Area No. 3 and No. 4: 20 feet

iii) Height interval between terraces; and

Coal Refuse Disposal Area No. 3 and No. 4: 50 feet

iv) Maximum grade along axis of terraces (%).

Coal Refuse Disposal Area No. 3 and No. 4: 2%

Refer to the Construction Drawings presented as Exhibit 21.1.

21.3 Underdrains, Spring Collectors, and Leachate Collectors

a) Show locations of underdrains, spring collectors and leachate collectors on Exhibit 9.1.

Refer to the Construction Drawings, Sheets 3, 4, 9, 10, 16 and 22, (Exhibit 21.1).

b) Provide a large scale cross section showing the construction of each drain and collector.

Refer to the Construction Drawings, Sheets 17, 18, 19, 20, 21, 23 and 32, (Exhibit 21.1).

c) Provide calculations, charts, or references to indicate hydraulic capacities of drains and collectors.

Refer to Appendix G of the Module 21 Design Report.

d) Provide material specifications for drain and collector construction.

Refer to Appendix B of the Module 21Design Report and the Module 21 Construction Drawings.

21.4 Keyway Cuts, Rock Toe Buttresses, Other Stabilization Structures

a) Show locations of keyway cuts, rock toe buttresses, and other stabilization structures on Exhibit 9.1.

The Main Dam and Saddle Dam A will be provided with a cutoff trench. Landslide material underlying Saddle Dam A will be removed, and sections of haul road will be benched into rock as indicated on Sheet 34 of the Module 21 Construction Drawings.

b) Provide a large scale cross section showing the construction of each cut, buttress and stabilization structure.

Refer to Sheets 13, 14, 19, 20, 21 and 23 of the Module 21 Construction Drawings.

c) Provide material specifications for each structure.

Refer to Appendix B of the Module 21 Design Report and the Module 21 Construction Drawings.

21.5 Construction Narrative

a) Describe how refuse and, if applicable, coal ash will be handled at the site from arrival to deposition, addressing the following items.

1) Storage prior to deposition;

Coarse coal refuse will be transported to the site by belt conveyor and temporarily stored in a refuse bin prior to deposition. Temporary storage of fine coal refuse slurry is not proposed.

2) Mixing and blending of ash and refuse:

Coal ash generated from the thermal dryers and coal refuse will be co-disposed.

3) Application of alkaline materials or bactericides;

Not applicable. Application of alkaline materials or bactericides are not part of this permit application.

4) Spreading at site of deposition;

Refer to Sections 2.2 and 2.3 of the Operation and Maintenance Manual appended to the Module 21 Design Report and to Section 7 of Technical Specifications appended to that same report.

5) Compaction methods (including testing procedures and frequencies);

Refer to Section 7 of Technical Specifications appended to the Module 21 Design Report.

6) Placement of cover.

Soil cover placement will be in accordance with Section 16 of the Technical Specifications appended to the Module 21 Design Report.

21.6 Engineering Certification

a) Indicate critical stages where:

1) Close engineering supervision is required;

Refer to Module 10.3

2) Certification of site development will be provided; and

Certification of the sedimentation pond (both chambers) will be required.

3) Photographic evidence of site development will be provided.

Photographic evidence of site development will be included with the construction certifications.

21.7 Stability Analysis

Stability analyses must be completed for all refuse piles greater than 20 feet in height; piles on slopes greater than 36%; and other structures as requested by the Department. If a structure meeting any of these criteria will be constructed or used under this permit, address the following.

a) If there are any clay horizons or known unstable units in the strata beneath the proposed structure explain what measures will be taken to remove or stabilize these units.

Soils underlying the eastern and western coarse coal refuse dams (Main Dam and Saddle Dam A, respectively) consist primarily of clays and silts with varying amounts of rock fragments. Colluvial deposits underlain by residual soils are present at most locations. Results of slope stability analyses indicate that the presence of these soils within the Main Dam foundation will not cause instability. Therefore, no measures will be taken to remove or stabilize the Main Dam foundation soils. Soils beneath Saddle Dam A exhibit signs of movement. Though the location and direction of this movement is such that stability of the structure under final conditions will not be affected, the unstable material will be completely removed and existing springs will be collected and discharged throught the spring drain system in order to enhance stability during initial construction of the upstream toe of the saddle dam. Cutoff trenches will be constructed for seepage control.

Additional unstable areas were located in Coal Refuse Disposal Area No. 4. Again the location and orientation of these unstable areas are such that they will not affect long term stability of the pile.

More detailed discussions of dam foundation conditions and slope stability analyses are presented in the Design Report attached to Module 21.

b) If there are any saturated zones or layers subject to artesian pressures beneath the proposed structure explain what measures will be taken to remove or drain these areas.

A rock drain will be installed beneath Coal Refuse Disposal Areas No. 3 and No. 4 at the location shown on Sheet 3 and 4 in the Exhibit 21 Construction Drawings. This drain will carry stream base flow under the facility. Springs that may be encountered at the subgrade of the downstream sections of impounding structures will be intercepted as needed with a spring drain constructed in accordance with Section 4.0 of the Technical Specifications presented in the Design Report (Module 21). Spring drains will discharge into the rock drain.

c) Define the effect of subsidence from deep mining on the stability of the proposed structure. Describe what measures will be taken to minimize subsidence beneath the proposed area in order to ensure stability of the area.

The extent of existing underground mine workings at the site is presented on the Module 6.2 Environmental Resource Map. Effects on dam stability are discussed in Section 4.9.6 of the Design Report.

d) Define the effect of blasting within the proposed area or adjacent areas on the stability of the proposed structure.

No blasting effects are expected since blasting either will not be permitted or will be carefully controlled by CPCC. Blasting will not be necessary after placement of the dam embankment materials has begun, but may be applicable during site preparation. Because the site is underlain by workings of the the Bailey Mine, CPCC intends to avoid blasting during site preparation. Section 5.0 of the Technical Specifications prohibits blasting unless approved by the Owner and such approval will be based on expected impacts to the dam foundation and underlying mine. If blasting is permitted, the Contractor will be responsible for obtaining all necessary permits and for complying with all regulatory requirements. Stability analyses were performed for seismic conditions that are similar to that which might result from blasting in areas adjacent to the proposed facility. Adequate factors of safety were found for these analyses. Stability analyses are presented in Module 21.

e) Provide calculations showing the lowest <u>static</u> and <u>seismic</u> safety factors <u>within</u> and <u>beneath</u> the structure. Identify the method and any computer software which were used. Explain all assumptions which were made. Provide all supporting data and tests results used in the calculations.

The dams have been analyzed under conditions of steady state seepage with and without seismic loading. Embankment as well as foundation failures were analyzed. The lowest factor of safety resulting from these analyses were 1.5 for static cases and 1.29 for seismic cases. Results of comprehensive slope stability analyses for all critical slopes of the design indicate that minimum required safety factors of 1.5 for static condition and 1.20 for seismic condition are maintained. Consequently, cut and fill slope designs proposed for the sedimentation pond, coarse coal refuse embankments, and earthen saddle dams are stable against deep-seated circular or sliding block failures under the conditions considered.

The stability analyses performed for this facility involves numerous different cases and cannot be adequately represented by providing a single lowest factor of safety. Results of the analyses are tabulated and discussed in Section 4.9.4 of the Design Report presented in Module 21. Supporting calculations are provided in the Design Report as Appendix G.

f) Describe the effects of the liner on the structure's stability.

Two types of liner systems are incorporated into the dam structures and have differing impacts on the stability of the dam; The soil liner to be installed beneath the entire facility to limit infiltration into the underlying groundwater table and the HDPE liner used in saddle dams B, C, and D to limit internal flow through these structures.

The soil liner is a potential weak layer that could cause a sliding block type failure of the entire dam. The strength of the remolded soil material was established through rigorous laboratory testing and these strength values were used in the stability analyses. Sliding block analyses were performed that limited the failure surface to this potential weak layer and acceptable factors of safety were obtained. See Section 4.9.4 of the attached Design Report.

The HDPE liner used to control seepage through Saddle Dams B, C, and D will enhance stability by lowering the phreatic surface in the downstream portions of the dam. For upstream failures under drawdown conditions, the liner serves as a potential plane of weakness. This is addressed by placing the liner deep within the dam structure and using a textured liner to increase the sliding friction between the soil and the liner. With these provisions, upstream failures were found to have acceptable factors of safety.

g) Provide a cross section (same scale as Exhibit 21.1) depicting all soil and rock units from bedrock to finished surface elevation of the structure. Include location of phreatic surface (if applicable) and depict the circular, block, and wedge failure surfaces for minimum factors of safety. Identify cross section as Exhibit 21.7.

Cross sections used for the slope stability analyses are presented in Section G of the attached Design Report. Results of the slope stability analyses, i.e., critical failure surfaces, are included on these cross sections.

h) All values utilized in the stability analysis must be verified by laboratory testing.

Material engineering properties used in the stability analyses have been based on laboratory testing as discussed in Sections 2.0 and 3.0 of the Design Report. Laboratory test results are presented in Appendix E of the Design Report..

21.8 Additional Geologic Information - Coal Refuse Disposal Sites.

a) Describe the physical characteristics of the soil and bedrock.

Refer to Module 14 and Module 18.3.e of this application for physical characteristics of the soil within the coal refuse disposal sites. Physical characteristics of the bedrock are discussed in section 2.5 of the attached Design Report.

b) For sites where refuse piles, fills, dams, or embankments will be constructed, provide the results of a detailed geotechnical investigation, including standard penetration tests.

Refer to geotechnical investigation results presented in Appendix D of the attached Design Report.

DESIGN REPORT
For
Bailey Central Mine Complex
Coal Refuse Disposal Areas No. 3 and No. 4
Greene County, Pennsylvania

Prepared For:

Consol Pennsylvania Coal Company
Pittsburgh, Pennsylvania

Prepared By

Michael Baker Jr., Inc.
Coraopolis, Pennsylvania

March 2002

Engineering Certification:

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
MICHELE STEWART
ENGINEER
PE-029157-E

Michele Stewart
PE-029157-E

I Michele Stewart do hereby certify pursuant to the penalties of 18 Pa. C.S.A. Sec. 4904 to the best of my knowledge, information and belief, that the information contained in the accompanying plans, specifications, and reports has been prepared in accordance with accepted engineering practice, is true and correct, and is in conformance with Chapter 105 of the rules and regulations of the Department of Environmental Protection.

CONSOL PENNSYLVANIA COAL COMPANY
BAILEY CENTRAL MINE COMPLEX
NEW COAL REFUSE DISPOSAL FACILITY

COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4

DESIGN REPORT

TABLE OF CONTENTS

Section	Page
1.0 GENERAL INFORMATION	1-1
1.1 Facility Identification [§77.215-2(b)(1&3) and 77.216-2(a)(1)]	1-1
1.2 Site Location [§ 77.215-2(b)(2) and 77.216-2(a)(2)]	1-1
1.3 Facility Purpose [§77.216-2(a)(3)]	1-1
1.4 Watershed Information [§77.216-2(a)(4)]	1-3
2.0 FACILITY FOUNDATION CHARACTERISTICS	2-1
2.1 Site Investigations [§77.216-2(a)(5)]	2-1
2.1.1 Field Investigations	2-1
2.1.2 Laboratory Testing Program	2-2
2.2 Regional Geology [§77.216-2(a)(5)]	2-2
2.3 Existing Underground Mine Workings [§77.216-2(a)(14)]	2-2
2.4 Site Foundation Soils [§77.216-2(a)(5)]	2-3
2.4.1 Description	2-3
2.4.2 Properties Used for Design	2-3
2.5 Site Bedrock [§77.216-2(a)(5)]	2-4
2.5.1 Description	2-4
2.5.2 Properties Used for Design	2-4
3.0 EMBANKMENT PROPERTIES	3-1
3.1 Coal Refuse [§77.216-2(a)(6)]	3-1
3.1.1 Coarse Coal Refuse	3-1
3.1.2 Fine Coal Refuse	3-2
3.2 Off Site Materials [§77.216-2(a)(6)]	3-2
4.0 ENGINEERING DESIGN	4-1
4.1 General Facility Layout and Operation	4-1
4.1.1 Coal Refuse Disposal Area No. 3 (Slurry Impoundment)	4-2
4.1.2 Coal Refuse Disposal Area No. 4 (Coarse Coal Refuse Disposal Area)	4-3
4.1.3 Sedimentation Pond	4-3

4.3 Facility Staging [§77.216-2(a)(6 & 9)] 4-4
4.3.1 Coal Refuse Disposal Area No. 3 [§7.216-2(a)(6 & 9)] 4-4
4.3.2 Coal Refuse Disposal Area No. 4 [§7.215-2(b)(3 & 4)] 4-5
4.3.3 Sedimentation Pond [§7.216-2(a)(6 & 9)] 4-6
4.4 Layout and Dimensions [§77.215-2(b)(4,6 & 7) and 77.216-2(a)(7)] 4-6
4.4.1 Coal Refuse Disposal Areas No. 3 and No. 4 4-6
4.4.2 Sedimentation Pond 4-7
4.5 Haul and Access Roads [§77.216-2(a)(7)] 4-7
4.6 Slurry Impoundment Hydrology and Hydraulic Design 4-7
4.6.1 Design Criteria [§77.216-2(a)(10 & 11)] 4-8
4.6.2 Maximum Water Surface Elevations [§77.216-2(a)(11)] 4-8
4.6.3 Discharge Systems [§77.216-2(a)(12)] 4-9
4.7 Sedimentation Pond Hydrology and Hydraulic Design [§77.216-2(a)(10,11&12)] 4-10
4.8 Erosion and Sedimentation Control [§77.215-2(b)(6) and 77.216-2(a)(7 & 12)] 4-11
4.8.1 E&S Control During Initial Site Preparation 4-11
4.8.2 E&S Control During Facility Operation 4-12
4.8.3 E&S Control During Facility Closure 4-13
4.9 Geotechnical Design 4-14
4.9.1 Infiltration Control [§77.216-2(a)(6)] 4-14
4.9.2 Drainage of Existing Surface Water [§77.215-2(b)(6) and 77.216-2(a)(12)] . 4-14
4.9.3 Internal Seepage Control [§77.215-2(b)(6) and 77.216-2(a)(6 & 7)] 4-15
4.9.4 Slope Stability [§77.215-2(b)(8) and 77.216-2(a)(13)] 4-19
4.9.5 Monitoring 4-24
4.9.6 Effects of Underground Mine Workings [§77.216-2(a)(13 & 14)] 4-25
4.10 References 4-30

5.0 ABANDONMENT PLAN [§77.215-2(b)(2) and 77.216-2(a)(16)] 5-1
5.1 Pool Filling and Finished Grade 5-1
5.2 Topsoiling and Vegetation 5-1
5.3 Surface Water Management 5-1

6.0 MONITORING AND MAINTENANCE [§77.215-2(b)(5) and 77.216-2(a)(8 & 15)] .. 6-1

APPENDICES

Appendix A - Drawings [§77.215-2(b)(4 & 7) and 77.216-2(a)(7)]
Appendix B - Technical Specifications [§77.216-2(a)(6 & 15)]
Appendix C - Operations and Maintenance Manual [§77.215-2(b)(8) and 77.216-2(a)(8 & 15)]
Appendix D - Test Boring Records, Test Pit Records, and Field Permeability Test Results
Appendix E - Laboratory Test Results
Appendix F – PADEP Module 7 – Geologic Information
Appendix G - Calculations

Section 1.0

GENERAL INFORMATION

1.1 FACILITY IDENTIFICATION [CFR, Title 30, Parts 77.215-2(b)(1&3) and 77.216-2(a)(1)]

Consol Pennsylvania Coal Company (CPCC) is seeking Mine Safety Health Administration (MSHA) approval of enclosed plans for a new coal refuse disposal facility for Bailey Central Mine Complex. The proposed disposal facility includes the following structures requiring MSHA approval:

- Coal Refuse Disposal Area No. 3 (Slurry Impoundment)
- Coal Refuse Disposal Area No. 4 (Coarse Coal Refuse Disposal Area)
- Sedimentation Pond

CPCC owns and operates Bailey Central Mine Complex (MSHA ID No. 36-07230) and will own and operate the proposed coal refuse disposal facility as well. CPCC is located at the following address:

Consol Pennsylvania Coal Company
1800 Washington Road
Pittsburgh, PA 15241-1421

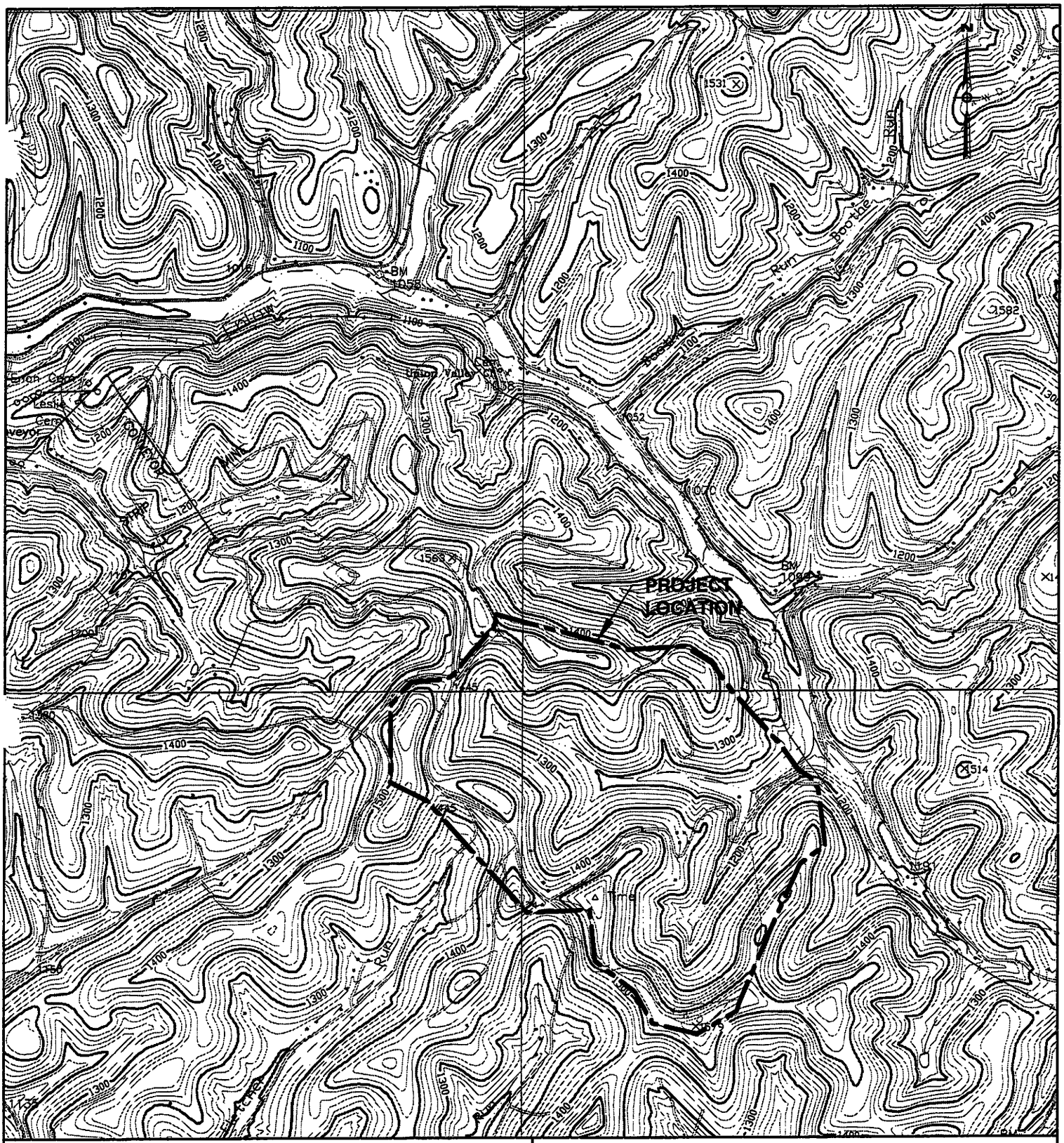
1.2 SITE LOCATION [CFR, Title 30, Parts 77.215-2(b)(2) and 77.216-2(a)(2)]

The project site is located in Greene County, Pennsylvania, approximately 3,300 feet south of the intersection of State Routes 4009 (Grinnage Road) and 4013 (Dog Town Road). It is comprised of a valley and adjoining valley containing unnamed tributaries to Enlow Fork. The proposed disposal facility site is bordered on the west by the existing slurry impoundment for CPCC's Bailey Central Mine Complex. Coal Refuse Disposal Area No. 3, the sedimentation pond, and the majority of Coal Refuse Disposal Area No. 4 are situated in Richhill Township, Greene County, Pennsylvania. A small section of Disposal Area No. 4 extends into Gray Township.

Presented as Figure 1-1 is the site location map.

1.3 FACILITY PURPOSE [CFR, Title 30, Part 77.216-2(a)(3)]

CPCC proposes to use the facility for disposal of coarse and fine coal refuse generated by Bailey Central Mine Complex. Existing disposal areas that currently service the mine complex are nearing capacity.



BAILEY CENTRAL MINE COMPLEX COAL
REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

FIGURE 1.1

WIND RIDGE AND ROGERSVILLE, PA.
QUADRANGLES - U.S.G.S. 7.5 MINUTE SERIES

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

SCALE:	DATE:
1" = 2000'	JANUARY, 2002

1-2

Drawing: J:\PROJECTS_CONSOL\24379\DRAWINGS\FINAL\MODULE 6-1.DWG-(MMS LOCATION MAP)
Attached Xrefs: BDR2 .DWG
S.O. No.: 24379-000
G03

1.4 WATERSHED INFORMATION [CFR, Title 30, Part 77.216-2(a)(4)]

As indicated previously, the proposed Bailey Disposal Facility site is a valley and adjoining valley containing unnamed tributaries to Enlow Fork. Coal Refuse Disposal Area No. 3 and the sedimentation pond will be constructed in the main tributary valley. Watershed areas affecting these two structures are 284 acres and 461 acres, respectively. Coal Refuse Disposal Area No. 4 will be developed within the watershed of the contributory valley, a watershed area of approximately 153 acres.

Section 2.0

FACILITY FOUNDATION CHARACTERISTICS

Characteristics of the new Bailey coal refuse disposal facility site were established from results of a geotechnical investigation conducted at the project site. The scope of the investigation consisted of: 1) a review of site geologic and mining information; 2) site reconnaissance 3) test boring and test pit investigations; and 4) laboratory and field testing. This section of the report identifies available site foundation information and summarizes site soil, bedrock, and mining conditions.

2.1 SITE INVESTIGATIONS [CFR, Title 30, Part 77.216-2(a)(5)]

2.1.1 Field Investigations

Twenty-three (23) borings, designated as B-1 through B-20, were drilled at the proposed disposal facility site by Triad Engineering during August and September of 2001 to investigate site foundation conditions. Three borings, B-5, B-10 and B-19, were drilled twice at nearby locations to fulfill requirements of sampling, field testing, and penetration depth. The second borings were designated as B-5A, B-10A, and B-19A. Boring locations are shown on Sheet 2 of the Construction Drawings presented in Appendix A; logs are included in Appendix D. Borings were advanced through soil using a split spoon sampler and standard penetration testing techniques, and through rock using an NQ rock-coring barrel. Undisturbed thin walled tube samples were collected from representative soil horizons for strength and permeability testing. Rock was sampled using a double tube N series core barrel.

Field permeability tests were performed in 12 of the 23 borings through the bedrock intervals (i.e., borings B-1, B-2, B-3, B-4, B-5, B-5A, B-6, B-7, B-8, B-19, B-19A, and B-20). Three of the 12 borings tested, B-19, B-19A, and B-20, were located at the site of the Coal Refuse Disposal Area No. 3 Main Dam, within the longwall-mined area, to investigate bedrock conditions within the subsided area's zone of tension. Field permeability tests were performed by pressure testing with water using a dual inflatable packer with a test length of five or ten feet. Field permeability test results are included in Appendix D.

Fifty-eight (58) test pits, designated as TP-1 through TP-56, were excavated at the site to further investigate site soil conditions. Two test pits, TP-17 and TP-21, were excavated twice at nearby locations to fulfill requirements of sampling and field investigation. The second test pits were designated as TP-17A and TP-21A. Locations of these test pits are shown on Sheet 2 in Appendix A. Test Pit Records are included in Appendix D.

Upon completion of the field investigation, all borings drilled at the project site were grouted and test pits backfilled.

2.1.2 Laboratory Testing Program

Geotechnical laboratory tests were performed on soil samples collected during the drilling and test pit program to evaluate physical and engineering properties of the site soils. The following tests were performed:

- Classification
- Water content
- Density
- Moisture-density and compaction
- Permeability
- Unconsolidated undrained (UU) triaxial shear tests
- Consolidated undrained (CU) triaxial shear tests

Site soils were subjected to moisture content and classification testing to identify clay soil suitable for use as liner soil. Ninety (90) classification tests were performed. Soils classifying as liner soil were remolded to 95% of the maximum dry density determined in accordance with ASTM D698 and subjected to permeability and strength testing. Four (4) permeability tests were performed on the remolded samples in accordance with ASTM D5084. Three (3) CU triaxial shear tests were performed on remolded, representative samples of clay collected from the project site to establish liner soil shear strength. Two (2) UU triaxial shear tests were performed on undisturbed samples of site foundation soils.

Results of testing performed to establish soil engineering properties are summarized on Table 2-1. Presented as Table 2-2 is an attachment to the PADEP Coal Refuse Disposal Permit that summarizes results of classification tests used to identify acceptable liner soils. Test results are provided in Appendix E.

2.2 REGIONAL GEOLOGY [CFR, Title 30, Part 77.216-2(a)(5)]

Moody and Associates Inc. conducted a separate site investigation to define site geology as well as groundwater conditions. Their summary of site geologic conditions has been compiled as Module 7 of the Coal Refuse Disposal Application developed for PADEP. A copy of that module is presented as Appendix F. It includes a description of regional geology as well as geologic cross sections.

2.3 EXISTING UNDERGROUND MINE WORKINGS [CFR, Title 30, Part 77.216-2(a)(14)]

The proposed disposal facility site is underlain by numerous coal seams as indicated by the geologic cross sections. Only the Pittsburgh coal seam has been mined within, or in the vicinity

of, the project site. No mining has been conducted, or is planned, within any of the other coal seams, including the Fish Creek Coal, which outcrops at the site.

Workings of Bailey Mine occur under the proposed slurry impoundment site. The extent of the mine workings is shown on the Geologic Data Map included in Appendix F. As shown on that map, longwall mining has been conducted under the reservoir area and the main dam. Mining occurred before 1988.

Pittsburgh Coal contours depicting the elevation of the mine have been included on the Geologic Data Map. The mine height averages 5.8 feet.

2.4 SITE FOUNDATION SOILS [CFR, Title 30, Part 77.216-2(a)(5)]

2.4.1 Description

Colluvial soils, i.e., soils that have moved during past or ancient landslide activity, blanket most of the project site. An active landslide was noted at the western end of the facility, on the saddle separating the existing slurry impoundment from Coal Refuse Disposal Area No. 3. At most locations residual soil derived from weathering of the underlying parent bedrock are present below the colluvium.

Site boring and test pit data indicate that site soils vary in thickness from 2 to 16 feet and consist primarily of clay with varying amounts of rock fragments. Some horizons include cobble and/or boulder size fragments. The soils are generally medium to very stiff.

2.4.2 Properties Used for Design

Engineering properties used for design were selected based on the laboratory test data presented in Table 2-1. UU strength tests on undisturbed samples (ST-1/ST-2 from B-8 and B-11) did not yield satisfactory results because of inhomogeneous soil as evidenced by varying densities and moisture contents. However, one of the tests (ST-1 from B-8) produced a total shear strength that is similar to that of remolded clay samples. Therefore, effective shear strengths determined by CU tests on remolded samples were used for the design. The test results show that confining pressure influences the effective shear strength. To be conservative, three sets of shear strength were used for the analysis for different confining pressures. A permeability of 1×10^{-5} cm/sec was used for the in-situ soil in the seepage analysis. Properties used for the stability analysis for both clay liner and in-situ soil are summarized in Table 2-3.

2.5 SITE BEDROCK [CFR, Title 30, Part 77.216-2(a)(5)]

2.5.1 Description

Bedrock encountered in the test borings consists of alternating sequences of shale, claystone, limestone and sandstone. In general, the upper portion of bedrock was found to be highly weathered to decomposed and the lower portions slightly weathered to weathered. The depth at which the weathering profile changes ranges from about 25 feet in the valley bottom to more than 150 feet in the valley walls. This transition correlates very well with field permeability test data because significant permeability (greater than 10^{-5} cm/sec) was noted within the weathered zone during packer tests performed at the site. Below this transition, permeability drops rapidly (no take in the packer tests), rock quality increases, and fracture spacing increases.

2.5.2 Properties Used for Design

The strength of the upper zone of rock is much greater than that of the overlying soils and, therefore, does not control the design. No significant weak zones were noted in the test borings but packer tests indicate permeable zones within bedrock forming the valley walls.

TABLE 2-1
SUMMARY OF ENGINEERING PROPERTIES
LABORATORY SOILS TEST DATA

Boring/ Test Pit	Sample No.	Depth (ft)	Water Content (%)	Natural Dry Density (pcf)	Unified Soil Class.	Max. Dry Density (pcf)	OMC (%)	Perm., K (cm/sec)	Friction Angle (deg.)		Cohesion (psi)		Confining Pressures For the Strength (psi)
									Total	Effective	Total	Effective	
B-8	ST-1	2.4-4.4	15.2	113.9									12.5
B-11	ST-2	3.9-4.4	24.5	96.4					12.0	-	15.0	-	25.0
B-8	ST-1	2.4-2.9	15.7	105.9	CL								50.0
B-11	ST-1	2.4-2.9	19.3	107.4									50.0
B-11	ST-2	4.4-4.9	31.5	91.0					U/D[1]	-	U/D	-	75.0
B-11	ST-1	1.9-2.4	25.0	91.4	CL								100.0
TP-3	Remolded	3.0-5.0	21.6[2]	97.8		102.5	19.8	2.6E-7	14.9	22.8	7.2	0[3]	100,75,50
TP-5	Remolded	0.5-2.5				99.3	20.2	2.1E-6					
TP-8	Remolded	0.75-4.0				102.1	20.4						
TP-15	Remolded	4.5-9.0	29.4	88.8		92.7	27.5	6.1E-8	17.8	25.3	3.1	0[3]	75,50,25
TP-24	Remolded	5.5-8.0				111.9	14.7						
TP-26	Remolded	5.5-7.5	19.9	100.2		105.3	18.0	3.5E-7	20.7	31.3	1.4	0[3]	50,25,12.5
TP-35	Remolded	6.0-8.0				110.4	15.4						

[1] U/D - Unable to Determine
[2] Remolded samples tested were compacted to 95% of Max. Dry Density at water content of 2% plus OMC.
[3] P-Q diagram indicates that cohesion is present but it was conservatively ignored.

TABLE 2-2 (PADEP COAL REFUSE DISPOSAL PERMIT ATTACHMENT 14.2.5)
SUMMARY OF SITE SOILS RELATIVE TO LINER SOIL REQUIREMENTS

Boring/ Test Pit	Depth	Generalized Visual Description	Top Size (in)	Pass #200 (%)	Plast. Index (%)	Unified Class.	Water Content (%)	Clay Thick. (ft)
TP-1	0-0.7	Topsoil						3.3
	0.7-4.0	Silty Clay w/Grvl size sandst & sh frags	½	87	18	CL	16.4	
	4.0-5.5*	Weathered Sandstone						
TP-2	0-2.0	Topsoil						0
	2.0-7.0*	Clayey Gravel (water @ 4.0)	1½	28	16	GC	20.2	
TP-3	0-0.5	Topsoil						6.5
	0.5-2.0	Silty Clay w/Gravel (colluvium)	¾	82	24	CL	23.4	
	2.0-3.0	Sandstone Cobbles & Bldrs (colluvium)						
	3.0-5.0	Lean Clay (colluvium, wet @5.0)	3/8	97	24	CL	25.0	
	5.0-7.0	Lean Clay w/Grvl (w/ clayst cobs, colluv.)	>1	94	18	CL	26.4	
	7.0-8.0*	Weathered Shale						
TP-4	0-0.8	Topsoil						7.2
	0.8-4.5	Silty Clay	1	77	26	CL	14.9	
	4.5-7.5	Clayey Gravel (gravel size shale frags)	¾	89	24	CL	15.8	
	7.5-8.0*	Weathered Claystone						
TP-5	0-0.5	Topsoil						2.0
	0.5-2.5	Lean Clay (wet)	3/8	90	19	CL	43.9	
	2.5-6.0	Clayey Gravel (shale frags), wet	1	39	15	SC	27.3	
	6.0-7.0*	Weathered Shale						
TP-6	0-0.3	Topsoil						4.7
	0.3-4.0	Silty Clay w/Grvl & Cobble size Sh Frags	>1½	56	18	CL	12.9	
	4.0-5.0*	Lean Clay	#4	96	22	CL	16.7	
TP-7	0-1.5	Topsoil						3.5
	1.5-3.0	Lean Clay (wet)						
	3.0-4.5	Clayey Gravel (water @ 4.0)						
	4.5-5.0*	Weathered Shale						
TP-8	0-0.8	Topsoil						6.2
	0.8-4.0	Lean Clay	#4	96	27	CL	27.1	
	4.0-7.0*	Clayey Gravel, wet (gravel is wthr shale)	3/8	83	9	CL	10.9	
TP-9	0-0.5	Topsoil						1.0
	0.5-5.0	Gravelly Elastic Silt w/cobbles & bldrs)						
	5.0-6.0*	Lean Clay						
TP-10	0-0.5	Topsoil						9.0
	0.5-5.5	Silty Clay (colluvium)						
	5.5-9.5*	Lean Clay, tr gvl (shale frags) tr cobbles						
TP-11	0-0.5	Topsoil						6.5
	0.5-3.0	Silty Clay	1	72	11	CL	17.3	
	3.0-7.0*	Gravelly Lean Clay	¾	85	17	CL	12.5	
TP-12	0-0.5	Topsoil						7.5
	0.5-5.0	Silty Clay w/Gravel (colluvium)	¾	82	25	CL	19.4	
	5.0-8.0*	Clayey Gravel (residual)	¾	75	13	CL	15.3	
TP-13	0-0.5	Topsoil						0
	0.5-7.0	Gravelly Lean Clay w/sandst cob. (colluv)	>1½	45	11	GC	17.1	
	7.0-8.0*	Weathered Sandy Shale						
TP-14	0-0.5	Topsoil						0
	0.5-5.0	Silty Clay w/Gravel & sandst cobs & bldrs	>1½	49	7	GC-GM	13.1	
	5.0-6.0*	Weathered Shale						
TP-15	0-1.3	Topsoil						7.7
	1.3-4.5	Silty Clay (colluvium)	3/8	73	12	CL	17.6	
	4.5-9.0	Lean Clay (moist to wet)	#4	98	27	CH	35.8	
	9.0-9.5*	Weathered Shale						

* Bottom of interval @ top of rock

TABLE 2-2(Cont'd)
SUMMARY OF SITE SOILS RELATIVE TO LINER SOIL REQUIREMENTS

Boring/ Test Pit	Depth	Generalized Visual Description	Top Size (in)	Pass #200 (%)	Plast. Index (%)	Unified Class.	Water Content (%)	Clay Thick. (ft)
TP-16	0-0.8	Topsoil						2.7
	0.8-3.5	Silty Clay w/Gravel (clayst & shale frags)						
	3.5-4.5*	Weathered Sandy Shale						
TP-17	0-0.8	Topsoil						3.2
	0.8-4.0	Silty Clay	3/8	78	22	CL	22.8	
	4.0-5.0*	Gravel (shale frags)						
TP-17A	0-0.7	Topsoil						4.8
	0.7-3.0	Silty Clay	⅜	96	28	CH	18.1	
	3.0-5.5*	Gravelly Clay (gravel is clayst frags)	¾	79	19	CL	13.3	
TP-19	0-0.8	Topsoil						7.7
	0.8-4.0	Silty Clay w/Gravel (shale frags)	1	71	19	CL	22.9	
	4.0-8.5*	Weathered Shale (gry-blk)						
TP-20	0-0.5	Topsoil						5.5
	0.5-5.0	Elastic Silt w/gvl-bldr size sh frags (colluv)	>1	52	9	CL	8.4	
	5.0-5.5	Lean Clay	3/8	95	27	CH	18.9	
	5.5-6.0*	Weathered Shale						
TP-21	0-0.3	Topsoil						0
	0.3-7.0*	Elastic Silt w/Gravel & sandst cobs & bldr	>1	55	16	CL	14.1	
TP-21A	0-0.5	Topsoil						8.5+
	0.5-5.5	Silty Clay	3/8	88	21,17	CL	16.1,14.8	
	5.5-9.0	Clayey Gravel (gravel is clayst & sandst)	¾	82	17	CL	13.7	
TP-22	0-1.5	Topsoil						3.5
	1.5-6.5	Silty Clay w/sandst cobbles & boulders	>1	80	17	CL	21.1	
	6.5-8.0	Lean Clay	#10	98	14	CL	22.2	
	8.0-10.0	Clayey Gravel (wet)	½	85	10	CL-ML	17.3	
TP-23	0-0.8	Topsoil						4.7
	0.8-5.5	Silty Clay	#4	97	23	CL	18.9	
	5.5-6.0*	Weathered Limestone						
TP-24	0-1.0	Topsoil						9.0
	1.0-5.5	Silty Clay	½	83	21	CL	25.7	
	5.5-8.0	Lean Clay	¾	71	19	CL	20.4	
	8.0-10.0*	Weathered Shale						
TP-25	0-0.8	Topsoil						5.2
	0.8-2.5	Elastic Silt w/Gravel w/shale cobs & bldrs						
	2.5-6.0*	Lean Clay w/ clayst cobbles & bldrs						
TP-26	0-0.8	Topsoil						6.7
	0.8-5.5	Silty Clay (gravel @ 5.0-5.5)	1	51	13	CL	28.1	
	5.5-7.5	Lean Clay (water @ 5.5)	1	82	16	CL	32.6	
	7.5-8.0*	Weathered Sandy Shale						
TP-27	0-0.8	Topsoil						2.7
	0.8-3.0	Silty Clay	3/8	81	17	CL	17.0	
	3.0-3.5	Lean Clay						
	3.5-5.5*	Weathered Sandy Shale						
TP-28	0-0.8	Topsoil						6.2
	0.8-3.0	Silty Clay w/Gravel (clayst frags)	1	67	19	CL	14.4	
	3.0-5.0	Lean Clay	#4	99	19	CL	18.7	
	5.0-7.0*	Weathered Claystone						
TP-29	0-0.5	Topsoil						6.0+
	0.5-2.5	Silt w/Gravel (shale frags)	1½	74	11	ML	13.1	
	2.5-4.0	Silty Clay	¾	89	32	CH	20.6	
	4.0-6.5	Lean Clay	#4	99	33	CH	33.5	

* Bottom of interval @ top of rock

TABLE 2-2(Cont'd)
SUMMARY OF SITE SOILS RELATIVE TO LINER SOIL REQUIREMENTS

Boring/ Test Pit	Depth	Generalized Visual Description	Top Size (in)	Pass #200 (%)	Plast. Index (%)	Unified Class.	Water Content (%)	Clay Thick. (ft)
TP-30	0-0.5	Topsoil						6.5
	0.5-4.0	Silty Clay w/Gravel (sandst frags)	¾	71	22	CL	17.0	
	4.0-7.0	Lean Clay	½	90	25	CL	16.7	
	7.0-8.0*	Weathered Sandstone						
TP-31	0-0.5	Topsoil						6.0
	0.5-6.0	Silty Clay w/Gravel (shale frags)	¾	60	21	CL	14.0	
	6.0-6.5*	Weathered Shale						
TP-32	0-0.8	Topsoil						0
	0.8-5.0	Silty Clay w/Gravel w sandst cobs & bldrs						
	5.0-8.5*	Weathered Shale						
TP-33	0-1.0	Topsoil						7.5
	1.0-6.0	Silty Clay w/Grvl to Boulder size Sh Frags	>1	75	22	CL	18.4	
	6.0-8.5*	Weathered Shale						
TP-34	0-0.8	Topsoil						9.2
	0.8-5.5	Silty Clay w/Gravel	¾	80	24	CL	21.9	
	5.5-10.0*	Clayey Gravel (shale frags), wet	¾	63	19	CL	15.4	
TP-35	0-0.8	Topsoil						8.2
	0.8-6.0	Silty Clay w/Gravel (shale frags)	¾	85	24	CL	19.3	
	6.0-8.5	Lean Clay	¾	90	19	CL	25.1	
	8.5-9.0*	Weathered Shale						
TP-36	0-0.5	Topsoil						8.0
	0.5-3.0	Elastic Silt w/Gravel (shale frags)						
	3.0-7.5	Silty Clay w/Gravel (shale frags)						
	7.5-8.5*	Lean Clay w/ Fine Sand						
TP-37	0-0.8	Topsoil						7.7
	0.8-5.0	Silty Clay w/Gravel (sandst frags)	1½	67	20	CL	14.3	
	5.0-6.0	Lean Clay	¾	74	29	CH	27.5	
	6.0-6.5	Black Weathered Shale	1½	74	18	CL	22.2	
	6.5-8.5	Lean Clay	#4	97	29	CH	35.9	
	8.5-9.0*	Weathered Sandstone						
TP-38	0-0.5	Topsoil						7.0
	0.5-5.0	Silty Clay w/Gravel some cobbles (colluv)	>1	59	17	CL	17.8	
	5.0-6.5	Silty Clay w/Cobbles (residual)	>1	95	29	CH	22.4	
	6.5-7.5*	Weathered Shale						
TP-39	0-0.5	Topsoil						2.0
	0.5-3.5	Silty Gravel (shale frags) w/Sandst Cobs	>1	51	13	CL	13.9	
	3.5-5.5*	Weathered Shale						
TP-40	0-0.5	Topsoil						8.5
	0.5-2.5	Elastic Silt w/Gravel size Shale Frags	¾	54	16	CL	15.0	
	2.5-6.0	Silty Clay	1	62	18	CL	13.7	
	6.0-9.0*	Lean Clay	½	94	23	MH	23.4	
TP-41	0-0.5	Topsoil						6.5
	0.5-5.5	Silty Clay w/Gravel (shale frags)	¾	75	16	CL	19.2	
	5.5-7.0	Lean Clay	3/8	91	22	CL	23.6	
	7.0-9.0*	Clayey Gravel (shale frags)	1½	37	9	GC	12.0	
TP-42	0-0.8	Topsoil						5.0
	0.8-6.0	Silty Clay w/cobbles & bldrs (sandy sh)						
	6.0-10.0	Lean Clay, tr shale frags	3/8	96	24	CH	24.4	
	10.0-11.0*	Weathered Shale						
TP-43	0-0.8	Topsoil						5.5+
	0.8-4.0	Silty Clay w/Grvl-bldr size sandst frags	>1½	73	13	CL	18.0	
	4.0-9.5+	Lean Clay	#4	96	25	CH-MH	34.7	

* Bottom of interval @ top of rock

TABLE 2-2(Cont'd)
SUMMARY OF SITE SOILS RELATIVE TO LINER SOIL REQUIREMENTS

Boring/ Test Pit	Depth	Generalized Visual Description	Top Size (in)	Pass #200 (%)	Plast. Index (%)	Unified Class.	Water Content (%)	Clay Thick. (ft)
TP-44	0-0.8	Topsoil						7.2
	0.8-5.5	Silty Clay w/Grvl (sh frags) & cob (water 4.5')	>1	82	21	CL	27.2	
	5.5-7.5	Lean Clay	#4	98	22	CL	22.7	
	7.5-8.0*	Weathered Shale						
TP-45	0-0.3	Topsoil						7.0
	0.3-1.0	Gravelly Elastic Silt (gravel is shale frags)						
	1.0-1.5	Topsoil						
	1.5-4.5	Silty Clay w/Gravel (shale frags) w/cobs						
	4.5-6.0	Lean Clay						
	6.0-8.5*	Weathered Shale						
TP-46	0-0.5	Topsoil						7.0
	0.5-1.5	Elastic Silt w/Gravel (sandy shale frags)	¾	69	8	CL	18.2	
	1.5-5.0	Silty Clay w/gravel-bldr size shale frags	>1½	58	19	CL	21.2	
	5.0-8.0	Lean Clay	3/8	96	25	CL	23.4	
	8.0-8.5*	Weathered Shale						
TP-47	0-0.5	Topsoil						6.5
	0.5-7.0	Silty Clay w/Gravel (sandst frags)	3/8	68	18	CL	19.6	
	7.0-9.0*	Weathered Sandstone						
TP-48	0-0.5	Topsoil						9.5
	0.5-6.5	Elastic Silt w/Gravel & Cobbles	>1	66	16	CL	20.1	
	6.5-10.0+	Silty Clay w/Gravel & Cobbles	>1	76	17	CL	18.8	
TP-49	0-0.5	Topsoil						7.5
	0.5-2.0	Silt	¾	71	14	CL	11.9	
	2.0-5.0	Gravelly Lean Clay	3/8	67	17	CL	10.5	
	5.0-7.0	Lean Clay	3/8	95	26	CL	14.0	
	7.0-8.0	Gravel (clayst frags) w/Clay	3/8	67	12	CL	9.2	
TP-50	0-0.8	Topsoil						1.0
	0.8-9.5	Elastic Silt w/Gravel (shale frags)	>1½	38	10	GC	14.1	
	9.5-10.5	Lean Clay w/Gravel (shale frags)	½	82	19	CL	17.5	
TP-51	0-0.3	Topsoil						0
	0.3-1.0	Silty Clay						
	1.0-1.3*	Weathered Limestone						
TP-52	0-0.3	Topsoil						0
	0.3-2.0*	Weathered Sandstone						
TP-53	0-0.3	Topsoil						4.0
	0.3-5.0	Elast Silt w/Grvl, Cob. & Bldrs (colluvium)	>1	68	7	CL-ML	9.9	
	5.0-9.0*	Lean Clay w/Gravel (shale frags)	3/8	86	18	CL	22.7	
TP-54	0-0.5	Topsoil						5.0
	0.5-4.5	Clayey Gravel (shale frags)	3/8	73	16	CL	16.6	
	4.5-5.5*	Weathered Shale						
TP-55	0-0.8	Topsoil						8.2
	0.8-4.5	Silty Gravel	1½	55	13	CL	12.6	
	4.5-7.0	Lean Clay	#4	94	19	CL	23.6	
	7.0-9.0*	Weathered Claystone						
TP-56	0-0.8	Topsoil						0.8
	0.8-1.6	Silty Clay w/Gravel (shale frags)						
	1.6-4.0*	Weathered Shale						

* Bottom of interval @ top of rock

TABLE 2-2(Cont'd)
SUMMARY OF SITE SOILS RELATIVE TO LINER SOIL REQUIREMENTS

Boring/ Test Pit	Depth	Generalized Visual Description	Top Size (in)	Pass #200 (%)	Plast. Index (%)	Unified Class.	Water Content (%)	Clay Thick. (ft)
B-1	0-3.5	Silty Clay w/Gravel (siltst frags)						3.0
	3.5-10.7*	Silty Clayey Gravel (siltst frags)						
B-2	0-6.0	Silty Clay w/Gravel (siltst frags)						11.5
	6.0-12.0*	Gravelly Silty Clay						
B-3	0-1.5	Silt						0
	1.5-9.0	Silty Clayey Gravel (sandst frags)						
	9.0-10.4*	Clayey Gravel (clayst frags)						
B-4	0-6.0	Silty Clay w/Gravel (sandst frags)						5.5
	6.0-10.0	Gravelly Lean Clay (gvl is sandst, sh, siltst)						
	10.0-13.0*	Silty Clay w/Gravel (shale frags)						
B-5	0-9.5	Silty Clay w/Gravel (rock frags)						9.0
	9.5-12.0	Gravelly Silty Clay (gvl is sandst & shale)						
	12.0-13.0*	Silty Clay w/Gravel (shale frags)						
B-6	0-3.0	Gravelly Silty Clay						5.0
	3.0-8.0	Lean Clay w/Gravel (rock frags)						
	8.0-9.0	Poorly Graded Gravel (rock frags)						
	9.0-10.0*	Gravelly Silty Clay (gravel is sandst frags)						
B-7	0-9.0	Sandy, Silty Clay w/Grvl (water @ 3)						6.3
	9.0-15.3*	Lean Clay w/Gravel (shale & clayst frags)						
B-8	0-3.5	Gravelly Silty Clay	2	27	12	GC	14.4	0
	3.5-7.3	Silty Clayey Gravel (water @ 5.0)						
	7.3-7.7*	Silty Clay w/Gravel						
B-9	0-9.0	Silty Clay w/Gravel (shale frags)						
	9.0-11.5*	Silty, Clayey Gravel (siltstone frags)						
B-10	0-6.0	Sandy Silty Clay w/Gravel						
	6.0-22.5*	Silty Clay w/Gravel (water @ 15.0)						
B-11	0-4.0	Silt	1	70	17	CL	15.1,23.5	3.5
	4.0-8.0*	Silty Clay w/Grvl (sandst/siltst frag) water 5'						
B-12	0-0.5	Silt						10.9
	0.5-3.0	Silty Clay w/Gravel						
	3.0-6.0	Gravelly, Silty Clay						
	6.0-7.7	Lean Clay w/Gravel						
	7.7-12.0	Silty Clayey Gravel						
	12.0-15.7*	Lean Clay w/Gravel						
B-13	0-9.0	Silty Clay w/Gravel						15.3
	9.0-15.8*	Gravelly Silty Clay						
B-14	0-0.2	Topsoil						8.8
	0.2-12.0	Silty Clay w/Gravel						
	12.0-15.6*	Weathered Siltstone & Sandstone						
B-15	0-15.0	Silty Clay w/Gravel						5.5
	15.0-15.9*	Gravelly Silty Clay						
B-16	0-0.2	Topsoil						5.8
	0.2-3.0	Silty Clay						
	3.0-11.0*	Silty Clay w/Gravel						
B-17	0-0.2	Topsoil						9.8
	0.2-10.0*	Silty Clay						
B-18	0-3.0	Sandy Silt w/Gravel						3.0
	3.0-9.0	Silty Clay w/Gravel						
	9.0-12.0	Lean Clay						
	12.0-12.7*	Clay w/Gravel (wthr shale)						

* Bottom of interval @ top of rock

TABLE 2-2(Cont'd)
SUMMARY OF SITE SOILS RELATIVE TO LINER SOIL REQUIREMENTS

Boring/ Test Pit	Depth	Generalized Visual Description	Top Size (in)	Pass #200 (%)	Plast. Index (%)	Unified Class.	Water Content (%)	Clay Thick. (ft)
B-19	0-5.5*	Silty Clay w/Gravel (wthr shale)						
B-20	0-0.5	Topsoil						
	0.5-3.0	Silty Clay						
	3.0-9.0	Silty Clay w/Gravel						
	9.0-9.5	Blk Silty Clay (wthr carb. shale)						
	9.5-12.0	Sandy Silt w/Gravel						
	12.0-15.0	Silty Clay w/Gravel						
	15.0-18.0	Silty Clay w/Gravel						
	18.0-21.2*	Sandy Silty Clay w/Gravel						

* Bottom of interval @ top of rock

TABLE 2-3
SUMMARY OF ENGINEERING PROPERTIES OF CLAY LINER AND IN-SITU SOIL FOR SLOPE STABILITY ANALYSIS

Soil	Total Density (pcf)	Saturated Density (pcf)	Effective Friction Angle (deg.)	Effective Cohesion (psi)	Confining Pressures (psi)	Confining Pressures In Terms of Height of Overburden Material (ft)	
						Total	Saturated
Clay Liner Or In-situ Soil	120	125	31.3	0	0 - 25	0 - 30	0 - 60
	120	125	25.3	0	25 - 75	31 - 90	61 - 180
	120	125	22.8	0	> 75	> 90	> 180

Section 3.0

EMBANKMENT PROPERTIES

3.1 COAL REFUSE [§ 77.216-2(a)(6)]

3.1.1 Coarse Coal Refuse

Strength properties for the coarse coal refuse were obtained from review of compaction data and laboratory test data that was developed for the existing facility. A triaxial strength test was performed on a sample of compacted coarse coal refuse giving an effective angle of internal friction (Ø') of 33.7° and effective cohesion (c') of 0 pcf. The sample was compacted to a target density representing 95% of the maximum dry density determined in accordance with ASTM D698. Moist and saturated unit weights of 118 pcf and 122 pcf, respectively, were calculated from moisture density data and water content data developed for the existing facility. Moisture content at the time of field density testing typically ranges from 3.3 % to 12 %.

Coarse coal refuse permeability was determined from a laboratory test performed on a 12-inch diameter specimen compacted to 95% of the maximum dry density per ASTM D698. The test was performed in accordance with ASTM D2434 and yielded a permeability of 2.67×10^{-3} cm/sec. A second test was performed for design of the existing facility height extension using a flexible wall permeameter and resulted in a permeability of 7.3×10^{-5} cm/sec. Based on reference values for permeability of coarse coal refuse, these two test values probably represent the upper and lower bound of permeability thus the log average of these values, 4.4×10^{-4} cm/sec was used to size the internal drains. Further justification for using this average value comes from the performance of the existing dam. The existing facility was designed assuming a permeability of 1.5×10^{-5} cm/sec. The piezometers located in the existing dam indicate that the drainage system designed using that permeability is not overloaded, thus it can be concluded that flow through the dam is accurately represented by that permeability. The ratio of horizontal to vertical permeability was selected for normal placement of uniform materials as recommended by MSHA. The piezometers in the existing dam indicate that this assumption is valid. Values used for design of the embankment are summarized below.

Moist Unit Weight (γ_{moist})	118	pcf
Saturated Unit Weight (γ_{sat})	122	pcf
Effective Angle of Internal Friction (Ø')	33°	
Effective Cohesion (c')	0	pcf
Vertical Permeability (K)	4.41×10^{-4}	cm/sec
K_h/K_v	9	

Results of coarse coal refuse test results used for facility design are included in Appendix E.

3.1.2 Fine Coal Refuse

Fine coal refuse is susceptible to liquefaction during seismic events. Liquefaction temporarily elevates the pore pressure in loose, saturated materials, which reduces the effective strength to near zero. To assess impacts of liquefaction on the stability of the structure, the effective angle of internal friction (Ø') for the entire mass of fine refuse was conservatively taken as zero. The permeability of the fine coal refuse is substantially lower than that of coarse coal refuse. However the effect of its lower permeability relative to that of the coarse coal refuse on the phreatic surface was not considered in seepage analysis.

3.2 OFF-SITE MATERIALS [§ 77.216-2(a)(6)]

Embankment material for construction of Saddle Dams B, C, and D, and the sedimentation pond dam will be comprised of on-site soils. On-site soils having the greatest clay content will be used for soil liner construction. Remaining soils will be used for embankment dam construction. Embankment material will be comprised of clays but is expected to contain varying amounts of rock fragments. Shear strength parameters developed for clay liner material were assigned to embankment material for dam stability analyses.

Aggregate material for construction of the internal drains will be obtained from an off-site source. Engineering properties for this material were estimated from reference values and empirical correlations. Strength properties and unit weight of the drainage material are nearly identical to that of the coarse coal refuse in which they are embedded. Since the drainage material comprises a very small percentage of the entire embankment mass, the strength and unit weight of the drainage material were assumed to be identical to that of the coarse coal refuse for stability analyses. However, permeability of the various aggregates varies greatly. The values developed are summarized below.

PADOT Bituminous concrete sand, Type B, #2	1×10^{-3} cm/sec
AASHTO #57 coarse aggregate	1×10^{1} cm/sec (laminar flow at gradients associated with critical drain section design)
Rip Rap R-3	Tubulent flow based on: D50 = 3.5 in void ratio = 0.3 Angular rocks
Rip Rap R-7	Tubulent flow based on: D50 = 18 in void ratio = 0.3 Angular rocks

The ratio of horizontal to vertical permeability was conservatively assumed as 1 for all drainage materials.

Section 4.0

ENGINEERING DESIGN

4.1 GENERAL FACILITY LAYOUT AND OPERATION

Consol Pennsylvania Coal Company (CPCC) plans to develop a new coal refuse disposal facility within the watershed of an unnamed tributary located east of the existing Bailey Central Mine Complex (Bailey) slurry impoundment. The new disposal facility will consist of a slurry impoundment referred to as Coal Refuse Disposal Area No. 3 and a coarse coal refuse disposal area referred to as Coal Refuse Disposal Area No. 4. The slurry impoundment will be constructed within the valley of the site's main unnamed tributary. Coarse coal refuse will be used for dam construction. Excess coarse coal refuse will be placed in the valley of a secondary, contributing, tributary. Both disposal areas will receive coal refuse generated by the Bailey Central Mine Complex.

Construction drawings for the new disposal facility are presented in Appendix A of this report. Technical Specifications are presented in Appendix B and an Operations and Maintenance Manual in Appendix C.

Surface water will be managed by a system of channels and sedimentation control structures. Prior to capping, stormwater runoff above the coarse refuse dam will be directed to the disposal impoundment. Other stormwater runoff will be collected by channels and conveyed through a sedimentation control structure prior to being discharged off-site. Runoff from the downstream face of the main dam, a section of the final cap, and all runoff from Disposal Area No. 4 will be directed to the site sedimentation pond. Runoff from temporary stockpile areas surrounding the site will pass through sediment traps before being discharged. The existing slurry impoundment (Coal Refuse Disposal Area No. 1) will be left open and will serve as a sedimentation pond for portions of Disposal Area No. 3. Runoff from Saddle Dam A and a section of the final cap will be directed to the existing Bailey slurry impoundment. When Disposal Area No. 1 is closed, drainage from Disposal Area No. 3 areas that are not yet vegetated will be channeled to the Disposal Area No. 1 sedimentation pond. Ultimately, drainage from vegetated areas will be discharged into the unnamed tributary bordering both slurry ponds.

A network of drains will be constructed to carry base stream and spring flow under both disposal areas. These underdrain systems will discharge into the sedimentation pond. Springs intercepted at the facility subgrade will be drained to a rock drain constructed along the center of the major valleys. A soil liner will be constructed over the rock/spring drainage system to reduce infiltration to the drains from above. Both disposal areas will be provided with a two-foot thick soil liner having a 6-inch protective cover. Internal drains will be installed above the soil liner in both disposal areas. The discharge from these drains, which are separate from the rock and spring drains, will also discharge into the sedimentation pond.

The expected service life of the proposed coal refuse disposal facility is estimated to be approximately 15 years based on current coal refuse generation rates. Both disposal areas will be developed in stages. Initial development of both disposal areas is expected to begin simultaneously although different time frames will occur for individual stages in each of the two areas. Coarse coal refuse placement within embankment areas of the slurry impoundment will begin after initial site preparation and is expected to be complete after about 5 years. During that time, the coarse coal refuse disposal area will be activated as needed during severe weather conditions not suitable for adequate compaction. Fine coal refuse slurry placement will begin after the Stage 1 dams are complete.

4.1.1 Coal Refuse Disposal Area No. 3 (Slurry Impoundment)

Coarse coal refuse will be used to construct embankments within the main stream valley at the downstream and upstream ends (eastern and western ends) of the proposed slurry impoundment site to form the reservoir area. Three additional small earthen saddle dams will be constructed to raise other low areas in the ridgeline to elevation1495 feet. Fine coal refuse will be placed within the impoundment area by water slurry techniques. Slurry will be discharged along the upstream face of the eastern dam (main dam). Water levels within the impoundment will be controlled by a decant pipe that will discharge into the sedimentation pond in conjunction with a pumping system which will recycle pond supernatant to the preparation plant on an as-needed basis. The impoundment has been designed to safely store the entire runoff from the design storm conditions, therefore, an emergency spillway has not been provided.

The earth saddle dams, Dams B, C, and D, will be provided with an upstream geomembrane liner to minimize seepage. A contingency internal drain will be installed in each dam for safety purposes. Seepage through the Main Dam and Saddle Dam A will be intercepted and controlled by internal blanket drain systems. The main dam internal drain will outlet to the sedimentation pond; the Saddle Dam A internal drain to the existing Bailey slurry impoundment (Coal Refuse Disposal Area No. 1). When the existing slurry impoundment is closed, Saddle Dam A internal drain flow will be redirected to a Disposal Area No. 1 sedimentation pond.

The Main Dam and Saddle Dam A will be comprised of coarse coal refuse and will be constructed in stages as indicated on the facility Construction Drawings. Expansion of both dams from their initial stage will be accomplished following downstream construction practices, i.e., expanding the dam footprint in a direction away from the pool.

When the fine coal refuse disposal capacity has been exhausted, the impoundment area will be capped with coarse coal refuse. Coarse coal refuse surfaces will be covered with a two feet of soil cover and vegetated. The lower foot of soil cover material will exhibit a permeability of $5x10^{-5}$ cm/sec after compaction.

Development of the slurry impoundment will require maintaining operation of the dewatering borehole located within the main dam area. Manhole sections will be installed as needed to provide access to the borehole and pump.

4.1.2 Coal Refuse Disposal Area No. 4 (Coarse Coal Refuse Disposal Area)

A coarse coal refuse valley fill will be developed adjacent to and southeast of the slurry impoundment. This area, referred to as Coal Refuse Disposal Area No. 4, will accept coarse coal refuse generated during weather conditions unsuitable for placement in the slurry impoundment embankment and after the slurry impoundment embankments are fully developed. The area will receive coarse coal refuse until it is needed for the final slurry impoundment capping phase. When conditions are unsuitable for adequate compaction, typically two months per year, coarse coal refuse will not be placed within 250 feet of the intermediate and final embankment outslopes. The site selected for disposal of unsuitable material will depend on which stage of the facility is being developed.

Coal Refuse Disposal Area No. 4 will be provided with an internal drain that will intercept and convey infiltration. This drain will be constructed above the soil liner and will outlet to the sedimentation pond.

4.1.3 Sedimentation Pond

The sedimentation pond will be constructed at the beginning of Coal Refuse Disposal facility site development and will be used throughout the life of the disposal facility. It will receive runoff from both disposal areas (i.e., slurry pond and coarse coal refuse disposal area), as well as, discharge from the disposal facility decant pipe, underdrain system and internal drains. CPCC plans to recycle slurry pond supernatant to the preparation plant; therefore, little flow is expected to be discharged through the decant pipe. The maximum contributory drainage area for the sedimentation pond, 455 acres, will occur during initial site preparation. When the proposed disposal facility is completely developed and capped, runoff from a 116-acre section of the slurry pond cap will drain to the existing Bailey slurry impoundment. This flow will be redirected to an unnamed tributary bordering both slurry ponds when the existing Bailey slurry impoundment is closed.

The sedimentation pond embankment and spillway will be constructed to the heights and grades shown on the disposal facility Construction Drawings, and in accordance with the facility Technical Specifications. Erosion and sedimentation controls will be installed prior to construction in accordance with Section 4.8 of the disposal facility Design Report.

The pond will be split into two chambers by an interior earthen dike. An upstream chamber will provide initial sedimentation and will require more frequent clean-out than the larger downstream chamber. A pipe culvert will hydraulically connect the two chambers. Pond levels will be controlled by the principal and emergency spillways. Under normal conditions, the lower pool level will be at elevation. 1141.5 feet. When the water level rises above normal pool, water will be discharged automatically through the principal spillway. During extreme rainfall periods, when the lower pool level rises above elevation 1157.5 feet, water will be discharged automatically through the emergency spillway.

4.2 COAL REFUSE PRODUCTION AND VOLUMES [CFR, Title 30, Part 77.216-2(a)(9)]

Coal refuse production for Disposal Areas No. 3 and No. 4 have been based on current mine/preparation plant operating conditions and coal production rates projected by CPCC. Raw and clean coal production rates are tabulated in the layout/staging calculations presented in Appendix G.

As indicated in those calculations, 75% of the raw coal from the mine (by weight) is assumed to be recovered as clean coal. The 25% reject from processing the coal includes two major components: fine coal refuse which accounts for 16% (by weight) of the total reject, and Coarse coal refuse which accounts for the remaining 84% of the total reject. The coarse coal refuse includes material from the rotary breaker (less than 6% of the coarse refuse by weight) and ash from the thermal dryers (less than 2% of the coarse coal refuse by weight). Projected annual generation rates for coarse coal refuse (including breaker rock and dryer ash) and fine coal refuse are included in the facility layout/staging calculations presented in Appendix G. Facility design has been based on these waste production rates.

Coal refuse disposal volumes have been based on the following dry unit weights:

Material	Dry Unit Weight (pcf)
Compacted Coarse Refuse (average including breaker rock, unsuitable placement, and dryer ash)	115
Fine Refuse (based on soundings of the existing pond)	40

4.3 FACILITY STAGING

4.3.1 Coal Refuse Disposal Area No. 3 [CFR, Title 30, Part 7.216-2(a)(6 & 9)]

Coal Refuse Disposal Area No. 3 will be constructed in three stages. Proposed development for each stage, including site preparation is presented on Sheets 3 through 8 of Appendix A. Each stage will involve construction of two impounding structures from suitable coarse coal refuse - one dam at the downstream end of the facility (Main Dam) and a smaller dam across the upstream end to increase site capacity (Saddle Dam A). Fine coal refuse slurry disposal will begin when Stage 1 of dam construction is complete. The coarse coal refuse embankments will be developed using downstream construction techniques. The final facility stage is the capping stage when the pool will be covered. It will be accomplished in 6 substages as indicated on Sheet 12 of Appendix A.

Initial development of the Stage 1 Main Dam will involve construction of a small 15-foot high temporary dike at the upstream toe to intercept stream flow and runoff. This temporary dike may

be constructed with embankment material meeting the requirements of Section 5 of the specifications presented in Appendix B. The outlet section of decant pipe located on the valley bottom will be used to pass flow intercepted by the dike.

Site preparation for final stages of slurry placement will require construction of three additional small earthen saddle dams to raise low areas in the ridgeline to elevation 1495 feet. These dams are referred to as Saddle Dams B, C, and D.

Facility cross sections depicting proposed Area No. 3 staging are presented on Sheet 13 of Appendix A. A staging diagram is presented as Sheet 15 of Appendix A. Curves depicting impoundment storage volume and embankment volume versus elevation are presented on this diagram and the following key operating elevations are shown throughout all stages of facility development:

- Embankment crest elevation at the beginning and end of the stage.
- The expected duration of each stage.
- Operating pool elevation (decant inlet elevation).
- Maximum expected storm pool elevation.
- Anticipated average fine refuse elevation in the pool area.
- Refuse disposition

Collectively the curves presented on this graph indicate the sequence of facility development; that is, when disposal of a waste stream in a particular area of the disposal facility will begin and end. The curves also indicate when site preparation for a particular stage must be completed.

As indicated on Sheet 15, the Area No. 3 facility is expected to begin receiving coarse coal refuse in 2005. Unsuitable coarse material, breaker rock and dryer ash will be disposed in Area No. 4 at locations designated as non structural. Suitable coarse refuse that can not be efficiently placed in Area No. 3 due to space and hauling limitations will be placed in the designated structural areas of Area No. 4. Fine coal refuse will continue to be disposed in Area No. 1 until the Area No. 3 Stage 1 embankment is complete. At that time, near the end of 2006, fine coal refuse will be diverted from Area No. 1 to Area No. 3.

4.3.2 Coal Refuse Disposal Area No. 4 [CFR, Title 30, Part 7.215-2(b)(3 & 4)]

Coal Refuse Disposal Area No. 4 will be constructed in three stages. The first stage will be development of a head of hollow fill to a maximum elevation of approximately 1495 feet as shown on Sheet 9 of Appendix A. Stage 1 development is expected to be initiated during Area No. 3 dam construction activities when coarse coal refuse not suitable for dam construction will be disposed in Area No. 4. During Stage 2 of Area No. 4 development, the embankment will be expanded downstream to the final proposed footprint limit. As indicated on Sheet 10 of Appendix A, the top of the Stage 2 Area No. 4 embankment will be maintained at the level established during Stage 1. Stage 2 can not be developed until Stage 3 of the Area No. 3 Main Dam is completed and vegetated. Once started, Stage 2 of Area 4 can be developed concurrently with Stage 1 but can never exceed the developed elevation of Stage 1 to maintain drainage. Stage

3 development for Coal Refuse Disposal Area No. 4 will consist of raising the top of the embankment to the final configuration depicted on Sheet 11 of Appendix A.

Facility cross sections depicting proposed staging are presented on Sheet 14 of Appendix A.

4.3.3 Sedimentation Pond [CFR, Title 30, Part 7.216-2(a)(6 & 9)]

The sedimentation pond will be constructed in one stage during initial site preparation. The impounding structure will be constructed with embankment material meeting the requirements of Section 7 of the specifications presented in Appendix B. It will include an internal drain and anti-seep diaphragm constructed of clean aggregate. Refer to pond construction drawings presented as Sheets 27-30 of Appendix A.

4.4 LAYOUT AND DIMENSIONS [CFR, Title 30, Parts 77.215-2(b)(4,6 & 7) and 77.216-2(a)(7)]

4.4.1 Coal Refuse Disposal Areas No. 3 and No. 4

Proposed footprints for Coal Refuse Disposal Area No. 3 and Area No. 4 are shown on Sheets 6 through 12 in Appendix A. Cross sections showing proposed construction are presented on Sheets 13 and 14. As indicated by these drawings, the selected footprint maximizes area available for disposal. The Area No. 3 facility will be developed within the footprint to a maximum crest elevation of 1495. Final closure of Area 3 will mound up the top to elevation 1570. Area No. 4 will be developed to a maximum elevation of 1720 feet.

All stages of coarse coal refuse embankment development have been provided with a 3H:1V inside (i.e., facing the impoundment) slope. Outside slopes shown for the various stages are 2.5H:1V with 20-foot wide benches at approximately 50-foot vertical intervals. Haul roads also have been incorporated into the Main Dam and Area No. 4 outside slopes. The overall outside slope for coal refuse embankment areas is 3H:1V or flatter. Benches slope into the embankment on a 5% grade to a collection ditch and are sloped longitudinally across the face of the embankment at a minimum slope of 1% to promote drainage.

Saddle Dams B, C, and D to be constructed in Coal Refuse Disposal Area No. 3 will have maximum heights ranging from approximately 13 to 22 feet (measured at the centerline). The lengths of these dams range from 450 to 725 feet. They will be constructed with inside and outside slope ratios of 3H:1V and 2H:1V, respectively.

All of the Area No. 3 impounding structures will be provided with an internal drain to control seepage. The upstream face of Saddle Dams B, C, and D will be covered with a geomembrane liner, therefore, internal drains for these dams have been provided solely as a backup for safety purposes in the event the geomembrane leaks.

4.4.2 Sedimentation Pond

A plan drawing of proposed sedimentation pond construction is presented on Sheet 27 in Appendix A. Cross sections are presented on Sheet 28. As indicated by these drawings, the dual-chamber pond will be constructed downstream of both disposal areas. The impounding structure will be an earthen dam constructed with a 15-foot wide crest at elevation 1162 feet. Pond inside slopes, including the dam upstream slope, will be 3H:1V. The downstream slope of the dam will be 2H:1V. A 25-foot wide dike constructed to the same elevation as the main dam divides the pond into two chambers. The upper chamber has a surface area of 1.03 acres at the emergency spillway elevation (1157.5) and the lower chamber has an area of 4.39 acres at the emergency spillway elevation (1157.5).

4.5 HAUL AND ACCESS ROADS [CFR, Title 30, Part 77.216-2(a)(7)]

A system of haul roads will be constructed on the hillside between the two disposal areas at the locations shown on Sheet 5 in Appendix A. The roads will extend into each disposal area and will provide access from the three proposed coal refuse bins to the bottom of the valley. An additional access road will be constructed along the ridge bordering the southern side of the slurry impoundment to provide access from the preparation plant and for Saddle Dam A construction. Access to all stages of coarse coal refuse placement will be from these roads. As shown on Sheet 34 in Appendix A, the typical haul road section generally incorporates a 60-foot wide combined cartway, safety barrier, and channel width and is sloped 2% toward the roadside channel. A safety berm or guard will be installed along the outside edge of roadway sections classified as elevated according to Program Information Bulletin No. P93-8.

Development of Coal Refuse Area No. 4 Stage 2 will encroach on haul roads providing access from the top of the pile to the sedimentation pond. To maintain access, a haul road (Haul Road 24) will be formed on the face of the Stage 2 slope. This haul road will connect with a road constructed on the hillside above the southern side of the sedimentation pond.

Construction vehicle only access roads are provided into the sedimentation pond lower chamber; to facilitate clean out; and adjacent to the decant pipe in the pool area; to provide access to the floating decant pump and for moving the inlet structure as the disposal area is filled.

4.6 SLURRY IMPOUNDMENT HYDROLOGY AND HYDRAULIC DESIGN

Coal Refuse Disposal Area No. 3 is a slurry impoundment that has been designed to store runoff from storm events during each stage of development. Runoff collected in the impoundment will be pumped to the preparation plant for use as process water or will be discharged through the decant structure. Since the impoundment has been designed to store runoff from the design storm event, an emergency spillway has not been provided. Hydrologic and hydraulic calculations performed for facility design are presented in Appendix G. They were performed in accordance with MSHA and PADEP recommended guidelines/procedures as described below.

4.6.1 Design Criteria [CFR, Title 30, Part 77.216-2(a)(10 & 11)]

Storm runoff was evaluated for the contributing 219-acre watershed area using US Army Corps of Engineers Computer Program HEC-1. The design storm was selected based on MSHA guidelines (USDOL IR1109, 1979 and PIL No. I90-II-6, 12-14-90) and PADEP Chapter 105.

Each stage of the impoundment has been designed to store runoff from the design storm above the operating pool level. Components of the design storm for include the antecedent storm, principal storm, and subsequent storm. More detailed description of these storm events follows.

1. **Antecedent Storm**: 100-year, 24-hour, storm event with antecedent moisture condition (AMC) II. Facility design has been based on the assumption that no discharge will occur, during the design event storms. The 24-hour, 100-year storm event was determined to be 5.2 inches based on the USDA SCS 24-hour time rainfall distribution.

2. **Principal Storm**: Probable Maximum Precipitation (PMP) of 72-hour duration with AMC III. The 72-hour PMP was determined to be 38.5 inches (USDOC, 1978) based on Hydrometeorological Report (HMR) No. 33 using PMP values from HMR No. 51 "Probable Maximum Precipitation Estimates U.S., East of the 105th Meridian" (NWS, 1982).

3. **Subsequent Storm**: PMP as described above.

A minimum freeboard of three feet or more has been maintained between the maximum water surface elevation determined as described above and the embankment crests.

4.6.2 Maximum Water Surface Elevations [CFR, Title 30, Part 77.216-2(a)(11)]

Maximum water surface elevations were calculated for Stages 1, 2, and 3. These stages represent the range of drainage area, pool area, and storage volume expected to be encountered during construction of the facility. Analyses assumed a starting water surface elevation one foot above the highest riser invert elevation expected to be activated during a stage. Because pool water will be returned to the plant via a floating decant pump, it is likely that the actual starting water surface elevation at the beginning of a design storm event will be significantly below the riser elevation thus providing additional storage volume for storm runoff. In addition, no discharge out of the decant pipe and no water withdrawal via pumping was assumed during or between storm events. This conservatively accounts for the possibility that the small diameter riser could become restricted with debris during the design storm. Maximum water surface elevations calculated by the HEC-1 runs are summarized in Table 4-1 below.

Table 4-1
Results of Hydraulic Analysis

Stage	Crest Elevation	Starting Water Surface Elevation	Maximum Water Surface Elevation After a Design Storm Event	Minimum Freeboard after a Design Storm Event (feet)
1	1350	1330	1346.3	3.7
2	1436	1424	1432.6	3.4
3	1495	1485	1491.6	3.4

As can be seen from the tabulated results, a minimum of 3.4 feet of freeboard is maintained at all stages. This is greater than the required minimum of 3 feet. Many stages provide substantially more freeboard than the minimum thus providing additional storage beyond the design storm and assuring that the design storm can be safely stored at any operating stage throughout the life of the facility.

It is noted that subsequent seepage and stability analyses assumed a maximum water surface elevation at the required minimum of 3 feet below the crest elevation which is conservative relative to the actual water surface elevations expected from the design storm event.

4.6.3 Discharge Systems [CFR, Title 30, Part 77.216-2(a)(12)]

Storm water that accumulates in the impoundment typically will be pumped to the preparation plant for use as process water. Nevertheless, a pipe decant system will be installed to drain storm water that may accumulate above the normal operating pool level and is not needed for plant operations.

The decant system will consist of 22-inch diameter, SDR 13.5 high density polyethylene (HDPE) pipe (minimum inside diameter = 18.5 inches). It will extend down the north abutment of Saddle Dam A to the valley bottom, and along the bottom of the valley to outlet at the downstream toe of the Main Dam (see Sheet 3 in Appendix A). The pipe will be fusion bonded and encased in concrete as shown on Sheet 33 in Appendix A and as specified in Section 12 of the Technical Specifications.

Eight inlets consisting of 22-inch diameter HDPE "T's" will be installed along the sloping section of decant pipe at elevations corresponding to the elevations shown on Sheet 3 in Appendix A. Since CPCC plans to pump slurry pond supernatant to the preparation plant for use as process water, the actual operating pool within the impoundment usually will be much lower than the riser elevations shown on Sheet 3.

Presented on Sheet 33 in Appendix A are details of the decant system, including inlet construction details and details for sealing the inlets before they are covered with fine coal refuse. Each inlet will be equipped with a cover which will be replaced with a trash rack and anti-vortex device

before it is activated. This device will be removed when the inlet is sealed. The cover installed over the highest inlet at elevation 1484 will be vented to maintain atmospheric pressure within the pipe. As indicated on Sheets 16 and 33, the outlet section of decant pipe extending under the Main Dam will be provided with seepage diaphragms. The decant system will be completely installed during initial site preparation.

As the slurry level rises, inlets which are no longer needed to maintain the operating pool level will be taken out of service. The trash rack and anti-vortex device will be removed and a 1.5 inch thick by 36 inch square steel plate will be bolted to the flange. Bituminous coating will be applied to the inlet and all exposed metal surfaces to provide a watertight seal and protect the surface from corrosion. The inlet then will be backfilled with a minimum of 3 feet of clay as indicated on Sheet 33 in Appendix A.

During initial site preparation, the outlet section of decant pipe located on the valley bottom will be used to carry runoff intercepted by the temporary dike. Flow will be diverted to an inlet installed at elevation 1210. Calculations demonstrating that the decant pipe will pass runoff from the 2-year, 24-hour storm event with a diversion dike built to El. 1220 feet are included in Appendix G.

The 22-inch, HDPE pipe will have a dimension ratio (DR) of 13.5, which is sufficient to carry the maximum hydrostatic loads to be imposed on the pipe. Although the pipe will be encased in concrete, it has been analyzed for the full hydrostatic head (maximum of 287 feet) in the event that the concrete cracks sufficiently to subject the pipe to full hydrostatic pressures. The concrete encasement has been sized sufficiently to carry the maximum earth loading to be imposed (295 feet of fill). Pipe strength analyses for these conditions indicate that the 22-inch, DR 13.5 HDPE pipe will provide a minimum factor of safety of 2.0 against failure by wall crushing, wall buckling, and excessive deflection. Supporting calculations are included in Appendix G.

4.7 SEDIMENTATION POND HYDROLOGY AND HYDRAULIC DESIGN [CFR, Title 30, Part 77.216-2(a)(10, 11 and 12)]

One Sedimentation Pond is proposed. This pond will be constructed during initial site preparation and will remain in service throughout the life of the facility. Pond operating conditions will vary over the life of the disposal facility. The most critical conditions relative to pond design will occur during the disposal facility's initial site preparation phase. At the start of initial site preparation for the disposal facility, drainage from approximately 455 acres (of which 215 acres will be disturbed) will be directed to the Sedimentation Pond. The required sediment storage volume has been calculated based on the maximum disturbed area of 215 acres.

The lower chamber provides for a sediment storage volume of 1,600 cubic feet per disturbed acre and a settling volume of 4,800 cubic feet per acre of drainage area during worst case conditions (i.e., initial site preparation). The sedimentation pond will provide significantly more sediment storage and settling storage per acre for later stages. The capacity of the upper chamber provides additional settling and storage volume beyond the requirements and is intended to reduce clean out requirements of the lower chamber. The maximum height of the pond impounding structure,

measured at the upstream toe of the dike, will be 28 feet. The sedimentation pond has been designed to pass runoff from the 100-year, 24-hour storm event via separate principal and open channel emergency spillways. The design storm event was routed through both chambers of the sedimentation pond using the HEC-1 Computer Program. Results of the storm routing show that the pond water level will reach a maximum elevation in the lower chamber of 1158.2 feet during the 100-year storm event. In addition to the surface runoff, the rock drain and decant pipe discharges will also outlet into the sedimentation pond. Details of the sedimentation pond are presented on Sheet 30 in Appendix A; supporting calculations in Appendix G.

4.8 EROSION AND SEDIMENTATION CONTROL [CFR, Title 30, Parts 77.215-2(b)(6) and 77.216-2(a)(7 & 12)]

Site erosion and sedimentation (E&S) will be controlled during each phase of facility development, i.e., initial site preparation, facility operation, and facility closure, using a system of channels and sedimentation control structures/devices consisting of a pond, sediment traps, and straw bale/silt fence barriers. The facility design provides for installation of approximately 100 permanent and temporary channels to control stormwater. All permanent channels have been designed to carry flow from the 100-year, 24-hour storm event. Temporary diversion channels have been designed to carry flow from the 2-year, 24-hour storm event. Haul road channels and temporary channels in the coal refuse disposal areas have been designed to carry flow from the 10-year, 24-hour storm event. Temporary culverts have been designed for the 100-year, 24-hour storm event and temporary culverts have been designed for the 10-year, 24-hour storm event. Channel and culvert calculations are presented in Appendix G. Channel linings will be provided to control erosion as indicated on Sheets 35 and 36 of Appendix A. Technical specifications outlining channel construction are presented in Appendix B.

More detailed description of specific E&S controls proposed for each phase of facility development is presented in the following subsections.

4.8.1 E&S Control During Initial Site Preparation

Initial site preparation consists of the work needed to prepare Coal Refuse Disposal Areas No. 3 and No. 4 for Stage 1 development. It will consist primarily of earthwork and other site work needed to construct the following:

- Sedimentation pond
- Haul roads
- Liner underdrain system (rock drain and spring drains)
- Decant pipe
- Temporary dike for dam construction
- Channels and associated culverts
- Manhole construction at the dewatering borehole and associated utility relocation
- Liner for Stage 1 development within the Coal Refuse Disposal Area No. 3 reservoir
- Liner for development of the Area No. 3 Stage 1, 2, and 3 coal refuse dams
- Liner for Stage 1 development in Coal Refuse Disposal Area No. 4

- Main Dam internal drainage systems
- Runoff collection sump
- Piezometer installation

Refer to Sheets 3 and 4 of Appendix A for work to be accomplished during initial site preparation. As indicated on these drawings, initial site preparation activities also will include development of temporary stockpile areas and excavation of excess soil needed for future stages of liner and final cover construction. Proposed construction sequencing is noted on the drawings.

The sedimentation pond and associated channels will be installed before any other work is initiated. Therefore, the pond will provide E&S control for most initial site work. Sediment traps and sediment barrier will be used for E&S control during pond installation. Construction sequencing and proposed E&S controls for sedimentation pond construction are presented on Sheet 29 of Appendix A.

Runoff from temporary soil stockpile areas bordering Coal Refuse Disposal Areas No. 3 and No. 4 will drain to the proposed disposal areas as well as adjoining valleys. Runoff from slopes facing the disposal areas will pass through the sedimentation pond before being discharged off site. Runoff from slopes facing adjoining valleys will be intercepted by collection channels and passed through sediment traps before being discharged off-site. Refer to Sheet 3 and 36 of Appendix A.

A large soil stockpile area will be developed in the western corner of existing Coal Refuse Disposal Area No. 1 as shown on Sheet 37 of Appendix A. Runoff from this area will be intercepted by existing collection channels and discharged into the existing Bailey sedimentation pond.

Coarse coal refuse will be transported to the site by belt conveyor. The proposed conveyor will cross the headwater area of Fletcher Run, a high quality watershed. It will be equipped with a cover through the Fletcher Run area. The facility design incorporates runoff controls that provide for runoff from below the conveyor crossing to be collected and pumped to the slurry impoundment. See Sheets 3 and 37 in Appendix A. Collection channels will be constructed downstream of the crossing. These channels will collect runoff from area below and adjacent to the conveyor and will discharge into a runoff collection sump. Diversion channels constructed upstream of the conveyor will minimize drainage area to the sump. The sump has been sized to store runoff from the 10-year, 24-hour storm event. Channels discharging to the sump also have been sized for the 10-year storm event. Water collected in the sump will be automatically pumped to the slurry impoundment.

4.8.2 E&S Control During Facility Operation

During development of Stages 1, 2, and 3, erosion will be controlled by collecting facility runoff in channel, by providing suitable channel lining, and by vegetating disturbed areas as soon as practical. Runoff from the two coal refuse disposal areas will be passed through a slurry impoundment and/or sedimentation pond before being discharged. Sediment traps will be used to

control sediment in runoff from soil stockpile areas not draining toward the proposed disposal areas or sedimentation pond.

Coal Refuse Disposal Area No. 3. Area below the ridgeline surrounding Disposal Area No. 3 will discharge into the slurry impoundment reservoir. Runoff from outslopes of the three small earthen saddle dams will be controlled by sediment barriers, seeding and mulching, and minimizing the amount of disturbed area. Runoff from the western slope of Saddle Dam A will be collected by channels and conveyed to the existing Bailey slurry impoundment (Coal Refuse Disposal Area No. 1). Runoff from the downstream face of the Main Dam will be collected on slope benches and conveyed to perimeter channels that will discharge into the upper chamber of the sedimentation pond. As part of site preparation for each stage of coarse refuse embankment development, collection channels will be installed along the proposed final embankment/abutment interface for the stage to be developed. Refer to Sheets 3 through 12 of Appendix A. As the embankment is being developed, flow from the working face will be channeled to these perimeter channels.

Coal Refuse Disposal Area No. 4. Runoff from embankment slopes will be handled as described above for the Area No. 3 coal refuse embankments. During pile development, runoff will be collected on slope benches and conveyed to perimeter channels installed along the proposed final Stage 1, 2, or 3 embankment/hillside interface. Refer to Sheets 3 through 12 in Appendix A. Area No. 4 perimeter channels will discharge into the upper chamber of the sedimentation pond. Runoff from the top of the pile also will be collected in channels along the final haul road and conveyed to the sedimentation pond.

Haul Roads. Haul roads will be sloped toward roadside collection channels. Flow from these channels either will be discharge into the slurry impoundment or will be conveyed to the sedimentation pond.

4.8.3 E&S Control During Facility Closure

Erosion and sedimentation control during the final capping stage of facility development will be accomplished by collecting runoff in lined channels, passing the runoff through suitable sedimentation control devices, and by vegetating disturbed areas as soon as practical. Soil stockpile runoff not directed to the sedimentation pond will be passed through sediment traps before being discharged.

Runoff from most of the Disposal Area No. 3 site and all runoff from Disposal Area No. 4 will be directed to the site sedimentation pond. Runoff from the western slope of Disposal Area No. 3 and a section of the final cap will be directed to the existing Bailey slurry impoundment (Coal Refuse Disposal Area No. 1). The existing slurry impoundment will be left open and will serve as a sedimentation pond until Disposal Area No. 3 cap areas draining to it are vegetated. When Disposal Area No. 1 is closed, drainage from Disposal Area No. 3 either will be channeled to the Disposal Area No. 1 sedimentation pond or will be discharged into the unnamed tributary bordering both slurry ponds.

The top of the slurry impoundment will be capped with coarse coal refuse to form the grades indicated on Sheet 11 and 12 in Appendix A before the vegetated soil cover is installed. Cap substages will be developed in numerical order as indicated on Sheet 12 in Appendix A. This sequencing provides for the pool to be fully functional as it is slowly decreased in area. The decant pipe intake area will be closed last. Development of each substage generally will progress in the direction of the arrows shown on Sheet 12. The top of the disposal area will drain to collection channels formed on the cap and perimeter channels.

4.9 GEOTECHNICAL DESIGN

4.9.1 Infiltration Control [CFR, Title 30, Part 77.216-2(a)(6)]

Infiltration from Coal Refuse Disposal Areas No. 3 and No. 4 and the pool area of the sedimentation pond will be controlled by a two-foot thick soil liner exhibiting a maximum permeability of $5x10^{-5}$ cm/sec. The disposal facility liners will be constructed incrementally in stages whereas the sedimentation pond liner will be constructed in one stage. Prior to liner installation, the areas to be lined will be cleared, grubbed, and stripped of topsoil in accordance with Section 3 of the Technical Specifications presented in Appendix B. Required grading also will be accomplished prior to liner installation. Grading for liner construction generally will be limited to undercutting site soils for use as soil and clay borrow and flattening steep areas as needed to provide slopes no steeper than 2H:1V.

Liner for all three facilities will be constructed by excavating and recompacting site soils as described in Module 14 of the Coal Refuse Disposal Permit Application. Soil liner material will be compacted to at least 95% of the maximum dry density determined by ASTM Test Method D698. Compaction to 100% of the maximum dry density will be required under dams. The required density and water content will be established prior to soil liner installation based on results of laboratory moisture-density tests. Soil grain size and Atterberg limit determinations also will made prior to liner installation to verify compliance with liner material requirements specified in the Technical Specifications. Prior to soil re-compaction, the moisture content will be adjusted as required by sprinkling with water or disking to dry. Adequacy of liner permeability and compaction will be assessed by measuring in-place density, water content, and permeability.

The disposal area liner will be overlain by a six inch protective cover consisting of either soil material or coarse coal refuse material. The sedimentation pond liner will be overlain by a one-foot thick soil layer that will incorporate an orange geogrid marker layer to prevent damage during cleanout operations. Finished grades depicted on Sheet 27 of Appendix A within the sedimentation pond area represent the top of the protective cover layer

4.9.2 Drainage of Existing Surface Water [CFR, Title 30, Parts 77.215-2(b)(6) and 77.216-2(a)(12)]

Base flow from the perennial streams will be carried under each disposal facility by a rock drain. This drain will be installed in the existing stream channel at the locations shown on Sheets 3 and 4

in Appendix A. Spring flows also will be intercepted by aggregate drains. Spring drains will discharge into the rock drains.

Rock and spring drains will be constructed in accordance with the details shown on Sheet 32 of Appendix A. Basically they will be composed of R-3 rip rap wrapped with PADOT bituminous concrete sand, Type B, #2 fine aggregate. Geotextile having an AOS of #40 will be installed between the two aggregate materials. The top surface of R-3 rip rap will be choked with AASHTO No. 57 aggregate before the geotextile is placed as indicated on the construction drawings. All aggregate materials will be non-carbonate.

4.9.3 Internal Seepage Control [CFR, Title 30, Parts 77.215-2(b)(6) and 77.216-2(a)(6 & 7)]

4.9.3.1 Approach

To enhance stability of the operating dams, it is necessary to control seepage through the dams and lower the phreatic surface to a safe level. To provide technically sound and cost-effective control measures, the following seepage controls have been designed for the five operating dams proposed for the slurry impoundment and the sedimentation pond dam:

1. For the Main Dam and Saddle Dam A that will be constructed of compacted coarse coal refuse, seepage control will be accomplished through installation of an internal blanket drain at the bottom of each dam and construction of a cutoff trench. The drains have been sized and positioned to intercept the seepage and convey it out of the structure.

2. For Saddle Dams B, C, and D that will be constructed of compacted site soil, seepage control will be achieved by installation of a geomembrane liner inside the embankment to reduce seepage. An internal drain will be installed as a contingency for safety purposes.

3. The sedimentation pond dam will be provided with a 5-foot wide combination chimney drain and anti-seepage diaphragm constructed of bituminous concrete sand, Type B, #2. It also will be provided with a cutoff trench to control foundation seepage.

Coal Refuse Disposal Area No. 4 will be provided with an internal drain along the valley bottom to collect leachate and convey it beyond the limits of the refuse pile. Refer to Sheet 4 in Appendix A for the proposed lateral extent of this drain.

4.9.3.2 Design Criteria

The size, position, and composition of the dam internal drain systems are controlled by various design criteria established by the regulatory agencies and by requirements for stability of the structure. The criteria used to design these drains are as follows.

A ratio of horizontal to vertical permeability of 9:1 was used for compacted coarse coal refuse that will be used to construct the Main Dam and Saddle Dam A. This is the minimum

recommended by MSHA and represents prudent engineering practice. This same permeability ratio was used to design Saddle Dams B, C, and D, and the sedimentation pond dam, all of which will be constructed of compacted embankment material. A ratio of horizontal to vertical permeability of one was used for the drainage material. This is conservative since some degree of stratification will occur during placement of the drain.

The effect of reduced inflow from the slurry deposited on the upstream face of the Main Dam was conservatively ignored to comply with recommended design guidelines. However, this effect has been noted in numerous monitored structures including the existing coal refuse disposal facility. Thus ignoring this effect will result in a conservative design.

The sedimentation pond seepage diaphragm has been designed to safely intercept seepage developed from the maximum pool elevation resulting from the 100-year, 24-hour storm event. This elevation is greater than 3 feet below the crest of the dam.

Internal drains for the slurry pond dam were located and sized to intercept seepage developed from the maximum pool elevation resulting from the design storm as defined in Section 4.6.1 of this report. This elevation was conservatively assumed to be 3 feet below the crest of each stage. However, during most stages of construction, additional freeboard is provided as discussed in Section 4.6.2 of this report. The pool elevation will decrease slowly after a storm event due to discharge out the decant system, thus the final developed phreatic surface will be less than that used for design.

A minimum safety factor of 10 was used for determining drain discharge capacity for the dams and is considered acceptable for the following reasons:

1) Inflow for each dam blanket drain, as well as the sedimentation pond seepage diaphragm, have been based on the maximum possible inflow developed from the maximum possible pool elevation (assumed to be 3 feet below the crest as discussed in above) at each stage. This is an extreme condition and inflows during normal operating conditions will be much less.

2) The coefficient of permeability for the drainage material was conservatively selected as the lower bound of referenced permeability values (see Appendix G).

3) Slurry placed on the upstream slope of the Main Dam will reduce drain inflow.

The internal drain proposed for Coal Refuse Disposal Area No. 4 has been sized to carry 0.6 cfs. The drain capacity provides for a safety factor of 2 if 50% of the average annual rainfall on exposed pile surface is assumed to soak into the pile and exit the base of the pile. This is conservative since at any one time, the sloped sides of the pile represent more than 50% of the total pile area and the effect of evaporation is ignored. Aggregate permeability values used for design and filter design criteria are the same as those used to design the dam internal drains.

Drain materials in contact with coarse coal refuse were designed with appropriate granular filter criteria as presented in the SCS National Engineering Handbook Chapter 26 to prevent migration

of fines. Where the designated filter material comes in contact with soil liner material, the filter criteria are not satisfied. Therefore, a geotextile will be incorporated between the granular filter and the soil liner material. It is difficult to design an appropriate geotextile that will not clog in the fine grained soils that will be used for the soil liner, however, this interface is not expected to see any significant water flow. Since the drains were designed assuming water flows in from the coarse refuse only, any clogging of the geotextile at the filter/soil liner interface will not impact the performance of the drain. See Appendix G for supporting calculations.

Blanket drains were designed with a minimum thickness of 3 feet.

4.9.3.3 Method of Analysis

The position of the phreatic surface through each dam was determined using the basic parabola solution for discharge into a horizontal drain (A. Casagrande, 1937). The effect of the permeability ratio of 9:1 was accommodated by compressing the cross section horizontally by a factor 3.

For the finer grained materials, drain capacity is based on the permeability of the drainage material, drain slope, and the cross sectional area of the drain using Darcy's Law of flow through porous media. For the coarse materials, where flow will be turbulent, the drain capacity is based on equations for turbulent flow as presented in COE EM-1110-2-10-1901(Seepage Analysis And Control For Dams)

Filter compatibility calculations have been performed for the various materials and are included in Appendix G. Criteria used for filter design are those required by the Soil Conservation Service in Part 633 of the National Engineering Handbook. Requirements for ignoring material greater than the #4 sieve as presented in this criteria were ignored when determining the compatibility of gravel sized filters with large rock core materials since this requirement would result in ignoring over 90% of the material's gradation and would result in drain core materials with permeabilities less than the filter that is protecting them.

4.9.3.4 Internal Drain Configuration

The internal drain system for the Main Dam is intended to intercept all seepage at a location just upstream of the Stage 1 crest. A large blanket drain located at the bottom of the dam will control seepage through the dam. This drain will lower the phreatic surface to the base of the coal refuse dam for the entire downstream toe of the embankment. The size of the blanket drain is sufficient to control seepage and ensure dam stability at all three developing stages. The blanket drain basically follows the original ground surface of the V-shape valley. Consequently, it slopes toward the center of the valley. Along the centerline of the valley, a filtered rock drain provides enough flow capacity for discharging collected seepage downstream to the sedimentation pond. Details of the Main Dam internal drain are presented on Sheet 31 of Appendix A. As indicated on Sheet 31, the Main Dam seepage control system includes a cut-off trench below the internal drain to interrupt possible high permeability zones in the soil horizon and provide pressure relief of

seepage that may come through the fractured rock encountered in the dam abutments and in the area of previous mining.

The internal drain system for Saddle Dam A is similar to the system for the Main Dam. However, since the upstream toe of Saddle Dam A extends well below the elevation of the existing saddle, the internal drain is positioned within the coarse coal refuse at the elevation of the existing saddle. Seepage below the elevation of the existing saddle will encounter the soil liner and then rock thus the flow beneath the internal drain is expected to be small and it will not impact the stability of the dam. Any flow that does pass through the soil liner and makes it way through rock to the toe of the dam where it could impact stability will be collected and safely discharged by the sand drain incorporated in the cut off trench. The internal drainage blanket incorporates a rock core in order to provide sufficient discharge capacity to the drain.

Earthen saddle dams have been provided with an HDPE membrane liner that effectively eliminates the majority of seepage through the dam. Assuming a reasonable amount of leakage through the membrane liner consistent with good construction practices results in a phreatic surface downstream of the liner that does not impact the overall stability of the dam. A simple trench drain with sand filter and slotted pipe is provided at the downstream toe to collect this seepage and as a contingency should the liner leak more than anticipated.

The internal drain proposed for Coal Refuse Disposal Area No. 4 is trapezoidal-shaped aggregate installed along the valley bottom. It will be constructed above the facility rock drain and will have the same design. The two drains will be separated by the facility liner.

As indicated previously, the sedimentation pond dam will be provided with a 5-foot wide combined chimney drain and anti- seepage diaphragm constructed of bituminous concrete sand, Type B, #2. The 5-foot wide drain will extend across the width of the dam, from the top of the cutoff trench to El. 1150 feet. It will be drained by two pipe outlets. Drain aggregate will extend into the dam cutoff trench for foundation pressure relief purposes. Refer to Sheet 28 of Appendix A for sedimentation pond drain and cutoff trench details.

Blanket drains for the Main Dam and Saddle Dam A have been designed to be 3 feet thick and constructed of AASHTO #57 coarse aggregate. A rock core consisting of NCSA R-3 rock has been provided where additional drainage capacity is needed and serves as the outlet for Saddle Dam A. These blanket drains will be constructed over the soil liner. A geotextile will be installed between the aggregate and soil liner for separation. For the main dam, the blanket drain outlet will be a drain consisting of NCSA R-7 rock wrapped with geotextile for separation. The outlet will be installed at the lowest point in the blanket drain.

The toe drains for Saddle Dams B, C, and D, and the sedimentation pond seepage diaphragm will be constructed of PADOT Bituminous Concrete Sand Type B, #2 fine aggregate. Pipe outlets will be provided.

All aggregate materials will be non-carbonate.

4.9.4 Slope Stability [CFR, Title 30, Parts 77.215-2(b)(8) and 77.216-2(a)(13)]

4.9.4.1 Method of Analysis

Safety factors were determined using the computer program PC STABL 5M developed by Purdue University. The Modified Janbu method of analysis for both circular failure surfaces and sliding block failure surfaces was employed. Seismic analyses were performed by applying a horizontal acceleration of 0.05g to the sliding mass in the direction of sliding. Pore pressures were specified using a single piezometric surface (water table criteria).

A circular failure surface analysis was performed to assess overall stability of a slope consisting of different materials, in this case the dam material of either coarse coal refuse or compacted soil and the in-situ soil or clay liner above bedrock. Generally, the circular failure surface leads to a deep-seated failure surface.

A sliding block analysis was conducted to further evaluate impacts of the clay liner or the in-situ soil on dam stability. The sliding block is consisted of a sliding wedge of dam material along a soil base that is composed of either clay liner or in-situ soil. The critical section selected for the analysis was same section analyzed for circular failure. Water table and coal refuse strength conditions modeled by the critical circular failure analysis were used for this analysis. The shear strength of the clay or soil varies based on height of overburden material, as indicated in Table 2-2.

4.9.4.2 Cases Considered

Stability is a function of loading conditions, material strength, embankment geometry and pore pressure conditions. Various reasonable combinations of these parameters were analyzed to determine the condition with the minimum factor of safety as discussed below.

1. Loading conditions considered for the analysis included static loading consisting of gravitational self-weight of the dam materials, and seismic loading consisting of static loading plus a horizontal acceleration of 0.05g to the sliding mass in the direction of sliding.

2. Material properties are discussed in Section 2 and Section 3. Because the settled slurry has a grain size and density that make it sensitive to liquefaction under seismic loading, strength of zero was assigned for the fine coal refuse. This is a conservative approach since it is unlikely that the entire mass of slurry will liquefy and lose all of its strength.

3. Embankment geometry determines the static loading condition. For the Main Dam and Saddle Dam A, three construction stages were analyzed. At each stage, several cross-sections along the dam axis were selected for the analysis. For Saddle Dams B, C, and D, only one cross-section was analyzed based on simplicity of the dam configurations. For the sedimentation pond, only one stage of the final geometry condition was analyzed. Two cross-sections, one of the fill slope and the other of cut slope, were evaluated for the pond. Lastly,

two cross-sections of the designed Coarse Coal Refuse Disposal Area (Disposal Area No. 4) were evaluated for stability.

4. Pore pressure conditions considered for the dam stability analyses included steady state seepage and rapid drawdown. Steady state seepage conditions were considered for both the downstream and upstream dam slope analyses. Rapid drawdown conditions were considered for the upstream slope analyses.

For downstream analyses, the most critical condition will be with the highest possible piezometric surface elevation. This will occur at the maximum pool elevation for each stage; i.e., the pool resulting from the design storm as defined in Section 4.6 of this report. Because the impoundment is designed to store the runoff from this event and because it would take a significant time for the decant system to discharge that volume of water, steady state phreatic surfaces developed from the maximum storm pool were used for the analyses. The internal drainage system is designed to collect and discharge seepage from this elevated surface, however, its presence will increase pore pressures on portions of the failure surface and thus reduce stability.

Two phreatic surfaces were considered for the upstream analyses. One is the saturated slope condition under the highest pool elevation resulting from the design storm event. The other is the rapid drawdown condition.

Rapid drawdown conditions for each stage of the Main Dam and final stage of the sedimentation pond were evaluated. The evaluations were based on simulated hydrographs (relationship between pool elevation and time) developed from filling and dewatering of the slurry impoundment and sedimentation pond by the decant system and pond outlet works, respectively. Phreatic surface changes during the filling and the drawdown conditions were obtained by solving the original controlling equation using finite difference method. Detailed calculations are attached in Appendix G. Since the maximum water head difference caused by rapid drawdown is less than or equal to two feet, the effect on slope stability is insignificant. Therefore, only saturated slope conditions were analyzed for the upstream slope evaluation.

4.9.4.3 Results of Analysis

The results of the analyses are summarized in Tables 4-2 through 4-8 for each cross-section evaluated. Details of the analyses are included in Appendix G.

Table 4-2
Results of Stability Analyses
Coal Refuse Disposal Area No. 3 Main Dam - Outside

Cross-Sections	Factor of Safety			
	Sliding Block Failure		Circular Failure	
	Static	Seismic	Static	Seismic
Stage 1				
22+65	1.74	1.48	1.65	1.38
19+10	1.58	1.35	1.53	1.29
14+10	1.92	1.66	1.72	1.39
Stage 2				
26+65	1.90	1.64	1.63	1.25
22+65	1.84	1.53	1.57	1.32
19+10	1.91	1.64	1.81	1.54
14+10	2.13	1.50	1.64	1.43
10+65	1.93	1.60	1.79	1.54
6+30	1.84	1.57	1.60	1.36
Stage 3				
26+65	1.51	1.30	1.50	1.29
22+65	1.61	1.36	1.67	1.42
19+10	1.94	1.60	1.81	1.54
14+10	2.20	1.86	1.74	1.47
10+65	2.26	1.81	1.70	1.48
6+30	2.10	1.75	1.66	1.43

Table 4-3
Results of Stability Analyses
Coal Refuse Disposal Area No. 3 Main Dam - Inside

Cross-Sections	Factor of Safety			
	Sliding Block Failure		Circular Failure	
	Static	Seismic	Static	Seismic
Stage 1				
19+10	2.11	1.59	1.66	1.27
Stage 2				
19+10	2.11	1.56	1.77	1.34
Stage 3				
19+10	2.18	1.57	1.95	1.44

Table 4-4
Results of Stability Analyses
Coal Refuse Disposal Area No. 3 Saddle Dam A - Outside

Cross-Sections	Factor of Safety			
	Sliding Block Failure		Circular Failure	
	Static	Seismic	Static	Seismic
Stage 3				
11+50	2.38	2.01	1.95	1.63
9+62	2.21	1.86	1.95	1.54
9+30	2.05	1.70	1.72	1.43
5+78	2.02	1.56	2.97	2.38
2+28	3.08	2.61	2.03	1.73

Table 4-5
Results of Stability Analyses
Coal Refuse Disposal Area No. 3 Saddle Dam A - Inside

Cross-Sections	Factor of Safety			
	Sliding Block Failure		Circular Failure	
	Static	Seismic	Static	Seismic
Stage 1				
9+30	2.14	1.59	1.97	1.46
Stage 2				
9+62	2.94	2.01	2.06	1.51
9+30	2.02	1.49	1.92	1.42
5+78	2.94	2.01	1.99	1.47
Stage 3				
11+50	2.41	1.77	1.98	1.46
9+62	2.24	1.63	2.03	1.48
9+30	2.03	1.49	1.89	1.40
5+78	2.28	1.68	1.97	1.45
2+28	2.14	1.57	1.96	1.45

Table 4-6
Results of Stability Analyses
Coal Refuse Disposal Area No. 3 Saddle Dams B, C, and D

Cross-Sections	Factor of Safety			
	Sliding Block Failure		Circular Failure	
	Static	Seismic	Static	Seismic
Stage 3/Outside				
Saddle B/3+50	2.00	1.71	1.74*	1.47*
Saddle C/4+20	1.50	1.32	1.59*	1.37*
Saddle D/2+40	1.69	1.49	1.60*	1.36*
Stage 3/Inside				
Saddle B/3+50	2.07	1.52	1.82	1.36
Saddle C/4+20	2.25	1.63	1.77	1.38
Saddle D/2+40	1.82	1.36	1.79	1.35

* Crest failure-failure surface extends through middle of crest.

Table 4-7
Results of Stability Analyses
Sedimentation Pond

Cross-Sections	Factor of Safety			
	Sliding Block Failure		Circular Failure	
	Static	Seismic	Static	Seismic
Fill Slope/Section E Outside	1.80	1.59	1.52	1.31
Fill Slope/Section E Inside	2.85	2.07	1.98	1.45
Cut Slope/Section F Inside	-	-	1.80	1.58

Table 4-8
Results of Stability Analyses
Coal Refuse Disposal Area No. 4

Cross-Sections	Factor of Safety			
	Sliding Block Failure		Circular Failure	
	Static	Seismic	Static	Seismic
Section A	1.93	1.60	1.76	1.50
Section D	1.68	1.42	1.68	1.43

4.9.4.4 Discussion of Analysis Results

Results of comprehensive slope stability analyses for all critical slopes of the design indicate that minimum required safety factors of 1.5 for static condition and 1.20 for seismic condition are maintained. Consequently, cut and fill slope designs proposed for the sedimentation pond, coarse coal refuse embankments, and earthen saddle dams are stable against deep-seated circular or sliding block failures under the conditions considered. In conclusion, the following issues are discussed in regard to the analyses:

1) The analyses generally are conservative with respect to the conditions considered (i.e., loading, geometry, strength, and pore pressure) to ensure that the designed facility is stable for both short- and long-term.

2) The analyses generally are applicable for deep-seated failure surfaces, either circular or sliding block. For Saddle Dams B, C and D, and the sedimentation pond dam, the cohesion component of shear strength for compacted embankment material was conservatively ignored. Therefore, analysis of shallow failure surfaces may show unacceptable factors of safety. Nevertheless, even a nominal amount of the cohesion that compacted clays typically exhibit will raise the safety factors for shallow slump type failures to acceptable levels.

3) Peak shear strengths of the coarse coal refuse and remolded site soil were used for the slope stability analysis. These strengths were obtained from results of laboratory triaxial shear strength testing. To ensure validity of this evaluation and stability of designed facility slope, the active landslide mass observed within the footprint of Saddle Dam A will be removed to competent residual soil or bedrock. Site soils used as structural backfill will be completely remolded and recompacted to the project specifications.

4) For the same analyzed conditions of geometry profile, material properties, and pore pressure (phreatic line), there is no exclusive dominance of one failure mode. Both circular failure and sliding block failure may be the controlling case with the minimum factor of safety, depending on the conditions analyzed.

5) The effectiveness of the analysis regarding phreatic surface development will be verified by monitoring the installed piezometer system and observing internal drain flow quantities as described in Section 4.9.5.

4.9.5 Monitoring

Performance of the internal drain systems of the Main Dam, Saddle Dam A, and the sedimentation pond dam will be monitored by recording outflows from each discharge point. Internal drain outlets for Saddle Dams B, C, and D, i.e., dams having a geomembrane seepage barrier, will be monitored for evidence of flow. Monitoring will be performed in accordance with the facility Operations and Maintenance Manual presented in Appendix C.

Piezometers will be installed through the Main Dam and Saddle Dam A to monitor the effectiveness of the internal drain systems in limiting the development of a high piezometric surface. A system consisting of 12 piezometers will be installed for the Main Dam; 3 piezometers will be installed for Saddle Dam A. Refer to Sheets 16, 22, and 32 in Appendix A for piezometer and remote read-out locations and construction details. Specifications for piezometer construction are included in the Technical Specifications presented in Appendix B. Piezometers will be monitored in accordance with the Operations and Maintenance Manual presented in Appendix C. The maximum water surface elevations for each piezometer shown on Sheet 32 in Appendix A is based on the allowable maximum piezometric surface determined in the stability analysis. Water surface elevations that exceed these elevations do not necessarily mean that an unacceptable factor of safety exists, however, they should be brought to the attention of the engineer so that a determination of the stability of the structure under actual conditions can be made.

4.9.6 Effects of Underground Mine Workings [CFR, Title 30, Part 77.216-2(a) (13 &14)]

Coal Refuse Disposal Area No. 3 is located above a mined-out area of the Bailey mine. This area was mined during 1985 and 1986 using longwall mining techniques. Analyses have been conducted to evaluate subsidence potential and its effect on facility performance with respect to:

1) dam stability and liner performance,
2) embankment and foundation piping,
3) performance of internal drainage structures,
4) performance of the decant pipe,
5) dam overtopping potential, and
6) inrush of water or slurry into the mine, i.e., increased mine water inflow.

Presented in the following subsections are more detailed discussions of subsidence potential and its impacts relative to these six aspects of facility performance. Any mitigating facility design measures also are discussed.

4.9.6.1 Subsidence Potential

Since the mining occurred before 1988, subsidence associated with the multi-panel longwall mining would have been completed a long time ago. The present subsidence potential associated with additional loading imposed by the facility involves the possible collapse of pillars remaining between mined-out panels. In the event that pillar collapse occurs, induced subsidence will be much less than the original subsidence caused by mining. This is due to the fact that the pillar coal material will remain in-place which limits the available space for subsidence, and the dimensions of the pillars are much less than that of panel's, which will results in smaller subsidence.

To simplify the subsidence evaluation, Baker estimated the original subsidence and corresponding surface strains that would have occurred due to the longwall mining and compared that data to allowable tolerances for critical facility components. If the original subsidence is tolerable to the

proposed facility, then impacts from the present subsidence potential are insignificant. Readily available techniques of analyzing subsidence caused by longwall mining were used to estimate the original subsidence.

Thus analyses were performed to:

1. Estimate original subsidence within the longwall mined area; and

2. Evaluate the magnitude of surface strains that would have resulted from the subsidence.

Consequently, strain analyses were conducted to determine the magnitude of horizontal tensile strain that would have resulted at the ground surface when the original subsidence occurred. Results of the strain analyses indicate maximum horizontal tensile strains and vertical strains of 0.59% and 1.41%, respectively.

The analyses described above were performed for one typical cross section through the site. A plan showing the section is attached to the detailed calculations in Appendix G.

4.9.6.2 Impacts on Dam Stability

Impacts of possible horizontal tensile strain development on dam stability were evaluated by considering properties of the coarse coal refuse embankment material and its susceptibility to cracking.

Due to its granular nature, the coarse coal refuse embankment will not be susceptible to cracking, therefore, development of 0.59% tensile strain will not affect dam stability. Sherard, et.al present a graph showing a gradation range for soil suspected to be critical embankment materials with respect to cracking (Reference 2). Comparison of this graph with gradation test results for coarse coal refuse indicates that coarse coal refuse gradation is outside of the critical range for cracking.

Based on stress/strain relationships reported for coarse coal refuse in Reference 3, coarse coal refuse typically exhibits failure at a strain much higher than 0.59%. The stress/strain curves also show that coarse coal refuse does not exhibit a drastic reduction in shear strength upon failure as would be expected if failure resulted in the formation of an open crack. The stress level in the coarse coal refuse typically builds up or levels off after failure indicating that the shear plane partially heals or does not exhibit a significant reduction in shear strength.

4.9.6.3 Impacts on Piping Potential through the Foundation

A minimum of approximately 800 feet of overburden is present between the mine and the surface above the mined area, which is sufficient to prevent open cracks from forming at the embankment subgrade if additional subsidence occurs. The presence of the stream in the valley bottom is evidence that open cracks did not form when the area subsided after longwall mining. If such cracks had formed, the stream most likely would have been lost. Also, evidence of open surface cracks were not noted during the site reconnaissance. Nevertheless, if a crack were to occur, it is

unlikely that the crack would be wide enough to pass the coarse coal refuse embankment material that has a maximum particle size on the order of 3 inches.

4.9.6.4 Impacts on Internal Drains

The subsidence analysis described previously indicates a worst case of localized vertical strain (change in slope) of 1.41% due to subsidence. Expected vertical strain in the area of the internal drains (low point of subsidence trough to edge of subsidence trough) in the direction of flow of the internal drain would be less than 1.0% over a distance of less than 200 feet. Th location of this potential impact is at the low point of the collection system thus there is some potential for water to back up in the blanket drain prior to being discharged through the outlet. However, this portion of drain is expected to be under a large driving head from the phreatic surface through the dam which will easily overcome the potential loss in drain slope. The outlet portion of the internal drain, where no driving head is expected to exist, lies beyond the influence of the mined out area.

4.9.6.5 Impacts on Decant Pipe

Horizontal tensile strains of 0.59% should not affect the structural integrity of the HDPE decant pipe. Based on manufacturer's data, HDPE piping can withstand 1% strain without failure. Pipe joints will be fused together; therefore, they will be at least as strong as the pipe.

Impacts of subsidence on the pipe vertical alignments will be localized. Because of the head differential between the inlet and outlet ends of these pipes, any localized reduction of pipe slope that might occur will not impact pipe performance. Since all pipes have been provided with a minimum slope of 2%, the worst case localized vertical strain of 1.41% in a direction nearly perpendicular to the pipe alignment will not create any dips or low spots in the pipes.

4.9.6.6 Impacts on Embankment Freeboard

Facility impounding structures will be constructed in stages and the crest of each stage will be developed to a specified elevation before the decant pipe is raised. As a result, any embankment crest settlement that may occur during impoundment operation will be eliminated with subsequent lifts of coarse coal refuse placement.

4.9.6.7 Impacts on Mine Water Inflow

Since the slurry impoundment will be developed over a longwall-mined area, site subsurface conditions were evaluated relative to the likelihood for detrimental increases in mine inflow rates. Results of the evaluation indicate that:

1) a sufficient safe cover thickness is present to deter mine inflow from the impoundment,
2) a protective aquiclude is present between the impoundment and the mine, and

3) tensile strains from future subsidence will be less than the recommended limiting value of 1% for total extraction under surface water bodies indicating that additional subsidence induced fracturing will not be a problem with respect to mine water inflow.

In Reference 4, Engineers International presents recommended guidelines for mining under bodies of water. Included are limiting criterion regarding safe cover thickness and maximum subsidence induced tensile strain. Potential impacts on mine water inflow rates also are presented. These guidelines have been used to evaluate the potential for the designed slurry impoundment to impact underlying mine workings. Evaluation of the facility relative to each guideline criterion is summarized below.

Safe Cover Thickness. Engineers International report that safe cover thickness for total extraction below water bodies is 60 times the seam thickness (i.e., mine height). This safe cover thickness should provide for a sufficient thickness of protective aquiclude zone (i.e., leaky barrier to vertical movement of water) (Reference 4). For the Bailey Mine this thickness would be:

Safe Cover Thickness = 60 x 5.8 feet = 348 feet

Comparison of site surface contours with coal contours presented on the Geologic Data Map in Appendix D indicates that the minimum cover thickness at the site occurs at the downstream toe of the facility and is:

Min. Available Cover Thickness = El. 1,200 - El. 410 = 790 feet

This 790-foot minimum available cover thickness exceeds the recommended safe cover thickness, indicating that an adequate thickness of aquiclude zone should overlie the Bailey Mine at the site.

Site boring and field permeability test data support the presence of an aquiclude zone at the site above the mine level. Field permeability testing was conducted in four borings drilled at the dam locations within the longwall-mined area to investigate bedrock permeability. Boring B-7 was located over the mined-out area, B-19 (and B-19A) at the edge of the mined-out area, B-3 over an eastern pillar area, and B-20 over a northern pillar area. Locations of these borings are shown on Sheet 2 in Appendix A. Results of the field permeability tests are presented in Appendix D and summarized in Appendix G.

Boring B-7 was drilled near the middle of the panel so it is located in the zone of compression rather than the zone of tension. Boring B-20 was located in the zone of tension, but it was terminated above the aquiclude zone. One deep boring, B-19A, was drilled within the zone of tension at the end of the longwall panel to investigate the worst case conditions relative to mine induced permeability effects. Analyses indicate that the boring was located in an area that has experienced tensile strain on the order of 0.4%. Analyses further indicate that tensile strains resulting from future subsidence will not cause the total tensile strain to exceed 0.59%. Boring B-19A encountered several zones of low permeability bedrock (zero intake of water during field testing) above the mine level. Two 10-foot zones occur at elevations of 1,223 and 1,183 feet. At the bottom of the borehole, 60 feet of bedrock exhibited low permeability characteristics at

elevations from 1,173.5 to 1,112.9 feet. Another deep boring, B-3 over eastern pillar area, encountered a 150-foot zone of low permeability bedrock at elevations from 990.5 to 1,135.8 feet. These aquiclude zones consist of alternating layers of claystone, siltstone, sandstone, limestone and shale with occasional coal layers.

Allowable Tensile Strain. It is recommended that the maximum cumulative calculated tensile strain beneath a body of surface water not exceed 1% (Reference 4). The maximum total tensile strain expected to occur beneath the slurry impoundment will not exceed 0.59% (see calculations in Appendix G) which is less than this maximum allowable value.

Mine Water Inflow. Engineers International reports that mine water inflow resulting from total extraction below a water body at a cover exceeding 30 times the seam thickness is not likely to be more than a few thousand gallons per minute (Reference 4). They further report that inflow rates of this magnitude can be handled at the mine level. Considering that the cover thickness at the Coal Refuse Disposal Area No.3 site exceeds 60 times the mine height and that aquiclude zones of considerable thickness are present, mine water inflow rate increases due to the slurry impoundment are not expected to exceed this reported value. Any additional mine water inflow will be controlled by the existing mine drainage system which is currently operating at about half capacity. Mine pool levels will be monitored to identify increases that may be due to infiltration from the slurry impoundment.

4.9.6.8 Impacts on Soil Liner

A maximum horizontal tensile strain of 0.59%, if it were to occur, should not result in cracking of the site soil liner. The maximum possible tensile strain of 0.59% is less than the tensile strain at failure of 0.62% established for clay having properties similar to, if not slightly less plastic, than properties of the liner soil sampled and tested at the project site.

As indicated in calculations included in Appendix G, Cheng, et. al. established a relationship between soil tensile strength, tensile strain at failure and Secant Modulus (Reference 8). Cheng also evaluated a clay soil that reportedly classified as a borderline ML-CL material and exhibited a Plasticity Index of 9. Using the soil tensile strength and Secant Modulus developed for this soil, a tensile strain at failure of approximately 0.62% was established. The soil tensile strength developed by Cheng is within the range of tensile strength reported by Johnston for other compacted clay soils (Reference 9).

4.9.6.9 Protection of Existing Dewatering Borehole and Discharge Pipe

The mine pool in the underlying Bailey mine is maintained by pumping through a borehole located at the northeast corner of the mine (lowest point in the mine). The stage 2 and stage 3 embankments in Refuse Area 3 will cover this borehole with up to 150 feet of coarse refuse. Since the borehole must be kept in operation, a precast concrete manhole will be placed over the borehole and raised as the embankment is raised. The existing discharge piping will have to be relocated and concrete encased in order to keep it from being crushed by the weight of the fill. Power for the pump will have to be relocated into an underground conduit concrete encased to

withstand the weight of the fill. Calculations for design of the manhole foundation, discharge pipe, and conduit are included in Appendix G. The manhole itself will be designed by the supplier to resist the confining pressure of the final expected fill height. To prevent large vertical loads from being transferred to the manhole from embankment that is compressing under self weight (downdrag); the manhole will be wrapped in a double layer of PVC sheet. This will create a low friction surface to prevent load transfer to the manhole

4.10 REFERENCES

1. Peng, S. S. Coal Mine Ground Control. 1978.

2. Sherard, J. L., et. al. Earth and Earth-Rock Dams. John Wiley and Sons, Inc. 1963.

3. Busch, R. A., et. al. Physical Property Data on Coal Waste Embankment Materials. USBM RI 7964, 1974.

4. Engineers International, Inc. Criteria for Determining When a Body of Surface Water Constitutes a Hazard to Mining. Open File Report 45-81, US Bureau of Mines, 364 pp., 1979.

5. Sherard, J. L., et. al. Basic Properties of Sand and Gravel Filters, American Society of Civil Engineers, Journal of Geotechnical Engineering, Vol. 110, No. 6, June 1994, pp 684-700

6. Casagrande, A., Seepage Through Dams, New England Water Works Association, Vol. II, No. 2, June 1937, pp 131-172

7. Cedergren, H. R., Seepage, Drainage, and Flow Nets, Third Edition, John Wiley and Sons, 1989

8. Cheng, Shi-Chieh, et. al. Hydraulic Conductivity of Compacted Clayey Soils Under Distortion or Elongation Conditions, Hydraulic Conductivity and Waste Contaminant Transport in Soil, ASTM STP 1142, August 1994.

9. Johnston, I. W. Strength of Intact Geomechanical Materials, ASCE Journal of Geotechnical Engineering, Vol. 111, No., 6, June 1985.

Section 5.0

ABANDONMENT PLAN
[CFR, Title 30, Parts 77.215-2(b)(2) and 77.216-2(a)(16)]

Coal Refuse Disposal Area No. 3 will be abandoned when the slurry level reaches Elevation 1485 feet. Abandonment will be conducted incrementally and will consist of filling the remaining pool volume with coarse coal refuse and breaker rock, building the cover up to a configuration that will ensure continued positive drainage as the fine coal refuse consolidates, covering the resulting top with cover soil and establishing vegetation.

Exposed coal refuse surfaces of Disposal Area No. 4 reaching final grade will be covered with soil and vegetated. The disposal area will be abandoned when the top of the coal refuse pile reaches Elevation 1720 feet. At that time, the top of the pile will be graded to drain based on the slopes indicated on Sheet 13 of Appendix A, and any remaining exposed areas of coal refuse will be provided with soil cover and vegetated.

5.1 POOL FILLING AND FINISHED GRADE

Pool filling will progress from the crest of the Main Dam in a westerly direction as indicated on Sheet 9 in Appendix A. The cap will be constructed in six substages in the numerical order indicated on Sheet 9. The pool will be fully functional as it is slowly decreased in area. Pool filling will be conducted in this manner to maintain cap stability and to maintain positive drainage from the cap. The top of the disposal facility will be shaped to the final contours shown on Sheet 9 in Appendix A.

5.2 TOPSOILING AND VEGETATION

Coal Refuse Disposal Areas No. 3 and No. 4 will be provided with a final cover consisting of soil and topsoil obtained from the disposal area subgrade during site preparation. Soil cover will be installed incrementally as areas reach final grade. Twelve inches of cover soil overlying twelve inches of clay liner soil will be placed over the refuse and vegetation established. Soil for cover construction will be obtained from stockpiles formed during site preparation. Stockpile areas are shown on Sheets 3, 4, and 37 of Appendix A.

5.3 SURFACE WATER MANAGEMENT

Refer to Section 4 of this report for a description of proposed surface water management during facility closure.

Section 6.0

MONITORING AND MAINTENANCE
[CFR, Title 30, Parts 77.215-2(b)(5) and 77.216-2(a)(8 & 15)]

Coal Refuse Disposal Areas No. 3 and No. 4 will be monitored on a routine basis by:

- Performing visual inspections to note signs of instability, burning refuse, erosion problems, etc;
- Measuring the inplace density of disposal coarse coal refuse;
- Measuring the quantity and quality of flow exiting the rock underdrain, internal drains, and sedimentation pond;
- Analyzing water quality at stream and well monitoring locations; and
- Measuring phreatic surface levels through the Main Dam and Saddle Dam A by taking and recording piezometer readings

Presented as Appendix C is on Operations and Maintenance Manual describing in more detail the monitoring that will be performed. Required maintenance for the facility is included.

S.O. No. 24379-000
March, 2001

Site Selection Study - Alternatives Analysis Report

For

BAILEY CENTRAL MINE COMPLEX COAL REFUSE DISPOSAL FACILITY

Greene County, Pennsylvania

Prepared For

CONSOL Pennsylvania Coal Company
Pittsburgh, Pennsylvania

Prepared By

Michael Baker Jr., Inc.
Coraopolis, Pennsylvania

Baker

CONSOL PENNSYLVANIA COAL COMPANY
BAILEY CENTRAL MINE COMPLEX
SITE SELECTION STUDY - ALTERNATIVES ANALYSIS REPORT

TABLE OF CONTENTS

		Page
EXECUTIVE SUMMARY		iii
1.0	INTRODUCTION	1-1
2.0	METHODOLOGY	2-1
3.0	COAL REFUSE QUANTITY REQUIRING DISPOSAL	3-1
4.0	DEFINITION OF THE SEARCH AREA	4-1
5.0	SITE SELECTION AND SCREENING	5-1
5.1	Underground Disposal Options.	5-1
5.2	Surface Disposal In Previously Affected Areas (Preferred Sites)	5-3
5.3	Possible Disposal Sites - Initial Assessment Site Elimination	5-4
5.4	Second Assessment Site Elimination	5-6
5.4.1	Streams	5-9
5.4.2	Public Water Supplies	5-13
5.4.3	Area Previously Disturbed	5-13
5.4.4	Wetlands	5-13
5.4.5	Historic and Archaeological Sites	5-15
5.4.6	Residences Within 1,000 Feet	5-16
5.4.7	Present Land Use	5-16
5.4.8	Threatened and Endangered Species	5-18
5.4.9	Aesthetics	5-18
6.0	CONCLUSIONS	6-1
APPENDIX – Supporting Data		

LIST OF TABLES

Table 3-1. Annual Coal and Refuse Production ---------- 3-2
Table 5-1. Results of Initial Site Screening---------- 5-8
Table 5-2. Second Assessment Site Elimination Summary of Results---------- 5-10
Table 5-3. Identified Resident Macroinvertibrates ---------- 5-12

LIST OF EXHIBITS

Exhibit 1. Search Area Map ---------- E-1
Exhibit 2. Second Assessment Map---------- E-2

EXECUTIVE SUMMARY

Raw coal mined in the Bailey and Enlow Fork Mines and processed at the Bailey Preparation Plant is sold for use in the production of electricity. Based on research published by the Pennsylvania State University, it is anticipated that mining of this coal will generate over 10,000 direct jobs and indirect jobs (Frias and Rose, 1994) for at least the next 15 years. Coal extracted by deep mining methods employed at these mines requires cleaning to remove impurities prior to sale; the cleaning results in a waste product referred to as coal refuse. Coal refuse is an inherent part of the mining process and cannot be eliminated. Accordingly, the proper and environmentally sound disposal of coal refuse is a fundamental mining element.

Coal refuse disposal facilities that service large mining operations have historically been, and continue to be, located in valleys. In the past this was done strictly because a larger volume of refuse could be disposed in a valley rather than a hillside. Today, valley fills still provide the large capacity necessary for efficient disposal, but the very nature of a valley allows mine operators to provide better environmental control of the disposal process by minimizing the extent affected by the disposal, utilizing natural barriers created by the valley (sidewalls and head of hollow) and limiting contact to usually one hydrologic system.

Selection of the site chosen by Consol Pennsylvania Coal Company for coal refuse disposal was derived through a site screening and selection process. This process followed requirements of the Pennsylvania Department of Environmental Protection (PADEP) as contained in the PADEP's Technical Guidance Document entitled "Coal Refuse Disposal-Site Selection", No. 563-2113-660, dated February 8, 1999. Additional recommendations obtained through discussions with representatives of PADEP McMurray District Mining Office also were followed. The process included initial consideration of all sites within a one-mile radius search area around the Bailey Central Mine Complex.

Evaluation of coal refuse disposal options included a search for the presence of suitable preferred sites as defined in the above-referenced PADEP TGD. Such sites generally include areas

previously disturbed or degraded such as abandoned mine lands. No preferred sites were identified within the one-mile radius search area. Coal refuse disposal in underground mine workings as an alternative to surface disposal was considered; however, it was determined that this method was not technologically or economically feasible in this case. Thus surface disposal options in non-preferred sites were considered.

Potential surface storage sites were subjected to an initial assessment to eliminate all sites exhibiting fatal flaws such as an obvious lack of the desired storage capacity, or location within an area where such activities are prohibited. Two potential sites emerged for further consideration after the initial assessment.

The two remaining sites were subjected to a second assessment in which environmental, cultural, public benefits, and other factors were investigated for each site for comparison. These factors included the estimated storage volume and facility life, potential impacts to existing streams and water quality, wetlands, historic and archaeological sites, endangered species, and others. After comparison with regard to the various factors, it is recommended that the most suitable location of the proposed refuse disposal facility is at the site designated as Site 4 located adjacent to the southeast boundary of the existing Bailey Central Mine Complex.

1.0 INTRODUCTION

Consol Pennsylvania Coal Company (CPCC) operates the Bailey Central Mine Complex in Greene and Washington Counties, Pennsylvania. The complex is comprised of two underground coal mines, known as the Bailey Mine and Enlow Fork Mine, a preparation facility, freshwater impoundment, and coal refuse disposal facility. The Bailey Central Mine Complex is located approximately 2.5 miles southeast of West Finley, PA with the coal preparation facility located on a hill overlooking Enlow Fork to the north (See Exhibit 1, Search Area Map). The operation produces coal that is sold primarily to electric utility companies for use in electric power generation. At present, coarse coal refuse and coal refuse fines (slurry), generated during the cleaning of raw coal are placed separately in a coarse coal refuse disposal area and adjacent slurry impoundment located approximately one-half to three-quarters of a mile southeast of the preparation plant. This area is shown on Exhibit 1 as the "Existing Bailey Central Mine Complex".

Raw coal removed from the mines must be cleaned to remove impurities such as rock, clay, and various other minerals before it is suitable for market. The preparation plant cleans the raw coal and other non-coal impurities. Cleaning also reduces mineral impurities thereby reducing the byproducts of combustion of the coal such as sulfur dioxide (SO_2) and nitrogen oxides (NO_x) as required by the Clean Air Act of 1990. The resultant coarse and fine material to be disposed of is commonly referred to as coal refuse. Coal refuse has no market value and therefore must be disposed of in an environmentally safe manner. A standard industry method for disposing of fine coal refuse is to slurry it into a valley upstream of an impounding structure built out of coarse coal refuse.

As determined by CPCC based on existing and projected operation parameters, the existing Bailey slurry impoundment has sufficient capacity for fine coal refuse until 2008, but coarse refuse storage capacity is expected to be exhausted by the third quarter of 2005. To continue to achieve long-term coal production goals for the Bailey Central Mine Complex, CPCC needs to provide for continued coal refuse disposal capabilities for at least 15 years past 2005.

CPCC has contracted with Michael Baker Jr., Inc. (Baker) to assist in selecting an appropriate and feasible coal refuse disposal option. Baker was responsible for design and permitting of the new slurry impoundment being developed at the Emerald Mine owned by RAG American Coal Company.

This report describes the work performed by Baker in performing a Site Selection Study/Alternatives Analysis for development of a new slurry impoundment to serve the Bailey Central Mine Complex. This report was prepared to document the potential environmental impact versus the public benefits of; the continuing development of an existing energy resource, creation and prolongation of significant employment, and provision of coal to generate electricity (a public utility service). It is the intent of this report to present the alternatives considered, findings of the site selection process, and to identify and address environmental impacts and public benefits, both social and economic, that might occur as a result of the construction of the coal refuse disposal facility.

2.0 METHODOLOGY

The site selection process was initiated by defining the quantity of coal refuse to be disposed of and identifying a search area. Methodologies used in this report satisfy the criteria established in the PADEP's TGD on coal refuse site selection as well as good engineering practice. After the search area was identified, reasonably available data were collected and reviewed to characterize the area and identify any locations meeting PADEP requirements for "preferred" sites. Finally, possible disposal sites were identified and screened for fatal flaws. Sites having fatal flaws were eliminated from further consideration. Remaining candidate sites were subjected to a second assessment and comparison based on environmental criteria. The second assessment yielded a selected site, therefore, an assessment of engineering/economic factors was not necessary.

The search area and possible disposal sites were characterized using available published information, information available from State and Federal agencies, and results of a limited field reconnaissance conducted on February 6 and 7, 2001. Data collection efforts focused on gathering the following type of information: 1) topographic mapping with planimetric type surface features (e.g., roads, buildings, streams, etc.); 2) utilities; 3) surface and underground mining activity in the area; 4) geology and water quality; 5) inventoried wetlands; 6) wildlife and aquatic resource data; and 7) inventoried cultural resources. Data sources used include:

- U.S.G.S. 7.5 Minute Series Topographic Maps: Wind Ridge, Pa. And Rogersville, Pa.
- Pennsylvania Code Title 25 Chapter 93. Water Quality Standards
- United States Department of Agriculture Soil Conservation Service Soil Survey of Greene and Washington Counties Pennsylvania
- Geologic Map of the Wind Ridge Quadrangle, Southwestern Pennsylvania
- Geologic Map of Greene County, Pennsylvania
- U.S. Fish and Wildlife Service National Wetlands Inventory Maps
- Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS)
- Tax Maps of Greene County Pennsylvania

- PennDOT Roadway Map of Greene County
- PADEP, Ebensburg – Bureau of Abandoned Mine Reclamation
- PADEP, McMurray – Bureau of Deep Mine Safety (Abandoned and Active)
- PADEP Uniontown - Bureau of Water Supply and Community Health
- U.S. Office of Surface Mining, Mine Map Repository
- Greene Co. Planning Commission (Waynesburg)
- PA Historical and Museum Commission, Harrisburg - Bureau of Historic Preservation
- US Environmental Protection Agency – Region 3, Philadelphia- Solid Waste Group (CERCLIS list of Hazardous Waste Sites)
- Technical and Economic Evaluation of Underground Disposal of Coal Mine Wastes – HRB Singer Report for the US Department of the Interior, 1980.
- Underground Disposal of Coal Mine Wastes – National Academy of Sciences, National Academy of Engineering, 1975.
- The Geology of Pennsylvania – The Pennsylvania Geological Society and The Pittsburgh Geological Society, 1999.
- PADEP Brownfields Directory – Brownfields Inventory Listing
- PADEP Technical Guidance Doc. 563-2113-660, Coal Refuse Disposal-Site Selection
- Bailey Mine Complex Coarse Refuse Disposal Facility, Site Selection Study-Alternatives Analysis Report - Killam Associates, 2000.
- Notes from January 8, 2001 meeting with PA DEP McMurray Mining Office representatives
- The Potential and Prospects for Alleviating Longwall-Mining Concerns Through the Use of Backstowing - Bise, Christopher J., et al. The Environmental Resources Research Institute, Pennsylvania State University, 1993.
- Classification of Wetland and Deepwater Habitats of the United States - Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. U.S. Fish and Wildlife Service. FWS/OBS-79/31 , 1979.
- Corps of Engineers Wetland Delineation Manual - Environmental Laboratories. Technical Report Y-87-1, U.S. Army Engineer Waterway Experiment Station, Vicksburg, Mississippi, 1987.

- The Highway Methodology Workbook Supplement. - United States Army Corps of Engineers. New England District, Concord, Massachusetts. NAEEP-360-1-30a, 1999.

- The Impact of Coal on the U.S. Economy. – Frias and Rose. Department of Mineral Economics, The Pennsylvania State University, 1994.

3.0 COAL REFUSE QUANTITY REQUIRING DISPOSAL

The Bailey and Enlow Fork Mines Reserve contains an estimated 650 million tons of clean coal. At current production rates this represents approximately 30 years of mine life for both the Bailey and Enlow Fork Mines.

CPCC projects that the current production rate of 20.4 million tons of clean coal per year will increase to 22.8 million tons per year by 2008. Coal cleaning operations are expected to achieve a recovery rate of 75%; consequently, 6.8 million tons of coal refuse per year will be produced in the year 2004 with increases to 7.6 million tons per year by 2008. It is estimated that 84% of the total coal refuse volume will be coarse coal refuse; the remaining 16% fine coal refuse.

These data were used to estimate annual coal refuse production rates for the new disposal facility. Table 3-1 presents estimated coarse and fine coal refuse generation rates expected to occur throughout a 15-year disposal period.

Both coarse and fine coal refuse will continue to be produced by the preparation plant at the Bailey Central Mine Complex and require disposal. CPCC's intent is to select a disposal site that provides a minimum approximate disposal life of 15 years.

TABLE 3-1
CONSOL - BAILEY AND ENLOW FORKS MINES
ANNUAL COAL & REFUSE PRODUCTION

Year No.	Estimated Clean Coal (tons)	Total Refuse (tons)	Fine Refuse (tons)	Coarse Refuse (tons)	Combined Total Refuse (CY)	Fine Refuse (CY)	Coarse Refuse (CY)	Combined Running Total (CY)	Running Total Fine Refuse (CY)	Running Total Crse. Refuse (CY)
1	20,400,000	6,799,993	1,093,012	5,706,982	5,697,368	2,022,071	3,675,296	5,697,368	2,022,071	3,675,296
2	20,400,000	6,799,993	1,093,012	5,706,982	5,697,368	2,022,071	3,675,296	11,394,735	4,044,143	7,350,592
3	21,800,000	7,266,659	1,168,022	6,098,637	6,088,363	2,160,841	3,927,522	17,483,099	6,204,984	11,278,115
4	22,300,000	7,433,326	1,194,812	6,238,514	6,228,005	2,210,402	4,017,603	23,711,103	8,415,386	15,295,718
5	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	30,078,750	10,675,348	19,403,402
6	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	36,446,396	12,935,310	23,511,086
7	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	42,814,042	15,195,272	27,618,770
8	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	49,181,688	17,455,235	31,726,454
9	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	55,549,334	19,715,197	35,834,137
10	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	61,916,980	21,975,159	39,941,821
11	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	68,284,627	24,235,121	44,049,505
12	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	74,652,273	26,495,083	48,157,189
13	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	81,019,919	28,755,046	52,264,873
14	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	87,387,565	31,015,008	56,372,557
15	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	93,755,211	33,274,970	60,480,241
16	22,800,000	7,599,992	1,221,601	6,378,391	6,367,646	2,259,962	4,107,684	100,122,857	35,534,932	64,587,925
TOTAL	358,500,000	119,499,881	19,208,072	100,291,809	100,122,857	35,534,932	64,587,925			

4.0 DEFINITION OF THE SEARCH AREA

The disposal site search area includes an approximate one-mile radius from the Bailey Central Mining Complex and disposal facility boundaries (see Exhibit No. 1). It is contained primarily on the Wind Ridge United States Geologic Survey 7.5-minute topographic quadrangle with a small portion overlapping the Rogersville quadrangle. The search area lies primarily within Greene County but extends northward into neighboring Washington County. Communities within the search area include portions of Richhill and Gray Townships in Greene County, and East Finley, Morris, and West Finley Townships in Washington County.

The northern portion of the search area is within the Ohio River watershed and Wheeling Creek basin and includes Owens Run, unnamed tributaries to Enlow Fork, and Enlow Fork itself. Owens Run and all unnamed tributaries to Enlow Fork have protected water use classification criteria for warm water fishes (WWF), while Enlow Fork has protected water use classification criteria for trout stocking (TSF) according to Pennsylvania Code Title 25 Chapter 93.

The southern portion of the search area is within the Monongahela River watershed area and includes Fletcher Run, Grinnage Run, and Grays Fork of South Fork Tenmile Creek. This portion of South Fork Tenmile Creek basin has protected water use classification criteria for high quality waters, warm water fishes (HQ-WWF).

Based on a review of available mapping there are gas wells, oil wells, gas transmission lines, and power lines present within the search area. However, there are no state forests, or state game lands within the search area.

The search area includes the Bailey Mine and Enlow Fork Mine owned and operated by Consol Pennsylvania Coal Company. These mines are expected to remain active for at least 30 years. The Pittsburgh #8 coal seam has been extensively deep mined in this area.

Predominant soil units within the search area are soils of the Dormont-Culleoka association. Dormont soils are formed in residuum and adjacent colluvium. They are characterized as deep

and moderately well drained. Some hillsides blanketed with Dormont soils reportedly have slips on them. Culleoka soils are moderately deep, well drained, residual soils which occur mostly on the ridges and hilltops. Type B Culleoka soils (CaB) are present and are characterized as prime farmland soils.

The study area also contains significant amounts of soils of the Dormont-Culleoka- Newark association. Newark soils are deep, somewhat poorly drained, alluvial soils. Within the search area they occur at lower elevations in and around the floodplain areas of Enlow Fork and its tributaries.

The prominent geologic structural feature of the search area is the Washington Anticline that runs northeast to southwest across the search area and below the existing preparation plant area. The Finney Syncline is located northwest of the Washington Anticline and the Nineveh Syncline is located to the southeast, but both are outside of the search area. Mineable coal seams in the region reportedly include the Waynesburg and Upper Freeport Coal Seams, in addition to the Pittsburgh Coal. However, mining of either the Waynesburg or Upper Freeport Coal within the search area would neither be practical nor economical. The Waynesburg Coal would be difficult to mine due to the presence of thick clastic partings, and the Upper Freeport Coal seam is somewhat discontinuous and located at great depth.

5.0 SITE SELECTION AND SCREENING

The search area was screened and evaluated to identify the most feasible slurry impoundment disposal site/option for the Bailey Central Mine Complex. Underground as well as surface disposal options were evaluated; however, underground disposal was determined to be not feasible. The search area also was screened for possible disposal sites meeting PADEP requirements for "preferred sites". No preferred site providing sufficient disposal capacity was identified. Five non-preferred sites were identified and subsequently evaluated as possible disposal sites based on fatal flaw and environmental criteria. One site emerged as the selected site.

5.1 Underground Disposal Options

Underground disposal options within the search area were considered and determined to be not feasible.

There are no known inactive, abandoned, or unreclaimed mines within the project search area. As previously stated, there are two active longwall mines located within the search area around the Bailey Central Preparation Plant. The Bailey Mine lies below the southern portion of the search area, whereas the Enlow Fork Mine lies beneath the northwest portion of the search area, with the Enlow Fork stream valley being the approximate division between the two. These mines extract raw coal using longwall mining methods. Upon completion of a longwall mining section, the mine experiences complete subsidence, filling the void space created by coal removal.

Mining techniques used at the Bailey and Enlow Fork mines are representative of the industry standard for longwall mining. Mine subsidence at the time of mining eliminates the large void spaces in longwall mining sections, while void spaces within the active main headings offer very little disposal capacity. Also, these main headings are needed for ventilation and transport/conveyance of mine personnel, mined coal, supplies, etc., and must be kept open.

Backstowing within the mine void created by long wall mining before roof collapse is impractical. It is not a proven technology for a fast moving longwall face, and would increase risks to worker safety. The system would add to the complexity of an already complex industrial setting creating negative impacts to the health and safety of underground miners. It would require additional surface support facilities and injection boreholes.

Transport of coal refuse into the mine would require extensive conveyor systems to bring both coarse and fine coal refuse from the preparation plant to an injection borehole and additional conveyance facilities to transport and place the coal refuse underground within the mine void. These systems would require surface disturbances for conveyor and injection point facilities and supporting access roads. A large number of injection boreholes would be needed to facilitate disposal throughout the entire mine area. Conveyance systems would have to be moved and/or extended as new injection boreholes were activated

Placement of coal refuse underground would increase risks to the health and safety of mine workers. Pneumatic conveyance systems used to transport coarse refuse underground can generate a significant amount of dust, especially if the material is dry. Also, pneumatic machinery is very noisy, and sparks produced at the discharge end of a pneumatic pipe could create a fire or explosion hazard. Fine coal refuse would have to be transported to the backstowing area hydraulically. The large amounts of water required to transport fine refuse would expose workers to increased flooding hazards and increase the volume of water requiring conveyance and treatment.

Dr. Christopher Bise of the Pennsylvania State University Department of Mineral Engineering has concluded that underground stowing technology cannot keep pace with the production potential of U.S. longwall systems, and such practices decrease coal production while significantly increasing costs (Bise, et al. 1993). Due to the operational, technology, safety, and economic concerns, use of the Bailey or Enlow Fork deep mines for coal refuse disposal was determined not to be feasible.

5.2 Surface Disposal in Previously Affected Areas (Preferred Sites)

The search area has no preferred sites suitable for development of the new Bailey slurry impoundment.

An inquiry to the Pennsylvania Department of Environmental Protection Bureau of Mining and Reclamation revealed no abandoned mine sites within the search area. A search of the Pennsylvania Brownfields Directory revealed no brownfields within the search area. Similarly, an inquiry to the CERCLIS listings available from the United States EPA region 3 revealed no hazardous waste sites within the search area.

Also, there is no watershed within the study area as identified in Chapter 93 Water Quality Standards where the in-stream water quality standards for pH, acidity, iron, or manganese are not met.

The Bailey Central Mine Complex itself contains active refuse disposal sites and areas affected by previous and ongoing mining activities. However, no areas within the complex are suitable for development of a new slurry impoundment. The current slurry impoundment design provides for development up to the surrounding ridge tops, thus vertical expansion of this facility to increase capacity is not practical. A lateral expansion of the existing disposal area toward the Bailey Shaft would not be suitable for development of a slurry impoundment. Development would be limited to the relatively small area between the existing disposal area and the Bailey Shaft. It would require relocation of three sedimentation ponds currently serving the coal refuse disposal area. Most of the added footprint area would be needed for reconstruction of large replacement sedimentation ponds that would be required to handle runoff from the vast disposal area. Estimated fine coal refuse disposal capacity can not provide for 15 years of disposal life. Lateral expansion of the existing disposal area also would require careful consideration of seepage patterns within the existing slurry impoundment dam to ensure dam stability. Development against the downstream slope of the dam would cover seepage outlets. Therefore seepage from

the existing dam, along with flows from the internal drainage system, would have to be properly intercepted and conveyed to the surface of the new coal refuse embankment. Any seepage outlets not apparent during drain installation could be missed and lead to an unanticipated increase in the phreatic surface through the dam. Installation of a blanket drain on the existing downstream dam face would eliminate the risk, but would be very costly and not practical for the relatively small increased disposal capacity that would be provided.

An unoccupied valley containing a tributary to Talley Run located immediately north of the existing freshwater water pond was evaluated for coal refuse disposal as Site 6. Development within this valley would only provide and estimated 2.1 years of coarse coal refuse disposal capacity and no slurry disposal capacity. Therefore, Site 6 was eliminated from further consideration.

5.3 Possible Disposal Sites – Initial Assessment Site Elimination

Possible surface disposal sites for the new Bailey Mine slurry impoundment were identified by selecting sites or combinations of adjoining sites that would provide at least 15 years of coal refuse disposal capacity. Because the disposal facility must be an impoundment to accommodate fine coal refuse slurry, the search focused on valley fill type sites.

The PADEP TGD on coal refuse disposal site selection states, "the goal of the (Coal Refuse Disposal) act is to minimize the number of new coal refuse disposal sites by building a few large ones instead of many smaller ones." A review of the Wind Ridge and Rogersville Quadrangles revealed five sites that appeared large enough to store coal refuse volumes that would be generated over a 15-year period. Numerous other small valleys are present in the study area, but they were eliminated from further consideration due to their very small size and scattered locations. Thus all but five potential sites were eliminated from consideration based on an obvious lack of storage capacity.

Conceptual layouts of each of the five sites and their estimated storage capacities are shown on Exhibit 1. As shown on Exhibit 1, the sites were assigned reference numbers from one to five in counterclockwise sequence rotating around the Bailey Central Preparation Plant.

An initial assessment of the five possible disposal sites was performed to eliminate those sites having apparent fatal flaws relative to disposal facility development. Fatal flaws included:

- Disposal capacity significantly less than a 15-year disposal life,
- Located within or discharging into a high quality watershed,
- Development will permanently impact prime farmlands,
- Located within the boundaries of the National Park System, Wildlife Refuge System, System of Trails, Wilderness Preservation System, or Wild and Scenic Rivers
- Located on Federal Lands within a National Forest
- Located within publicly owned parks or location included on the National register of Historic Places
- Located within lands within the Commonwealth park system
- Located within lands within the Commonwealth forest picnic areas
- Located within lands within the game land system of the Commonwealth
- Located within the boundaries of Pennsylvania Scenic River Systems
- Located within 100 feet of a cemetery
- Located within 300 feet of a public building

All but two of the five possible disposal sites exhibit a fatal flaw and were eliminated from further consideration. Sites 1 and 4 had no apparent fatal flaws and were not eliminated. Table 5-1 summarizes results of the initial assessment.

Site 2 (Fletcher Run valley), Site 3 (Grinnage Run valley), and Site 5 (valley on the north side of Enlow Fork) were eliminated from further consideration because of inadequate capacity. Refer to Table 5-1. Sites 2 and 3 also are located within the South Fork of Tenmile Creek watershed, a

stream designated in Chapter 93 as a High Quality Warm Water Fishery (HQ-WWF). Furthermore, Site 5 would require conveyance of coarse and fine coal refuse by belt conveyor and slurry pipeline from the plant across Enlow Fork as well as Pennsylvania State Highway Route 3026 (Enon Church Road). Such conveyor crossings are undesirable due to potential impacts to Enlow Fork and safety and operational concerns associated with placing a conveyor over a traveled roadway.

Initial assessment of Site 1, (valley containing an unnamed tributary to Owens Run), and Site 4, (valleys east of the existing slurry impoundment) indicate these two sites have potential to provide sufficient storage capacity. Since no fatal flaws had become apparent for Sites 1 and 4, the two sites were subjected to a second assessment of environmental factors associated with their development for coal refuse disposal.

5.4 Second Assessment Site Elimination

In the second assessment the two remaining sites not eliminated in the initial assessment were evaluated in greater detail and compared to each other with respect to their potential environmental impacts, public benefits, and other relevant parameters. Parameters chosen for additional evaluation and quantification are derived from the PADEP TGD for coal refuse disposal site selection, and from discussions with PADEP McMurray District Mining Office representatives.

Site 1 includes a valley containing an unnamed tributary to Owens Run. The valley is uninhabited and abuts the southwestern boundary of the existing slurry impoundment. It contains two de-gas boreholes associated with the Bailey Mine, as well as three gas wells, and a gas pipeline. An existing unpaved road provides primary access through the site. There are no occupied residences within the site, and locked gates restrict access. The western portion of the site contains an existing tree farm not currently owned by CPCC.

The Site 4 watershed contains unnamed streams that discharge into a tributary of Enlow Fork at a location upstream from the confluence with Boothe Run. This valley contains existing CPCC facilities including a dewatering borehole and pump. Currently CPCC leases much of the land for use as pasture for cattle. Access to the site is provided primarily by State Route 4009, a paved road in this area. The site lies southeast of the adjacent Bailey coal refuse disposal area. The railroad spur leading from the plant borders the eastern portion of the site.

TABLE 5-1

RESULTS OF INITIAL SITE SCREENING

Site No.	Site Location	Total Capacity (CY)	Disposal Life (Yrs)	Remarks
1	Valley containing the unnamed tributary to Owens Run and township road south of the existing slurry impoundment.	84,450,000	13.5	**Second Site Assessment to be Performed.** Layout requires acquisition of an existing tree farm.
2	Valley containing Fletcher Run.	64,900,000	10.5	**Eliminated.** Inadequate Capacity. Also, located within the S. Fork Tenmile Cr watershed that is classified as a high quality warm water fishery.
3	Valley containing Grinnage Run.	58,820,000	9.5	**Eliminated.** Inadequate Capacity. Also, located within the S. Fork Tenmile Cr watershed that is classified as a high quality warm water fishery.
4	Valley containing the unnamed tributary east of the existing slurry impoundment.	95,800,000	15.1	**Second Site Assessment to be Performed.**
5	Valley site on the N side of Enlow Fork; near Simpson's Store.	44,300,000	7.2	**Eliminated.** Inadequate Capacity. Other significant undesirable site characteristics are: • High visibility, and • The site's location relative to the preparation plant which would require construction and operation of a belt conveyor over Enlow Fork. Also, the Bureau of Forestry indicates that a flora species of special concern is present along Enlow Fork, near Simpson's Store.
6	Valley containing an unnamed tributary to Talley Run.	11,450,000	2.1	**Eliminated.** Inadequate Capacity.

5.4.1 Streams

Both the Site 1 and Site 4 valleys contain unnamed tributaries in the Enlow Fork watershed. Stream reaches in all but the lowermost sections of each site would be impacted by coal refuse disposal operations. Stream lengths expected to be impacted by the proposed activity in each site are presented on Table 5-2. They were estimated from available mapping based on approximate source locations observed during field reconnaissance on February 6 and 7, 2001. The extent and locations of stream reaches observed in the field at both sites are presented on Exhibit 2.

Unnamed tributaries within Site 1 discharge into Owens Run, which flows northward to Enlow Fork. The primary tributary within Site 4 discharges into an unnamed tributary to Enlow Fork, at a point approximately 1.1 miles upstream from the confluence with Boothe Run. Owens Run as well as all unnamed tributaries to Enlow Fork are designated in Chapter 93 as warm water fishes (WWF).

The main tributary in Site 1 and portions of feeder tributaries from side valleys contain meandering pool/riffle streams in a relatively broad valley meadow. Site 4 also contains segments of meandering pool/riffle stream morphology, but includes a higher percentage of steeper entrenched and confined streams than Site 1.

Two stream water samples from Site 4 (Sample A and C) and one from Site 1 (Sample B) were collected on February 7, 2001 for water quality analyses. The sampling location points are shown on Exhibit 2, and results of the baseline chemical analyses are presented at the beginning of the Appendix. Water samples from Site 4 included high concentrations of iron and manganese that equal the secondary maximum contaminant levels recommended for drinking water by the US EPA. Site 1 sample results revealed much lower iron and manganese concentrations. Sulfate levels appeared slightly elevated at both sites, but no other unusual chemical parameters were noted.

TABLE 5-2

SECOND ASSESSMENT SITE ELIMINATION – SUMMARY OF RESULTS

Environmental Factor	Site 1	Site 4
Estimated Stream Length to be Impacted	13,230 LF	9,270 LF
Stream Quality (based on cursory macroinvertebrate analysis)	Excellent upstream of tree farm; fair through tree farm property indicating degradation has occurred.	Poorer than Site 1; evidence of substantial degradation.
Receiving Stream Designation	WWF	WWF
Public Water Sources	None	None
Area Previously Disturbed	None	None
Approx. Wetland Area to be Impacted	5.3 acres	5.5 acres
Historic Sites	None Identified	None Identified
Archaeological Sites	None Identified	None Identified
Residences Within 1000 ft	3	1
Land Use (Prime Farmland Soils)	Forest, Open Grassland, Pine Tree Farm, and 16.9 Acres of Prime Farmland Soil	Forest, Open Grassland/Cattle Pasture, and 3.9 Acres of Prime Farmland Soil
Threatened & Endangered Species	None Identified	None Identified
Aesthetics	Site Visible from SR 4007 (Owens Run Road)	Site View from SR 4013 restricted by Railroad Embankment

Qualitative macroinvertebrate samples were collected from main stream reaches within Sites 1 and 4 to identify the type and relative number of species present. Two samples were collected from the main stem of Site 1 and one sample from Site 4. Refer to Exhibit 2 for sample locations. Due to the small size of the streams, aquatic invertebrates were hand picked to form the qualitative samples. Samples were taken within riffle/run reaches because these areas provide the greatest surface to volume ratios; are strongly associated with secondary production; and are where many pollution-sensitive taxa of the Scraper and Filtering Collector Functional Feeding Groups are found. In addition to sampling riffle/run reaches, samples also were taken within submerged macrophytes, and submergent snags.

Results of the macroinvertibrate investigation are contained in Table 5-3. For each sample, the organisms were identified to the family taxonomic level. Each macroinvertebrate family was assigned a tolerance value (Hilsenhoff, 1982; 1987, 1988; Bode, 1988), which reflects its sensitivity to organic pollutants. Tolerance values range from 0 (sensitive) to 10 (tolerant).

Results of the macroinvertebrate analysis parallel results of the water quality analyses. Water quality based on the Family-Level Biotic Index value, for the upper reach of the Site 1 tributary (upstream of the tree farm) is Excellent based on Hilsenhoff (1988). Results of the analysis indicated no evidence of degradation along this section of stream. The downstream section of the tributary (tree farm property) is rated Fair, indicating degradation has occurred. In addition, fewer individuals were collected from the downstream site, in approximately the same amount of time spent at the other sites. The poorest water quality is in the stream flowing through the Site 4 study area. As shown in Table 5-3, the degree of degradation for this stream relative to Site 1 is very substantial.

During the stream investigation, no fish were observed.

TABLE 5-3

IDENTIFIED RESIDENT MACROINVERTEBRATES

Order	Family	Functional Feeding Group	EPA Tolerance Values*	Number Identified
Site 1 Upstream (CPCC property)				
Coleoptera	Psephenidae	Scraper	4	3
Diptera	Tipulidae	Shredders	3	2
Ephemeroptera	Heptageniidae	Collectors	4	1
Plecoptera	Chloroperlidae	Shredders	1	5
Trichoptera	Hydopsychidae	Collectors	4	12
Overall Family-level Biotic Index*			**3.26 (Excellent)**	
Site 1 Downstream (Tree Farm property)				
Basommatophora	Physidae	Collectors	8	3
Coleoptera	Psephenidae	Scraper	4	1
Diptera	Culicidae	Collectors	8	1
	Tipulidae	Shredders	3	1
Plecoptera	Chloroperlidae	Shredders	1	1
Trichoptera	Hydopsychidae	Collectors	4	1
	Hydroptilidae		4	1
	Leptoceridae	Collectors	4	1
Overall Family-level Biotic Index*			**5.20 (Fair)**	
Site 4				
Basommatophora	Physidae	Collectors	8	10
Diptera	Chironomidae	Collectors	8	6
	Tipulidae	Shredders	3	2
Plecoptera	Chloroperlidae	Shredders	1	2
Trichoptera	Philopotamidae	Collectors	3	1
	Polycentropodidae	Collectors	6	1
Overall Family-level Biotic Index*			**6.59 (Poor)**	

*Based on Plafkin et al. (1989)

5.4.2 Public Water Supplies

PADEP Bureau of Water Supply and Community Health has no record of a permitted community water supply within 10 miles downstream of the proposed facilities. A non-community system in the area is the Bailey Mine Water Treatment Plant. It is therefore concluded that the proposed refuse facilities will not impact community drinking water supplies. See the appendix for correspondence from the PADEP Uniontown District Office, Bureau of Water Supply and Community Health.

5.4.3 Area Previously Disturbed

Disturbances in Site 1 include two degas holes, a bleeder shaft borehole site, and associated access roads to each. Site 4 contains a mine dewatering borehole and buried pipeline, and access road. Site 4 is adjacent to a railroad spur and embankment at the valley mouth. In addition to these facilities, disturbances within both areas include those associated with dedicated roadways, houses, and minor access roads. Past logging activities may account for the lack of trees in portions of both sites. Although there are disturbances at each site they occupy relatively small portions of the sites. See the Exhibit 2, Secondary Assessment map for notable topographic features.

5.4.4 Wetlands

Prior to the field reconnaissance, Sites 1 and 4 were located on USGS mapping (Wind Ridge, PA 7.5 minute Quadrangle) and evaluated for topographic relief, drainage patterns, and subwatershed characteristics that may suggest potential wetlands. The United States Fish and Wildlife Service's National Wetland Inventory (NWI) map was reviewed for the presence of inventoried wetlands. The USDA Soil Conservation Service's *Soil Survey of Greene and Washington Counties, Pennsylvania* (1983) was used to determine soil drainage classification in the study area. Those

soils classified as having poorly or very poorly drained conditions may suggest wetland areas. Potential wetland sites identified by any of these sources were recorded for field evaluation.

Field evaluation concentrated on those areas identified from the mapping as potentially containing wetlands. Preliminary wetland boundaries were identified using the guidelines outlined in U. S. Army Corps of Engineers (ACOE) Manual. Wetland identification was based on the diagnostic characteristics of the vegetation, soil, and hydrology. Wetlands were categorized according to the USFWS's *Classification of Wetlands and Deep Water Habitats in the United States* (Cowardin, et al., 1979).

Approximately 5.3 acres and 5.5 acres of palustrine wetlands systems were found in Sites 1 and 4, respectively. Wetlands located in Site 1 are associated with tributaries that eventually feed Owens Run. Several seeps and springs feed this wetland. The soils are saturated and/or inundated. This wetland supports herbaceous and woody vegetation. Site 4 has approximately 0.2 acre more palustrine wetlands than Site 1. Wetlands in Site 4 also encompass the riparian zone of perennial and intermittent streams. Seeps and springs feed the Site 4 wetland, as well as sheet flow. The soils are saturated and/or inundated. The Site 4 wetland area supports herbaceous, shrubby, and woody vegetation.

The wetland functions and values "Descriptive Approach" (ACOE, 1999) was used to ascertain a preliminary assessment of each wetland's principal functions and values provided. A professional wetland biologist determined the wetland functions and values during the field reconnaissance.

The wetlands on both sites basically provide the same degree and types of functions and values. This is due to similarities between the wetlands, including their hydrologic sources, classifications, topographic setting, geographic location, surrounding landscape, etc. Principal functions provided by both the site's wetland areas include groundwater recharge/discharge, nutrient removal/retention/transformation, sediment stabilization, and wildlife habitat. The wetlands are not considered of special value to society, from a local, regional, and/or national perspective. Estimated wetland locations and boundaries are shown on the Exhibit 2.

5.4.5 Historic and Archaeological Sites

The Pennsylvania Historical and Museum Commission has indicated in letters contained in the Appendix that there is a high probability that historic resources exist in the proposed coal refuse disposal sites. They also indicated that, based on a field view by one of their staff, there is a high probability that significant archaeological sites exist within both sites. No specific historic or archaeological sites were identified and a more detailed investigation consisting of a Phase I archaeological survey is recommended prior to issuance of any permits.

Field reconnaissance revealed an abandoned house and barn within Site 1. The age of the unoccupied buildings was not apparent. Site 4 contains an occupied residence held by a private owner located on a ridge top at the southwestern edge of the site boundary along Pa State Route 4009. CPCC owns the vast majority of the property within Site 4 and currently leases it for use as cattle pasture. A cattle barn is located on an adjacent ridge at the western edge of the site boundary. Ruins of a demolished house consisting of a stone basement foundation and small stone retaining wall also are present within Site 4.

Locations of all structures observed during the field reconnaissance are shown on the Exhibit 2, Second Assessment Map. As shown on the exhibit, structures at Site 4 are located near the tops of ridges and thus might be avoided by site development. Structures within Site 1 are located at the valley floor.

Based on the limited information currently available there is no clear advantage to the selection of either site in terms of impacts to historic sites. A more detailed investigation is required to render such a determination.

5.4.6 Residences Within 1,000 feet

Three residences located along State Route 4007 are within 1,000 feet of Site 1, as shown on Exhibit 2. Site 4 has only one residence within 1,000 feet of the conceptual facility layout, which is the same residence described previously in section 5.4.5 "Historic and Archaeological Sites". Thus, Site 4 is the more suitable site based solely on the number of affected residences within 1,000 feet of the conceptual layout.

5.4.7. Present Land Use.

The majority of Site 1 is forestland with secondary usage as wildlife habitat. A significant portion of the lower valley includes a tree farm not owned by CPCC where pine trees are currently growing. Selection of Site 1, therefore, would result in the loss of forestland, wildlife habitat, and the tree farm.

The majority of Site 4 is also forestland with secondary usage as wildlife habitat, but a large percentage of the area is currently grassland leased by CPCC for use as pasture for cattle. Selection of Site 4 would result in a loss of woodland and wildlife habitat as well as end the use of the grassy portion of the site as cattle pasture. However, CPCC owns the land and could discontinue the lease if desired. These areas are shown on Exhibit 2.

Site 1 contains a greater acreage of forestland and wildlife habitat than Site 4. The presence of the tree farm and the fact that CPCC already oversees the land usage in Site 4 makes it the more desirable location for the proposed facility.

An inquiry to the USDA Natural Resources Conservation Service revealed the presence of prime farmland soil types within the boundaries of Site 1. This finding was not considered to be a fatal flaw as no farming has been performed in those areas for over five years, and the Culleoka (CaB) soil identified as a prime farmland soil is located in small areas at the tops of ridges.

The USDA Natural Resources Conservation Service also revealed the presence of prime farmland soil types within the boundaries of Site 4. Culleoka soil (CaB) identified as a prime farmland soil is reportedly located in small areas at the tops of ridges. This finding was also not considered to be a fatal flaw as the locations of the soils in question are limited to three ridge top locations which may possibly be avoided by the proposed activities, and no farming is believed to have occurred in those area for over five years. See the appendix for correspondence regarding prime farmland soils from the USDA-Natural Resources Conservation District.

5.4.8. Threatened and Endangered Species

Inquiries into the possible presence of endangered species were performed. Requests for information were submitted to the PADEP (Pennsylvania Natural Diversity Inventory), Pennsylvania Fish and Boat Commission (species of special concern to the Herptology, Endangered Species and Triploid Grass Carp Coordinator), Pennsylvania Game Commissions, and the US Fish and Wildlife service. Based on the results of these investigations there are no threatened or endangered species within or associated with either of the two sites. Copies of inquiry responses are contained in the Appendix.

5.4.9. Aesthetics

The Exhibit 1 Search Area map and Exhibit 2 Second Assessment map show both proposed refuse impoundment configurations and site features. No significant difference in the appearance of a coal refuse disposal area within either of the two sites including during disposal operations or after final reclamation is anticipated. Each site will be between valley ridges and both will be most visible from the adjacent existing Bailey coal refuse disposal area. There is one known residence within 1,000 feet of Site 4 as compared to three residences at Site 1. There is also a large railroad embankment at the mouth of Site 4 reducing its visibility from State Route 4013 and the surrounding area. Although narrower at its mouth, no such obstruction to visibility exists at the valley containing Site 1 leaving it clearly visible to all traffic passing along State Route 4007 (Owens Run Road). It is concluded that Site 4 will be less visible overall and thus will have less impact on the aesthetics of the surrounding area.

6.0 CONCLUSIONS

Removal and processing of available coal reserves from the Bailey and Enlow Fork Mines will produce an anticipated quantity of coal refuse large enough to justify permitting and design of a disposal site capable of providing a minimum of 15 years of storage capacity. Based on the preceding analysis, the best method for achieving continued coal refuse disposal at the Bailey Central Mine Complex is with a coarse coal refuse embankment and slurry impoundment constructed within the area referred to as Site 4.

Table 5-2 summarizes environmental and cultural criteria used for comparing the two candidate sites, Sites 1 and Site 4. A review of this table reveals that in terms of receiving stream quality (both sites discharge to the Enlow Fork watershed), public water sources, areas previously disturbed, wetlands, historic and archaeological sites, and threatened and endangered species, neither site has an apparent advantage over the other. There is no anticipated impact to receiving streams, public water sources, and threatened or endangered species from the proposed refuse storage facility at all. Thus construction of the coal refuse storage facility will benefit the public by continuing to support an estimated 1,100 direct and many more indirect jobs and producing coal for production of electricity without impacting the environmental factors noted.

In terms of length and quality of impacted stream, Site 4 is the clear preference for the coal refuse disposal site. This conclusion is supported by the apparent degraded conditions of the biological community in Site 4 relative to Site 1 and the greater overall length of stream in Site 1. Therefore, selection of Site 4 would result in the least impact to streams while providing the coal refuse storage needed to maintain production in two mines.

Land use categories also appear to favor selection of Site 4. Loss of the tree farm in Site 1 is a negative impact. It will result in the loss of a natural resource that currently benefits the public. Although the cattle pasture at Site 4 would be unavailable during coal refuse disposal at Site 4, the land could be returned to pasture after final reclamation of the site. The tree farm would not be restored so easily or quickly. Both sites contain prime farmland soils; however, Site 1 contains 16.9 Acres compared to 3.9 in Site 4.

As shown in Table 5-1, the greatest estimated coal refuse storage volume is available within Site 4. Site 4 is also less visible from adjacent State roads. Selection of Site 4 will therefore provide the maximum refuse storage capacity with the least disturbance to the environment and the public while providing jobs and fuel to produce electricity.

H&H WATER CONTROLS, INC.

565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
EPA Lab # 30-287

Report No. 138615

Report Date: 02/21/2001
H&H Sample No: 01-5818.1-2
P.O. Number:
Collection Date: 02/07/2001
Collected By: CLIENT
Received Date: 02/07/2001
Analysis Completed: 02/19/2001
Sample Id: A-Consol Site #4

Ship To Michael Baker Jr. Inc.
Box 280, 4301 Dutch Ridge Road
Beaver, PA 15009

LABORATORY ANALYSIS REPORT

Method No.	Parameter	Results	Units	Date/Time/By
S4500H+B	PH/Lab	7.4	S.U.	)2070101510E
S2320B	Alkalinity	108	mg CaCO3/L	0211010900P
S2310B-4a	Acidity (Hot)	-98	mg CaC03/L	0211011430P
S2540D	Total Suspended Solids	<5.0	mg/L	0212010920L
S2510B	Specific Conductance @ 25C	220	micromhos/cm	0207011510E
EPA 375.4	Sulfate	86	mg/L	0213011345E
S3113BFe	Iron	0.3	mg/L	0219011200E
3111BMn	Manganese	0.03	mg/L	0219011200E
S3111D	Aluminum	0.1	mg/L	0219011330E

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

" Corrected Report "

H&H WATER CONTROLS, INC.

565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
EPA Lab # 30-287

Report No. 138616

Report Date: 02/21/2001
H&H Sample No: 01-5818.3-4
P.O. Number:
Collection Date: 02/07/2001
Collected By: CLIENT
Received Date: 02/07/2001
Analysis Completed: 02/19/2001
Sample Id: B-Consol Site #1

Ship To Michael Baker Jr. Inc.
Box 280, 4301 Dutch Ridge Road
Beaver, PA 15009

LABORATORY ANALYSIS REPORT

Method No.	Parameter	Results	Units	Date/Time/By
S4500H+B	PH/Lab	8.1	S.U.	0207011510E
S2320B	Alkalinity	142	mg CaC03/L	0211010900P
S2310B-4a	Acidity (Hot)	-131	mg CaC03/L	0211011430P
S2540D	Total Suspended Solids	<5.0	mg/L	0212010920L
S2510B	Specific Conductance @ 25C	390	micromhos/cm	0207011510E
EPA 375.4	Sulfate	149	mg/L	0213011345E
`3111BFe	Iron	0.09	mg/L	0219011030E
3111BMn	Manganese	0.02	mg/L	0219011200E
S3111D	Aluminum	<0.01	mg/L	0219011330E

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

H&H WATER CONTROLS, INC.

565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
EPA Lab # 30-287

Report No. 138617

Report Date: 02/21/2001
H&H Sample No: 01-5818.5-6
P.O. Number:
Collection Date: 02/07/2001
Collected By: CLIENT
Received Date: 02/07/2001
Analysis Completed: 02/19/2001
Sample Id: C-Consol Site #4

Ship To Michael Baker Jr. Inc.
Box 280, 4301 Dutch Ridge Road
Beaver, PA 15009

LABORATORY ANALYSIS REPORT

Method No.	Parameter	Results	Units	Date/Time/By
S4500H+B	PH/Lab	7.8	S.U.	0207011510E
S2320B	Alkalinity	107	mg CaCO3/L	0211010900P
S2310B-4a	Acidity (Hot)	-96	mg CaC03/L	0211011430P
S2540D	Total Suspended Solids	7.0	mg/L	0212010920L
S2510B	Specific Conductance @ 25C	360	micromhos/cm	0207011510E
EPA 375.4	Sulfate	116	mg/L	0213011345E
3113BFe	Iron	0.2	mg/L	0219011030E
3111BMn	Manganese	0.05	mg/L	0219011200E
S3111D	Aluminum	0.05	mg/L	0219011330E

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

Baker

New S.O.#
24379-000-0000-ARX01
cc: PF, CF

Michael Baker Jr., Inc.
A Unit of Michael Baker Corporation

Box 280, 4301 Dutch Ridge Road
Beaver, Pennsylvania 15009-0280

(724) 495-7711
FAX (724) 495-4001

March 6, 2000

Pennsylvania Department of Environmental Protection
Bureau of Abandoned Mine Lands
122 South Center Street
Ebensburg, Pa. 15931
Attention: District Engineer

Re: Abandoned Mine Lands

Dear Sir,

I am an engineer seeking information regarding the presence of abandoned mine lands in the areas marked on the attached Wind Ridge and Rogersville Quadrangle maps. I am involved in an alternatives analysis for a proposed refuse disposal area and this information is needed to determine the optimum location in accordance with PaDEP requirements.

If you have any information or maps showing abandoned mine lands within the indicated areas I would be interested in obtaining copies. Please feel free to call me at (724) 495-4273 or fax information to me at (724) 495-4017. If no abandoned mine lands exist within the area please state this in a letter or fax so that I may have evidence of my investigation for my files. Thank you for your time regarding this matter.

MICHAEL BAKER, JR., INC.

Greg Hynes

Gregory P. Hynes, P.E.
Senior Engineer
Mining and Reclamation Department

Enclosures

115

COMMONWEALTH OF PENNSYLVANIA
STD-502

DESK MEMORANDUM

SUBJECT: abandoned mine land Features West Ridge Quad

TO: Greg Heisy

FROM: Bob Testjeske

DATE SENT: 2/09/01

DATE NEEDED:

	PLEASE CALL:		APPROVAL		SEE ME
	RETURNED YOUR CALL		AS REQUESTED		COMMENT
	INFORMATION & FILE		PREPARE REPLY/REPORT		NOTE AND RETURN
	NECESSARY ACTION		SIGNATURE		

RECEIVED BY: DATE: TIME:

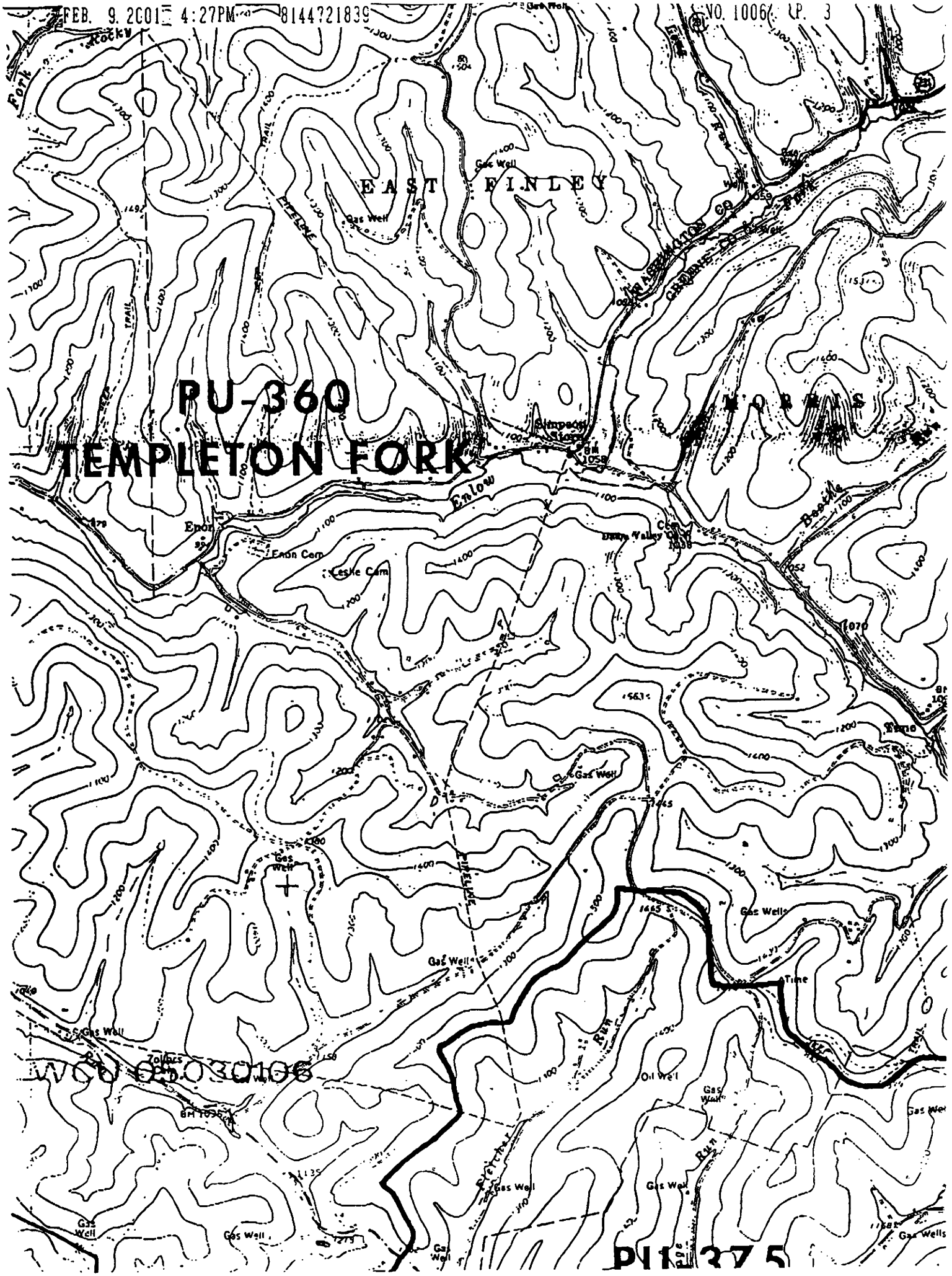
ROUTE	INITIAL	DATE	ROUTE	INITIAL	DATE

MESSAGE:

Enclosed is our Problem Area Quad for West Ridge, NO abandoned mine land Features are Shown

Thanks Bob

Testjeske



PU-360
TEMPLETON FORK

3630-FM-WQ0037 Rev. 9/98

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY PROTECTION
BUREAU OF WATERWAYS ENGINEERING

PNDI Screening
Reviewer: NB2177 gj
Date: 7/22/02
Phone No: 412-442-4308

SUPPLEMENT NO. 1
PENNSYLVANIA NATURAL DIVERSITY INVENTORY SEARCH FORM

This form provides site information necessary to perform a computer screening for species of special concern listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, the Pennsylvania Fish and Boat Code or the Game Code. Records regarding species of special concern are maintained in a computer data base called the "Pennsylvania Natural Diversity Inventory" (PNDI). This screening represents the most up to date PNDI data and may not reflect actual field conditions. Results of this PNDI search are valid for one year.

Please complete the information below, attach an 8½" x 11" photocopy (DO NOT REDUCE) of the portion of the U.S.G.S. Quadrangle Map that identifies the project location and outlines the approximate boundaries of the project and mail to the appropriate regional office or the delegated County Conservation District prior to completing a Chapter 105 environmental assessment or any other DEP permit application. (SEE REVERSE SIDE FOR LIST OF OFFICES AND ADDRESSES).

NAME: Greg Hynes

ADDRESS: Michael Baker Jr., Inc.
4301 Dutch Ridge Road
Beaver, Pa. 15009

PHONE: 724 495-4273

COUNTY: Greene

TWP./MUNICIPALITY: Richhill & Gray Townships

U.S.G.S. 7½ Minute Quadrangle
Wind Ridge

PROJECT DESCRIPTION AND SIZE (Briefly describe entire area relevant to your project, including acreage.)
Coal Refuse Disposal Site(s)
- Alternatives Analysis

North (Up) 13.50 inches
West (to the left) 3.35 inches

Approx. Center of Area

INDICATE PROJECT LOCATION TO THE NEAREST ONE TENTH INCH MEASURING FROM THE EDGE OF THE MAP IMAGE FROM THE LOWER RIGHT CORNER.

SCREENING RESULTS - Follow the directions of the checked block.

☒ No potential conflicts were encountered during the PNDI computer screening. Include this form with your environmental assessment or permit application submission.

☐ Potential conflicts were resolved with (FAS/PNDI staff person on _____, 19__) Include this form with your environmental assessment or permit application submission.

☐ Potential conflicts must be resolved by contacting the following natural resource agencies checked below. Please provide a copy of this form along with a brief description of your project to the following agency for consultation and recommendations.

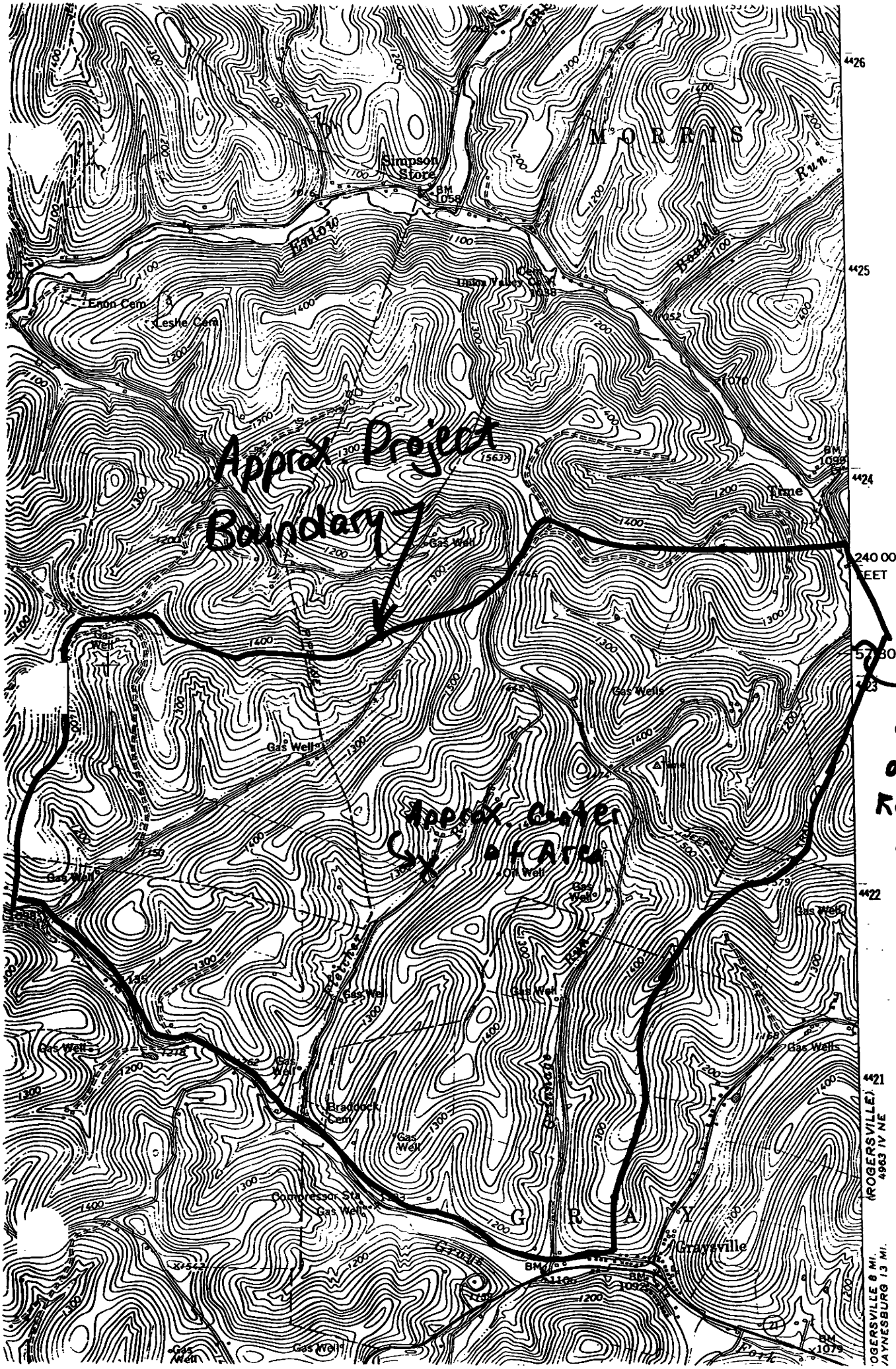
PLEASE CONTACT:

☐ Dept. of Conservation and Natural Resources
Bureau of Forestry/FAS/PNDI
P.O. Box 8552
Harrisburg, PA 17105
717-787-3444

☐ Mr. Andrew L. Shiels
PA Fish & Boat Commission
450 Robinson Lane
Bellefonte, PA 16823
814-359-5113

☐ Mr. Denver A. McDowell
PA Game Commission
2001 Elmerton Ave.
Harrisburg, PA 17110-9797
717-783-8743

Include this form and the agency's written recommendation with your environmental assessment or permit application submission.


Approx. Project Boundary
Approx. Center of Area
Small portion of project area on Rogersville Quad
MORRIS
GRAY
Simpson Store
Enon Cem.
Leslie Cem.
Gas Well
Gas Wells
Oil Well
Braddock Cem.
Compressor Sta.
Grayville
Time
240 000 FEET
(ROGERSVILLE)
4963 IV NE
ROGERSVILLE 8 MI.
JAYNESBURG 1.3 MI.

Baker

Michael Baker Jr., Inc.
A Unit of Michael Baker Corporation

Box 280, 4301 Dutch Ridge Road
Beaver, Pennsylvania 15009-0280

(724) 495-7711
FAX (724) 495-4001

24379-000-0000-ARX01
cc: CF, PF

March 29, 2000

Ms. Susan Funka-Petery
U.S. Department of Agriculture
Natural Resources Conservation District
22 West High Street
Waynesburg, PA 15370

Re: Prime Farmlands Soils Investigation
Consol Pennsylvania Coal Company
Bailey Mine Complex

Dear Ms. Funka-Petery:

Michael Baker Jr., Inc. is currently performing an alternatives analysis for selection of a location for a new coal refuse disposal area. There are five areas being considered which are variously located in Richhill and Gray Townships in Greene County, and East Finley Township in Washington County. The Pennsylvania Department of Environmental Protection guidance document entitled "Coal Refuse Disposal–Site Selection" requires that all persons proposing to develop new coal refuse disposal sites select a site that is most suitable based on comparison of environmental, economic, social, and technical factors. As part of our evaluation we request that prime farmland soils investigations be performed for each of the five areas under consideration and certified by the U.S. Department of Agriculture.

I have enclosed a USGS quadrangle location map and soils maps from the Washington and Greene County Soil Survey with each of the five areas under consideration for coal refuse storage shown. Please review this information and provide a letter with the results of your determination stating whether prime farmland soils are present at each of the five areas.

If you need additional information, please contact me at (724) 495-4273. Thank you for your time and assistance.

Sincerely,

MICHAEL BAKER JR., INC

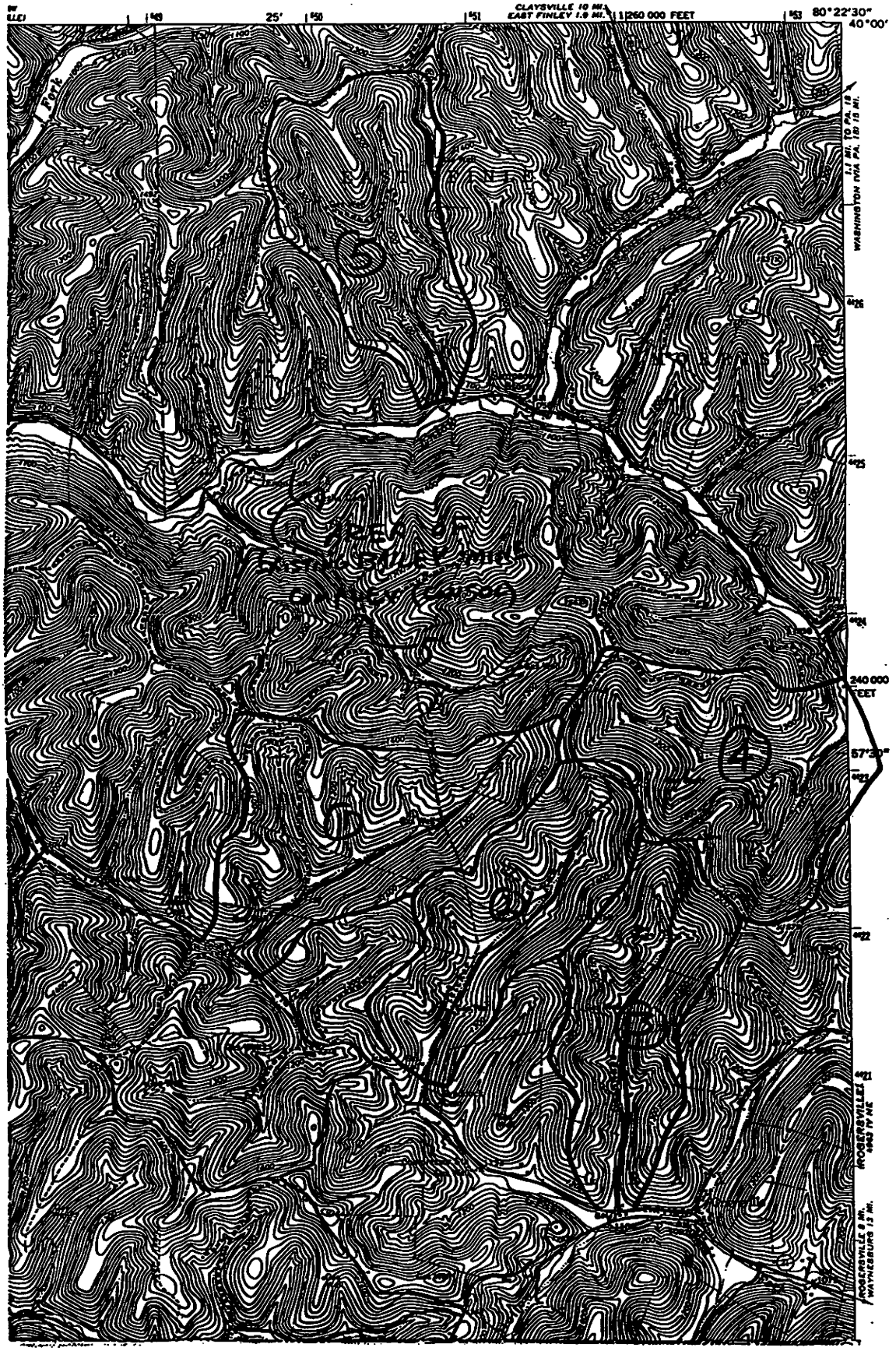
Gregory Hynes

Gregory P. Hynes, P.E.
Senior Engineer

w/Attachment

GE (REFUSE) SITES - ALTERNATIVES ANALYSIS

WIND RIDGE QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)



USDA-NATURAL RESOURCES CONSERVATION SERVICE
93 E. High Street
Greene County Office Bldg., Room 213
Waynesburg, PA 15370
724-627-5821

April 28, 2000

Gregory P. Hynes, P. E.
Michael Baker Jr., Inc.
Box 280, 4301 Dutch Ridge Road
Beaver, PA 15009-0280

Dear Mr. Hynes:

I have reviewed the information provided for the location of a new coal refuse disposal area for the operation of the Consol PA Coal Company's, Bailey Mine, located in Greene and Washington Counties. The prime farmland determination request is for five alternative sites that are being considered. According to the information and maps provided, there is a prime farmland soil, CaB, located on all of the five sites being considered, with location #5 having the smallest portion.

This determination was completed by review of the information provided and using the current soil survey for Greene-Washington counties. If you need further assistance please feel free to contact me.

Sincerely,

Susan C. Funka-Petery

Susan C. Funka-Petery
Supvry. District Conservationist

"An Equal Opportunity Employer"

Baker

Michael Baker Jr., Inc.
A Unit of Michael Baker Corporation

Box 280, 4301 Dutch Ridge Road
Beaver, Pennsylvania 15009-0280

(724) 495-7711
FAX (724) 495-4001

April 3, 2000

24379-000-0000-ARX01
cc: CF, PF

Ms. Noël Strattan
Bureau of Historic Preservation
PA Historical & Museum Commission
Third & North Streets, Box 1026
Harrisburg, PA 17108-1026

RE: Coal Refuse Disposal Site Selection
Consol Pennsylvania Coal Company
Bailey Central Preparation Plant

Dear Ms. Strattan:

Michael Baker Jr., Inc. is currently performing an alternatives analysis for selection of a location for a new coal refuse disposal area. There are five areas being considered which are variously located in Richhill and Gray Townships in Greene County, and East Finley Township in Washington County. The Pennsylvania Department of Environmental Protection guidance document entitled "Coal Refuse Disposal–Site Selection" requires that all persons proposing to develop new coal refuse disposal sites select a site that is most suitable based on comparison of environmental, economic, social, and technical factors. As part of our evaluation we request that Historical Resource Determinations be performed for the five areas under consideration. Enclosed is a completed notice form with accompanying attachments for your review. Please review this information and advise me of your determination so as to aid in the site selection process. If you need additional information, please feel free to contact me at (724) 495-4273.

Thank you for your assistance.

Michael Baker Jr., Inc.

Greg Hynes

Gregory P Hynes, P.E.
Senior Engineer

0120-PM-PY0003 Rev. 6/96

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bar Code

CULTURAL RESOURCE NOTICE

Before completing this form, read the step-by-step instructions provided with this form.

OFFICIAL USE ONLY

ID# (Assigned by State Agency) _____

Stamp Date Application Received

SECTION A. APPLICANT IDENTIFIER

Applicant Name CONSOL PENNSYLVANIA COAL CO.

1800 WASHINGTON ROAD (412) 831-4679
Street Address Telephone Number

Pittsburgh PA 15241-1421
City State Zip

Project Title BAILEY MINE COMPLEX - NEW REFUSE DISPOSAL AREA

SECTION B. LOCATION OF PROJECT

Municipality Richhill, Gray, and East Finley townships

County Name GREENE - WASHINGTON
DEP County Code 30 63

SECTION C. REQUEST

☐ DEP Permit ☒ DEP Approval

List other permits, funding or approvals required, if known (federal/state/local).

Alternatives Analysis for new refuse disposal Area
Name of Specific DEP Permit or Approval Requested

SECTION D. RESPONSIBLE DEP REGIONAL, CENTRAL, DISTRICT MINING or OIL AND GAS MGMT. OFFICE

DEP Regional Office Responsible for Review of Permit Application

- ☐ Southeast Regional Office (Conshohocken)
- ☐ Southcentral Regional Office (Harrisburg)
- ☐ Southwest Regional Office (Pittsburgh)
- ☒ District Mining Office: McMurray
- ☐ Central Office (Harrisburg)
- ☐ Northeast Regional Office (Wilkes-Barre)
- ☐ Northcentral Regional Office (Williamsport)
- ☐ Northwest Regional Office (Meadville)
- ☐ Oil and Gas Office: _____

SECTION E. RESPONSIBLE COUNTY CONSERVATION DISTRICT, if applicable.

_____ County Conservation District

_____ Telephone Number, if known

SECTION F. CONSULTANT

Michael Baker Jr. Inc.
Consultant, if applicable

4301 Dutch Ridge Rd.
Street Address

Beaver Pa. 15009
City, State, Zip

(724) 495-4273 - Greg Hynes
Telephone Number

SECTION G. PROJECT BOUNDARIES AND DESCRIPTION

REQUIRED

Indicate the total acres in the property under review. Of this acreage, indicate the total acres of earth disturbance for the proposed activity.

Attach a 7.5' U.S.G.S. Map indicating the defined boundary of the proposed activity.

Attach photographs of any building over 50 years old. Indicate what is to be done to all buildings in the project area.

Attach a narrative description of the proposed activity.

Attach the return receipt of delivery of this notice to the Pennsylvania Historical and Museum Commission.

REQUESTED

Attach photographs of any building over 40 years old

Attach construction drawing, if available.

SECTION H. SIGNATURE BLOCK

4/3/00
Date of Submission of Notice to PHMC

Gregory P. Hynes
Applicant's Signature

Attachment to Section G. **Project Boundaries Description**

- **The total acreage of the areas under review are approximately:**

  Site 1 - 495 Acres.
  Site 2 - 422 Acres
  Site 3 - 414 Acres
  Site 4 - 496 Acres
  Site 5 - 405 Acres

  Since these are proposed for refuse storage, assume 100% of each area will be disturbed.

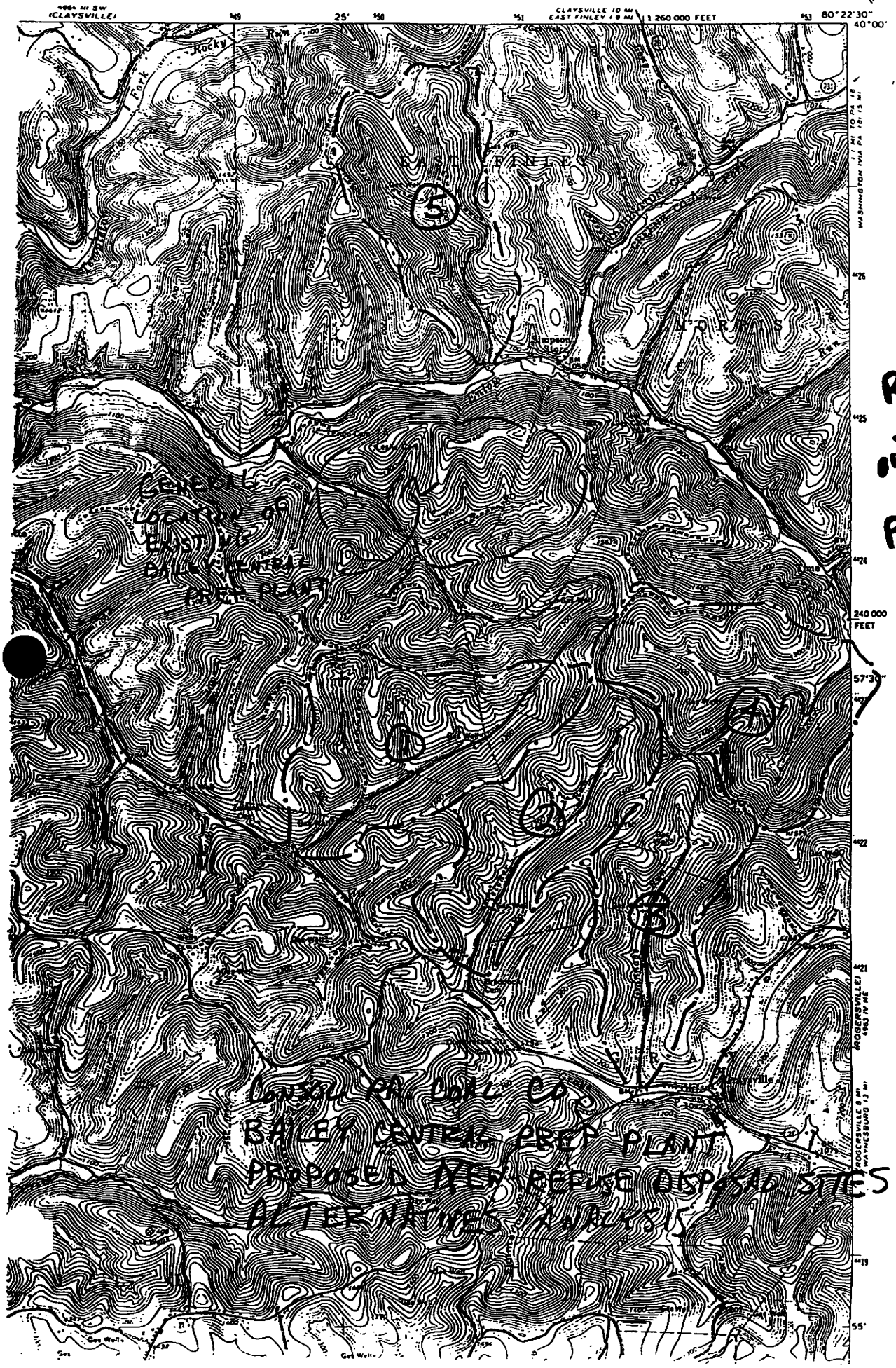
- The proposed activity boundaries are shown on the attached Wind Ridge quadrangle sheet.

- Buildings less than 50 years old are known to exist within the project sites. No buildings over 50 years old are known to exist within the project sites. Any buildings within the ultimately selected site will be demolished.

- Michael Baker Jr., Inc. is currently performing an alternatives analysis for selection of a location for a new coal refuse disposal area. The five areas being considered are located in Richhill and Gray Townships in Greene County, and East Finley Township in Washington County. After completion of the alternatives analysis a site (or sites) will be selected for permitting and design of the proposed coal refuse disposal facilities. The facility is expected to include an embankment and slurry pond for disposal of coarse and fine coal refuse from the Bailey Central Preparation Plant.

WIND RIDGE PA
photo revised 1973

WIND RIDGE QUADRANGLE
PENNSYLVANIA
7.5 MINUTE SERIES (TOPOGRAPHIC)



Reduced Copy
original Sent to
PAHMC @
1"=2000'
on 11"x17"
paper

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Post Office Box 1026
Harrisburg, Pennsylvania 17108-1026

May 4, 2000

24379-000-000
-ARX01

TO EXPEDITE REVIEW USE
BHP REFERENCE NUMBER

Gregory P. Hynes, P.E.
Michael Baker Jr., Inc.
Box 280, 4301 Dutch Ridge Road
Beaver, PA 15009-0280

Re: File No. ER 98-2131-042-B
COAL, Consol Pennsylvania Coal Company, Coal Refuse Disposal Site Selection, Bailey Central Preparation Plant, Greene & Washington Counties

Dear Mr. Hynes:

The Bureau for Historic Preservation has reviewed the above named project under the authority of the Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988), and in accordance with relevant Federal legislation. This legislation includes Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, the Surface Mining Control and Reclamation Act, and OSM's regulations. This review includes comments on the project's potential effect on both historic and archaeological resources.

There is a high probability that prehistoric and historic archaeological resources are located in the project area and may be affected by this project. We are unable to proceed with our review until our field archaeologist, Mark McConaughy, conducts a field check of the project area. The information submitted to us will be forwarded onto Mr. McConaughy. We will complete our review upon receipt of the field archaeologist's comments. Call Mr. McConaughy to make an appointment for a field visit. It is our recommendation that the permit should not be issued until this review is completed.

Your request does not include sufficient information. We are unable to proceed with our review for historic structures until the information on the attached form is provided.

If you need further information in this matter please consult Chan Funk at(717) 772-0924. If you need further information regarding archaeological survey please contact Mark McConaughy at (724) 527-5585. If you need further information concerning historic structures please counsult Susan Zacher at (717) 783-9920. If you need a **status only** of the reviewed project please call Tina Webber at (717) 705-4036.

Sincerely,

Kurt W. Carr, Chief
Division of Archaeology & Protection

Cc: Consol Pennsylvania Coal Co., 1800 Washington Road, Pittsburgh, PA 15241-1421
DEP, McMurray District Mining Office
Mark McConaughy

Attachment
KWC/tmw

98-2131-042-B

PENNSYLVANIA HISTORICAL AND MUSEUM COMMISSION (PA 11/99)
BUREAU FOR HISTORIC PRESERVATION: INFORMATION REQUEST SHEET
(Please supply items checked below for PHMC to proceed with review)

PROJECT INITIATION

( )A. FUNDING/PERMITTING/LICENSING/APPROVAL PROGRAM
- ( ) 1. Contact person for federal/state/local agency, address, phone number.
- ( ) 2. Letter from federal agency initiating consultation, or a letter from federal agency authorizing an alternate agency or a consultant to initiate consultation.
- ( ) 3. Identify the Federal/State Agency and funding program or permit/license.
- ( ) 4. Identification of all Federal agencies involved in project.
- ( ) 5. Designated "lead" Federal Agency in complex or multi-agency project.

(X)B. PROJECT DESCRIPTION
- ( ) 1. Narrative description of the project and related actions resulting from the project.
- (X) 2. Proposed boundary of the project's Area of Potential Effect (APE) (remember to consider visual impacts)
- (X) 3. Description and Justification of selection of the Area of Potential Effect
- ( ) 4. Plans of existing conditions (as-built or as-found)
- ( ) 5. Preliminary drawings or plans (floor plans, elevations, specifications)
- ( ) 6. Work write-ups
- ( ) 7. Plans and specifications

( ) C. PROJECT LOCATION
- ( ) 1. U.S.G.S. 7.5 min. series quadrangle with the PROJECT LOCATION(S) AND LIMITS CLEARLY MARKED using a colored pen. Please include name of the quadrangle
- ( ) 2. U.S.G.S. 7.5 min. series quadrangle with Area of Potential Effect marked (potential area of direct effect can be delineated inside area of indirect effect)
- ( ) 3. Street map (for properties in densely populated areas)
- ( ) 4. Street map showing location and historic district boundaries (if appropriate)
- ( ) 5. Street address of property
- ( ) 6. Municipality in which project is located (not mailing address location)

( ) D. PROJECT SIZE (supply as appropriate for project)
- ( ) 1. Acreage of project area
- ( ) 2. Miles/feet of project and right-of-way width
- ( ) 3. Extent and nature of ground disturbing activities (i.e. grading, trenching, foundation excavation)

(X) E. PHOTOGRAPHS (no Polaroids, copies or scanned images)
- (X) 1. Exterior of building(s) in project area
- ( ) 2. Interior of building(s) in project area
- ( ) 3. Interior of building(s) illustrating the proposed work areas/features
- ( ) 4. Buildings, streetscape, setting of features in Area of Potential Effect (APE)
- ( ) 5. Views of project site
- ( ) 6. Other _____

PUBIC PARTICIPATION

- (X) 1. Measures which will be/or have been taken to identify consulting parties.
- ( ) 2. List of proposed consulting parties.
- (X) 3. Measures which will be/or have been taken to notify and involve the public.

RESOURCE IDENTIFICATION, EVALUATION AND PROJECT EFFECT

(X) A. Cultural Resource Identification
- (X) 1. Description of methodology used for identification and sources examined.
- (X) 2. Plan proposed for identification of historical (including historic districts, buildings, structures, objects) and archaeological resources and proposed methodology to be used.
- (X) 3. Pennsylvania Historic Resource form(s) for all properties 50 years or older and potentially eligible for the National Register identified in the APE.
- ( ) 4. Historical background/context report/information for historic resources identified.
- ( ) 5. Pennsylvania Archaeological Site Survey form(s) (P.A.S.S) for archaeological sites identified in surveys of APE.
- ( ) 6. Phase I, II, III Archaeological Survey Reports
- ( ) 7. 5 Copies of Final Phase I, II, III Archaeological Survey Report(s) (4 bound and 1 unbound copies)

(X) B. Evaluation of Project Effect on Cultural Resources (Physical, visual, atmospheric, direct and indirect, secondary)

( ) C. Other: _____

_____

Commonwealth of Pennsylvania
Pennsylvania Historical and Museum Commission
Bureau for Historic Preservation
Post Office Box 1026
Harrisburg, Pennsylvania 17108-1026

June 2, 2000

Gregory P. Hynes, P.E.
Michael Baker Jr., Inc.
Box 280, 4301 Dutch Ridge Road
Beaver, PA 15009-0280

TO EXPEDITE REVIEW USE
OUR REFERENCE NUMBER

Re: File No. ER 1998-2131-042-C
COAL, Consol Pennsylvania Coal Company, Coal Refuse Disposal Site Selection, Bailey Central Preparation Plant, Gray and East Findley Twps., Green & Washington Counties

Dear Mr. Hynes:

The Bureau for Historic Preservation has reviewed the above named project under the authority of the Environmental Rights amendment, Article 1, Section 27 of the Pennsylvania Constitution and the Pennsylvania History Code, 37 Pa. Cons. Stat. Section 500 et seq. (1988), and in accordance with relevant Federal legislation. This legislation includes Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, the regulations (36 CFR Part 800) of the Advisory Council on Historic Preservation, the Surface Mining Control and Reclamation Act, and OSM's regulations. This review includes comments on the project's potential effect on both historic and archaeological resources.

Based on a site visit on May 30, 2000, by Mark McConaughy of our staff, there is a high probability that significant archaeological sites are located in all five proposed project areas and could be adversely affected by project activities. Although there are no recorded archaeological sites within the project boundaries, the soil type, topographic setting, slope direction, and distance to water of the project area are similar to the settings of known archaeological sites in the vicinity. Burial mounds may be located on the hilltops and bluffs overlooking the major tributaries that bound each area. Prehistoric habitation sites could be present on benches and the terraces of the small creeks that flow through each project area. Several historic farmsteads are also located in the areas selected for

possible coal disposal sites. A Phase I archaeological survey of the project area is required to locate potentially significant archaeological resources. Guidelines and information for survey are available from our office upon request.

At this time, we recommend that the permit be denied and we request a conference to discuss the effects to archaeological resources within the permit area. We also recommend that, if the Phase I survey is not undertaken, that the permit be conditioned to require that archaeological investigations be conducted if sites are discovered after the mining permit is issued. We also request that you provide us with written justification for your decision if you decide not to require the Phase I survey.

If you need further information regarding this project, please contact Chan Funk at (717) 772-0924. If you need further information regarding archaeological survey, please contact Mark McConaughy at (724) 527-5585 x103. If you need a **status only** of the reviewed project please call Tina Webber at (717) 705-4036.

Sincerely yours,

Kurt W. Carr, Chief
Division of Archaeology &
Protection

CC. Consol Pennsylvania Coal Co., 1800 Washington Road, Pittsburgh, PA 15241-1421
DEP, McMurray District Mining Office
Mark A. McConaughy

A NEW ERA OF
UNDERGROUND PROTECTION
CALL 1-800-242-1776

24379-000-0000-
ARX01

CC: CF, FF

ELEPHONE NUMBER: (724) 495-4273 EXT: ____ CALLER: Greg Hynes

CONTRACTOR: Michael Baker

ADDRESS: ____ FAX #: (724) 495-4001

ITY: ____ STATE: ____ ZIP: ____

OTIFICATION TYPE:

☐ CONSTRUCTION Not less than 3 nor more than 10 Working Days

☐ DESIGN Not less than 10 nor more than 90 Working Days

DIG DATE: ____ TIME: ____

ARE MAPS BEING SENT: Yes ☐ No ☐

ORKSITE INFORMATION:

OUNTY: Greene MUNICIPALITY: (1)(2)(3)+(5) = Richhill (4) = Gray Township

TREET #: ____ STREET NAME: ____ WARD: ____

EAREST INTERSECTION: ____

OCATION INFORMATION: (1) T-611 from SR 4007 (Owens Run Rd) to SR 4011
(2) T-370 " " " " " " " " "
(3)+(4) SR 4009 " " " " " " " " " ((3) = Richhill (4) = Gray)
F WORK: (5) SR 4009 " SR 4011 to T392 EXTENT OF EXCAV: ____
→ Coal refuse storage facility - along Rd. & private prop

ESIGN STAGE ONLY:

SGS QUADRANGLE MAP: ____ LAT/LONG: ____

TATE PLANE: X ____ Y ____ UTM GRID: X ____ Y ____

RKING IN ST: X WALK: ____ PUB PROPERTY: X PVT PROPERTY: X OWNER: ____

HER (SPECIFY): ____

RSON TO CONTACT: Self

MARKS: maps requested PHONE: (____) ____ EXT: ____

TO BE COMPLETED AFTER PROCESSING

AL # ASSIGNED: (1) 1036442 (2) 1036448 DATE/TIME: 4/12/00 - pm

ER SERIAL # REFERENCED: (3) 1036452 (4) 1036454 (5) 1036460

MEMBERS NOTIFIED: List applicable to (1), (2), (3), + (5) but '✓' apply only to (4)
Pa., ✓Columbia Gas Trans. & Corp., ✓Equitrans L.P., Bell
Atlantic, Mountain energy, ✓Allegheny Power, ✓Nat. Fuel Gas,
Peoples Nat. Gas, Texas Eastern, Richhill township

There is an ANNUAL FEE

DO NOT FAX this form to POCS—If you are interested in FAX-A-LOCATE please call 1 800 248-1786

04/27/2000 14:28:02

Fax: 7244954001

PENNSYLVANIA ONE CALL SYSTEM, INC.
AUTOMATED RESPONSE SERVICE

Excavator: michael baker jr inc
Telephone #: 7244954273

Caller: greg hynes

Fax Number: 7244954001

SITE 1

Serial Number 1036442 at the following location:

greene County
richhill township
t 611 & state route 4007 and state route 4011

Has been responded to through Pennsylvania One Call System by these facility Operators in the following manner:

UTILITY	RESPONSE
ALLTEL COMMUNICATIONS	Clear - no facilities
ALLEGHENY POWER	Clear - no facilities
TEXAS EASTERN TRANSMISSION CORPORATIO	Clear - no facilities
BELL ATLANTIC-PA	Clear - no facilities
COLUMBIA GAS TRANSMISSION CORP, WAYNE	Clear - no facilities
PEOPLES NATURAL GAS COMPANY	Clear - no facilities
NATIONAL FUEL GAS SUPPLY CORP-Henders	Clear - no facilities
COLUMBIA GAS OF PA INC, WASHINGTON	Has not responded through PA One Call
MOUNTAIN ENERGY	Has not responded through PA One Call
	Has not responded through PA One Call
COLUMBIA GAS TRANSMISSION CORP, MAJOR	Has not responded through PA One Call
Richhill Township	Clear - no facilities
EQUITRANS INC	Clear - no facilities

Please call 1-800-222-6470 to hear any
Voice Message.

04/27/2000 14:34:43 Fax: 7244954001

PENNSYLVANIA ONE CALL SYSTEM, INC.
AUTOMATED RESPONSE SERVICE

Excavator: michael baker jr inc
Telephone #: 7244954273

Caller: greg hynes

Fax Number: 7244954001

SITE (4)

Serial Number 1036454 at the following location:

greene County
gray township
state route 4009 & state route 4007 and state route 4011

Has been responded to through Pennsylvania One Call System by these facility Operators in the following manner:

UTILITY	RESPONSE
ALLTEL COMMUNICATIONS	Clear - no facilities
ALLEGHENY POWER	Clear - no facilities
NATIONAL FUEL GAS SUPPLY CORP-Henders	Clear - no facilities
COLUMBIA GAS OF PA INC, WASHINGTON	Has not responded through PA One Call
	Has not responded through PA One Call
COLUMBIA GAS TRANSMISSION CORP, MAJOR	Has not responded through PA One Call
EQUITRANS INC	Clear - no facilities

Please call 1-800-222-6470 to hear any
Voice Message.

Scott Polen - Columbia Gas says an active 6" line passes through this area.

EPA United States Environmental Protection Agency **Superfund**

Basic Site Query Search Results
Active Sites

On February 10, 2001 at 1:19:26 PM ET, you searched for the following Superfund criteria:

State: PA
County: greene

0 records found matching your criteria. [Disclaimer | Data Source]

To revise your query, click the "Back" button in your browser to return to the search options form.

[EPA Home | OSWER Home | Superfund Home]
[Search EPA | Search Superfund | Site Information | Advanced Site Query | Contact Us]

This page was generated on February 10, 2001 at 1:19:26 PM ET
Site maintained by: Office of Emergency and Remedial Response
superfund.info@epa.gov

Brownfields Inventory Search Results

Pennsylvania's Land Recycling Program

3 items were found which match your criteria. Displayed is item 1.

- County: Greene
- **Property: Mather Coal Reclamation Site** - not within search area
- Street Address:
- City: Mather PA 15346
- Municipality: Morgan Township
- Size of Property (acres): 3.83
- Land Use or Zoning: Commercial or Industrial Development
- Number of Usable Buildings: 0
- Condition of Buildings:
- Building Space (square feet): 0.00
- Utilities:
- Other Information:
- Environmental Condition:
- Environmental Assessments:
- Environmental Response Actions:
- Available for Lease?: Yes
- Lease Price: $0.00
- Available for Sale?: Yes
- Sale Price: $0.00
- Redevelopment Incentives:
- Other Information:
- Contact Person: Donald Chappel
- Company: Greene County Industrial Development Authority
- Address: 19 S. Washington St. Suite 150 Waynesburg, PA 15370
- Phone: 724-627-9259
- E-mail: dchappel@greenecountyida.org

Do Another Search

Brownfields Inventory Homepage

Pennsylvania Department of Environmental Protection

DEP Home / Search / NewsRoom / Update / Ask DEP / County Notebooks
Public Participation / What's New

Brownfields Inventory Search Results

Pennsylvania's Land Recycling Program

3 items were found which match your criteria. Displayed is item 2.

- County: Greene
- **Property: Mather Coal Reclamation Site** — not within search area
- Street Address:
- City: Mather PA 15346
- Municipality: Jefferson Township

- Size of Property (acres): 14.32
- Land Use or Zoning: Commercial or Industrial Development
- Number of Usable Buildings: 0
- Condition of Buildings:
- Building Space (square feet): 0.00
- Utilities:
- Other Information:

- Environmental Condition:
- Environmental Assessments:
- Environmental Response Actions:

- Available for Lease?: Yes
- Lease Price: $0.00
- Available for Sale?: Yes
- Sale Price: $0.00
- Redevelopment Incentives:
- Other Information:

- Contact Person: Donald Chappel, Exec. Dir.
- Company: Greene County Industrial Development Authority
- Address: Suite 150 19 S. Washington St.
- Phone: 724-627-9259
- E-mail: dchappel@greenecountyida.org

Next

Back Next

Brownfields Inventory Search Results

Pennsylvania's Land Recycling Program

3 items were found which match your criteria. Displayed is item 3.

- County: Greene
- **Property: Mather Coal Reclamation Site** — not within search area
- Street Address:
- City: Mather PA 15346
- Municipality: Morgan Township
- Size of Property (acres): 2.53
- Land Use or Zoning: Commercial or Industrial Development
- Number of Usable Buildings: 0
- Condition of Buildings:
- Building Space (square feet): 0.00
- Utilities:
- Other Information:
- Environmental Condition:
- Environmental Assessments:
- Environmental Response Actions:
- Available for Lease?: Yes
- Lease Price: $0.00
- Available for Sale?: Yes
- Sale Price: $0.00
- Redevelopment Incentives:
- Other Information:
- Contact Person: Donald Chappel, Exec. Dir.
- Company: Greene County Industrial Development
- Address: Suite 150 19 S. Washington St. Waynesburg, PA 15370
- Phone: 724-627-9259
- E-mail: dchappel@greenecountyida.org

Do Another Search

Brownfields Inventory Homepage

Pennsylvania Department of Environmental Protection

COMMONWEALTH OF PENNSYLVANIA
FISH AND BOAT COMMISSION

24379-000-0000-ARK

A. This form provides the site information necessary to perform a computer search for species of special concern listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, the Pennsylvania Fish and Boat Code or the Wildlife Code.

B. Complete the information below and mail to:

cc: CF, PF, GPH

Andrew L. Shiels
Herpetology, Endangered Species and Triploid Grass Carp Coordinator
PA Fish and Boat Commission
450 Robinson Lane
Bellefonte, PA 16823
(814) 359-5113

mailed Pa F+B and PNDI forms on 3/15/00

C. This form and accompanying maps should be sent to the above address for environmental reviews that only concern reptiles, amphibians, fishes and aquatic invertebrates. Reviews for other natural resources must be submitted to other appropriate agencies.

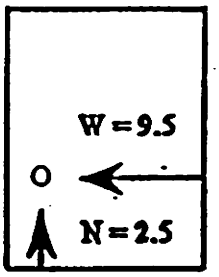
D. The absence of recorded information from our files does not necessarily imply actual conditions on site. Future field investigations could alter this determination. The information contained in our files is routinely updated. A review is valid for one year.

Please print or type
Applicant's Name: Greg Hynes Company: Michael Baker Jr., Inc.
Address: 4301 Dutch Ridge Road
Beaver, Pa. 15009 Phone (8:00 AM to 4:00 PM): 724-495-427
Project Description: Coal Refuse Disposal Site-Alternatives Analysis
Co: Greene Twp/Municipality: Richhill and Gray Townships

Name of the United States Geological Survey (U.S.G.S.) 7.5 Minute Quadrangle Map Where project is located:
Wind Ridge, Pa. Project size (in acres): 2,000

Indicate the location of approximate project center on the U.S.G.S. Quad map by measuring in inches (to nearest one-tenth) from the lower right corner of the actual U.S.G.S. Quad map.

- North (Up) 13.50 inches
- West (to the left) 3.35 inches



(Example, not to scale)

Use only one form for each proposed project or location.
Attach an 8.5" by 11" photocopy (DO NOT REDUCE) of the section of the U.S.G.S. Quadrangle Map which identifies the project location and outlines the approximate boundaries of the project.

FOR PFBC USE ONLY

§ 93.2. Scope.

(a) This chapter sets forth water quality standards for the waters of this Commonwealth. These standards are based upon water uses which are to be protected and will be considered by the Department in its regulation of discharges.

(b) Where interstate or international agencies under an interstate compact or international agreement establish water quality standards regulations applicable to the waters of this Commonwealth more stringent than those in this title the more stringent standards shall apply.

Source

The provisions of this § 93.2 amended through March 8, 1985, effective February 16, 1985, 15 Pa.B. 907. Immediately preceding text appears at serial page (50936).

Notes of Decisions

Denial of an application for a mine drainage permit cannot be based solely on the ground that the watershed has been designated a conservation area as defined in this section. *Doraville Enterprises v. Commonwealth*, 73 Pa. D.&C.2d 635, 644, 645 (1975).

§ 93.3. Protected water uses.

Water uses which shall be protected, and upon which the development of water quality criteria shall be based, are set forth, accompanied by their identifying symbols, in the following Table 1:

Table 1

Symbol	*Protected Use*
	Aquatic Life
CWF	*Cold Water Fishes*—Maintenance and/or propagation of fish species including the family Salmonidae and additional flora and fauna which are indigenous to a cold water habitat.
WWF	*Warm Water Fishes*—Maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat.
MF	*Migratory Fishes*—Passage, maintenance and propagation of anadromous and catadromous fishes and other fishes which ascend to flowing waters to complete their life cycle.
TSF	*Trout Stocking*—Maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat.

Copyright © 1992 Commonwealth of Pennsylvania

Symbol	*Protected Use*
	Water Supply
PWS	*Potable Water Supply*—Used by the public as defined by the Federal Safe Drinking Water Act, 42 U.S.C. § 300F, or by other water users that require a permit from the Department under The Pennsylvania Safe Drinking Water Act (35 P. S. §§ 721.1—721.18), or the act of June 24, 1939 (P. L. 842, No. 365) (32 P. S. §§ 631—641), after conventional treatment, for drinking, culinary, and other domestic purposes, such as inclusion into foods, either directly or indirectly.
IWS	*Industrial Water Supply*—Use by industry for inclusion into nonfood products, processing and cooling.
LWS	*Livestock Water Supply*—Use by livestock and poultry for drinking and cleansing.
AWS	*Wildlife Water Supply*—Use for waterfowl habitat and for drinking and cleansing by wildlife.
IRS	*Irrigation*—Used to supplement precipitation for growing crops.
	Recreation
B	*Boating*—Use of the water for power boating, sail boating, canoeing, and rowing for recreational purposes when surface water flow or impoundment conditions allow.
F	*Fishing*—Use of the water for the legal taking of fish.
WC	*Water Contact Sports*—Use of the water for swimming and related activities.
E	*Esthetics*—Use of the water as an esthetic setting to recreational pursuits.
	Special Protection
HQ	*High Quality Waters*—A stream or watershed which has excellent quality waters and environmental or other features that require special water quality protection.
EV	*Exceptional Value Waters*—A stream or watershed which constitutes an outstanding national, State, regional or local resource, such as waters of national, State or county parks or forests, or waters which are used as a source of unfiltered potable water supply, or waters of wildlife refuges or State game lands, or waters which have been characterized by the Fish Commission as "Wilderness Trout Streams," and other waters of substantial recreational or ecological significance.

Symbol	*Protected Use*
	Other
N	*Navigation*—Use of the water for the commercial transfer and transport of persons, animals, and goods.

Source

The provisions of this § 93.3 amended February 15, 1985, effective February 16, 1985, 15 Pa.B. 544. Immediately preceding text appears at serial pages (50936) to (50938).

Cross References

This section cited in 25 Pa. Code § 287.1 (relating to definitions).

§ 93.4. Statewide water uses.

(a) Those uses set forth in the following Table 2 were considered in determining the water quality criteria applicable to the particular waters listed in § 93.9 (relating to designated water uses and water quality criteria) except where otherwise indicated in such section.

TABLE 2

Symbol	*Use*
	Aquatic Life
WWF	Warm Water Fishes
	Water Supply
PWS	Potable Water Supply
IWS	Industrial Water Supply
LWS	Livestock Water Supply
AWS	Wildlife Water Supply
IRS	Irrigation
	Recreation
B	Boating
F	Fishing
WC	Water Contact Sports
E	Esthetics

(b) Less restrictive uses than those currently designated for particular waters listed in § 93.9 may be adopted where it is demonstrated that:

(1) The existing designated use is not attainable because of natural background conditions;

(2) The existing designated use is not attainable because of irretrievable man-induced conditions; or

(3) Application of effluent limitations for existing sources more stringent than those required under 33 U.S.C. § 1311, in order to attain the existing designated use, would result in substantial and widespread adverse economic and social impact.

Copyright © 1992 Commonwealth of Pennsylvania

Stream	Zone	County	Water Uses Protected	Exceptions To Specific Criteria
5—Unnamed Tributaries to Shannon Run	Basins	Greene	WWF	None
5—Fox Run	Basin	Greene	WWF	None
5—Little Shannon Run	Basin	Greene	CWF	None
4—Bacon Run	Basin	Greene	WWF	None
4—Hobbs Run	Basin	Greene	WWF	None
4—Calvin Run	Basin	Greene	WWF	None
4—Dooley Run	Basin	Greene	WWF	None
4—Glade Run	Basin	Greene	WWF	None
4—Meadow Run	Basin	Greene	WWF	None
3—Georges Creek	Main Stem	Fayette	WWF	None
4—Unnamed Tributaries to Georges Creek	Basins	Fayette	WWF	None
4—Muddy Run	Basin	Fayette	WWF	None
4—Mountain Creek	Basin	Fayette	CWF	None
4—York Run	Basin	Fayette	WWF	None
4—War Branch	Basin	Fayette	WWF	None
3—Jacobs Creek	Basin	Fayette	WWF	None
3—Cats Run	Basin	Fayette	WWF	None
3—Whiteley Creek	Basin, Source to FAS 616 (SR 2011) Bridge	Greene	TSF	None
3—Whiteley Creek	Basins, FAS 616 Bridge to Mouth	Greene	WWF	None
3—Little Whiteley Creek	Basin	Greene	WWF	None
3—Browns Run	Basin	Fayette	WWF	None
3—Pegs Run	Basin	Greene	WWF	None
3—Middle Run	Basin	Fayette	WWF	None
3—Antram Run	Basin	Fayette	WWF	None
3—Wallace Run	Basin	Fayette	WWF	None
3—Muddy Creek	Basin	Greene	WWF	None
3—Neel Run	Basin	Greene	WWF	None
3—Pumpkin Run	Basin	Greene	WWF	None
3—Rush Run	Basin	Greene	WWF	None
3—Bates Run	Basin	Fayette	WWF	None
3—Tenmile Creek	Basin, Source to South Fork Tenmile Creek	Greene	TSF	None
4—South Fork Tenmile Creek	Basin, Source to Browns Creek	Greene	HQ-WWF	None
5—Browns Creek	Basin	Greene	HQ-WWF	None
4—South Fork Tenmile Creek	Basin, Browns Creek to Mouth	Greene	WWF	None

Copyright © 1992 Commonwealth of Pennsylvania

Stream	Zone	County	Water Uses Protected	Exceptions To Specific Criteria
2—Cross Creek	Basin (all Sections in PA), Avella Water Intake to PA-WV State Border	Washington	WWF	None
2—Buffalo Creek	Basin (all sections in PA)	Washington	HQ-WWF	None
2—Wheeling Creek				
3—Enlow Fork	Main Stem, Source to PA-WV State Border	Washington-Greene	TSF	None
4—Unnamed Tributaries to Enlow Fork	Basins, Source to PA-WV State Border	Washington-Greene	WWF	None
close 4—Boothe Run	Basin	Greene	WWF	None
4—Long Run	Basin	Washington	WWF	None
4—Templeton Fork	Basin	Washington	TSF	None
4—Owens Run	Basin	Greene	WWF	None
4—Robinson Fork	Basin	Washington	WWF	None
4—Spottedtail Run	Basin (all sections in PA)	Washington	WWF	None
3—Enlow Fork (WV)				
4—Unnamed Tributaries to Enlow Fork	Basins (all sections in PA), PA-WV Border to Confluence with Dunkard Fork	Washington-Greene	WWF	None
3—Dunkard Fork				
4—North Fork Dunkard Fork	Basin, Source to Confluence with South Fork	Greene	TSF	None
4—South Fork Dunkard Fork	Basin (all sections in PA), Source to Confluence with North Fork	Greene	TSF	None
3—Dunkard Fork	Main Stem, Confluence of North and South Forks to PA-WV State Border	Greene	WWF	None

BUREAU OF FISHERIES

Delano R. Graff, Director
(814) 359-5154
FAX: (814) 359-5153

DIVISION OF FISHERIES MANAGEMENT

Richard A. Snyder, Chief
(814) 359-5110
FAX: (814) 359-5153

COMMONWEALTH OF PENNSYLVANIA
PENNSYLVANIA FISH & BOAT COMMISSION
450 Robinson Lane
Bellefonte, PA 16823-9620

IN REPLY REFER TO
SIR# 4782

The following inquiries were performed for the same search area by Killam Associates.

July 14, 2000

KILLAM ASSOCIATES
Edward M. Davis
Morocco Building
651 South Center Avenue
Somerset, PA 15501-2511

Dear Mr. Davis:

RE: Species Impact Review - Rare, Candidate, Threatened and Endangered Species
Consol Pennsylvania Coal Co.
Richhill Township, Greene County, Pennsylvania

I have examined the map accompanying your recent correspondence which shows the location for the proposed above referenced project.

Presently, none of the fishes, amphibians or reptiles we list as endangered or threatened are known to occur at or in the immediate vicinity of this study area.

To allow faster processing of Species Impact Reviews (SIRs) in the future, we are requesting that the attached form be completed and returned to this office together with other relevant project information. Please make copies of the attached form and use with all future project reviews. If you have received, and in fact are using the new form, disregard the above request. Please note that the PFBC conducts Species Impact Reviews **only for reptiles, amphibians, fishes, and aquatic invertebrates.** Reviews concerning other natural resources must be submitted to other appropriate agencies. In any future correspondence with us regarding this specific project, please refer to the SIR number above. Thank you in advance for your cooperation.

Sincerely,

Andrew L. Shiels

Andrew L. Shiels, Leader
Nongame and Endangered Species Unit

hb

Encl. (1)

COMMONWEALTH OF PENNSYLVANIA
FISH AND BOAT COMMISSION

A. This form provides the site information necessary to perform a computer search for species of special concern listed under the Endangered Species Act of 1973, the Wild Resource Conservation Act, the Pennsylvania Fish and Boat Code or the Wildlife Code.

B. Complete the information below and mail to:

Andrew L. Shiels
Nongame and Endangered Species Unit
PA Fish and Boat Commission
450 Robinson Lane
Bellefonte, PA 16823
(814) 359-5113

C. This form and accompanying maps should be sent to the above address for environmental reviews that **only** concern **reptiles, amphibians, fishes and aquatic invertebrates.** Reviews for other natural resources must be submitted to other appropriate agencies.

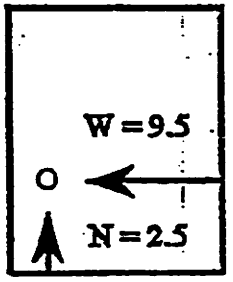
D. The absence of recorded information from our files does not necessarily imply actual conditions on site. Future field investigations could alter this determination. The information contained in our files is routinely updated. A review is valid for one year.

Please print or type
Applicant's Name:_____ Company:_____
Address:_____
_____ Phone (8:00 AM to 4:00 PM):_____
Project Description:_____
Co:_____ Twp/Municipality:_____

Name of the United States Geological Survey (U.S.G.S.) 7.5 Minute Quadrangle Map Where project is located:
_____ Project size (in acres):_____

Indicate the location of approximate project center on the U.S.G.S. Quad map by measuring in inches (to nearest one-tenth) from the **lower right corner** of the actual U.S.G.S. Quad map.

- North (Up) _____ inches
- West (to the left) _____ inches



(Example, not to scale)

Use only one form for each proposed project or location.
Attach an 8.5" by 11" photocopy (DO NOT REDUCE) of the section of the U.S.G.S. Quadrangle Map which identifies the project location and outlines the approximate boundaries of the project.

FOR PFBC USE ONLY

COMMONWEALTH OF PENNSYLVANIA

PENNSYLVANIA GAME COMMISSION

2001 ELMERTON AVENUE
HARRISBURG, PA 17110-9797

ADMINISTRATIVE BUREAUS:

ADMINISTRATION	717-787-5670
AUTOMOTIVE AND PROCUREMENT DIVISION	717-787-6594
LICENSE DIVISION	717-787-2084
PERSONNEL DIVISION	717-787-7836
WILDLIFE MANAGEMENT	717-787-5529
INFORMATION & EDUCATION	717-787-6286
LAW ENFORCEMENT	717-787-5740
LAND MANAGEMENT	717-787-6818
REAL ESTATE DIVISION	717-787-6568
MANAGEMENT INFORMATION SYSTEMS	717-787-4076

July 20, 2000

Mr. Edward M. Davis
Environmental Specialist
Killam Associates
Morocco Building
651 South Center Avenue
Somerset, PA 15501-2511

In re: Consol Pennsylvania Coal Company
Potential coal refuse disposal facility
Richland Township, Greene County, PA

Dear Mr. Davis:

This is in reference to your letter requesting information relative to the above project.

We have completed an office review and determined that except for occasional individuals, this project should not affect any endangered or threatened species of bird or mammal recognized by the Pennsylvania Game Commission.

This response relates only to endangered or threatened species. It does not address other concerns of the Pennsylvania Game Commission. If, in the normal review process, it is determined that the project may impact critical or unique habitats such as wetlands, wintering areas, or nesting cover, etc., you may be requested to conduct additional studies.

For your convenience, please find attached, a copy of the United States Department of Interior's National Wetlands Inventory Map. Based on a map reconnaissance of the project area, your project may encroach upon wetlands. Any encroachment in wetlands will require permits from the Pennsylvania Department of Environmental Resources under the Dam Safety and Encroachment Act, Section 105, and the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act.

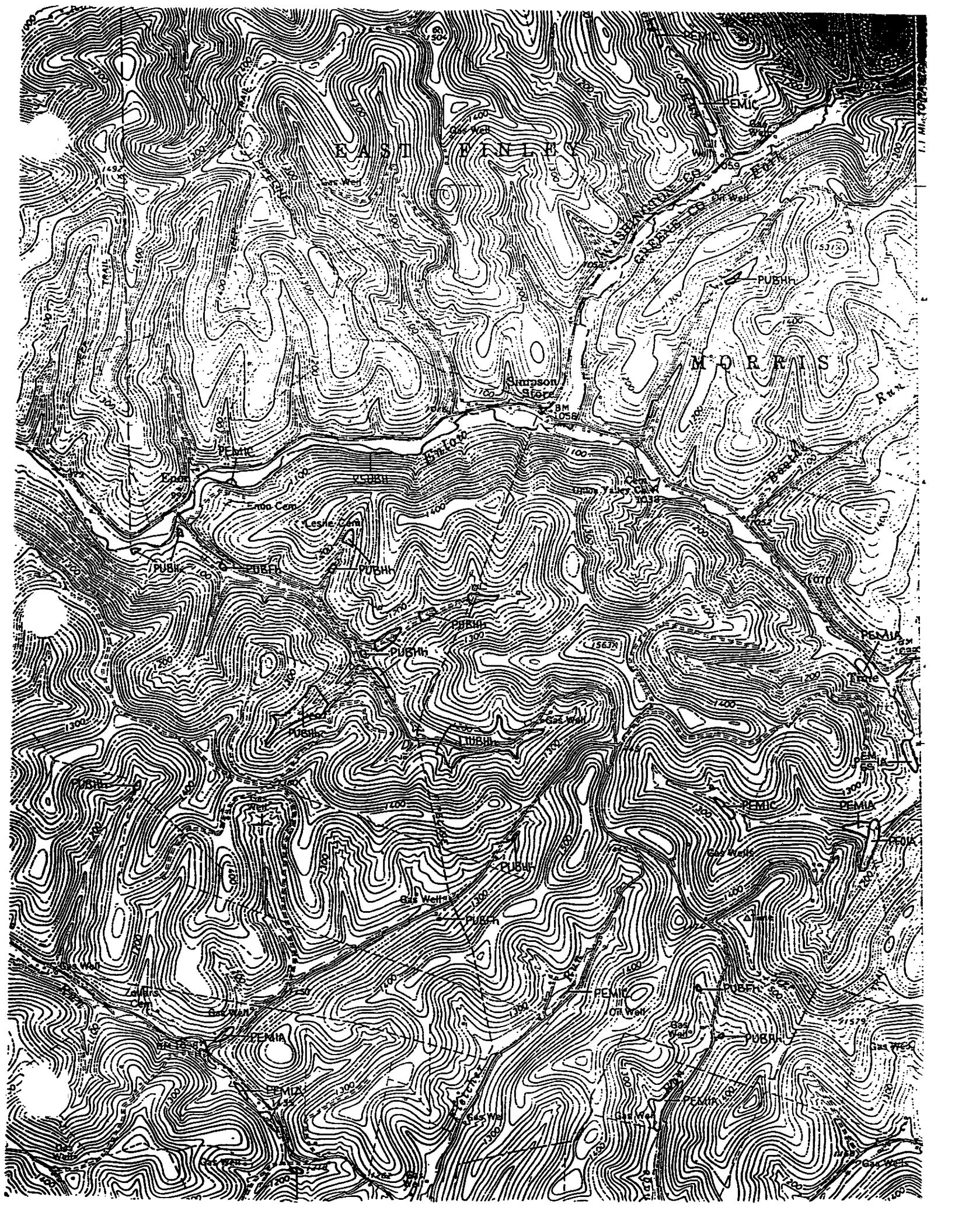
If you have any questions on the above, please contact me directly at 717-783-1728.

Very truly yours,

William A. Capouillez, PG
Section Oil/Gas and Mineral Development
Bureau of Land Management

WAC/pfb

cc: File
GRC
Kepler


EAST FINLEY
MORRIS
Simpson Store
Epon
Leslie Cem
Upper Valley Cem
Zellers Cem
Gas Well
Oil Well
PEMIC
PUBHh
PUBFh
PEMIA
PUBFh

Pennsylvania Department of Environmental Protection

100 New Salem Road, Suite 175
Uniontown, Pa. 15401

May 16, 2000

Uniontown District Office

724-439-7325
FAX 724-439-7324

Mr. Edward M. Davis
Environmental Specialist
Killam Associates
Morocco Building
651 South Center Ave.
Somerset, Pa. 15501-2511

Dear Mr. Davis:

I received your request to identify any permitted community and/or non-community water supply downstream of the Consol Coal Company site; Richill Township, Greene County. The following non-community systems in the area would be the Bailey Mine Water Treatment Plant located on the site. This is a surface water treatment owned and operated by Consol Coal Company.

Should you have any further questions feel free to contact me at 724-439-7325 Monday – Friday between the hours of 8 AM and 4 PM.

Sincerely,

Philip Ranieri / TZ

Philip Ranieri, Sanitarian
Water Supply Management

PR:tz

COMMONWEALTH OF PENNSYLVANIA
Department of Conservation and Natural Resources

Bureau of Recreation and Conservation
Division of Conservation Partnerships
Rachel Carson State Office Building
P.O. Box 8475
Harrisburg, PA 17105-8475
717-787-2316

PA Scenic Rivers - DCNR Rivers Conservation - Recreation Trails

Speed Message:

May 22, 2000

Subject: Consol Pennsylvania Coal Co.
Richhll Township
Greene County: May 22, 2000

To: Edward M. Davis
Morocco Building
651 South Center Avenue
Somerset, PA 15501-2511

From: Jim Mays
DCNR Rivers Section
Harrisburg, PA

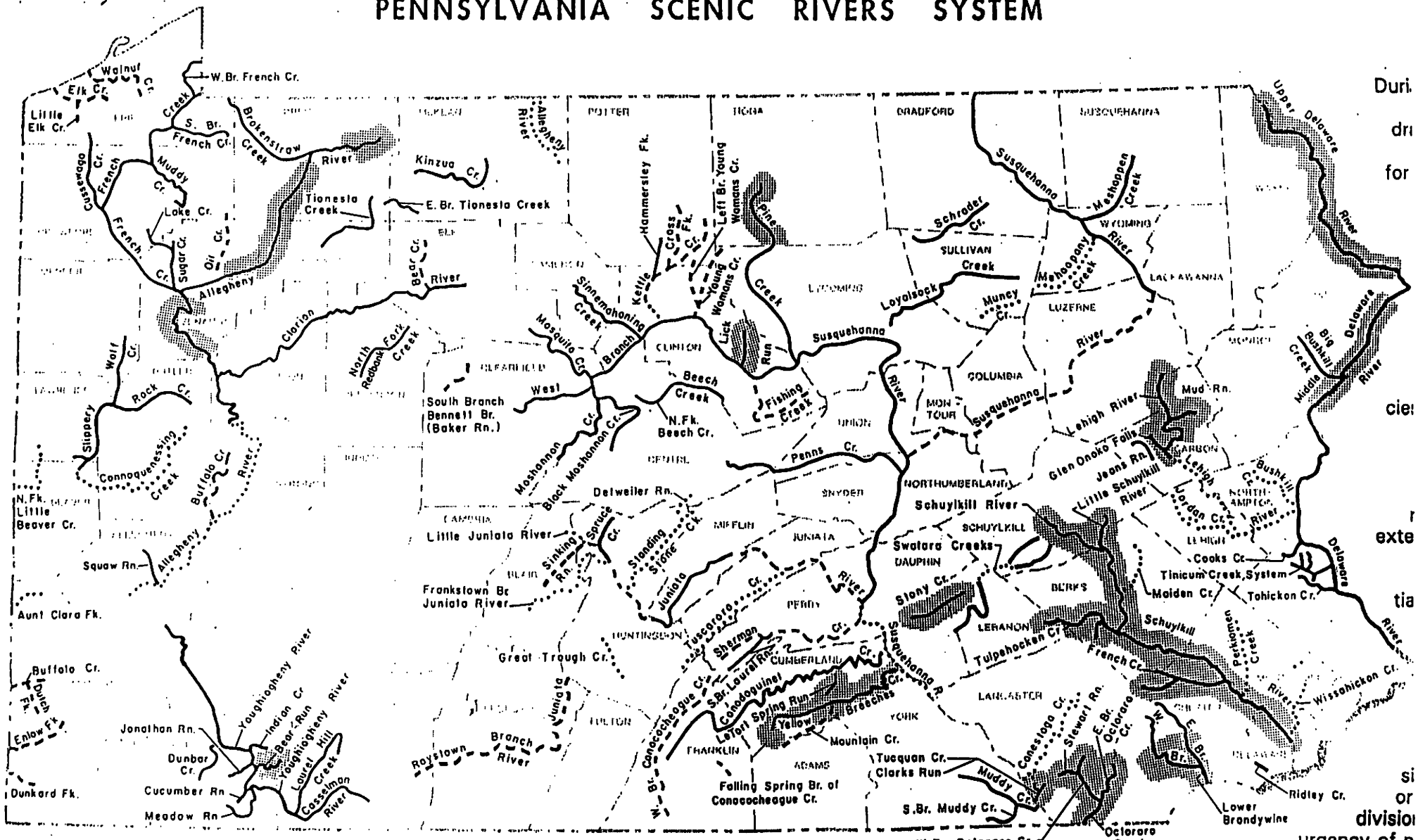
Jim Mays

Message:

The DCNR Rivers Program Staff is given the responsibility to review and assess impacts from projects on or along designated PA Scenic Rivers and 1-A Priority waterways.

Since the project you referred to us for review does not involve either of these types of waterways it is not necessary for you to submit it for our review. The information you sent to us is being returned. Also, I am enclosing, for your future use, a map showing designated scenic rivers and 1-A priority streams. In the near future we will have this map, along with a description of the waterways on the DCNR Rivers Activities website; http://www.dcnr.state.pa.us/rivers/srhome.htm.

PENNSYLVANIA SCENIC RIVERS SYSTEM



Duri
dri
for
cie
exte
tia
si
or
division
urgency of p
waterways with an i

PRIORITY : 1 - A ——— 1 - B - - - - - - 1 - C ····· DESIGNATED

Killam
Associates ▫ Consulting Engineers

Morocco Building
651 South Center Avenue
Somerset, PA 15501-2511
Telephone: 814-445-5645
Fax: 814-445-5738
killam@shol.com
www.randerskillam.com

Terry TH

Terry

May 10, 2000

Ms. Marian H. Hrubovcak
Division of Conservation Partnerships
Bureau of Recreation and Conservation
DCNR
P.O. Box 8475
Harrisburg, PA 17105-8475

RECEIVED
MAY 15 2000
Bureau of Recreation & Conservation

RE: Consol Pennsylvania Coal Co.
Greene County, PA
Environmental Information Request

Dear Ms. Hrubovcak:

Killam Associates is assisting Consol Pennsylvania Coal Company in the selection of a site for a coal refuse disposal facility. The proposed site will be located in Richhill Township, Greene County, PA. The site selection area is shown on the enclosed 7.5' U.S.G.S. Wind Ridge, PA quadrangle. Information is requested concerning the site location with any corridor of a stream or river designated as a natural or state wild, scenic, recreation or modified recreational river in accordance with the National Wild and Scenic Rivers Act of 1968, or the Pennsylvania Scenic Rivers Act. Additional information is also requested concerning the site location within one mile of the nearest bank of a stream or river listed as a 1-A Priority for study by the Department of Environmental Protection as a state wild, scenic, recreational or modified recreational river.

We appreciate your cooperation in this matter. If you have any questions please feel free to contact me.

Sincerely,

Edward M. Davis

Edward M. Davis
Environmental Specialist

EMD/jk
85401001.z
Enclosure

cc: J. Pachter, CPCC
file 619584.01

Pennsylvania Department of Conservation and Natural Resources
Rachel Carson State Office Building
P.O. Box 8551
Harrisburg, PA 17105-8551
May 22, 2000

Bureau of State Parks

717-787-6674

Mr. Edward M. Davis
Environmental Specialist
Killam Associates
651 South Center Avenue
Somerset, PA 15501-2511

Dear Mr. Davis:

We have reviewed the site location map for the proposed Consol Coal Company coal refuse disposal site in Richhill Township, Greene County, Pennsylvania. Please be advised that this location is approximately four miles northeast of Ryerson Station State Park.

If you have any further questions, please contact me. Thank you for the opportunity to review this proposal.

Sincerely,

for James P. Barr
Chief
Resources Management Section
Resources Management and
Planning Division

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pennsylvania Field Office
315 South Allen Street, Suite 322
State College, Pennsylvania 16801-4850

June 15, 2000

Mr. Edward M. Davis
Killam Associates
Morocco Building
651 South Center Avenue
Somerset, PA 15501-2511

Dear Mr. Davis:

This responds to your letter of May 10, 2000, requesting information about natural resource areas of special concern, and federally listed and proposed species in the vicinity of the proposed coal refuse disposal facility to be located in Richhill Township, Greene County, Pennsylvania. The following comments are provided pursuant to the Fish and Wildlife Coordination Act (48 Stat. 401, 16 U.S.C. 661 *et seq.*) and the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*).

Except for occasional transient species, no federally listed or proposed threatened or endangered species under our jurisdiction are known to occur within the project impact area. Therefore, no biological assessment or further Section 7 consultation under the Endangered Species Act will be required with the Fish and Wildlife Service. Should project plans change, or if additional information on listed or proposed species becomes available, this determination may be reconsidered. A compilation of certain federal status species in Pennsylvania is enclosed for your information.

Based on our office review of project information provided and map reconnaissance (i.e., County Soils maps and/or National Wetland Inventory maps), wetlands may occur within the boundaries of the proposed project. Work in wetlands requires permits from the Pennsylvania Department of Environmental Protection (DEP) and/or the Army Corps of Engineers (Corps). We suggest you contact the DEP and the Corps at the addresses listed below for information on permit requirements.

Pennsylvania Department of
Environmental Protection
Division of Rivers and
Wetlands Conservation
P.O. Box 8554
Harrisburg, PA 17105-8554

District Engineer, Pittsburgh
U.S. Army Corps of Engineers
Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222

By copy of this letter, we are informing these agencies of the proposed project.

This response relates only to endangered and threatened species under our jurisdiction and a preliminary review for wetlands, based on an office review of the proposed project's location. No field inspection of the project area has been conducted by this office. Therefore, we suggest contacting a qualified consultant to evaluate your site for potential wetland impacts.

For information regarding State resources of special concern, including State-listed endangered and threatened species, please contact the Pennsylvania Game Commission (birds and mammals; State Game Lands), the Pennsylvania Fish and Boat Commission (fish, reptiles, amphibians and aquatic invertebrates; trout streams), the Pennsylvania Department of Conservation and Natural Resources (PNDI; plants and plant sanctuaries; State Forests; State Parks; Natural Areas; State Wild and Scenic Rivers) and the Department of Environmental Protection (Special Protection Watersheds; Wetlands).

If we can be of further assistance, please contact Michael McCarthy of my staff at 814-234-4090.

Sincerely,

for David Densmore
Supervisor

Enclosure

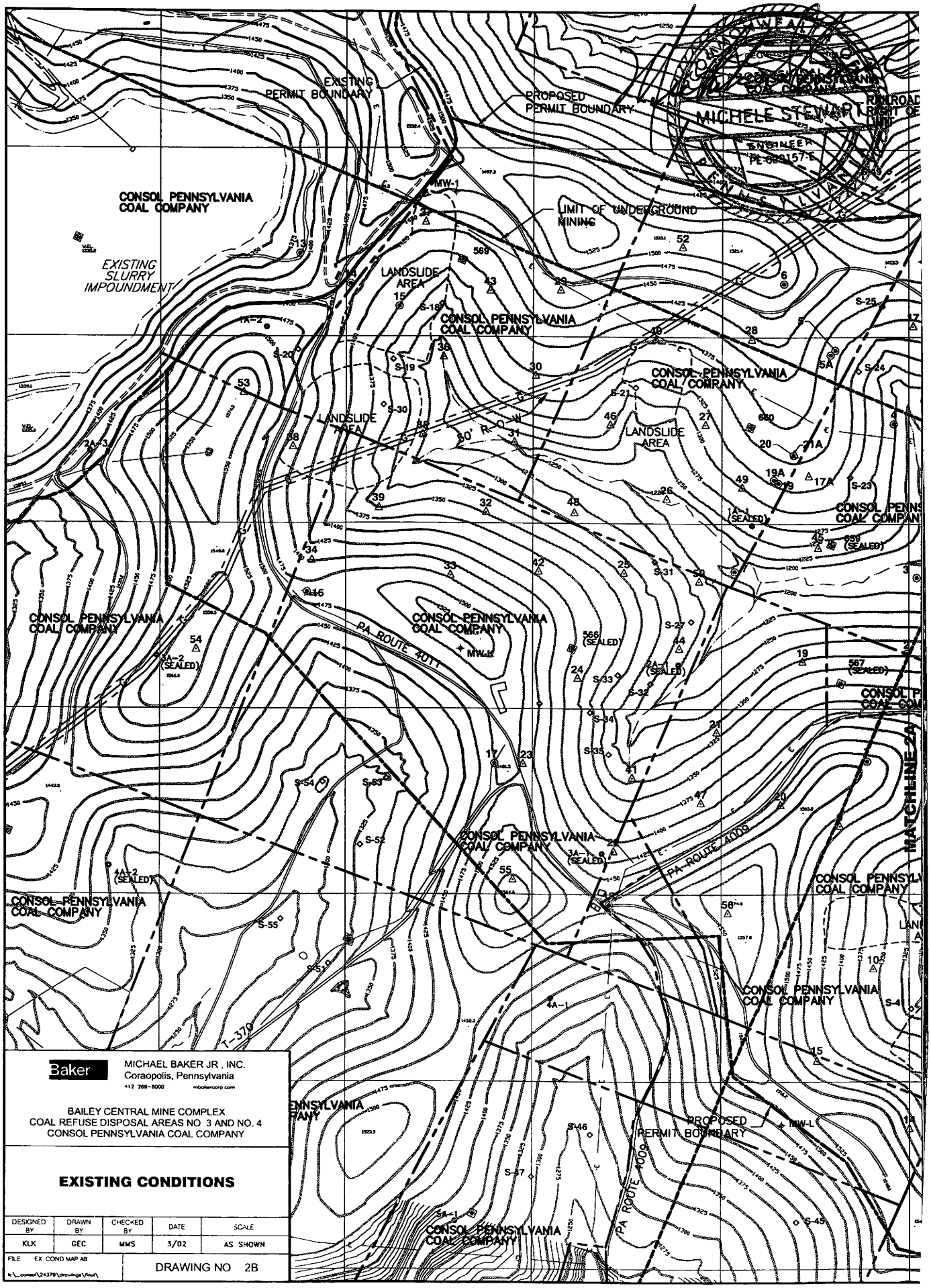
FEDERALLY LISTED, PROPOSED AND CANDIDATE SPECIES (in Pennsylvania)

COMMON NAME	SCIENTIFIC NAME	STATUS*	DISTRIBUTION
FISHES			
Shortnose sturgeon**	*Acipenser brevirostrum*	E	Delaware River & other Atlantic coastal waters
REPTILES & AMPHIBIANS			
Bog turtle	*Clemmys muhlenbergii*	T	Current - Adams, Berks, Bucks, Chester, Cumberland, Delaware, Franklin, Lancaster, Lebanon, Lehigh, Monroe, Montgomery, Northampton and York Counties. Historic - Crawford, Mercer and Philadelphia Counties
Eastern massasauga rattlesnake	*Sistrurus catenatus catenatus*	C	Current - Butler, Crawford, Mercer and Venango Counties. Historic - Allegheny and Lawrence Counties.
BIRDS			
Bald eagle	*Haliaeetus leucocephalus*	T	Suitable habitats across the state. Recent nesting in Butler, Centre, Chester, Crawford, Dauphin, Erie, Forest, Huntingdon, Lancaster, Mercer, Northumberland, Pike, Tioga, Venango, Warren and York Co. Wintering concentrations occur near ice-free sections of rivers, lakes and reservoirs, including the Delaware River.
Piping plover	*Charadrius melodus*	E	Presque Isle (Erie County). Migratory. No nesting in Pennsylvania since mid-1950s.
MAMMALS			
Indiana bat	*Myotis sodalis*	E	Winter hibernacula: Armstrong, Blair, Lawrence, Luzerne, Mifflin and Somerset Co.
MOLLUSKS			
Clubshell mussel	*Pleurobema clava*	E	French Creek and Allegheny River watersheds; Clarion, Crawford, Erie, Forest, Mercer, Venango and Warren Counties
Northern riffleshell	*Epioblasma torulosa rangiana*	E	French Creek and Allegheny River watersheds; Clarion, Crawford, Erie, Forest, Mercer, Venango and Warren Counties
PLANTS			
Northeastern bulrush	*Scirpus ancistrochaetus*	E	Current - Adams, Bedford, Blair, Carbon, Centre, Clinton, Cumberland, Dauphin, Franklin, Huntingdon, Lackawanna, Lehigh, Lycoming, Mifflin, Monroe, Perry, Snyder and Union Counties. Historic - Northampton County
Small-whorled pogonia	*Isotria medeoloides*	T	Current - Centre and Venango Counties. Historic - Berks, Chester, Greene, Monroe, Montgomery and Philadelphia Counties

** E = Endangered, T = Threatened, PE = Proposed Endangered, PT = Proposed Threatened, C = Candidate* *Revised 3/20/00*

*** Shortnose sturgeon is under the jurisdiction of the National Marine Fisheries Service*

U.S. FISH AND WILDLIFE SERVICE
315 SOUTH ALLEN ST., SUITE 322, STATE COLLEGE, PA 16801



Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

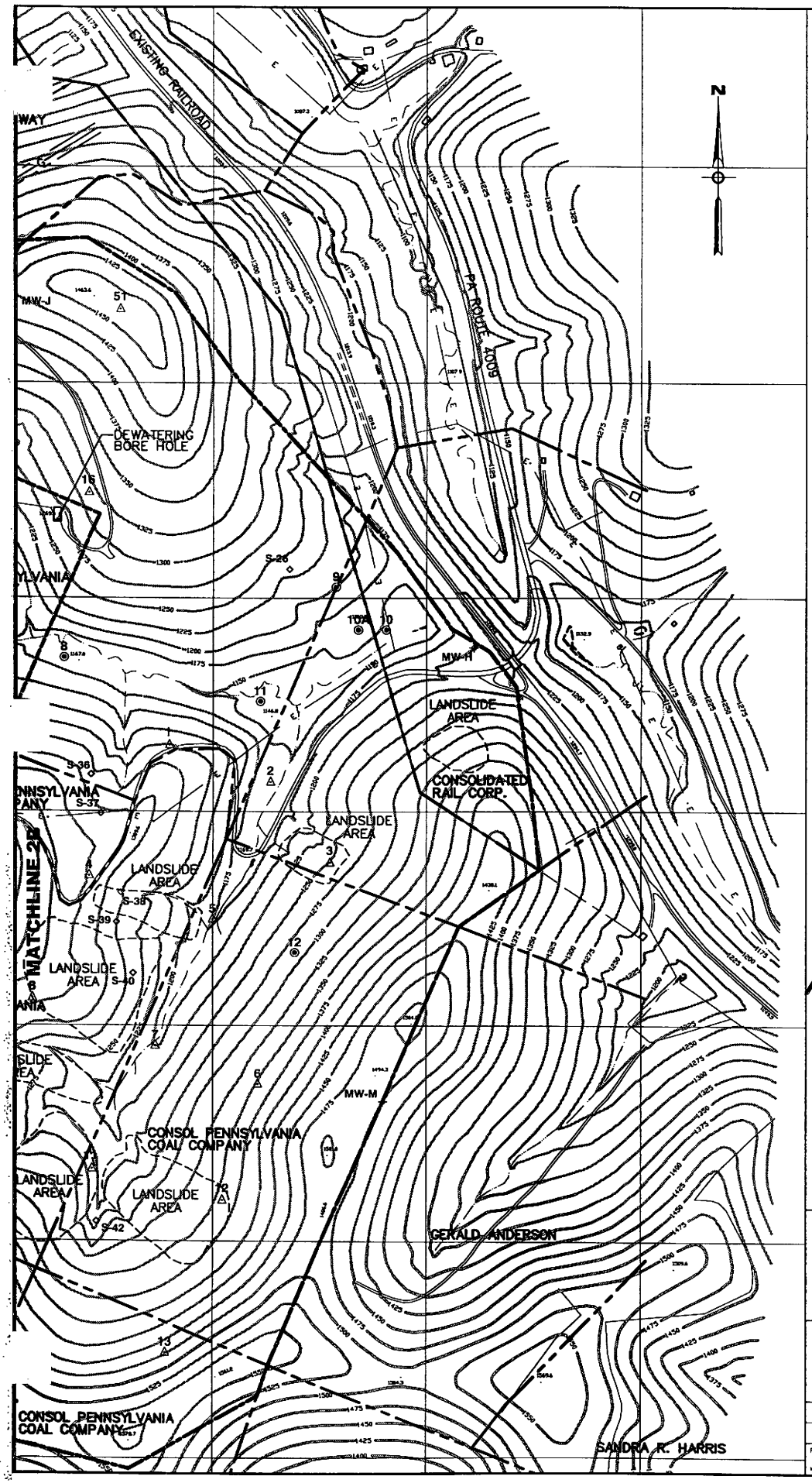
EXISTING CONDITIONS

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
KLK	GEC	MMS	3/02	AS SHOWN

FILE EX COND MAP AB
k:_consol\24379\drawings\final\

DRAWING NO 2B

January 21, 20 :12 p.m. LOGIN NAME : gcarracci
Drawing: J:\P_CTS_CONSOL\24379\DRAWINGS\FINAL\EX COND MAP-AB.DWG-(LAYOUT)
Attached Xrefs: BOR2436a.DWG
S.O. No: 24379-000-0000-ENG03



LEGEND

- Stream
- Groundwater Monitoring Well Location — MW-L
- Spring Sampling & Inventory Location — S-25
- Degas Borehole — 4A-1
- Soil Borings — 4
- Test Pits — 16
- Gas Well — 660
- Oil Well
- Gasline and 50' Right-of-Way
- Property Boundary
- Limit of Underground Mining
- Electric Line — E
- Permit Boundary

Notes:

The existing 6" gas line and existing overhead electric lines will be relocated by others prior to construction. Locations of the existing and relocated gas and electric lines shown are approximate. The Contractor shall be responsible to verify the location and depths of all utilities prior to the start of construction. The contractor must comply with the Pennsylvania underground utilities act and shall contact PA one call at 1-800-242-1776 prior to construction.

Landslide areas shown were identified during a November 2001 site reconnaissance performed by Michael Baker Jr. personnel. There may be additional landslide or unstable areas other than those shown

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
MICHELE STEWART
ENGINEER
PE-029157-E

300 150 0 300
SCALE IN FEET

Baker
MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

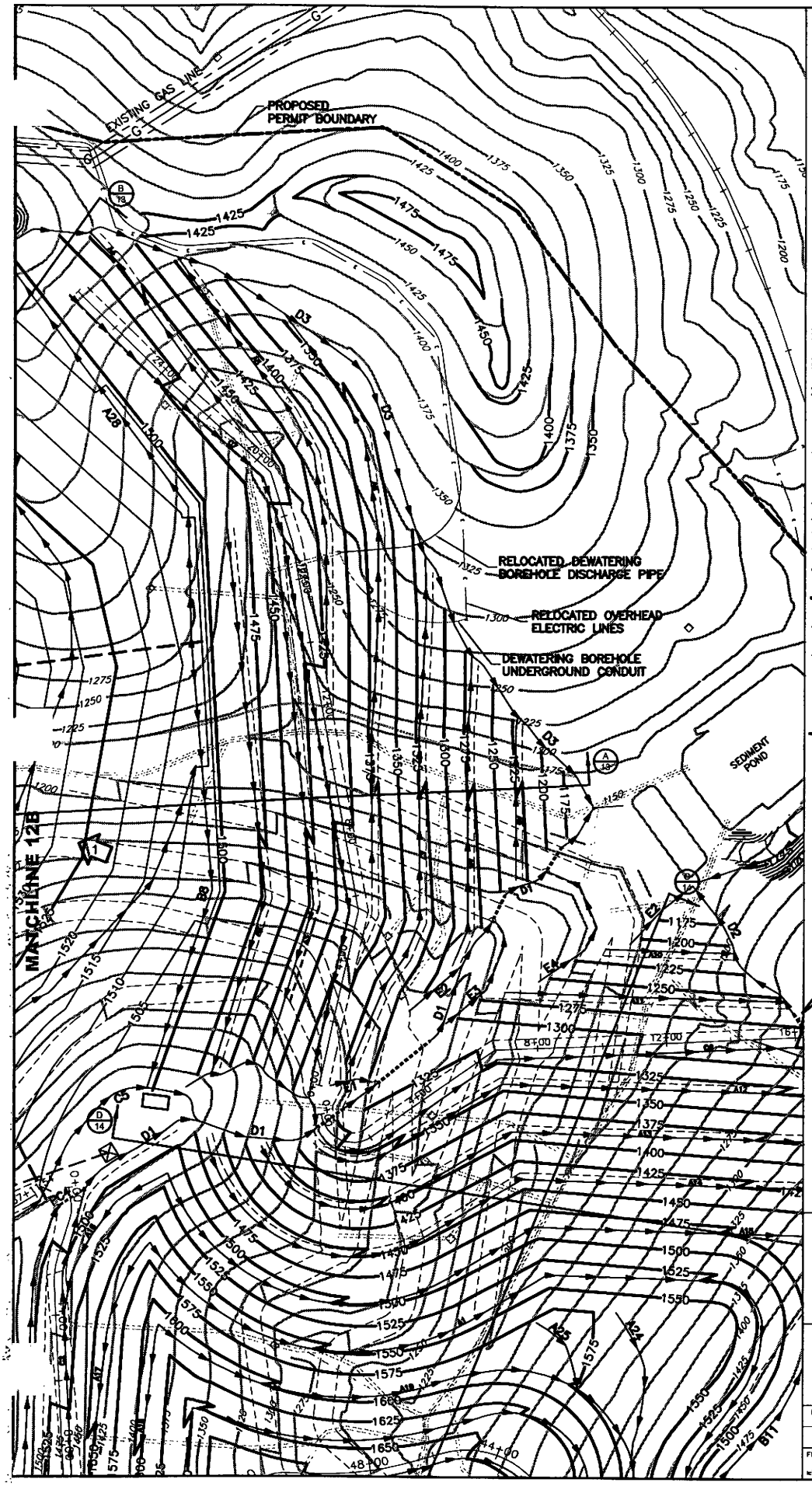
BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

EXISTING CONDITIONS

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
KLK	GEC	MMS	3/02	AS SHOWN

FILE EX COND MAP-AB
k:_consol\24379\drawings\final\

DRAWING NO. 2A



N

LEGEND

- DECANT RISER
- DECANT
- ROCK DRAIN
- MODIFIED ROCK DRAIN
- SPRING DRAIN
- SPRING LOCATION
- CHANNEL
- PROPOSED CONVEYOR & BIN
- GAS LINE & 50' ROW
- EDGE OF PROPOSED ROAD
- CULVERT
- PERMIT BOUNDARY
- COARSE REFUSE INTERNAL DRAIN
- OVERHEAD ELECTRIC LINE
- CAP PLACEMENT SEQUENCE AND DIRECTION
- CAP PLACEMENT AREA BOUNDARY

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
MICHELE STEWART
ENGINEER
PE-029157-E

200 100 0 200
SCALE IN FEET

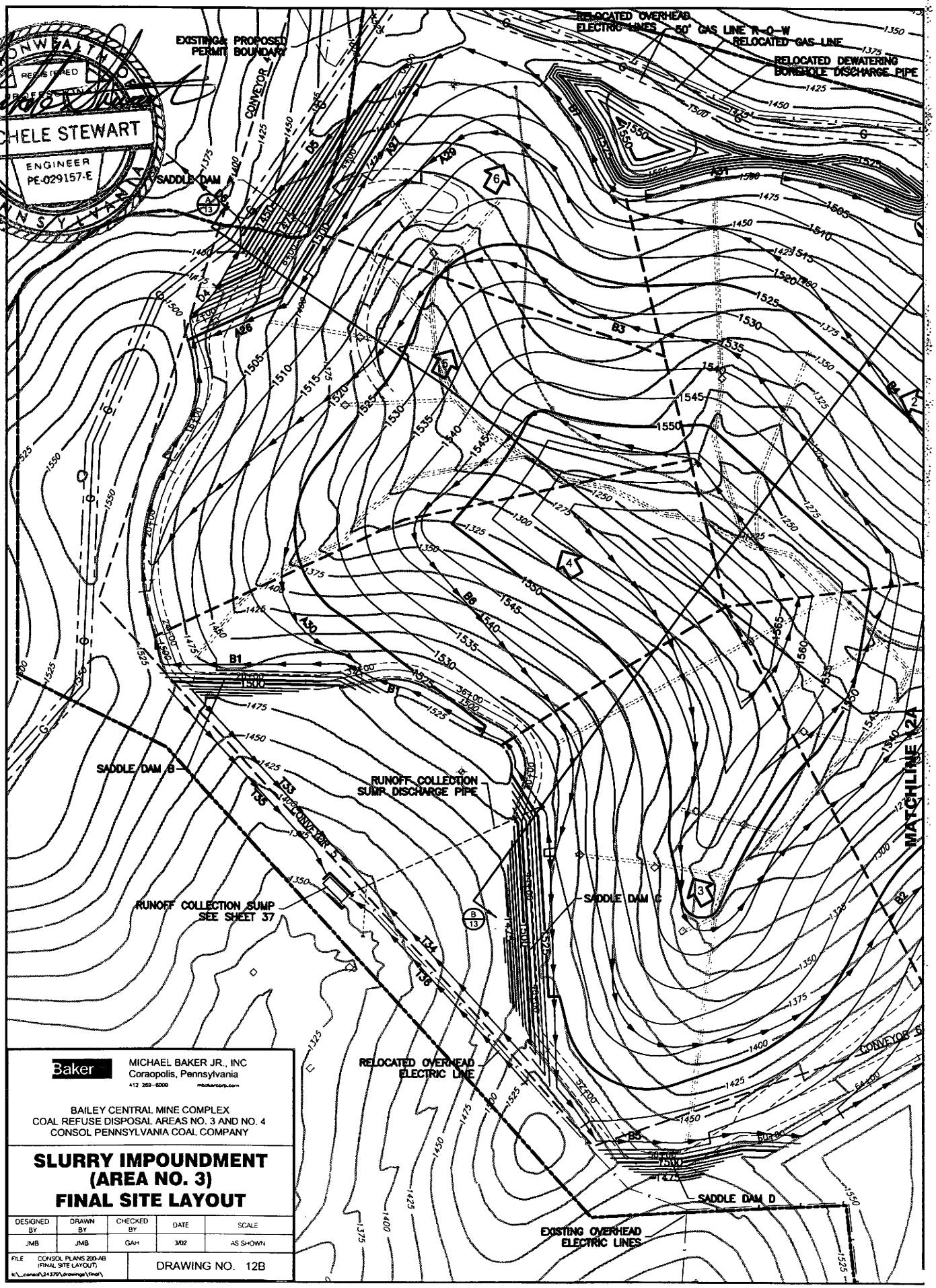
Baker
MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

SLURRY IMPOUNDMENT (AREA NO. 3) FINAL SITE LAYOUT

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	GAH	3/02	AS SHOWN

FILE CONSOL PLANS 200-AB (FINAL SITE LAYOUT)
DRAWING NO. 12A



Baker

MICHAEL BAKER JR., INC
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

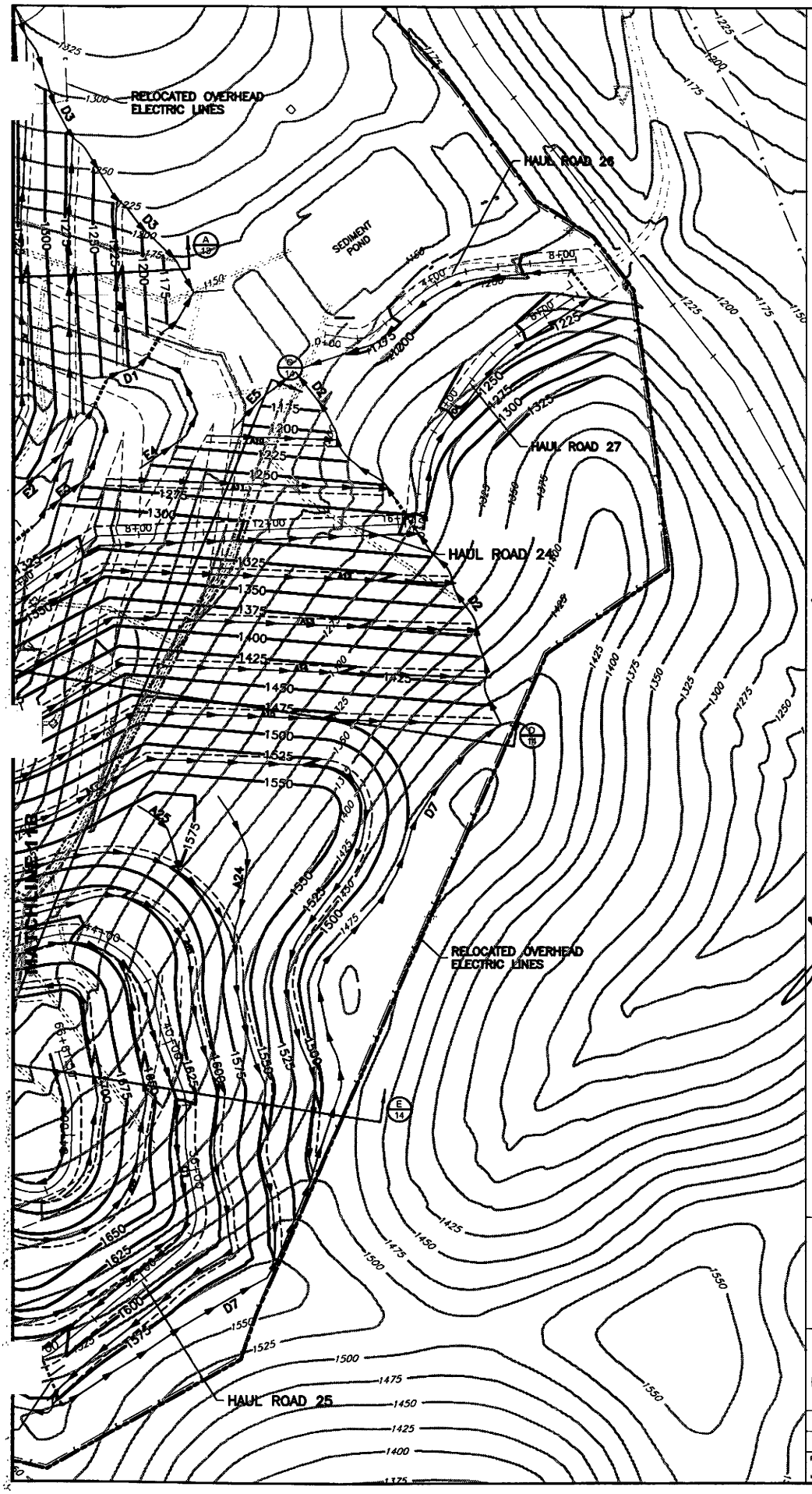
SLURRY IMPOUNDMENT (AREA NO. 3) FINAL SITE LAYOUT

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	GAH	3/02	AS SHOWN

FILE CONSOL PLANS 200-AB (FINAL SITE LAYOUT)
e:_consol\24379\drawings\final\

DRAWING NO. 12B

January 21, 2... 9:06 p.m. LOGIN NAME: gcarrocci
Drawing: J:\CTS\CONSOL\24379\DRAWINGS\FINAL\CONSOL PLANS 200.DWG-(FINAL SITE LAYOUT)
Attached Xrefs: BDR2436c.DWG
S.O. No. 24379-000-0000



N

LEGEND

- DECANT RISER
- DECANT
- ROCK DRAIN
- MODIFIED ROCK DRAIN
- SPRING DRAIN
- SPRING LOCATION
- CHANNEL
- PROPOSED CONVEYOR & BIN
- GAS LINE & 50' ROW
- EDGE OF PROPOSED ROAD
- CULVERT
- PERMIT BOUNDARY
- COARSE REFUSE INTERNAL DRAIN
- OVERHEAD ELECTRIC LINE

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
MICHELE STEWART
ENGINEER
PE-029157-E

200 100 0 200
SCALE IN FEET

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

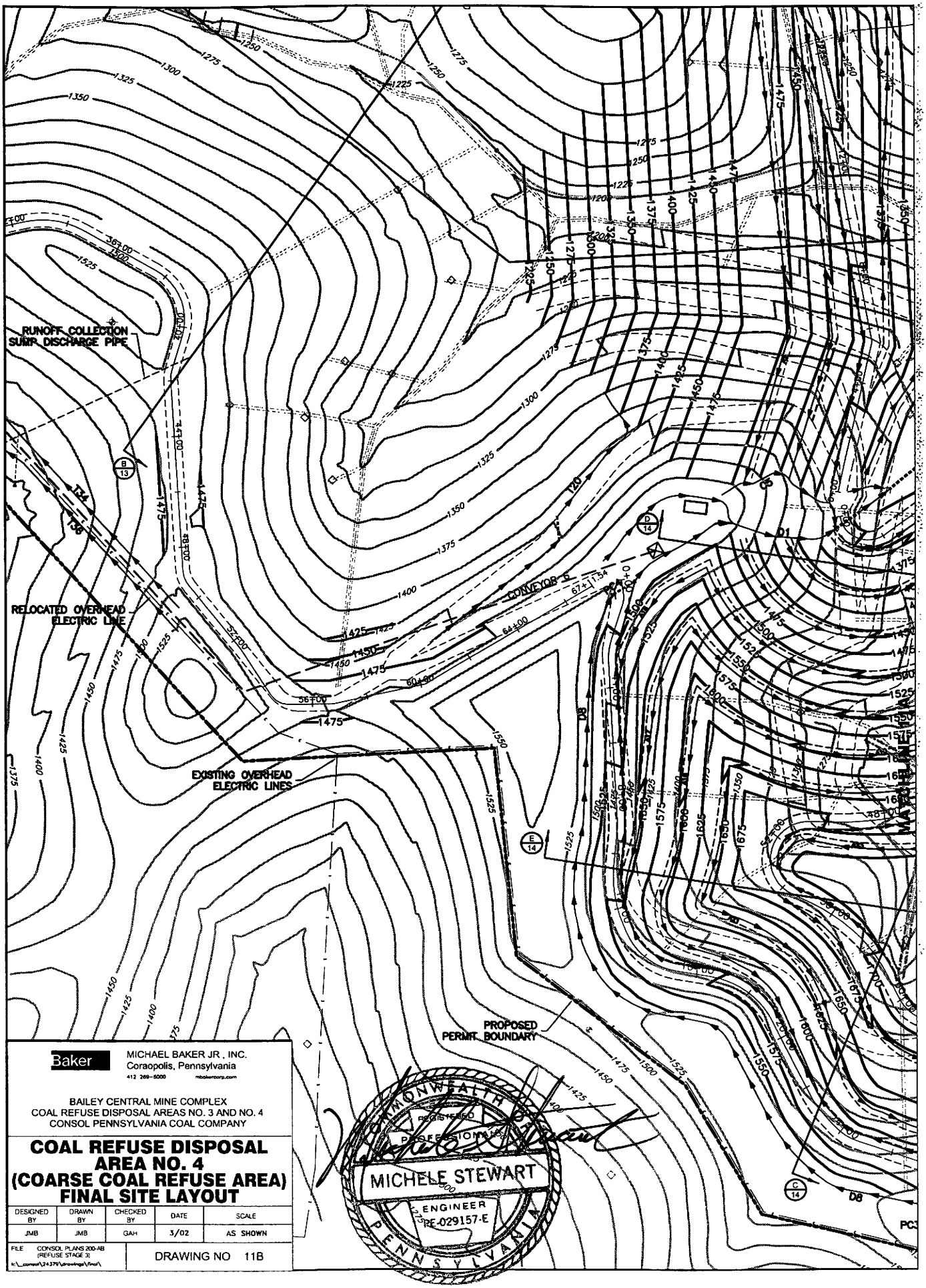
BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

COAL REFUSE DISPOSAL AREA NO. 4 (COARSE COAL REFUSE AREA) FINAL SITE LAYOUT

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	GAH	3/02	AS SHOWN

FILE CONSOL PLANS 200-AB (REFUSE STAGE 3)
k:_consol\24379\drawings\final\

DRAWING NO. 11A



Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

COAL REFUSE DISPOSAL AREA NO. 4 (COARSE COAL REFUSE AREA) FINAL SITE LAYOUT

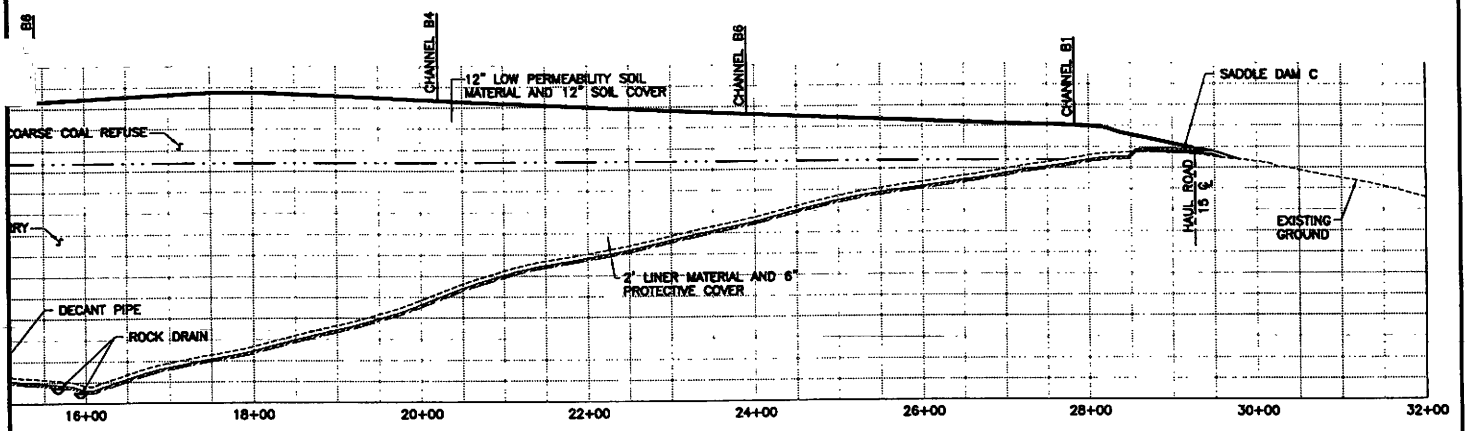
DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	GAH	3/02	AS SHOWN

FILE CONSOL PLANS 200-AB (REFUSE STAGE 3)
e:_consol\24379\drawings\final\

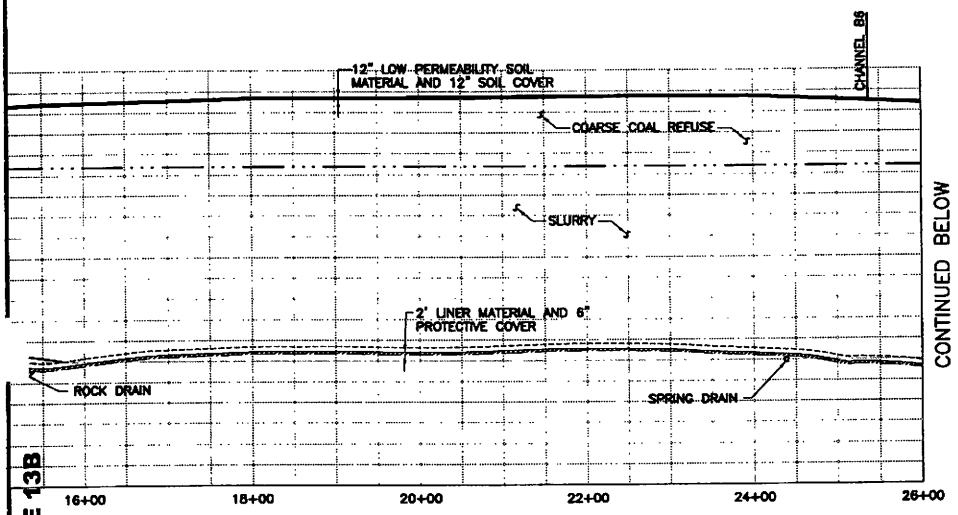
DRAWING NO 11B

January 21, 2
Drawing: J:
Attached Xrefs: BDR2436a.DWG
S O No 24379-000-0000

9:06 p.m. LOGIN NAME : gcarocci
C75 CONSOL \24379\DRAWINGS\FINAL \CONSOL PLANS 200-AB.DWG-(FINAL SITE LAYOUT)

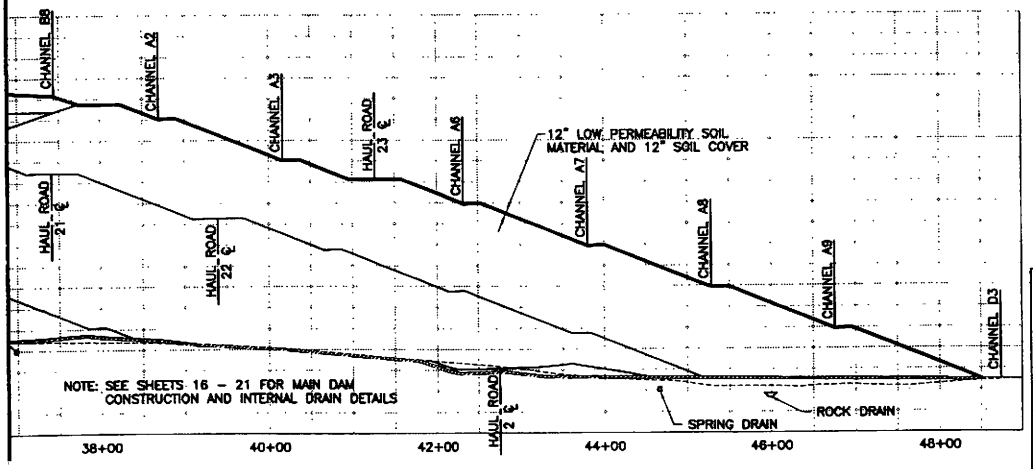


SECTION BB



CONTINUED BELOW

MATCHLINE 13B



COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
MICHELE STEWART
PE-029157-E

SCALE IN FEET (HORIZONTAL) 100 50 0 100

SCALE IN FEET (VERTICAL) 100 50 0 100

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

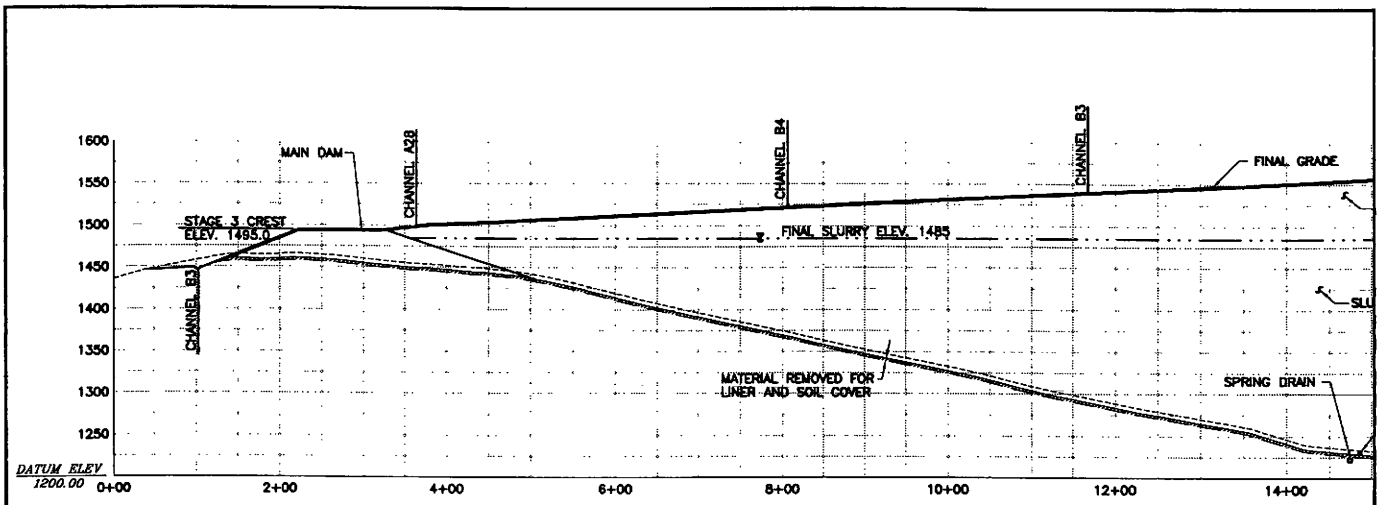
BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

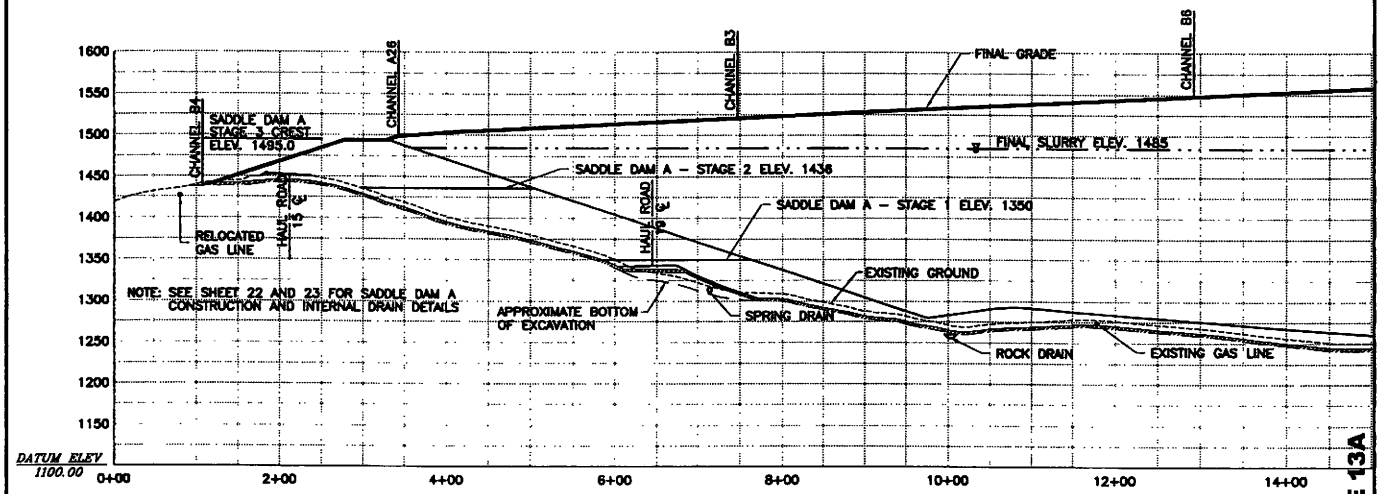
COAL REFUSE DISPOSAL AREA NO. 3 (SLURRY IMPOUNDMENT) CROSS SECTIONS

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	GAH	3/02	AS SHOWN

FILE: CROSS SECTIONS 100-AB (LAYOUT 1)
k:_consol\24379\drawings\final\

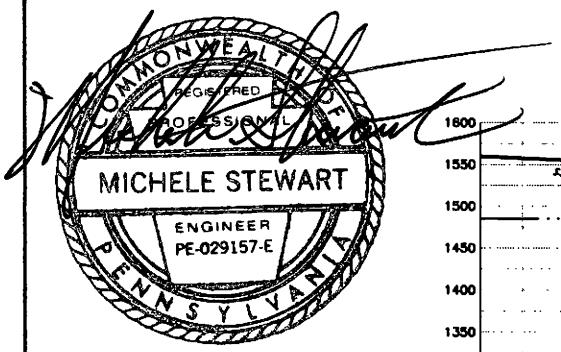
DRAWING NO. 13A

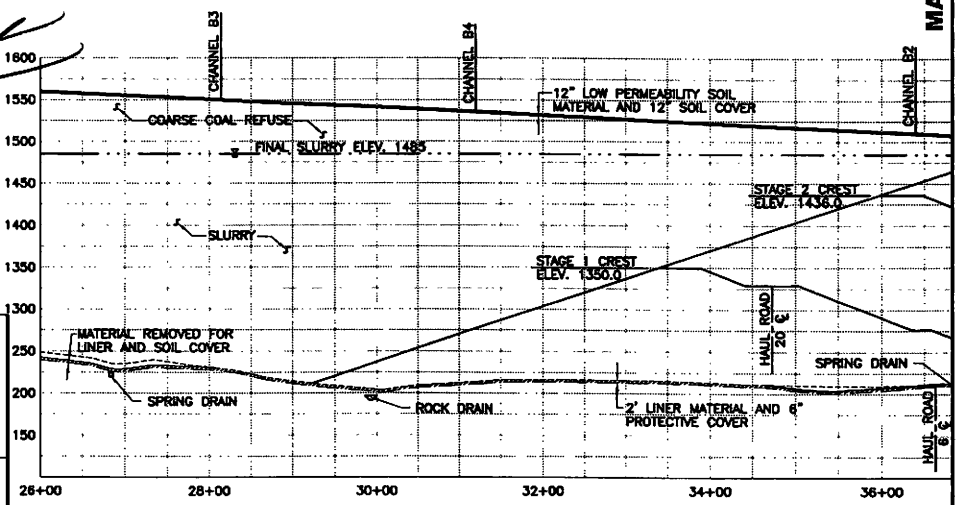




SECTION AA

MATCHLINE 13A





SECTION AA

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

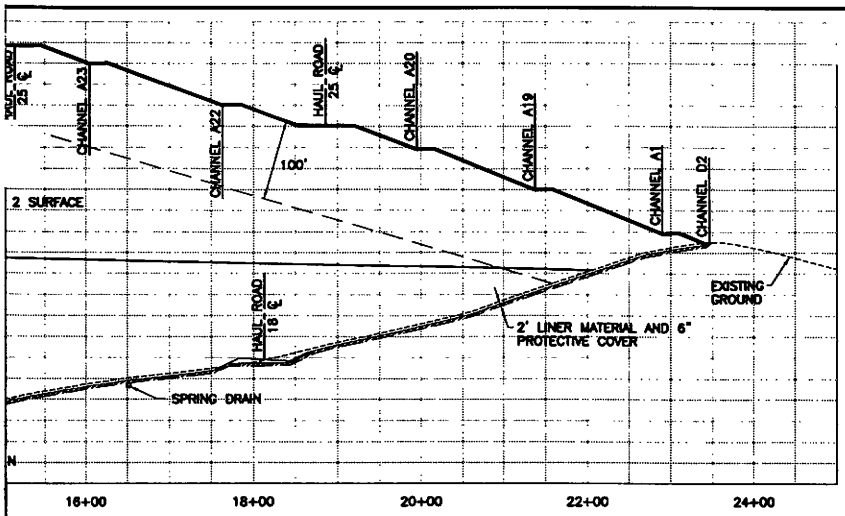
COAL REFUSE DISPOSAL AREA NO. 3 (SLURRY IMPOUNDMENT) CROSS SECTIONS

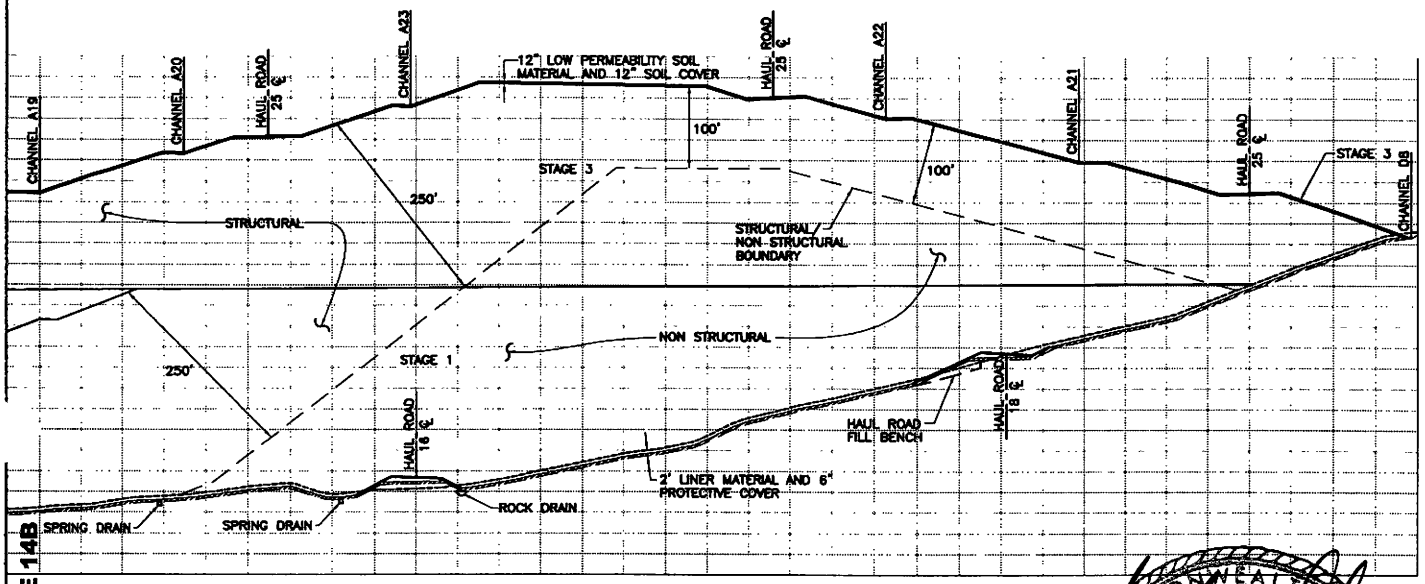
DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	GAH	3/02	AS SHOWN

FILE: CROSS SECTIONS 100-AB (LAYOUT 1)
k:_consol\24379\drawings\final\

DRAWING NO. 13B

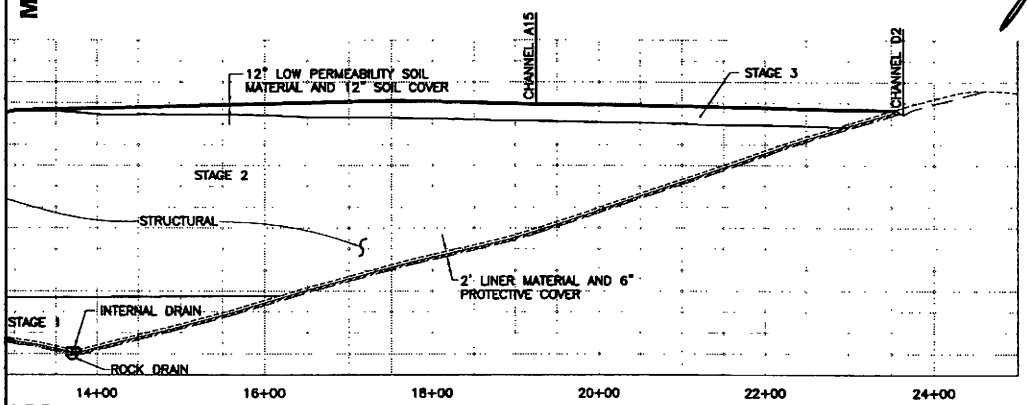
January 22, 2002 p.m. LOGIN NAME: gcarrocci
Drawing: L:\PR\CONSOL\24379\DRAWINGS\FINAL\CROSS SECTIONS 100-AB.DWG-(LAYOUT3)
Attached Xrefs: BD
S.O. No.: 24379-00
del.DWG





MATCHLINE 14B

TION CC



N DD

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL ENGINEER
MICHELE STEWART
ENGINEER
PE-029157-E

100 50 0 100
SCALE IN FEET (HORIZONTAL)
100 50 0 100
SCALE IN FEET (VERTICAL)

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

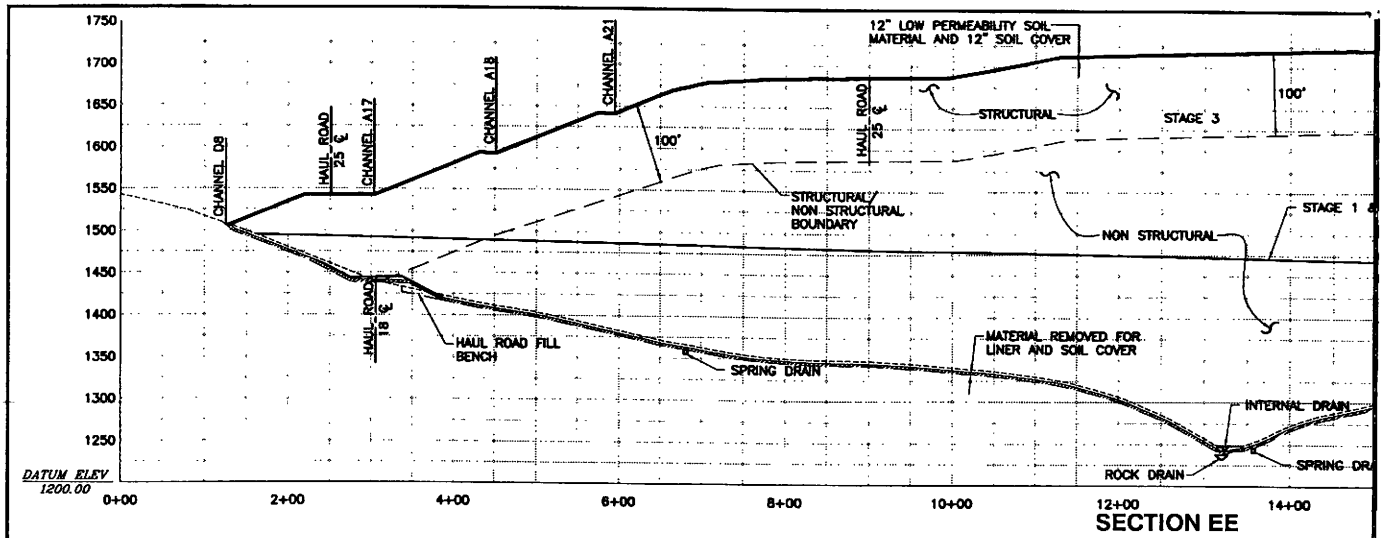
BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

COAL REFUSE DISPOSAL AREA NO. 4 (COARSE COAL REFUSE AREA) CROSS SECTIONS

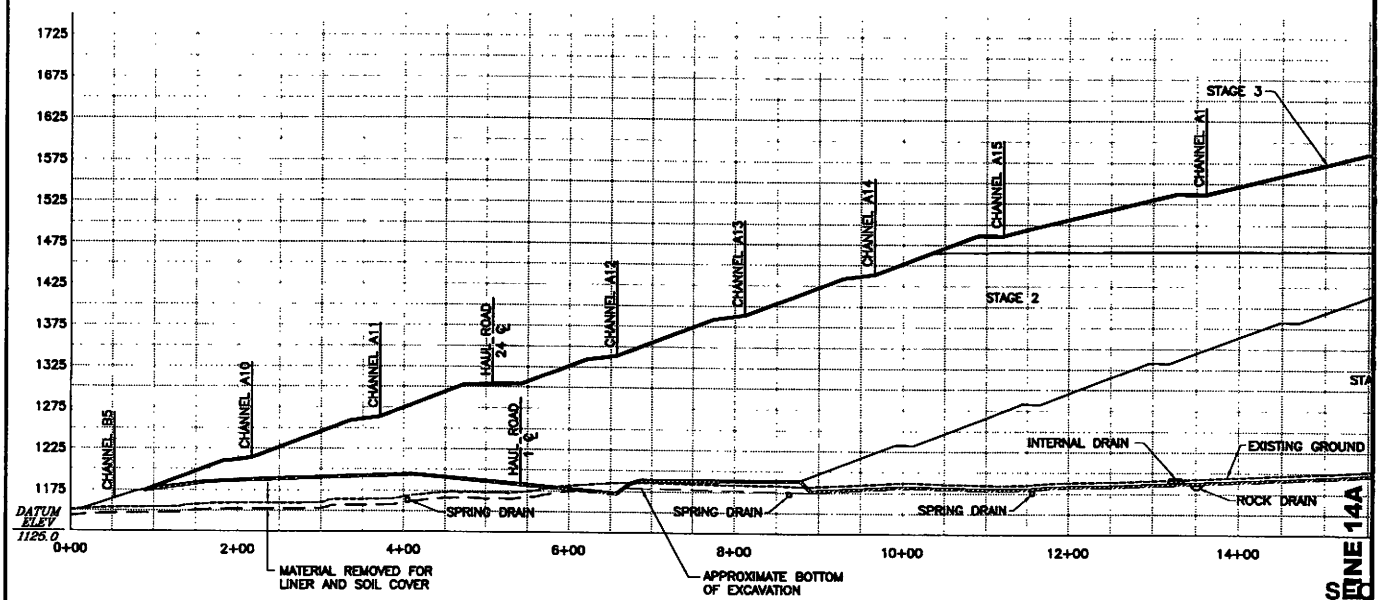
DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	GAH	3/02	AS SHOWN

FILE CROSS SECTIONS 100-AB (LAYOUT 3)
t:_consol\24379\drawings\final\

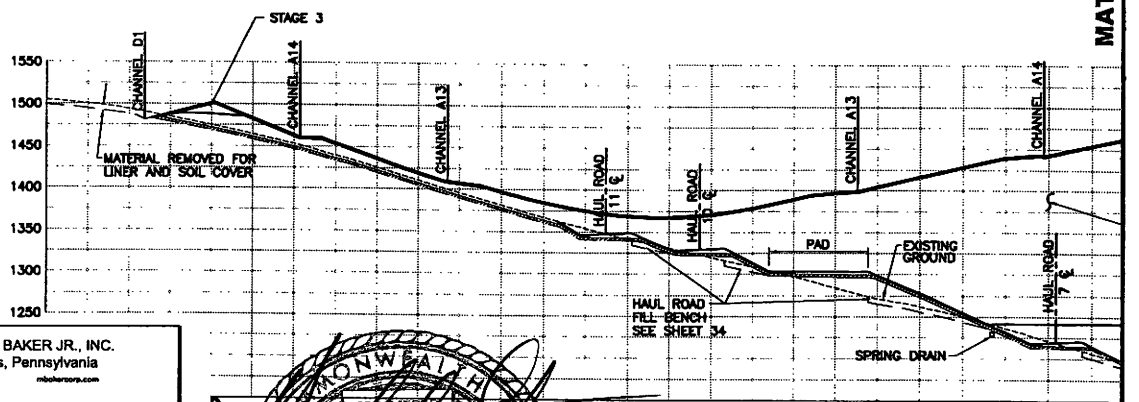
DRAWING NO. 14A



SECTION EE



MATCHLINE 14A



SECTIO

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakerjrcorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

COAL REFUSE DISPOSAL AREA NO. 4 (COARSE COAL REFUSE AREA) CROSS SECTIONS

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	GAH	3/02	AS SHOWN

FILE: CROSS SECTIONS 100-AB (LAYOUT 3)
k:_consol\24379\drawings\final\

DRAWING NO. 14B

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
MICHELE STEWART
ENGINEER
PE-029157-E

p.m.: LOGIN NAME: gcarocci
_CONSOL\24379\DRAWINGS\FINAL\CROSS SECTIONS 100-AB.DWG-(LAYOUT3)
det.DWG

January 22, 2002
Drawing: k:\P\
Attached Xrefs: B
S.O. No.: 24379-00

Pennsylvania Department of Environmental Protection

3913 Washington Road
McMurray, PA 15317
August 1, 2001

McMurray District Office 724-941-7100

Mr. Jonathan Pachter
Consol Energy, Inc.
1800 Washington Road
Pittsburgh, PA 15241-1421

Re: New Coal Refuse Disposal Area – Site Selection
Bailey Central Mine Complex
Consol Pennsylvania Coal Company
Richhill Township
Greene County

Dear Mr. Pachter:

A review of the above referenced Coal Refuse Disposal Site Selection Report, accepted on March 20, 2001 and subsequent revisions from Michael Baker Jr., Inc. has been completed. Candidate Site No. 4 has been determined to be the most suitable Non-Preferred Site for refuse disposal in accordance with the Coal Refuse Disposal Control Act, as amended. You may now submit a Coal Refuse Disposal Application to our office for review.

Please be advised that it is a violation of the law to perform any work in conjunction with a coal mining activity without first obtaining a written permit from the Department.

If you have any questions, please contact this office at the above listed number.

Sincerely,

Joseph F. Leone

Joseph F. Leone, P.E.
Chief, Bituminous Mine Permit Section
District Mining Operations

AR Rec'd Scott 8/3/2001

JFL/CB/jf: f a JK JFL

bc: Greensburg District Office – C. R. Greene
MCI Keith Lucas
Michael Baker Jr., Inc. – Michele Stewart, P.E.
U.S. Army Corps of Engineers – Scott Hans
U.S. E.P.A., Region III – Daniel Sweeney
U.S. Department of the Interior, Fish and Wildlife Service – Cindy Tibbott
PA Game Commission – Denver McDowell
PA Fish Commission – Steve Kepler

CONSOL PENNSYLVANIA COAL COMPANY
1800 Washington Road
Pittsburgh, PA 15241-1421

March 19, 2001

Mr. Joel Koricich, Engineering Supervisor
Pennsylvania Department of Environmental Protection
District Mining Operations
3913 Washington Road
McMurray, PA 15317

RE: Bailey Central Mine Complex
Richhill Township, Greene County
CMAP No. 30841317, CRDA No. 30810701

Dear Mr. Koricich:

Enclosed for your review and approval are three copies of a "Site Selection Study – Alternatives Analysis Report for Bailey Central Mine Complex Coal Refuse Disposal Facility". Michael Baker Jr. Inc. compiled this analysis for Consol Pennsylvania Coal Company (CPCC). The enclosed report provides the PA Department of Environmental Protection with the information required by Technical Guidance Document No. 563-2113-660.

Any priority that your office can place upon reviewing this analysis is greatly appreciated. CPCC hopes to begin fieldwork soon to gather the engineering and environmental information needed for designing a new slurry impoundment for this existing mining complex. Your approval of the enclosed document is critical to the schedule of this project. Please feel free to call me at (412) 831-4679 with any questions regarding this correspondence and its enclosures.

Sincerely,

Jonathan M. Pachter

Jonathan M. Pachter

Enclosures

rec'd 3/22/2001

M2 April 2001

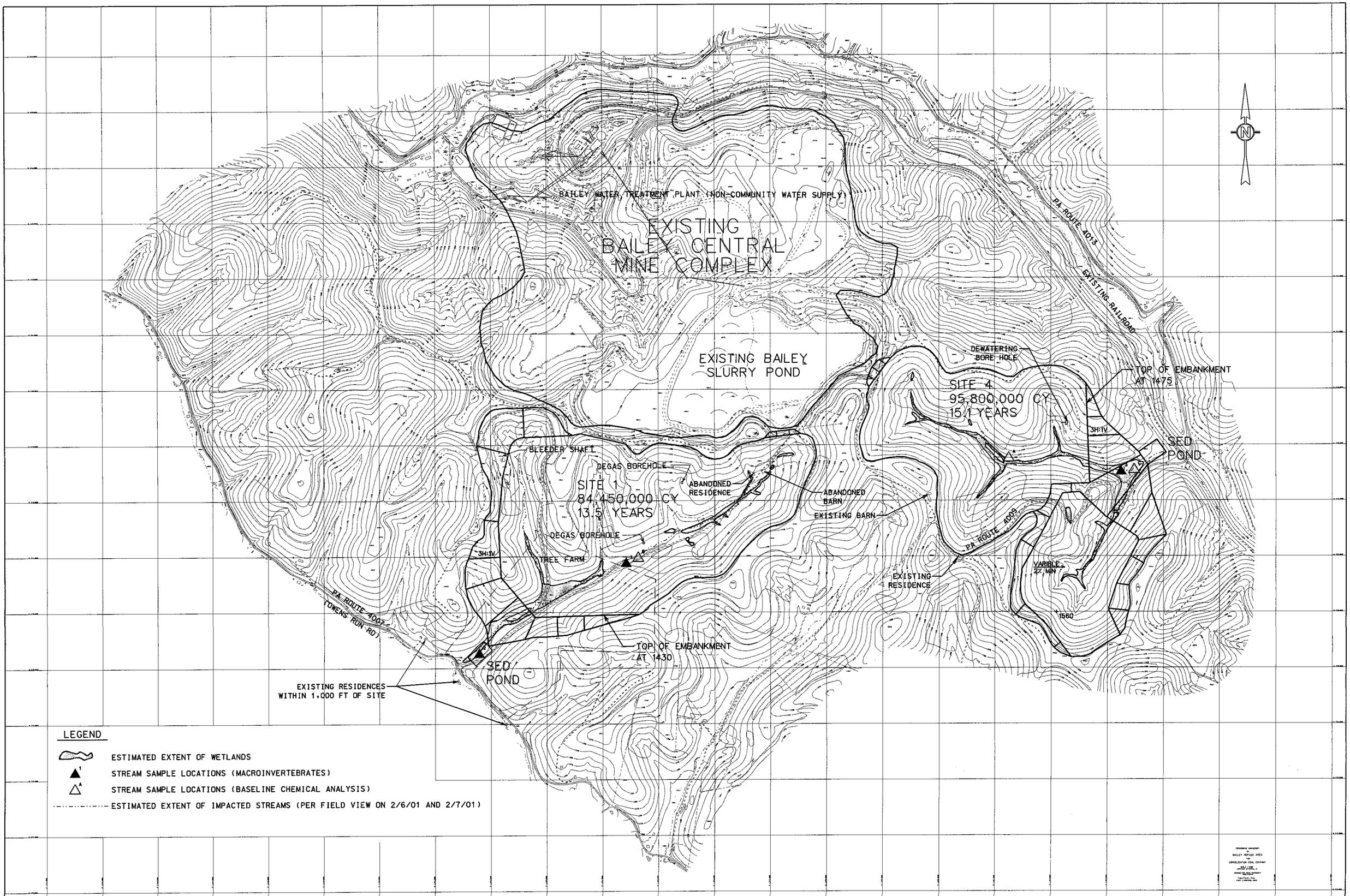
cc w/ enc.: Mr. Scott Hans
U. S. Army Corps of Engineers
Pittsburgh District
William S. Moorehead Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222-4186

Mr. Daniel Sweeney
U. S. Environmental Protection Agency
Region III
Wetlands and Marine Policy Section
1650 Arch Street
Philadelphia, PA 19103-2029

Ms. Cindy Tibbott
U. S. Department of the Interior
Fish and Wildlife Service
Suite 322
315 South Allen Street
State College, PA 16801

Mr. Denver McDowell
PA Game Commission
Bureau of Land Management
2001 Elmerton Avenue
Harrisburg, PA 17110-9797

Mr. Steven Kepler
PA Fish and Boat Commission
Division of Environmental Services
450 Robinson Lane
Bellefonte, PA 16823-9616



REVISIONS

DESIGNED GPH
DRAWN DRP
CHECKED GPH
REVIEWED
S.O. 24379-000-0000
CADD FILE DETAILED SITES.DGN

CONSOL PENNSYLVANIA COAL COMPANY
PITTSBURGH, PENNSYLVANIA

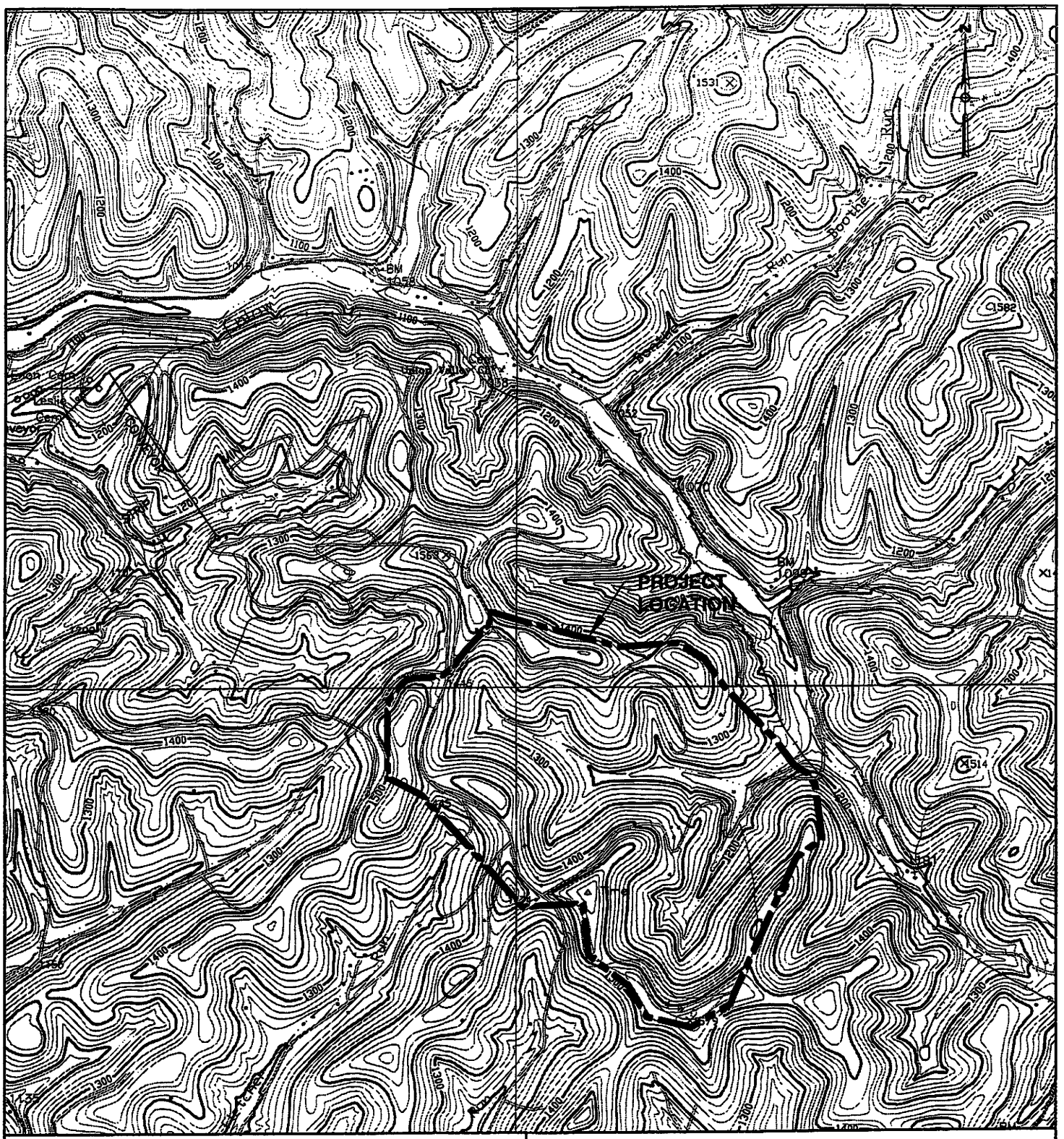
MICHAEL BAKER JR., INC.
CONSULTING ENGINEERS CORAOPOLIS, PENNSYLVANIA

Baker

EXHIBIT 2 SECOND ASSESSMENT
SITE SELECTION STUDY – ALTERNATIVES ANALYSIS
BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY

SCALE 1" = 600'
DATE FEB. 15, 2001

SHEET NO.
E-2



BAILEY CENTRAL MINE COMPLEX COAL
REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

PROJECT LOCATION MAP

WIND RIDGE AND ROGERSVILLE, PA.
QUADRANGLES - U.S.G.S. 7.5 MINUTE SERIES

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

SCALE:	DATE:
1" = 2000'	JANUARY, 2002

Drawing: J:\ 7S_CONSOL\24379\DRAWINGS\FINAL\MODULE 6-1.DWG-(LOCATION MAP
Attached Xrefs: 3a.DWG
S.O. No.: 24379 000-ENG03

CONSOL ENERGY™

CONSOL Energy Inc.
Consol Plaza
1800 Washington Road
Pittsburgh, PA 15241-1421
phone: 412/831-4679
fax: 412/831-4513
e-mail: Jonathanpachter@consolenergy.com
web: www.consolenergy.com

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

April 19, 2002

Mr. Scott Hans
U. S. Army Corps of Engineers
Pittsburgh District
William S. Moorehead Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222-4186

RE: Bailey Central Mine Complex
Bailey Mine – Application Number 30020701
New Coal Refuse Disposal Facility
Richhill Township, Greene County

Dear Mr. Hans:

Enclosed for your information are copies of revised pages from Consol Pennsylvania Coal Company (CPCC)'s Coal Refuse Disposal Area permit application that was recently submitted to the PA Department of Environmental Protection (PA DEP)'s District Mining Office in McMurray, PA. A copy of this application was forwarded to you as part of the Joint Permit Application for this facility. These pages have been revised to reflect CPCC's responses to the PA DEP's April 3, 2002 correction letter; copies of both letters are attached for your files.

Please note that CPCC is a subsidiary of CONSOL Energy Inc. Please feel free to call me at (412) 831-4679 with any questions regarding this correspondence and its enclosures, or if you wish to meet and discuss this application.

Sincerely.

Jonathan M. Pachter

Jonathan M. Pachter
Manager, Environmental Permits

Attachments and Enclosures

Christy/Nancy
4/25/2002

CONSOL ENERGY

CONSOL Energy Inc.
Consol Plaza
1800 Washington Road
Pittsburgh, PA 15241-1421

phone: 412/831-4679
fax: 412/831-4513
e-mail: Jonathanpachter@consolenergy.com
web: www.consolenergy.com

April 19, 2002

Mr. David P. Milliron, Mining Specialist
District Mining Operations
PA Department of Environmental Protection
3913 Washington Road
McMurray, PA 15317

RE: Consol Pennsylvania Coal Company
Bailey Mine – Application Number 30020701
New Refuse Disposal Area
Richhill Township, Greene County

Dear Mr. Milliron:

In reference to your April 3, 2002 comment letter, enclosed please find the following additions and/or revisions. The Department of Environmental Protection (the Department)'s corrections are shown *in italics*, followed by Consol Pennsylvania Coal Company (CPCC)'s responses. Please note that CPCC is a subsidiary of CONSOL Energy Inc.

1. Please refer to a separate certified letter regarding Acts 67 and 68. The information requested in that letter is needed before this permit application can be considered administratively complete.

Acts 67 and 68 certified letters with Land Use Questionnaire have been sent to Gray Township, Greene County, and to Richhill Township. One page containing copies of the certified mail receipts is enclosed for your files.

2. Once the permit is accepted for review, a copy of the permit application must be placed at the Greene County Soil Conservation District for public viewing.

So noted.

3. (Module 2) – Modules 25 and 27 are not checked on Module 2 check list. If fly ash is not used, a negative declaration can be submitted. Same for Module (27).

CPCC has revised the application to remove any reference to using or disposing of fly ash from the thermal dryers located at the Bailey preparation plant.

4. (Module 2) – Modules 24 and 28 are checked (Special Protection Waters) and (Blasting Plan), but could not locate these modules in the application. Either submit them or tell us where they are located in the application.

Modules 24 and 28 are located in are located in Volume 8 at the very end behind the appendices.

5. Module 15 must be sent to U. S. Army Corps of Engineers, Pittsburgh District, U. S. EPA Region III, U. S. Department of the Interior, PA Game Commission, and PA Fish and Boat Commission. If they have already been sent to these locations, please submit some type of proof that these organizations were notified, and received Module (15). (Addresses Enclosed).

The US Army Corps of Engineers and the US EPA have already been provided with a copy of Module 15 as part of the application that CPCC submitted to the Corps – copies of their proofs of receipt of this information are enclosed. A complete copy of Module 15 has been sent by certified mail to each of the following: US Department of the Interior (U. S. Fish and Wildlife Service), PA Game Commission and PA Fish and Boat Commission. Copies of those certified mail receipts will be sent to you when we receive them.

6. Submit original and (3) copies of the above required information.

An original and three (3) copies of the above-referenced information are enclosed. Module 4, page 1 was modified to show that a property owner waiver has been included with the application. Please note that I have enclosed for your files single copies of letters transmitting these revisions to the U. S. Army Corps of Engineers, the US EPA, and the US Department of the Interior (U. S. Fish and Wildlife Service). I have also enclosed for your files single copies of letters transmitting pages regarding removal of any ash disposal information for the Dam Safety permit application submitted to the PA DEP - Bureau of Waterways Engineering, Division of Dam Safety, and for the design report submitted to MSHA. Finally, included for your files is one copy of General Information Form submitted to the PA DEP - Bureau of Waterways Engineering, Division of Dam Safety and to the Soils and Waterways Section.

7. Eight (8) copies of Module 9 and 10 are needed for notification packets.

Eight (8) copies of Module 9 and 10 are enclosed for your use as notification packets.

An original and three (3) copies of all information are enclosed with this letter; copies of this information will be included with the public review copy of the application that will be placed with the Greene County Soil Conservation District when the application is accepted for review. All new pages have been formatted and submitted so that you can incorporate them directly into the application.

Submission of these additions and/or revisions should allow the PA DEP to continue with the processing of the above referenced application. Any priority that you can place upon completing your completeness review of this application is greatly appreciated. Please call me at (412) 831-4679 with any questions regarding this correspondence and its enclosures.

Sincerely,

Jonathan M. Pachter

Jonathan M. Pachter
Manager, Environmental Permits

Enclosures

Pennsylvania Department of Environmental Protection
3913 Washington Road
McMurray, PA 15317
April 3, 2002

McMurray District Office 724-941-7100

Mr. Jonathan Pachter
Consol PA Coal Company
1800 Washington Road
Pittsburgh, PA 15241-1421

APR - 4 2002
EQC DEPT.

Re: Applicant's Name: Consol PA Coal Company
Application Number: 30020701
Richhill and Gray Townships, Greene County

Dear Mr. Pachter:

This is a follow-up to our March 29, 2002, telephone conversation regarding the proposal by Consol PA Coal Company to permit 556.6 acres for coal refuse disposal area No. 3 and No. 4 for the Bailey Mine Complex CRDA #3 and #4. The following information is needed to make this application administratively complete:

1. Please refer to a separate certified letter regarding Acts 67 and 68. The information requested in that letter is needed before this permit application can be considered administratively complete.

2. Once the permit is accepted for review, a copy of the permit application must be placed at the Greene County Soul Conservation Service for public viewing.

3. (Module 2) - Modules 25 and 27 are not checked on Module 2 check list. If fly ash is not used, a negative declaration can be submitted. Same for Module (27).

4. (Module 2) - Modules 24 and 28 are checked (Special Protection Waters) and (Blasting Plan), but could not locate these modules in the application. Either submit them or tell us where they are located in this application.

5. Module 15 must be sent to U. S. Army Corp of Engineers, Pittsburgh District, U. S. EPA Region III, U. S. Dept. of Interiors, PA Game Commission, and PA Fish and Boat Commission. If they have already been sent to these locations, please submit some type of proof that these organizations were notified, and received Module (15). (Addresses Enclosed).

6. Submit original and three (3) copies of the above require information.

7. Eight (8) copies of Module 9 and 10 are needed for notification packets.

Please submit this information by April 30, 2002, or your application will be returned to you as incomplete. If you have any questions, please contact me at the above number.

Sincerely,

David P. Milliron
Mining Specialist
District Mining Operations

Enclosure

ADDRESSES

1. Mr. Scott Hans
U. S. Army Corps of Engineers
Pittsburgh District
William S. Moorehead Federal Building
1000 Liberty Avenue
Pittsburgh, PA 15222-4186
(412) 395-7100 - Extension 7154

2. Mr. Daniel Sweeney
U.S. E.P.A., Region III
Wetlands and Marine Policy Sec.
1650 Arch Street
Philadelphia, PA 19103-2029
1-800-438-2474

3. Ms. Cindy Tibbott
U.S. Department of the Interior
Fish and Wildlife Service
Suite 322
315 South Allen Street
State College, PA 16801
(814) 234-4090

4. Mr. Denver McDowell
PA Game Commission
Bureau of Land Management
2001 Elmerton Avenue
Harrisburg, PA 17110-9797
(717) 783-1728

5. Mr. Steven Kepler
PA Fish and Boat Commission
Division of Environmental Services
450 Robinson Lane
Bellefonte, PA 16823-9616
(814) 359-5117

6. Mr. Joel Koricich
Engineering Supervisor
Department of Environmental Protection
McMurray District Office
3913 Washington Road
McMurray, PA 15317
[Provide three (3) copies of Submittal)

Baker

Engineering & Energy

Michael Baker Jr., Inc
A Unit of Michael Baker Corporation

Airside Business Park
100 Airside Drive
Moon Township, PA 15108

412-269-6300
FAX 412-375-3986

September 12, 2003

Mr. Craig Burda
Pennsylvania Department of Environmental Protection
District Mining Operations
25 Technology Drive
California Technology Park
Coal Center, PA 15423

Re: Consol Pennsylvania Coal Company
Bailey Central Mine Complex
Coal Refuse Disposal Areas No. 3 and No. 4
Coal Refuse Disposal Permit Application Number 30020701
Richhill Township, Greene County

Dear Craig:

Enclosed are four copies of permit application revision pages/drawings resulting from comments that you and Joe Szunyog provided during recent telephone conversations and in your third corrections list dated September 10, 2003. Attached is a table that identifies the documents being provided along with the changes that were made.

Please feel free to call me at (412) 269-6022 or Jonathan Pachter of CONSOL at (412) 831-4679 if you have any questions or comments or require additional information.

Sincerely,

MICHAEL BAKER JR., INC.

Michele Stewart

Michele Stewart, P.E.
Engineering Manager

cc: Jonathan M. Pachter, Consol Pennsylvania Coal Company – one copy
Edward Suter, Consol Pennsylvania Coal Company – 2 copies
Dennis R. Dickey, Division of Dam Safety - 3 copies
Cheryl McGill, Mine Safety and Health Administration – 3 copies, w/o wetland mitigation info
Albert H. Rogalla, U.S. Army Corps of Engineers – one copy
William J. Hoffman, U. S. EPA, Region III – one copy
David Densmore, U.S. Fish & Wildlife Service – one copy

PN 02-53
200200371
Christy

Rec'd
9/16/03

BAILEY COAL REFUSE DISPOS__ AREAS NO. 3 & NO. 4
COAL REFUSE DISPOSAL PERMIT APPLICATION NUMBER 30020701
SUMMARY OF ATTACHED REVISION DOCUMENTS

Attached Document	Comment
Wetland Characterization Report	Replaces the Wetland Mitigation Plan by Owen et. al. dated Dec. 22, 2001. Keep Figures 1, 2, & 3 from the Mitigation Plan and attach them to the back of the new Characterization Report.
Exhibit 6.1	Township lines included.
Replacement Form 8.3B	Revised to include stream near SE permit boundary.
Replacement 8.4A Forms for S7 and S8	Receiving tributary corrected per PADEP 2-21-03 Comment #10.
Replacement page: Appendix 8.6A, page 1	MW-L-I depth designation corrected to intermediate.
Replacement Form 11.1A	Channel C-5 revised.
Replacement page: Module 15, p. 15-6	Revised 15.4.c.1 to properly refer to the wetland location figures.
Replacement page: Module 15, p. 15-7	Wetland mitigation plan references revised.
Replacement page: p. 5 of Attachment 15.2.C, Stream Mitigation Plan	Revised Part II, Item 7 to include phosphorus compounds, plant, fish, and invertebrate variables as benchmarks for success as requested.
Replacement Attachment 19.2	Increased size to 11" x 17"
Replacement page: Design Report Appendix B p. 14-1	Revised to delete Section 14.2.3 that referenced the use of a manhole.
Design Report Appendix G calculation pages; replacement p. 4-4 & additional p. 4-38a	Calculation of minimum crest elevations for decants that had been proposed in previous submittals.
Additional pages: Design Report Appendix G calculation pages; p. 6-224 thru 226	Calculations demonstrating adequacy of fabricform anchor bolt spacing with the current channel design.
Replacement Design Report Appendix G calculation pages; p. 6-136, 143, 144, & 146	Revised Channel C-5 calculations.
Drawing No. 3	Revised to show decant inverts.
Drawing No. 15	Decant inverts & related data updated.
Drawing No. 15A	Revised to include a concrete barrier between the conveyor and diversion ditch (barrier detail added).
Drawing No. 35	Culvert entrance detail and profile revised to be consistent with the culvert schedule; Channel C-5 depth revised.
Drawing Nos. 49, 50, 51	Revised as required to include the note referencing incremental cover placement, and to show additional Area No. 4 slope area as being reclaimed.

Baker

Michael Baker Jr., Inc.
Airside Business Park
100 Airside Drive
Moon Township, PA 15108

FAX: (412) 375-3986

Letter of Transmittal

To:	PA Department of Environmental Protection	S.O. No.:	B243790000000 00001
	California District Office 25 Technology Drive	Project:	Consol PA Coal Company Bailey Mine Coal Refuse Disposal Areas
	Coal Center, PA 15423		No. 3 and No. 4; APP No. 30020701
Attn:	Mr. Craig Burda	Date:	September 18, 2003

We are forwarding the following: ☒ Attached ☐ Under Separate Cover ☐ _____

DWG. NO.	NO. COPIES	TITLE OR DESCRIPTION	COMMENTS
	4	Replacement for "Drawing No. 3, Revised Sept 2003" #200200371 - Christy	Duplicated decant invert elevation corrected.

THESE ARE TRANSMITTED as checked below:

☒ As requested
☐ For review and comment
☐ For your information
☐ No exception taken
☐ Rejected - See remarks
☐ Proceed subject to corrections noted
☐ Revise and resubmit
☐ Submit specified items
☐ _____

GENERAL COMMENTS: cc:
Jonathan Pachter, Consol Pennsylvania Coal Company – (1 copy)
Edward Suter, Consol Pennsylvania Coal Company – (2 copies)
Dennis R. Dickey, PADEP Division of Dam Safety – (3 copies)
Cheryl McGill, MSHA – (3 copies)
Albert H. Rogalla, U.S. Army Corps of Engineers – (1 copy)
William J. Hoffman, U.S. EPA, Region III – (1 copy)
David Densmore, U.S. fish & Wildlife Service – (1 copy)

By: Michele Stewart, P.E.
Title: Project Manager

Page: 1 of 1

Rec'd 9/23/03

Baker

Engineering & Energy

Michael Baker Jr., Inc
A Unit of Michael Baker Corporation

Airside Business Park
100 Airside Drive
Moon Township, PA 15108

412-269-6300
FAX 412-375-3986

May 1, 2003

Mr. Joseph Szunyog, Hydrogeologist
Pennsylvania Department of Environmental Protection
District Mining Operations
3913 Washington Road
McMurray, PA 15317

Re: Consol Pennsylvania Coal Company
Bailey Central Mine Complex
Proposed Coal Refuse Disposal Areas No. 3 and No. 4
Coal Refuse Disposal Permit Application Number 30020701
Richhill Township, Greene County

Dear Mr. Szunyog:

Enclosed are four copies of responses to your February 21, 2003 comments on the subject permit application. Also enclosed are an original and three copies of permit application revision pages/drawings resulting from responses to your comments, as well as comments by other review agencies. Four copies of the revised wetland mitigation plan are included.

Please feel free to call me at (724) 269-6022 or Jonathan Pachter of CONSOL at (412) 831-4679 if you have any questions or comments or require additional information. We are providing replacement pages and drawings to other review agencies that received copies of the subject permit application as indicated below.

Sincerely,

MICHAEL BAKER JR., INC.

Michele Stewart

Michele Stewart, P.E.
Engineering Manager

cc: Jonathan M. Pachter, Consol Pennsylvania Coal Company – one copy
Edward Suter, Consol Pennsylvania Coal Company – two copies
Dennis R. Dickey, Division of Dam Safety - 3 copies, letter & comment response only
Cheryl McGill, Mine Safety and Health Administration – 3 copies, letter & comment response only
Albert H. Rogalla, U.S. Army Corps of Engineers – one copy
William J. Hoffman, U. S. EPA, Region III – one copy
David Densmore, U.S. Fish & Wildlife Service – one copy

Coal Refuse Disposal Application No. 30020701
Consol Pennsylvania Coal Company
Bailey Coal Refuse Disposal Area Nos. 3 and 4

Response to PADEP Mining February 21, 2003 Comments

Module 6.2

1. The limit of underground mining has been added to Exhibit 6.2.

2. The dewatering borehole is shown on Exhibit 6.2.

Module 8

3. A solid blue line indicating the location of this stream has been added to the Exhibit 8.2A and 8.2B maps

4. The name of the monitoring point has been changed to S6-A.

5. The Form 8.4A's have been updated to include remaining water quality monitoring data.

6. The identifying colors of the monitoring points have been revised. Please see the legend on Exhibit 8.2 A for the revisions.

7. The brown line on Exhibits 8.2 A and 8.2 B depicted the permit boundary for the new CRDA. The color of this line has been changed to orange. (See legend on Exhibits 8.2A and 8.2B).

8. The name of the monitoring points has been changed to S1 A and S7 A.

9. The surface elevations, latitudes and longitudes or the monitoring points in the hydrologic monitoring plan have been attached to the Module 8 as APPENDIX 8.6 A.

10. The stream in question is an unnamed tributary to Owens Run. The Form 8.4 A has been revised. The Exhibit 8.2A and 8.2B maps have also been revised. The stream name "Kerr Run" was removed and a "Kerr Road" identification was added.

11. The name of the monitoring point has been changed to "Spring Collector No. 2" on Exhibit 8.2A.

12. A diagram depicting the typical monitoring well construction has been attached to the Module 8 as Figure 8.6-B

13. A statement establishing a Departmental notification requirement if sulfate concentrations exceed a threshold level in monitoring wells MW K-S, MW K-I, MW K-D, MW L-S, MW L-I and MW L-D has been added to Section 8.6a.

Additional Revisions to Module 8: Hydrology

In response to a verbal request of the PADEP, two additional monitoring wells (MW K – I and MW L – I) have been added to the Section 8.6 Hydrologic Monitoring Plan. These wells are described in the monitoring plan.

Module 9.1

14. The location of degas borehole 2A-2 (which was converted from an old gas well) has been corrected on Exhibit 9.1 and has also been added to Exhibit 6.2 and Drawing 2. The status of this borehole (sealed) is included on Drawing 2.

Module 10

15a. Attachment 10.3, Stage 3 has been revised to correctly show reclaimed and soil stockpile areas for the Area No. 1 slurry impoundment.

15b. A note has been added to the Stage 4 Attachment 10.3 drawing and to Module 10.3 indicating that slurry disposal in Area No. 3 will not commence until Slurry Disposal in Area No. 1 has ceased. The Stage 5 drawing note regarding coarse refuse disposal in Area No. 4 has been revised accordingly.

15c. Drawing No. 15 was not intended to show the sequencing of coal refuse placement between the existing and proposed disposal areas. A note has been added to Drawing 15 that refers to Module 10 of the application for specific sequencing between the existing and proposed disposal facilities. Module 10.3 has been revised to indicate that coarse coal refuse disposal will be diverted to the western "beach" portion of Area No. 1 after the Area No. 3 coal refuse dams are complete.

The complete Module 10.8 response that was truncated in the previous revision is attached.

Module 11

16. Permanent channels and culverts have been reviewed and revised as appropriate to ensure that the channels are designed for the worst case condition during the life of the facility. Form 11.1A, Sections 6.3 and 6.4 of Appendix G, and Drawing 35 have been revised to reflect the changes.

17a. Design information for Manning's coefficients used in channel design has been added to Section 6.4 of Appendix G.

17b. As shown in the calculations presented in Section 6.4 of Appendix G, all permanent vegetated channels have a velocity less than 4 fps. Also, shear stress calculations have been added to Section 6.4 of Appendix G to demonstrate that the synthetic/vegetated lined channels are stable.

17c. The ditch data sheets in Module 11 and Sections 6.1 and 6.3 of Appendix G have been revised to include watershed slopes for all channels as requested.

17d. The correct watershed slopes for Channels A-1 through A-38 have been added to the ditch data sheets in Module 11 and Section 6.3 of Appendix G.

17e. The correct watershed slopes for Channels B-1 through B-12 have been added to the ditch data sheets in Module 11 and Section 6.3 of Appendix G.

17f. The correct watershed slopes for Type D Channels have been added to the ditch data sheets in Module 11 and Section 6.3 of Appendix G.

17g. Channels T37 through T43 and Channel T45 through T47 have been revised to a 10-year design storm as requested. Module 11, Section 6.1 of Appendix G, and Drawing 36 have been revised to reflect the changes. Note that Channel T44 was already designed for a 100-year storm and was therefore not revised as requested.

17h. The ditch data sheets in Module 11 and Sections 6.1 and 6.3 of Appendix G have been revised to include filter point designations (FP220) as requested. This designation is consistent with values provided by the manufacturer.

Module 13

18a. Drawing No. 30A has been revised to include a note addressing how the pond will be dewatered and sediment will be removed (to an approved CRDA).

18b. Erosion and sedimentation controls for the sedimentation pond abandonment plan (Drawing 30A) have been revised to include sediment traps and collections channels. Form 11.1A and Section 6.1 of Design Report Appendix G have been revised to include the channels. Module 11.1a has been revised to reference Drawing 30A for pond reclamation controls. A new sediment trap data sheet has been added to Section 6.5 of Appendix G.

18c. Drawing No. 30A has been revised to indicate that R-4 riprap will be grouted.

18d. Drawing No. 30A has been revised to indicate that Haul Road 26 will be reclaimed. Haul Road 27 will remain to provide access to the top of the disposal area for maintenance. Also, Channel D2, Channel C3, and Culvert PC2 must remain to safely convey runoff to the bottom of the disposal facility.

18e. Drawing No. 30A has been revised to completely remove embankments for both the upper and lower chambers of the sedimentation pond. The grading has been revised to be as close to approximate original ground as possible using the material available from the embankment and haul road removal. Restoration of the entire area to approximate original ground would require thousands (>75,000) of cubic yards of fill material from an off-site borrow source.

18f. Drawing No. 30A has been revised to require channel lining materials to be removed prior to fill placement as requested.

Module 15

19. Proof of publication of the Fletcher Run variance request is attached as requested.

20a. The executive summary has been revised to be consistent with item 47.j. of the previous response letter describing the benchmarks for success.

20b. It has been indicated that mitigation will be conducted within the affected watershed to the greatest extent possible.

20c. Any language concerning the seeding and restoration work to be performed on the refuse disposal site has been removed. All seeding of warm season grasses will occur on farms that are within the affected watershed to the greatest extent possible.

20d. Altering of the text has taken place so that vegetation monitoring is consistent throughout the document. Because the stream mitigation plan is not including work on the refuse site as part of its scope of activity, statements have not been included to the compliance with §90.159.

20e. The grass mixes that Mr. Taracido, of the University of California will provide for Consol, will be determined according to the site needs (e.g., wildlife use only or agricultural and wildlife use) and will be applied within the affected watershed to the greatest extent possible.

Module 18.5 and Specification Section 16.0 have been revised as required to comply with the standards specified in Chapter 90.159 for percent of ground cover for final reclamation. Refer to revised replacement pages 18-8 and 18-9 of Module 18 and page 16-3 of the technical specifications.

Module 18.5.c and Specification Section 16.2.4.2 have been revised to include the suggested seed mixture for relatively flat areas of the coal refuse disposal areas. Refer to revise replacement pages 18-7 of Module 18 and 16-3 of the Technical Specifications.

21. Consol proposes to create a minimum of 1.37 acres of palustrine shrub and herbaceous wetlands at the Rocky Run B Mitigation area, to offset the proposed loss of 1.37 acre of similar wetlands during construction of the Bailey Mine Refuse Areas No. 3 and No. 4. The proposed wetland creation will satisfy the 1:1 wetland replacement requirement specified previously in comment 48.d of the Department's July 24, 2002 comment letter. The wetland replacement area will consist of grading non-wetland pasture along Rocky Run to wetland elevations and re-vegetating the area with wetland herbs, forbs, and shrubs. Please find enclosed a detailed mitigation plan entitled "Wetland Mitigation Plan for Bailey Mine Refuse Areas No. 3 and No.4" and dated April 7, 2003.

22. In addition to streambank fencing, trees and other native plants along selected reaches of the fences riparian corridors will be planted. Species selected will be consistent with those found in southwestern Pennsylvania.

23. Additional macroinvertebrate metrics have been added to the document.

24. Every attempt will be made to perform mitigation work in the same watershed as the refuse disposal site.

Module 18

25a. Section 18.1.e.11 has been revised to indicate that the sedimentation pond will be removed in accordance with the Sedimentation Pond Abandonment Plan.

25b. Drawing Nos. 11 and 12, and Exhibit 18.1 have been revised to include a note that all roadways not used for permanent access and maintenance will be reclaimed prior to final abandonment.

A Post Mining Road Maintenance Plan has been prepared for inclusion in the permit application as Attachment 18.4.d. Module Sections 18.4.c and 18.4.d have been revised to reference this plan.

Module 18.5.c and Specification Section 16.0 have been revised as requested. See Comment Response No. 20e.

Module 19

Modules 19.1 and 19.2 have been revised to address the bonding costs. A bonding cost estimate and a supporting site plan are included as Attachment 19.1.

Miscellaneous

26. The three saddle dam drain outlets (SD-B, SD-C and SD-D) have been added to the Section 8.6 Hydrologic Monitoring Plan. The locations of these points are shown on Exhibit 8.2A.

27. Module 13.1.b has been revised as requested.

28. No response necessary.

Note: Module 21.7.e has been revised to correctly report the lowest factor of safety for seismic cases as 1.25 rather than 1.29.

Drawings – Miscellaneous

29. A drain inlet detail and additional construction requirements have been added to Drawing 32 to address the issue of sediment entering the drains.

Drawing No. 2

30. The Fletcher Run barrier and variance areas have been added to Drawing No. 2.

Drawing No. 3 and No. 38

31. The runoff collection sump and associated collection channels have been revised and are presented on Drawing 15A. A construction sequence for the sump construction also has been included on Drawing 15A. All sump activities are located within the confines of the collection channels. The sump and channel layout has been revised on other Drawings as necessary.

32. Channels T50 and T51 have been added to the sump area and are located above all affected areas. As shown on Drawing 15A, rock protection is provided at the outlet into the existing drainageway to protect against erosion. Form 11.1A has been revised to include these new channels.

33. The headwaters of Fletcher Run has been added to the plan drawings as requested. The proposed activities are a minimum of 20-feet away from Fletcher Run.

34. As shown on Drawing 15A, the spillway has been revised so that it is constructed in original ground.

Drawing No. 8

35. As shown on Drawing 15A Culvert TC23 has been added to allow access for sump maintenance. Also, Culvert TC22 has been relocated to allow Channel T46 to pass beneath the conveyor access road.

Drawing No. 9

36. We maintain our position that additional lateral drains are not needed in Area No. 4 to control head buildup over the liner. Calculations attached to our October 31, 2002 comment response letter and incorporated into Appendix G Section 8.4 of the Design Report, demonstrate that head buildup within the 375 foot high pile will not exceed 4 feet assuming worst case conditions (i.e., no leakage through the liner). Since the target permeability for the liner is $5x10^{-5}$ cm/sec, this assumption is very conservative and head buildup is likely to be considerably less than 4 feet. Furthermore, the 4 feet of head buildup, if it were to occur, would not cause adverse impacts to the adjacent high quality watershed (HQW). Attached calculations, which have been incorporated into Appendix G Section 8.4 of the Design Report, show that specific discharge through the ridge to the adjacent HQW under 4 feet of leachate head is less than specific discharge through the facility liner assuming the drains are 100% effective and no head build-up occurs. This specific discharge comparison shows that the ridge will be more effective than the liner system at reducing migration of seepage. The calculations also show that it will take 48 years for seepage from Area No. 4 to reach the HQW. Area No. 4 will be capped in less than half that time which will limit infiltration into the refuse. Also note that calculations of seepage through the ridge have neglected the presence of the liner, and the fact that the HQW is not down-dip relative to the proposed disposal area. In addition, the calculations have been based conservatively on permeability values determined for bedrock within the undermined section of Area No. 3 and bedrock within Area No. 4 is not undermined.

Drawing No. 12

37. The runoff collection sump was not shown on Drawing No. 12 since this drawing depicts final site conditions after the conveyor and sump have been removed. However, Drawing No 12 has been revised to include the sump as requested.

Drawing No. 15

38. See response for Comment 15c.

Drawing Nos. 24-26 and 39

39. The soil dikes have been modified and additional construction requirements have been added as requested.

Drawing No. 32

40. The requirement to monitor the rock drain outlet valves has been added to Sections 3.5 and 4.1 of the Operations and Maintenance Manual (Appendix C).

Drawing No. 35

41. Notes have been added to the Channel Type A, B, and C details on Drawing 35 to specify which channels must be constructed in original ground.

42. The Channel Type D and E details on Drawing 35 have been revised to show the coal refuse fill and to indicate that the channels must be constructed in original ground.

Drawing No. 36

43. The synthetic mat liner detail on Drawing 36 has been revised to include additional installation requirements.

Drawing Nos. 37 and 38

44. As shown on Drawing 15A, the spillway has been revised so that it is constructed in original ground. A cutoff is provided at the spillway entrance to prevent discharge under the spillway lining.

45. The manhole has been deleted. The borehole casing will be extended incrementally to facilitate coal refuse placement and the pump motor will be moved to the top of the casing as it is extended. Drawing 38 has been revised to reflect this change. Also Technical Specification Section 14, Modules 10.3 and 10.6, and report page 4-30 have been revised to remove the manhole.

Drawing Nos. 41 - 55

46. The grading plans on Drawings 46 and 48 have been revised so that surface runoff is directed away from the embankment faces. Notes have also been added where appropriate on several drawings that state the Contractor shall place coarse refuse in a manner to promote drainage away from the embankment outslope.

47. The sequencing on Drawings 41-45 has been revised to include removal of temporary culverts and channels.

48. Drawings 41-55 show channels being constructed prior to or concurrent with embankment development.

49. Drawing 50 has been revised to show the Area No.3 embankment being covered as it is completed. In addition, a note has been added to Drawing 51 stating that the outer slopes shall be covered and vegetated as work progresses.

Drawing No. 41

50. Drawings 41 and 42 have been revised to show development of the stockpile areas.

Drawing No. 42

51. Drawing 51 has been revised to include Channels T12, T13, T44 and D3 as requested.

Baker

Engineering & Energy

Michael Baker Jr., Inc
A Unit of Michael Baker Corporation

Airside Business Park
100 Airside Drive
Moon Township, PA 15108

412-269-6300
FAX 412-375-3986

May 1, 2003

Mr. Dennis R. Dickey, P.E.
Pennsylvania Department of Environmental Protection
Division of Dam Safety
Rachel Carson State Office Building
P.O. Box 8554
Harrisburg, PA 17105-8554

Re: Consol Pennsylvania Coal Company
Bailey Mine Area No. 3 Slurry Dam
Richhill Township, Greene County
DEP File No. D30-055
Technical Review No. 1

Dear Mr. Dickey:

Enclosed are three copies of responses to your February 13, 2003 comments on the subject dam permit application. Also enclosed are three copies of revision pages/drawings resulting from responses to your comments as well as comments by other review agencies. One copy includes my embossed seal on the first page of the replacement drawings and specifications as requested.

Please feel free to call me at (724) 269-6022 or Jonathan Pachter of CONSOL at (412) 831-4679 if you have any questions or comments or require additional information.

Sincerely,

MICHAEL BAKER JR., INC.

Michele Stewart

Michele Stewart, P.E.
Engineering Manager

cc: Jonathan M. Pachter, Consol Pennsylvania Coal Company – letter & comment response only
Edward Suter, Consol Pennsylvania Coal Company – 2 copies, letter & comment response only
Joseph Szunyog, PADEP District Mining Operations – 4 copies, letter 7 comment response only
Cheryl McGill, Mine Safety and Health Administration – 3 copies, letter & comment response only
Albert H. Rogalla, U.S. Army Corps of Engineers - letter & comment response only
William J. Hoffman, U. S. EPA, Region III - letter & comment response only
David Densmore, U.S. Fish & Wildlife Service - letter & comment response only

Consol Pennsylvania Coal Company
Bailey Coal Refuse Disposal Area Nos. 3 and 4

Dam Permit Application : DEP File No. D30-055, 056, 057, 058, & 059

Response to PADEP Dam Safety February 13, 2003 Comments

1. Responses to comments provided by Gannett Fleming are included with this document.

2. No response necessary

3. No response necessary

4. The sunny day breach analyses, and changes to the EAP, if necessary, will be submitted under separate cover.

5. CPCC understands that the dam permit application will not be complete and cannot be published in the Bulletin until proof of financial responsibility is provided. CPCC also understands that permit issuance will be delayed for the required thirty day public comment period after publication in the Bulletin begins. Proof of financial responsibility will be provided under separate cover at the end of the permit review process.

6. See response to Comment No. 5.

7. No response necessary

8. No response necessary

9. The wetland and stream mitigation plans have been revised to address comments provided by the U.S. Army Corps of Engineers as well as comments provided by PADEP McMurray District Mining Office dated July 24, 2002 and February 21, 2003. The revised plans are attached.

PLAN REVIEW

10. Drawing No. 2 has been revised to include the serial number for the preliminary call to the Pennsylvania One Call System.

11. The downstream and upstream slopes of the main dam are 2.5H:1V and 3H:1V, respectively. Drawing 13 has been revised to indicate proposed slopes.

12. Drawing Nos. 24, 25, and 26 have been revised to include the top of dam elevations as requested.

13. The rock drain is not essential to insure the stability of the dam. It is provided to satisfy the requirement to preserve the original stream water flow. If it clogs, there will be no adverse impact on the dam. If it deteriorates or fails there is potential for migration of the fine sand into the rock core which could produce a seepage path and zone of low density in the dam. This is why a Class 1 geotextile was specified (which is much stronger than

the old class A geotextile). Given that the life of the structure as a dam is only 15 years, deterioration of the geotextile is not a concern since geotextiles have a proven service life that exceeds this.

SPECIFICATION REVIEW

14. Specification Section 12.0 has been revised to require compaction with a mechanical tamper adjacent to the decant pipe.

GEOTECHNICAL COMMENTS BY GANNETT FLEMING Dated 12-20-02

1. The slurry was not included in the stability analysis for the following reasons:

   1.1 It is consistent with the assumption of no upstream clogging by the slurry when computing the phreatic surface as required in MSHA Procedure Instruction Letter (PIL) I91-II-3. The assumption behind this requirement is that the worst case for stability would be the case of a phreatic surface developed if the design storm event occurs prior to filling with slurry.

   1.2 Review of the location of the critical failure surface in all of the downstream analyses indicated that the critical failure surface rarely breached the crest of the dam where it would encounter the slurry if present. Thus, the increase in unit weight from 62.4 (water) to 80 pcf (slurry) is not likely to cause a change in the computed factor of safety. To verify this, the tallest section on the main dam (Section A-A as discussed in the response to comment 6 below) was analyzed including the slurry.

   The following factors of safety were computed:

Case	Sliding Block Failure		Circular Failure	
	Static	Seismic	Static	Seismic
Section A-A Station 20+15, Full Pool, Downstream, Slurry not considered	1.84	1.50	1.75	1.49
Section A-A Station 20+15, Full Pool, Downstream, Slurry considered	1.82	--	1.75	--

   As can be seen from the above comparison, including the slurry results in little or no reduction in the factor of safety. The results of these analyses have been added to the report.

   1.3 Ignoring the slurry is definitely more conservative for the upstream cases.

2. The comment appears to be in error. The current edition of PADOT Publication 408 show the maximum percent passing the #P200 sieve for Bituminous concrete sand, Type B, #2; is 5%. This would yield a minimum D_{10} size of about 0.09mm. Hazen's equation can be used to estimate the permeability of this material and yields a permeability greater than $1x10^{-3}$ cm/sec. Even if the maximum percent passing the #200 sieve is 10%, the resulting minimum D_{10} would be 0.074 mm and Hazen's equation would still give a permeability greater than $1x10^{-3}$ cm/sec. Since this material is being used as a drain

filter, using $k=1x10^{-3}$ cm/sec is conservative. Computations of permeability based on Hazen's equation and other references appear on page 8-10 of the calculations.

3. A ratio of 9:1 was used per MSHA guidance (this reference is in PIL I91-II-3, page 3). The cited reference indicates that MSHA has studied the guidance of various agencies and concluded that a ratio of 9:1 is reasonable. The particular reference is reproduced below.

"It is well documented that compacted embankments usually demonstrate a coefficient of permeability in the horizontal direction which is greater than the coefficient of permeability in the vertical direction. A term called "permeability ratio" is commonly used to express the horizontal coefficient of permeability to the vertical coefficient of permeability. The available literature shows a wide range of permeability ratios, from less than 1 to over 100, for earthen embankments. MSHA has examined the guidelines of other recognized agencies experienced in dam design and construction, most notably the Corps of Engineers (Reference 8) and the Bureau of Reclamation (Reference 3) and other permeability ratios, and has concluded that all embankment dams should be designed assuming a minimum permeability ratio of 9. Although the published information supports this ratio, lower permeability ratios may be allowed provided they are adequately substantiated and documented"

The two references cited in this paragraph are:

> Reference 3: Bureau of Reclamation, Chapter 8 Seepage Analysis and Control, U.S. Department of the Interior, Engineering and Research Center, Design Standards No. 13, Embankment Dams, 1987.
>
> Reference 8: Corps of Engineers, Recommended Guidelines for Safety Inspection of Dams, Appendix D, U. S. Department of the Army, Guidelines issued pursuant to the National Dam Inspection Act, Public Law 92-367

While Baker agrees that use of a permeability ratio of 9 is not a "conservative" assumption, we also feel it is not unreasonably unconservative. Given the other conservative assumptions in the seepage design; specifically, the assumption of no upstream choking by coal fines, full saturation by water to the minimum freeboard, internal drain capacity 10 times expected flow, etc.; we feel the overall drain design is conservative and prudent.

4. The location of the phreatic surface in the embankment does not depend on the actual value of permeability used since upstream clogging by fines was not accounted for in the analysis. It does depend on the ratio of horizontal to vertical permeability which was assumed at 9:1. Any value of permeability could have been used and the results would be the same. The quantity of seepage entering the drainage system is directly proportional to the value of permeability used, thus when the drainage system was designed, the discharge determined in the seepage analysis was multiplied by the ratio of what was used in the seepage analysis to the actual permeability to arrive at the correct discharge. No change to the seepage analyses or stability analyses are required.

5. A rapid drawdown analysis was performed starting on page 7-1560 of the calculations. It can be seen from this analysis that the worst case for rapid drawdown is stage I where the pool is lowered 16.3' in 253 hours. Analysis of the phreatic surface developed during filling and draining during the design storm indicates that the maximum excess head (head above the water level in the pool) that could develop is less than 2'. This small excess head will not significantly impact the stability thus a specific rapid drawdown stability analysis was not performed. Discussion of this analysis is provided in the last paragraph of section 4.9.4.2 of the design report. No additional changes were made.

6. Section A-A (located at about station 20+15 is only about 105' away from the section analyzed at station 19+10. The geometry of both sections are nearly identical except that section A-A has a slightly higher positive slope on the liner material. Additional stability analyses were performed to verify that Section A-A also has an acceptable factor of safety. The results are summarized below and are compared to the original stability analysis at station 19+10.

Case	Sliding Block Failure		Circular Failure	
	Static	Seismic	Static	Seismic
Section A-A Station 20+15, Full Pool, Downstream, Slurry not considered	1.84	1.50	1.75	1.49
Original analysis at Station 19+10, Full Pool, Downstream, Slurry not considered	1.94	1.60	1.81	1.54

As can be seen, Section A-A has slightly lower factors of safety than the original analysis but the factors of safety are still acceptable since this is not the section with the lowest factor of safety. The results of these analyses have been added to the report.

7. The critical case should be with a fully developed storm pool phreatic surface. When the cover is in place the phreatic surface will be much lower or non-existent thus this is not expected to be the critical case. Given that the coarse coal refuse is a non-cohesive material, increasing the height of the slope will not significantly change the factor of safety. While it does increase the driving force, it also increases the resisting force due to more normal weight on the failure surface. To verify this, additional stability analyses were run at the Main Dam (section A-A) and at Saddle Dam C (which demonstrated the lowest factor of safety for the saddle dams). For the main dam, the phreatic surface was recomputed to what would develop if the design flood occurred shortly after the initial pushout of final cover material was commenced. This provides the worst possible combination of cover material weight and developed phreatic surface. For Saddle Dam C the phreatic surface used accounts for the presence of the HDPE liner in the dam which will restrict flow on the upstream side of the dam and result in a maximum head equal to the maximum storm pool. The phreatic surface on the downstream side of the dam represents a conservative assumption of the surface that would develop if there are leaks in the liner. The results of these analyses are presented below.

Case	Sliding Block Failure		Circular Failure	
	Static	Seismic	Static	Seismic
Section A-A Station 20+15, Full Pool, Downstream, with final cover at initial pushout	2.14	1.74	1.97[1]	1.66[1]
Saddle Dam C Station 4+20, full pool, Downstream, Final cover fully developed,	1.57	1.37	1.53[2]	1.34[2]

NOTES:
[1] Failure through crest forced.
[2]Nominal cohesion added to embankment material to limit surface slump failures

These analyses show that for the main dam, the final cover condition is not the worst case. In fact, circular failures had to be forced to cut through the cover material since the critical failure surface was located downstream of the crest.

For Saddle Dam C the critical failure surfaces did not extend to the top of the cover material. This is because the cover material has a higher strength and is at a flatter slope than the underlying embankment.

The results of these additional analyses have been added to the report.

8. Comment 61c of PADEP McMurray District Mining Office July 24 2002 comments addressed the issue of non structural fill in the embankment. Additional analyses were performed and included in our October 31, 2002 responses to those comments. Revised pages and additional calculations (Section 7.10 of Appendix G) were subsequently transmitted to PADEP Division of Dam Safety as well as the McMurray District Mining Office. Refer to the revised submission for discussion of this issue.

   Section C-C as shown on drawing 14 is skew to the coal refuse area outslope (See Drawing 11) and therefore would not represent the critical condition. The stability of the embankment was analyzed at the 2 most critical sections that are perpendicular to the embankment outslope. These are identified in the calculations and report as Section A-A and D-D. Section A-A is taken through the tallest outslope on the left abutment (looking downstream). Section D-D is taken through the main outslope starting at the toe of the facility and perpendicular to the outslope. It is noted that Section D-D has a large positive slope on the liner material since it climbs the wall of the valley. A drawing showing the location of stability sections A-A and D-D has been added to Section 7.7 and Section 7.10 of Appendix G to clarify this issue. Subsequent to analysis of Section A-A, the total height of the pile was reduced to comply with other issues, thus, the stability analysis section will not match the finished grade contours shown on this drawing. However, since the outslope, subsurface conditions, and water conditions all remain the same as in the analyzed section, the factors of safety computed will be conservative. Thus, this analysis was not redone to reflect the lowered maximum pile elevation.

9. The section at Station 26+65 (stability section L1) was selected as representative of typical conditions on the south abutment. The construction sections were taken at Station 25+00 and Station 27+50. The rapidly changing conditions between these two stations is responsible for the difference observed between the construction sections and the stability

section. The stability section suitably depicts the actual conditions at Station 26+65 between the two construction sections.

10. We investigated and could not find any discrepancy. The crest in stability analysis Section 4a (11+50) Stage 3 beginning on page 7-965 of the calculations is 50' feet wide as shown on the design cross sections on Sheet 23 of the drawings. The reviewer may have been mislead since these particular stability sections were plotted at a different scale than the other stability sections so the crest appears to be much wider than the other sections.

11. The cross section with the lowest factor of safety, Station 9+30 Stage 3, was analyzed for the end of construction case with no supporting slurry or water on the inside face. The results of this analysis are presented below and have been included in the report.

Case	Sliding Block Failure		Circular Failure	
	Static	Seismic	Static	Seismic
Saddle Dam A, Station 9+30, Stage 3, End of Construction with no slurry or pool, Inside Face	1.81	1.54	1.57	1.34

As can be seen from the above results, acceptable factors of safety are maintained for this case.

12. The factors of safety were misreported in the report. The correct values are shown below and this correction was made to the report.

Cross-Sections	Factor of Safety			
	Sliding Block Failure		Circular Failure	
	Static	Seismic	Static	Seismic
Stage 3				
11+50	2.38	2.01	1.95	1.63
9+62	2.21	1.86	1.95	1.54
9+30	~~2.05~~ 2.26	~~1.70~~ 1.89	~~1.72~~ 1.77	~~1.43~~ 1.47
5+78	~~2.02~~ 2.97	~~1.56~~ 2.38	~~2.97~~ 2.02	~~2.38~~ 1.56
2+28	3.08	2.61	2.03	1.73

13. The noted differences between the phreatic surface used for the upstream analyses and the downstream analyses are a result of the effects of the HDPE liner placed within the embankment. This liner restricts flow through the embankment thus the upstream analyses used a phreatic surface that assumes full saturation of the upstream materials. If the liner is 100% impermeable, there would be no phreatic surface on the downstream side of these dams. However, a phreatic surface assuming that some leakage occurs through the liner was conservatively used for the downstream analyses. Use of a higher phreatic surface on the downstream analyses is not warranted due to the presence of the HDPE liner in the embankment. The higher phreatic surface on the upstream side of the HDPE liner was not included in the stability analyses for the downstream failures because the critical failure surfaces were all well downstream of the HDPE liner. To verify that the additional horizontal force that would be imposed by a higher upstream phreatic surface does not result in a more critical failure surface, the downstream analyses

for Saddle Dam C were redone with a phreatic surface that is coincident with the maximum storm pool upstream of the liner and drops to the previously calculated phreatic surface downstream of the liner. The result of these analyses showed no change in the location of the critical failure surface or factor of safety. The results of the have been incorporated into the report.

The specified liner is a textured liner that maximizes the interface friction of embankment on the liner. This will minimize the potential for block type failures at the liner embankment interface. In addition, the geometry of the embankment was designed to place the liner in the center of the embankment well away from the upstream toe to prevent block type failures. To show this, the saddle dam with the lowest upstream factor of safety (Saddle Dam D, Station 2+40, Stage 3) was analyzed without the supporting effect of the pool. The phreatic surface was assumed to be at the original ground line which conservatively represents the end of construction condition. An additional analysis in which rain water is assumed to have been trapped between the liner and the embankment thus resulting in full hydrostatic pressure at the interface was also investigated. The results of these analyses are provided below and have been incorporated into the report.

Cross-Sections	Factor of Safety			
	Sliding Block Failure		Circular Failure	
	Static	Seismic	Static	Seismic
Saddle D, Station 2+40, Stage 3, End of Construction, Water table assumed at original ground line	1.65	1.40	--	--
Saddle D, Station 2+40, Stage 3, End of Construction, Full water pressure assumed at liner/ soil interface	1.55	--	--	--

These results indicate that even under the worst case conditions, acceptable factors of safety are obtained.

14. Taking tests on a grid system is not practical since material placement locations may vary with operational constraints. For example, if a pre-established grid system is used, it would be possible to place an entire days worth of fill without ever having to take a test if none of the fill was placed at one of the grid points. In order to address the reviewers concern regarding ensuring uniformity of compaction, the following text has been added to the referenced sections.

"Select locations for compaction tests that are representative of the material placed. Record the location and elevation of each compaction test. Review the locations to insure that tests are uniformly distributed through the embankment."

15. Taking tests on a grid system is not practical since material placement locations may vary with operational constraints. For example, if a pre-established grid system is used, it would be possible to place an entire days worth of fill without ever having to take a test if none of the fill was placed at one of the pre-established grid points. In order to address the reviewers concern regarding insuring uniformity of compaction, the following text has been added to the section 7.3.6.

    "Select locations for compaction tests that are representative of the material placed. Record the location and elevation of each compaction test. Review the locations to insure that tests are uniformly distributed through the embankment."

16. To clarify this issue, the following has been added to section 10.3.10 of the specifications.

    "Compact material immediately adjacent to pipes and in other confined areas in accordance with section 5.5.4.1.6."

    And the following has been added to section 5.5.4.1.6:

    "Reduce the lift thickness to 4 inches when using hand compaction equipment."

17. This section refers to testing of potential borrow materials prior to excavation. The testing frequency had already been changed to one per acre in response to previous comments.

18. The last sentence of section 15.2.1 has been deleted. This leaves the requirements in section 15.3.1.4 as the correct requirements. The moisture limits are different for areas beneath impounding structures since placement at high moisture contents will reduce the compacted strength of the liner material. Strength of this material is critical to insuring stability of the impounding structure. The moisture limits for liner materials outside the limits of impounding structures is relaxed since these materials do not impact the stability of the impounding structure. However, they still must support themselves on the slopes of the valley walls so the lower limit is maintained at –2%. Requiring wet placement of the liner material may result in slippage of the liner on steep slopes. Experience with similar soils on nearby sites has indicated that the required permeability can be obtained at lower moisture contents allowed by this specification.

19. The subject section has been modified to read:

    "ASTM D2922, D1556 (density) ASTM D2216, D3017 (water content)"

    for both Area #3 and #4 liner and Sedimentation Pond liner.

20. The following text has been added to the beginning of section 17.3.3:

"Verify proper operation of piezometers before installation. Replace or repair piezometers that do not read zero prior to installation. Record an initial reading after the piezometer has been placed in the trench and the initial lift of backfill has been placed."

21. The piezometers are placed in coarse coal refuse material. If fine materials and bentonite are used to backfill the trench, they will not be compatible with the coarse refuse material and will migrate or disperse into the adjacent coarse refuse. This will leave a low density zone in the vicinity of the cable that will definitely become a conduit for seepage which is undesirable as noted. A double layer of heavy geotextile is detailed as a protective cushion material for the cables similar to what is done to protect HDPE liners in landfills from overlying aggregates. The geotextile will transport some quantity of water horizontally along it's length due to in-plane permeability, however, it is placed directly above the internal drain which should provide a seepage path with less resistance and intercept any significant amount of water transported by the geotextile before it reaches the downstream toe of the embankment. The piezometers should indicate if this is not the case. In order to address concerns with respect to compaction of coarse refuse against the vertical walls of a trench, the sides of the trench as shown on the detail in the drawings have been sloped back to a 1.5:1 slope.

22. Baker believes that use of fine grained material would be detrimental in this case and requests consideration of the reasoning presented in the response to Comment 21.

23. Even though an anchor trench is provided, the tensile strength of the liner material is not required to insure the stability of the upstream face (refer to stability analyses). This is because the soil zone on top of the liner is wide enough to be placed in horizontal lifts and has a flatter final slope than the liner itself. Thus the "buttressing" effect is sufficient to support the soil on top of the liner and no tension should develop. Also, since the embankment zone on top of the liner can be placed in horizontal lifts instead of being "pasted" on top of the liner as in conventional landfill construction, tension should not develop in the HDPE liner during construction. The anchor trench is provided merely to hold the top of the liner in place until the embankment zone is placed on top of it and does not contribute to the stability of the embankment. Thus, calculations to verify capacity of the anchor trench and strength of the liner material are not warranted.

Baker

Engineering & Energy

Michael Baker Jr., Inc
A Unit of Michael Baker Corporation

Airside Business Park
100 Airside Drive
Moon Township, PA 15108

412-269-6300
FAX 412-375-3986

May 1, 2003

Ms. Cheryl McGill
District Manager – Coal Mine Safety and Health District 2
U. S. Department of Labor
Mine Safety and Health Administration
New Stanton Office
RR1, Box 736
Hunker, PA 15639

Re: Consol Pennsylvania Coal Company
Bailey Central Mine Complex
Slurry Impoundment I.D. No 1211PA200107-08
Sedimentation Impoundment I.D. No 1211PA200107-09
Refuse Pile I.D. No 1211PA200107-10

Dear Ms. McGill:

Enclosed are three copies of responses to your March 27, 2003 comments on Consol Pennsylvania Coal Company's request for approval for the subject proposed disposal facilities. Also enclosed are three copies of Design Report revision pages/drawings resulting from responses to your comments as well as comments by other review agencies.

Please feel free to call me at (724) 269-6022 or Jonathan Pachter of CONSOL at (412) 831-4679 if you have any questions or comments or require additional information.

Sincerely,

MICHAEL BAKER JR., INC.

Michele Stewart, P.E.
Engineering Manager

cc: Jonathan M. Pachter, Consol Pennsylvania Coal Company – letter & comment response only
Edward Suter, Consol Pennsylvania Coal Company – 2 copies, letter & comment response only
Dennis R. Dickey, Division of Dam Safety – 3 copies, letter & comment response only
Joseph Szunyog, PADEP District Mining Operations – 4 copies, letter & comment response only
Albert H. Rogalla, U.S. Army Corps of Engineers - letter & comment response only
William J. Hoffman, U. S. EPA, Region III - letter & comment response only
David Densmore, U.S. Fish & Wildlife Service - letter & comment response only

Consol Pennsylvania Coal Company
Bailey Coal Refuse Disposal Area Nos. 3 and 4
Request for MSHA Approval

Slurry Impoundment I.D. No 1211PA200107-08
Sedimentation Impoundment I.D. No 1211PA200107-09
Refuse Pile I.D. No 1211PA200107-10

Response to MSHA March 27, 2003 Comments

1. Attached for inclusion in Appendix F of the Design Report is Drawing F-1 showing underground mine workings below the proposed disposal areas. Page 2-3 of the Design Report has been revised to reference this map.

2. Section 3.1 of the Operation and Maintenance Manual provides for piezometer data and slurry pond levels to be plotted and reviewed relative to the maximum allowable piezometric surface elevations presented on Sheet 32 of the facility design drawings. Section 3.1 of the O&M Manual has been revised to note that the data is to be plotted on facility cross sections and that the elevation(s) of any seepage on the embankment face is to be plotted and considered as well. Severe precipitation events will be reflected by the reservoir level data.

3. Section 7.3.6 of the Technical Specifications has been revised to require field density tests at a rate of one test per 200 cubic yards of backfill in trenches or around structures to comply with MSHA Handbook Number PH89-V-4 and MSHA PIL No. I90-II-7. The testing rate for overall coarse coal refuse embankment construction has been maintained at one test per 5,000 cubic yards of structural fill with at least one test per lift. This is the testing rate that is being followed for development of the existing Bailey slurry impoundment and coarse coal refuse pile (Area Nos. 1 and 2). CPCC has developed an extensive database of compaction test results from development of these disposal facilities. The field density testing program being implemented by CPCC includes over 18 years of data demonstrating the adequacy of CPCC's coarse coal refuse placement and compaction procedures. The test results are submitted to MSHA quarterly. The data show that the required degree of compaction has been consistently achieved, and these same placement/compaction techniques will be followed for development of Area Nos. 3 and 4. Publications by the U. S. Department of the Interior, i.e., Design of Small Dams, and Earth Manual, suggest a testing frequency of one test for every 10,000 cubic yards of material placed for pervious fill used in earth dam construction after placement procedures have been proven to be satisfactory. The proposed testing frequency is more conservative than this suggested frequency.

   Revised Section 7.3.6 proposes a moisture density testing frequency of one test per 100 field density tests. This testing frequency will result in one test per month. CPCC's experience with development of Area Nos. 1 and 2 facilities indicates that this testing frequency will be sufficient to detect long term variations in coal refuse compaction properties.

4a. The potential for additional settlement/differential settlement resulting from embankment construction over the mined area/undisturbed area interface was addressed and presented in Section 4.9.6 of the Design Report. As indicated in the report, maximum surface strains that would have been produced by initial collapse of the longwall panel were used for the strain impact evaluation. The maximum horizontal tensile strain that was calculated occurs in the vicinity of the mine/undisturbed area interface. Additional surface strain due to pillar collapse or compression of the gob from increased overburden pressure (embankment construction) must be much less than that calculated for the complete subsidence as indicated in the report; therefore, the analysis that was presented is conservative.

4b. A map of the Bailey Mine workings, Drawing F-2, is attached for inclusion in Appendix F of the Design Report.

4c. Coal seam contours are presented on Drawing F-2. That drawing also delineates active and abandoned workings of the Bailey Mine.

4d. Locations of sealed entries for the Bailey Mine are presented on Drawing F-2. Note that no "entries" or underground areas of Bailey Mine are sealed. Some De-Gas borehole openings have been sealed as shown on the larger scale drawing, Drawing F-1.

5. Language has been added to Section 7.37 of the specifications requiring that new coarse coal refuse embankment be keyed into previous coarse coal refuse stages by benching. Baker does not feel that benching the coarse refuse into the abutment is necessary for the following reasons.

1. All of the dams incorporate a continuous internal drain that extends up the abutments. This drain will intercept and safely discharge any seepage that occurs along the interface between the coarse coal refuse and the clay liner.
2. Stepped construction could cut into the clay liner thereby reducing its effectiveness as a barrier to contamination.
3. The abutments will be sloped at a minimum 2:1 slope thus as each lift is placed some mixing inevitably occurs as the lift is feathered out onto the liner. Compaction of this feathered edge will force coarse coal refuse into the top few inches of the clay liner material.
4. Conceivable schemes to incorporate this benching into the design such as concurrent placement of liner and coarse coal refuse in horizontal lifts using zoned construction techniques or stepping of the liner, internal drains, cut off trench, and spring drains would likely make the construction so complicated that the probability of achieving the desired result is low. Further, it is likely that this complexity may result in gaps or breaks in the internal drain or liner, which would be detrimental to the performance of the dam.

6. Refer to the response to Comment 16.

7. Specification Section 5.3.2 has been revised to require the maximum particle size to conform with PADOT Publication 408.

8. Drawing Nos. 17 through 21 have been revised to indicate that the 6-inch protective cover will be provided over soil liner at rock/spring drain locations.

9. The #57 aggregate drains shown on Drawing No. 18 are internal drains that are specified in Specification Section 6.0. As indicated in Section 6.0, geotextile is to be installed below aggregate that is placed over soil liner material. The interface between the internal drain and the soil liner material will not see flow thus it does not mater if the geotextile clogs. This geotextile is provided to maintain separation between the internal drain and the liner soils only. Specification Section 4.0 addresses construction of rock and spring drains as indicated in Section 4.1.1. Page 4-3, Section 4.4.2.3 has been revised to clarify that the geotextile is for rock and spring drains.

10. All internal drains have been sized for a minimum factor of safety of 10 for flow through the drain. In most cases flow is assumed through the core of the drain only and the flow capacity of the graded filter is ignored which makes this conservative. The bituminous concrete sand is never used to transmit flow in a drain. It is used as a graded filter against the existing fine grained site soils only and must be as fine as it is to adequately retain those site soils and prevent clogging. Refer to filter compatibility calculations in section 8 of Appendix G to the report. The gradation of coarse coal refuse used to determine it's compatibility with adjacent graded filters was based on samples of refuse collected from the existing disposal area. Samples of both fresh refuse and refuse that had been subject to heavy traffic were obtained in order to develop a realistic range of gradations to use in design. As demonstrated in the calculations presented in Section 8 of Appendix G, filter criteria as specified in NEH Chapter 26 are satisfied at all interfaces that are intended to collect seepage through the dam.

11. Dimensions as assumed in the calculations are correct. The detail on Drawing 33 has been revised to more accurately reflect the calculations.

12. A note has been added to Drawing 31 requiring gunite to be installed in cutoff trenches in accordance with Section 5.0 of the specifications.

13. The manhole has been deleted from the design and from Specification Section 14.0. The borehole casing will be extended incrementally to facilitate coal refuse placement and the pump motor will be moved to the top of the casing as it is extended.

14. Maximum allowable piezometric surface elevations for each piezometer are tabulated on Drawing No. 32. The maximum water surface elevations for each piezometer shown on Drawing No. 32 is based on the allowable maximum piezometric surface determined from the stability analysis as indicated on Page 4-25 of the Design Report.

15. Drawing No. 14 has been modified to label Stage 2 as structural fill.

16. A dam breach analysis of the sedimentation pond demonstrates that there would be no loss of life or serious property damage in the event of failure. This dam breach analysis, along with the corresponding inundation map, is provided in Attachment A. MSHA guidance document IR1109, "*Design Guidelines for Coal Refuse Pile and Water,*

Sediment, or Slurry Impoundments and Impounding Structures", states that a 100-year design storm is acceptable for structures that would not cause loss of life or serious property damage in the event of failure. The inundation map clearly shows that no structures would be affected by a sedimentation pond failure.

The sedimentation pond is located immediately upstream of a large railroad embankment (refer to Drawing 27). The top of the railroad embankment (elev. 1222) is approximately 60 feet higher than the top of the sedimentation pond embankment (elev. 1162). A 96-inch galvanized steel culvert conveys flows through the railroad embankment. Design drawings for the railroad and culvert are provided in Attachment B. The railroad embankment would severely restrict discharges downstream in the event of a sedimentation pond failure (i.e., peak discharges downstream are limited by the capacity of the railroad culvert). The dam breach analyses indicates that the peak elevation upstream of the railroad during a sedimentation pond failure is 1163.6, which is over 58 feet below the top of embankment.

Also note that the Pennsylvania Department of Environmental Protection (PADEP) Division of Dam Safety has reviewed the attached dam breach analysis, and they concur that the sedimentation pond is a Hazard Potential Category 3 Dam (see PADEP correspondence in Attachment C). PADEP's definition for Hazard Potential Category 3 is no loss of life expected and minimal economic loss (undeveloped or occasional structures with no significant effect on public inconvenience) in the event of failure.

Based on our analysis, site conditions, and applicable regulations, we believe that a 100-year design storm is justified and warranted for the sedimentation pond.

17. Drawing No. 30 has been revised to eliminate the discrepancies.

18. Drawing No. 30A has been revised as requested.

Pennsylvania Department of Environmental Protection

Rachel Carson State Office Building
P.O. Box 8554
Harrisburg, PA 17105-8554
June 19, 2003

717-787-8568
717-772-0409 (FAX)

Bureau of Waterways Engineering

Mr. Jonathan M. Pachter
Consol Pennsylvania Coal Company
1800 Washington Road
Pittsburgh, PA 15241

Re: Technical Review No. 2
Bailey Mine Area No. 3 Slurry Dam
Richhill Township, Greene County
DEP File No. D30-055

Dear Mr. Pachter:

We have completed the second technical review of your application seeking authorization to construct, operate and maintain the Bailey Mine Area No. 3 Slurry Dam at Coal Refuse Disposal Facility No. 3 at the Bailey Central Mine Complex. The proposed dam construction includes three stages of embankment construction and a final site layout or Closure Phase. We consider the following comments to be appropriate:

1. At our request, the Division's Geotechnical Consultant, Gannett Fleming, Inc., (Gannett Fleming) performed a second geotechnical review of this application. A letter from Gannett Fleming dated June 11, 2003 indicated that their previous comments have been adequately addressed and that they have no further comments.

2. The Emergency Action Plans (EAPs) submitted by Michael Baker for Saddle Dams A, B, C, and D with this Application were forwarded to our Monitoring and Compliance Section for processing. A Special Condition will be attached to the Dam Permit requiring approval of the EAPs by this office and the Pennsylvania Emergency Management Agency prior to the commencement of storage of slurry in the dam's first stage impoundment.

3. Michael Baker has indicated that the "sunny day" breach analyses for the Main Dam and Saddle Dams A, B, C, and D will be submitted at a later date. A "sunny day" analysis **will be required for each of the five dams before we can issue a Dam Permit**. Any additional downstream impacts will require changes to the inundation mapping in the EAPs but **would not** affect the current Hazard Potential Classifications. Any questions on these required "sunny day" analyses should be directed to Michael Packard of our staff at the above number.

Rec'd 6/23/03

extended deadline, the Department will consider the application to be withdrawn. Application fees will not be refunded; however, the application file can be reopened after submitting the previously identified information and a new application fee. This application has previously been removed from the Department's Money-Back Guarantee Permit Review Program; however, the permit application will continue to be reviewed by our staff. If you have any questions or desire to meet to discuss any of the above comments, please contact Larry McCauley at the address or telephone number listed above.

Sincerely,

For Dennis R. Dickey, P.E.
Chief
Project Review Section
Division of Dam Safety

cc: Craig Burda, California District Mining Office
Robert T. Saber, P.E., Gannett Fleming, Inc.
Albert H. Rogalla, U.S. Army Corps of Engineers, Pittsburgh District
Michele Stewart, P.E., Michael Baker Jr., Inc.

Pennsylvania Department of Environmental Protection

3913 Washington Road
McMurray, PA 15317
February 21, 2003

McMurray District Office 724-941-7100

Certified Mail #7002 2030 0002 1920 3973

Jonathan M. Pachter
Consol Pennsylvania Coal Company
1800 Washington Road
Pittsburgh, PA 15241

Re: Applicant's Name: Consol Pennsylvania Coal Company
Application No.: 30020701
Richhill and Gray Townships, Greene County

Dear Mr. Pachter:

A review of the information for the Coal Refuse Disposal Areas No. 3 and No. 4. accepted on April 26, 2002 for a new coal refuse disposal facility and received November 18, 2002 from Michael Baker Jr., Inc. has shown that several of the items in our correction letter of July 24, 2002 have not been satisfactorily addressed. Therefore, we will be holding an informal pre-denial conference at the McMurray District Office to discuss the deficiencies. We recommend that you make arrangements to have your consultant present at this meeting.

This is to confirm that the meeting has been scheduled for March 12, 2003, at 9:00 a.m. in the McMurray District Office.

Specifically, the items, which were not adequately addressed or are still outstanding, include the following:

Module 6.2

1. Either provide a note on Exhibit 6.2 map that the proposed permit area has been completely undermined or show the limits of mining.

2. Depict the location of the dewatering borehole, as the location was removed from the previously submitted map.

Module 8

3. It was observed during a field review that a stream exists adjacent to the southeast side of the permit boundary. Please identify this stream and list on all the appropriate maps and modules.

Sft Rec'd 2/27/2003 fr

4. On page 5, Module 8, please change evaluation monitoring point SA-6 to S6-A.

5. Submit the remaining complete sets of water quality data for the proposed hydrologic monitoring points.

6. It appears the hydrologic monitoring points located within 1000 feet of the southwestern portion of the permit area are colored incorrectly. Please revise the Exhibit 8.2A map accordingly.

7. Please identify on the Exhibits 8.2A and 8.2B hydrologic data maps the designation of the brown line.

8. Please change on the Exhibit 8.2A hydrologic data map evaluation monitoring points S7 Moody and S1 Kerr to S7A and S1A as per Module 8.4A

9. Provide the surface elevations, latitudes and longitudes for the proposed surface and groundwater monitoring points in the hydrologic monitoring plan.

10. According to the Exhibit 8.2A hydrologic data map, evaluation monitoring points S7 and S8 appear to be located on a unnamed tributary to Kerr Run. Module 8.4A lists these sampling points on an unnamed tributary to Owens Run. Please explain.

11. Exhibit 8.2A shows evaluation monitoring point no. 2 on the existing coal refuse disposal area. Is this the location of spring collector no. 2?

12. Provide a typical monitoring well construction diagram for the proposed groundwater monitoring wells.

13. Revise the surface and groundwater monitoring plan to establish a Departmental notification requirement should sulfate levels in groundwater monitoring wells MW-K and MW-L exceed 250 mg/l.

Module 9.1

14. Degas borehole 2A-2 was not correctly shown on the map. This borehole was previously a converted plugged gas well. Identify the proper location on the map and indicate the status of the borehole. Revise Exhibit 6.2 accordingly.

Module 10

15 Attachment 10.3:

a. Previously reclaimed areas on the slurry pond embankment as shown in stage 3, are shown as active disposal area in stage 3. The topsoil storage area for refuse areas no. 3 and no. 4 are shown as closed disposal area. It appears the designations have been reversed.

b. Slurry disposal in refuse area no. 3 should not commence until slurry disposal in refuse area no. 1 has ceased at the point necessary to complete the timely reclamation of the western pool areas, as shown on the stage 4 diagram.
c. The staging diagram for the slurry impoundment found on drawings no. 15 indicates that 100% of the slurry will be diverted less than 3 years subsequent to the commencement of slurry dam no. 3 construction. The staging diagram also shows that although all slurry will be diverted to slurry pond no. 3 at year 3, coarse refuse disposal will continue in disposal areas no. 4. Coarse refuse disposal in area no. 4 is to be discontinued until slurry pond dam no. 1 is reclaimed, as shown on the stage 4 drawing. This will permit the completion of slurry pond dam no. 3 while facilitating the timely closure of slurry pond dam no. 1.

A portion of the Module 10.8 response was truncated in the recent module revisions.

Module 11

16. Permanent channels and culverts conveying surface runoff from, adjacent to, and above the refuse fills, do not appear to be designated for a 100 year precipitation event for the worst case watershed condition.

17. Forms 11.1A – miscellaneous. It is requested the individual channel design sheets be reviewed with the design engineer in the pre-denial meetings.

a. Please provide the design information for the selected Manning's coefficient for all synthetically lined channels.
b. Please be advised that synthetic lining materials may not be utilized for any permanent channels with flow velocities in excess of 4 feet per second.
c. List the average watershed slopes for all channels.
d. Channels A-1 through A-38. The design watershed slopes for the channels are shown between 1.86% and 4.7%. Many of the channels watershed slopes exceed 30%. Please reconcile.
e. Channels B-1 through B-12. The watershed slopes for the channels are listed at 1.2%; however, the watershed slope is 5%. Please reconcile
f. Channels D. What is the basis for the listed average watershed slope?
g. Channels T-37 thorough T-47. The channels are to be designed for a 10 year design storm, as they are not temporary.
h. Specify filter pnt. designation on the channel data sheets. In addition, the specified linings are inconsistent with the values provided by the Goestar Corporation in Appendix G. Please reconcile.

Module 13

18. 13.6 and drawing 30A – sediment pond removal

a. The plans must provide details on how the pond will be dewatered and how the sediment/sludge will be removed. Sediment and treatment sludge may not be graded into or covered by the backfill.

b. Sediment traps and constructed channels must be utilized to treat runoff from affected areas. Sediment barriers are to be utilized only in areas that cannot be controlled by sediment traps.
c. The pore spaces in the R-4 channel lining for channel 1 and 2 should be filled facilitate base flow in the channel bottom.
d. The access road from channel D-2 to the pond should be reclaimed. The culvert in channel D-2 is to be removed and D-2 channel lining material replaced.
e. The pond embankments and the access roads to the pond bottom are to be restored to approximate original contour.
f. The channel lining materials in T1, the emergency spillway, and the upstream section of SP-2 are to be removed prior to fill placement. Flow can occur along the fill and channel lining interfaces, causing internal erosion of the fills and gullies to develop.

Module 15

19. A public notice is required for the proposed activities within 100 feet of Fletcher Run and the requested stream variance. Please submit the proof of publication.

20. Attachment 15.2.C – stream mitigation plans:

a. The executive summary still states that restoration/protection program will be considered successful if measured biological variables do not decline over pre-restoration values. The narrative is to be revised to be consistent with item 47.j of the previous response letter and the "bench marks" describe throughout the mitigation plan. The restoration project will not be considered successful if measured biological variables do not decline over pre-restoration values.
b. Please indicate that mitigation will be conducted within the affected watershed to the greatest extent practical.
c. The recent response letter stated that warm season grasses would be planted on the farms that receive restoration. Detailed farm restoration plans were not discussed in the scope of activity or indicated in the plan schedule. Warm season grass plantings appear to be only proposed during the final reclamation phases of the refuse disposal area. Terrestrial habitat enhancements must be developed concurrent with refuse site development to mitigate for terrestrial habitat losses, in addition to the warm season grass plantings to be provided during final reclamation of the site.
d. The success of revegetation standard for warm season grasses states the target will be one plant per square yard. The monitoring plan states that one hundred, random 0.25-meter square plots will be monitored and if 80% of the plots contain at least 1 plant, seeding will be considered successful. The two standards are in conflict; however, the success rate listed in the monitoring plan is acceptable. In addition, please indicate that the percent of ground cover for the final reclamation of the refuse site will comply with the standards for successful revegetation specified in §90.159.

e. The previously submitted warm season grass mixture was reviewed in consultation with the Pennsylvania Game Commission, which resulted in the following suggestions for your consideration: 1) Specify pure live seed (PLS) content for the selected species. 2) Soils must be tested and fertilized to promote warm season grasses. Phosphorus is a key nutrient to promoting warm season grasses. 3) The seed mixture is suggested to provide 10 lbs.-chewings (red) fescue, 5 lbs.-Timothy, 20 lbs.-annual rye grass, 6 lbs.-birdsfoot trefoil (inoculated), 3 lbs.-Indian grass (Rumsey), 6 lbs.-shelter switchgrass (purple top), 4 lbs.-little bluestem (Aldous or Camper), 2 lbs.-side oats grama (El-Reno), and 2 lbs-forb mix. No big bluestem is permitted within the foot print of the refuse disposal area due to its deep root systems and potential for damage to the refuse soil cap. The suggested seed mixture listed above should be utilized in flat or nearly flat areas. An alternate mixture should be utilized for embankment outslopes to promote rapid soil stabilization. In addition, the warm season grasses may be difficult to plant on steep grades due to the required planting methods.

21. Please submit an updated wetland mitigation plan for review.

22. Stream fencing is listed as the only stream improvement technique. Re-establishing a healthy riparian buffer along the treatment stream in equal quantity to the stream fencing would greatly enhance water quality. Include plantings of seedlings and seed mixes containing native trees and shrubs associated with stream corridors in southwest PA.

23. Include additional metrics for macroinvertebrate analysis. The bureau of water management has a standard set of metrics that would be appropriate.

24. If feasible, mitigation should take place in the same watershed as the refuse site.

<u>Module 18</u>

25 18.1:

a. Revise section 11) responses to indicate the sediment pond will be removed consistent with the sediment pond abandonment plans.
b. The recent response letter stated that all roadways not used for permanent access and maintenance would be reclaimed prior to final abandonment. Include a statement on drawings 11, 12, and 18.1 to reflect this intent. In addition, a haulroad maintenance plan is required to retain the access roads. The maintenance plan should be identified as a "Postmining Road Maintenance Plan" and should be written for maintaining the road in good condition. The maintenance plan should include measures for preventing or controlling erosion and siltation, flooding and damage to public or private property, air and water pollution and or minimizing damage to fish, wildlife and their habitat. It should include a recommended schedule for inspecting the road (at least annually) and correcting problems. It should also state that road crowns and surfacing are to be maintained, and road ditches and culverts kept clean.

18.5. Please revise 18.5.b) and section 16.0 of the technical specifications to be consistent with the seed mixtures specified in the mitigation plan in module 15.

Module 19

Please calculate the bond for the entire permit area as per TGD 563-2504-001. If the Means Building Costs Data Publication is used, identify the means 12 digit code based line.

Miscellanous

26. Saddle dams B, C, and D toe drain outlets are to be established as groundwater monitoring points.

27. Plans were previously requested to maintain the stream uses of the tributary located downstream from the refuse site by maintaining a minimum base flow from the treatment pond outlet. The refuse site will occupy approximately 50% of the Enlow Fork watershed at the treatment pond discharge point. Plans were provided that stated no water would be pumped from the treatment pond when the treatment pond discharge was less than 29 gpm. This rate was based on the average flow of the unnamed tributary to the South Branch of Enlow Fork. An analysis of the stream monitoring report for SW-N provided an average stream flow of 209 gpm for 7 sample periods, extending from 8/1/01 to 3/25/02. Therefore, revise module 13.1.b). to state no pumping from the pond will occur when the discharge rate is less than 200 gpm or provide justification for a lesser rate.

28. The sediment ponds are currently under review by the Division of Dam Safety and additional comments may follow.

Drawings – Miscellaneous

29. It is acknowledged that the underdrains will be covered with liner materials and internal drains covered with coarse coal refuse to prevent contamination from surface runoff subsequent to drain construction. Please also describe the measures to be employed to prevent contamination of the drains during construction. Specifically, how surface runoff/sediment will be prevented from entering the drains. The drains will be constructed incrementally in multiple phases of site development and will not be completed for many years. How will the inlets be protected when drain construction is suspended and how will the inlet locations be preserved for future identification and subsequent extensions? Surface runoff may not enter the underdrain or leachate collection systems.

Drawing No. 2

30. Identify the barrier area for Fletcher Run on sheet no. 2 as shown on exhibit 9.1.

Drawings No. 3 and No. 38

31. Collection channels are to be provided below the areas to be disturbed by belt conveyor and access road construction located upstream from Fletcher Run. In addition, the channels should be located in a manner to permit access to the sump for cleaning. Additionally, the conveyor may block access to the sump. All activities, including but not limited to clearing/grubbing, maintenance of the conveyor road, sump, and final reclamation activities are to be conducted within the confines of the collection channels/sump. Revise all other exhibits as needed.

32. Diversion channels T-33 and T-34 are to be located above the affected areas and not immediately adjacent to the road and beltway. In addition, the diversion channel outlet must discharge to a natural drainageway in nonerosive manner.

33. Depict the headwater of Fletcher Run and the stream barrier area on the drawings. Currently the proposed activities are too close to the stream to ensure the stream will not be impacted. The stream barrier area is to include a minimum of 20 horizontal feet from the stream.

34. The sump emergency spillway outlet is to be constructed in original ground.

Drawing No. 8

35. Channel T-46 should pass beneath the roadway/conveyor bench in a culvert, as the channel will be difficult to maintain across the roadway and belt conveyor.

Drawing No. 9

36. Although the internal drain was expanded slightly, the extent of the proposed internal drain is still extremely still limited. The water levels within the refuse pile must be limited to the greatest extent practical to enhance the performance of the clay liner system and afford maximum protection to the adjacent watersheds.

Drawing No. 12

37. The runoff sump and all runoff controls in vicinity to the same have been deleted from the drawing. Please restore the facilities to the drawing, as now shown on drawing no. 8 and as revised to address drawing no. 3 comments.

Drawing No. 15

38. Although attachment 10.3 was recently added to address the final closure (staging) of the existing no. 1 and no. 2 disposal areas, the timing of the final closure is still unclear. Why is coarse refuse disposal proposed in area no. 4 prior to the final reclamation of areas no. 1 and no. 2? Please reconcile the staging diagram for the slurry no. 3 dam with attachment 10.3.

Drawings Nos. 24-26 and No. 39

39. The plans were revised to provide soil dikes to contain coarse coal refuse runoff from exiting the site and potentially impacting the two adjacent high quality watersheds from saddle dams B, C, and D. Reference is made to comments no. 81 and no. 82 of the Department's initial corrections letter. Although the revised plans are a significant improvement and will contain surface runoff from the refuse site, additional measures are requested to ensure leachate may not seep from the embankment faces. We are concerned that the phreatic surface that will develop within the coarse refuse cap may seep through the fills placed above the saddle dams (crest elevation 1495). The design plans must ensure no seepage will develop through the coarse refuse and berm fills. The following comments are provided for consideration and for discussion in the pre-denial meeting:

    a. The soil berm(s) footprints should extend to the centerline of the proposed saddle dam upstream faces.
    b. Provide minimum dimensions for the soil berms to be constructed above the maximum saddle dam crests. Indicated minimum soil interface widths between the saddle dam crest and subsequent berm fills.
    c. Provide compaction and placement specifications for the berm/embankment fill materials. Indicate the fill surfaces will be cleaned and scarified prior to the placement of subsequent soil fills to integrate the fills and to prevent seepage surfaces.
    d. Provide material specifications for the berm/embankment fills. The soils must be suitable to prevent leachate from passing through the fills.
    e. Included liner details on drawing no. 39 as shown on drawings no. 24-26.

Drawing No. 32

40. A check valve has now been added to the rock drain outlet pipe to prevent the backup of sediment pond water when the sediment pond pool exceeds the invert of the pipe outlet. Please provide a monitoring plan to ensure the outlet valve is functioning properly. The frequency of monitoring should be no less than 7 days or more frequently, as required by conditions of Dam Safety or MSHA permits. The suggested monitoring frequency is consistent with MSHA requirements for weekly inspections of the impoundments.

Drawing No. 35

41. Details were provided to show perimeter channels are to be constructed in existing ground; however, additional clarification is needed to specify when the channels are to be constructed in existing ground. Channels A, B, and C are perimeter and internal channels. It must be clear that all channels constructed on the perimeter are to be constructed in original ground or within the soil fill in the case of the saddle dams.

42. Channels D and E are to be constructed in original ground in all cases. Label the original ground and depict the refuse fill in the cross-section.

Drawing No. 36

43. The revised drawing provided stapling requirements for synthetic channels; however, no other details were provided, including but not limited to trenching and overlapping requirements. Synthetic ditch lining materials are to be installed in accordance with manufacturer's recommendations. Please provide manufactures installation requirements/recommendations and drawing details of the same. Improper installation of the materials will lead to channel failure.

Drawing No. 37

44. The emergency spillway of the conveyor collection sump is to be constructed in original ground. An earthen plug or other suitable cutoff is to be established in the spillway to prevent discharge through the spillway lining prior to exceeding a 10-year design storm. A minimum berm width is 5 feet is required.

45 The manhole drain was removed to prevent contamination by pump lubricants of the rock/spring drain systems; however, the floor drain was retained. The drain is located below the liner system, which may allow pump lubricants to enter the ground water or eventually enter the underdrain system. In addition, pump lubricants may pool in the manhole and enter the mine via the pump borehole in the absence of a drain.

Drawing Nos. 41-55

46. Please indicate that coarse refuse fills and the drainage controls in areas no. 3 and no. 4 will be installed placed in a manner to promote drainage away from the embankment faces toward the temporary channels. Please revise the drawings that currently show surface runoff from the top surface of the fills over the embankment faces.

47. Please indicate temporary channels and culverts are to be removed prior to covering with refuse fills.

48. Channels are to be constructed, as the fills reach final grade. All groin and perimeter channels are to be constructed prior to or concurrent with the embankment development. Runoff from the top surface of the pile and benches may only discharge to constructed channels.

49. Revise to provide cap, soil cover, and vegetation on the completed embankment outslopes/fills in areas no. 3 and no. 4 as they are completed, weather permitting. Concurrent reclamation is required on all areas, as the final site configuration is achieved.

Drawing No. 41

50. Topsoil and clay storage areas are to be developed in the first phase of site development.

Drawing No. 42

51. Channels T12, T13, T44, and the downstream end of D3 should be installed in this phase to protect the dam north abutment drain and the constructed liner.

All outstanding deficiencies must be addressed to the satisfaction of the Department within thirty (30) days of the date of this letter. Failure to comply with this schedule by April 12, 2003, will result in the denial or return of this application.

If you have any questions, please contact me at the above listed number.

Sincerely,

Joe Szunyog
Hydrogeologist
District Mining Operations

Pennsylvania Department of Environmental Protection
Rachel Carson State Office Building
P.O. Box 8554
Harrisburg, PA 17105-8554
February 13, 2003

Telephone: 717-787-8568
Telecopier: 717-772-0409

Bureau of Waterways Engineering

Mr. Jonathan M. Pachter
Consol Pennsylvania Coal Company
1800 Washington Road
Pittsburgh, PA 15241

Re: Technical Review No. 1
Bailey Mine Area No. 3 Slurry Dam
Richhill Township, Greene County
DEP File No. D30-055

Dear Mr. Pachter:

We have completed the first technical review of your application seeking authorization to construct, operate and maintain the Bailey Mine Area No. 3 Slurry Dam at Coal Refuse Disposal Facility No. 3 at the Bailey Central Mine Complex. The proposed dam construction includes three stages of embankment construction and a final site layout or Closure Phase. We consider the following comments to be appropriate:

1. At our request, the Division's Geotechnical Consultant, Gannett Fleming, Inc., (Gannett Fleming) performed a geotechnical review of this application. We have enclosed a copy of the Gannett Fleming December 20, 2002 letter commenting on the proposed construction. A copy of the Gannett Fleming letter was faxed to Michael Baker, Jr., Inc., (Michael Baker) on January 28, 2003. Please address these comments in your response to the Division of Dam Safety and direct any questions to Paul Lewis or Robert J. Saber of Gannett Fleming at 717-763-7211.

2. The Department's review of the proposed Stages 1 through 3 includes reviews of the Main Dam, which has been assigned File No. D35-055, and Saddle Dams A, B, C, and D. Saddle Dams A, B, C, and D are isolated from the Main Dam and a potential failure of these saddle dams impacts adjacent and different floodways downstream. The Emergency Action Plans (EAPs) submitted by Michael Baker for Saddle Dams A, B, C, and D with this Application have been forwarded to our Monitoring and Compliance Section for processing. So as not to create any unnecessary delays in the processing of this Dam Permit Application, we will authorize the construction of the Main Dam and Saddle Dams A, B, C, and D with the issuance of one Dam Permit. We have assigned separate file numbers D30-056, D30-057, D30-058, and D30-059 for Saddle Dams A, B, C, and D, respectively. This is necessary to avoid confusion in

Chris/Dam Permit
Recd 2/26/2003
JL

future correspondence and during any necessary emergency response at any of the four saddle dams.

3. The hydrology and hydraulics for the proposed construction of the Bailey Mine Area No. 3 Slurry Dam are acceptable. We note that Stages 1, 2 and 3 and the Closure Phase include sufficient freeboard to pass the Spillway Design Flood, which is the Probable Maximum Flood (PMF).

4. The breach analyses for the Main Dam and Saddle Dams A, B, C, and D have been reviewed by this office and are acceptable. The Main Dam is properly classified as a Size Class A, Hazard Potential Classification Category 1, High Hazard (A-1). Saddle Dams A, B, C, and D are properly classified as Size Class B, Hazard Potential Classification Category 1, High Hazard (B-1). We note that "sunny day" breach analyses were **not** performed by Michael Baker for the Main Dam or Saddle Dams A, B, C, and D. A "sunny day" analysis will be required for each dam to determine if there are any additional impacts to residences downstream of the current downstream limits of impacts on each watershed. Any additional downstream impacts would require changes to the inundation mapping in the EAPs but **would not** affect the current Hazard Potential Classifications. Any questions on these required "sunny day" analyses should be directed to Michael Packard of our staff at the above number.

5. We note your statement in the Dam Permit Application that Consol Pennsylvania Coal Company will delay submittal of proof of financial responsibility for the dams until the end of the permit review process. Based on the size (height and storage) of the dams we have determined that the dams will require proof of financial responsibility in the following total amounts: Main Dam- $150,000.00; Saddle Dam A-$100,000; Saddle Dams B, C and D- $75,000. Proof of financial responsibility forms for the dam are enclosed for your use. **Commonwealth approval of proof of financial responsibility will be required before we can issue the Dam Permit.** If you have any questions on the forms, please contact Kathy Gutshall of the Department's Division of Certification, Licensing and Bonding at 717-783-7503.

6. We note that the Dam Permit Application **will not be complete until we have received proof of financial responsibility for all five dams, and that the Department cannot publish the Dam Permit Application in the Pennsylvania Bulletin until the application is complete**. You are advised that depending on when the Application is determined to be complete, permit issuance will be delayed for the thirty day comment period required for the public after a project is published in the Bulletin.

7. As indicated in the Department's letter to you dated September 26, 2002, permits for the Upper and Lower Sediment Pond Dams (DEP File Nos. D30-062 and D30-060, respectively) have been waived in accordance with Section 105.12(a)(4) of the Department's Dam Safety Waterway Management Regulations. We, therefore, have not commented on the design for these dams. We have, however, received a request from the Department's McMurray District Mining Office on February 12, 2003, for

this office to review the proposed design of these two dams. We will complete this review and provide any comments to you as soon as possible. In the interim, we recommend that any comments on these dams provided by Gannett Fleming in their December 20, 2002 correspondence be implemented in the sedimentation pond designs.

8. The plans submitted include the closure of the Area No. 3 Disposal Facility. Upon final closure of the facility, the Division of Dam Safety (DDS) may eventually be able to consider the dam embankment to no longer be a regulated impounding dam and may eliminate the need to continue with inspections and reporting requirements for the operation and maintenance of the dam. In order for this to happen, Consol Pennsylvania Coal Company (CPCC) must submit information required by the Department of Environmental Protection's Technical Guidance Document, Criteria for Deregulation of Tailings Impoundments as Dams (copy attached). A Special Condition will be attached to the Dam Permit advising the (CPCC) to notify the DDS when the criteria for deregulation of the Bailey Mine Area No. 3 Slurry Dam at Coal Refuse Disposal Facility No. 3 have been met.

9. The project will impact approximately 13,200 feet of perennial and intermittent stream channel and 1.37 acres of wetland. Wetlands affected must be replaced in accordance with §105.20a, Wetland replacement criteria. As discussed during our May 15, 2002, site meeting, the Department cannot accept enhancement of existing wetlands as mitigation for proposed impacts. We concur with the review letter from Joe Szunyog, Hydrogeologist, dated July 24, 2002, regarding the revisions needed to approve the stream and wetland mitigation plans. The proposed wetland mitigation plan must be revised to provide a minimum of one acre of constructed wetland for each acre of wetland impacted, excluding existing wetlands at the mitigation sites. After this mitigation plan has been finalized through the McMurray District Mining Office, please submit a copy of the finalized stream and wetland mitigation plans to this office for our file.

PLAN REVIEW

10. On Drawing No. 2, please provide the serial number for the preliminary call to the Pennsylvania One Call System.

11. On Drawing No. 13, the downstream and upstream slopes on the Main Dam appear to be 2.5H:1V and 3H:1V, respectively. Please indicate the appropriate slopes on the drawings.

12. On Drawing Nos. 24, 25,and 26, label the top-of-dam elevation as El. 1495.0.

13. On Drawing No. 32, the "Rock Drain Detail" shows the installation of a Class 1 geotextile between the bituminous concrete sand and the R-3 stone. If clogging occurs due to deterioration or degradation of the geotextile in the foundation area of the dam, repairs to eliminate potential seepage paths would be impossible. For this

reason, we ask that the rock drain in the foundation of the dam be designed with natural coarse aggregates and sand that meet filter criteria. Please provide the appropriate revisions and design calculations.

SPECIFICATION REVIEW

14. Fill placed in the immediate vicinity of the decant pipe and the dewatering manhole in the Main Dam embankment should be compacted with a mechanical tamper. Please indicate this in the appropriate sections of the Technical Specifications.

Three sets of properly sealed and certified construction plans and specifications should be submitted to this office for review and approval. An embossed seal is required on the first page of all plans and specifications. A facsimile seal is acceptable on all subsequent pages of plans. The submission can include three copies of only the sheets that require revisions, if you so desire.

As stipulated in Chapter 105 of the Department's Rules and Regulations, information required by this office must be received within 60 days of the receipt of this letter or the Department will consider your permit application withdrawn. If additional time is required to submit the requested information, you may request an extension in writing. If the information is not received by the extended deadline, the Department will consider the application to be withdrawn. Application fees will not be refunded; however, the application file can be reopened after submitting the previously identified information and a new application fee. This application has previously been removed from the Department's Money-Back Guarantee Permit Review Program; however, the permit application will continue to be reviewed by our staff. If you have any questions or desire to meet to discuss any of the above comments, please contact Larry McCauley at the address or telephone number listed above.

Sincerely,

Dennis R. Dickey

Dennis R. Dickey, P.E.
Chief
Project Review Section
Division of Dam Safety

Enclosures: Gannett Fleming December 20, 2002 Letter
Deregulation Guidance Document
Bonding Forms

cc: Craig Burda, McMurray District Mining Office
Robert T. Saber, P.E., Gannett Fleming, Inc.
Albert H. Rogalla, U.S. Army Corps of Engineers, Pittsburgh District
Michele Stewart, P.E., Michael Baker Jr., Inc.

Pennsylvania Department of Environmental Protection

Rachel Carson State Office Building
P.O. Box 8554
Harrisburg, PA 17105-8554
December 24, 2002

Bureau of Waterways Engineering

Telephone: 717-787-8568
Telecopier: 717-772-0409

Mr. Joseph C. Wilcox, Jr.
Supervisor of Environmental Engineering
Consolidation Coal Company
P.O. Box 355
Eighty-Four, PA 15330

Re: Proposed Expansion of Existing Slurry Impoundment Dam
Wayne Township, Greene County
DEP File No. D30-063

Dear Mr. Wilcox:

Reference is made to the information submitted by you to this office dated November 22, 2002, concerning the proposed expansion of an existing slurry impoundment dam on the property of Consolidation Coal Company. This existing dam is located across Hughes Run in Wayne Township, Greene County.

The following impounding structures (dams) located on a watercourse are regulated by this agency under Section 4 of the Dam Safety and Encroachments Act and would therefore require a Dam Permit from this office for construction or modification:

1. Dams where the contributory drainage area exceeds 100 acres,

2. Dams where the greatest depth of water measured from the upstream toe of the dam to the top of the dam at maximum storage elevation exceeds 15 feet, and

3. Dams where the impounding capacity (storage volume) at maximum storage elevation exceeds 50 acre-feet.

Based on the information provided and the provisions of Section 4 of the Dam Safety and Encroachments Act, we have determined that the existing dam is regulated by this Act, and therefore a Dam Permit is required to raise the height of the dam by 56 feet. We have enclosed an Application for Dam Permit, which includes an Application Checklist to assist you in applying for the necessary permit. Also, enclosed is a copy of Chapter 105 of our Rules and Regulations. Please note that Department regulations require that a Registered Professional Engineer design all modifications to the existing dam.

Scott - rec'd 12/30/2002

It would facilitate the process if your engineer would contact this office to schedule a pre-application meeting to discuss the Dam Permit Application process and the specific requirements for the design and modification of this dam. If you have any questions concerning this material or the information to be submitted with the application, please give me a call at the above number.

Sincerely,

Dennis R. Dickey

Dennis R. Dickey, P.E.
Chief
Project Review Section
Division of Dam Safety

Enclosure: Application for Dam Permit
Chapter 105 Rules and Regulations
Pre-Application Conference Fact Sheet

cc: Claudio E. Yon, P.E., Alliance Consulting, Inc.
Greene County Conservation District
(Wadestown Quad, N: 17.5 in., E: 11.75 in.)
Pennsylvania Fish and Boat Commission, Southeast Region
Albert H. Rogalla, U.S. Army Corps of Engineers, Pittsburgh District

U.S. Army Corp. of Engineers

Pennsylvania Department of Environmental Protection
3913 Washington Road
McMurray, PA 15317

DEC 09 2002

McMurray District Office 724-941-7100

Certified Mail #7001 0320 0005 4340 3534

Mr. Ed Suter
Consol Pennsylvania Coal Company
PO Box 355, 172 Route 519
Eighty Four, PA 15330

Re: Operation Name: Bailey Mine and Preparation Plant
Permit No.: 30841316
Richhill Township, Greene County

Ladies and Gentlemen:

We have enclosed a revised permit for the above operation. This proposal was accepted for technical review on September 16, 2002.

The permit has been revised to authorize full extraction mining in panels 19A and 20A and a Chapter 105 permit for approximately 2300 feet of Kent Run overlying the 19A and 20A panels.

Please refer to Pages E-4 and E-9, Special Condition Nos. 29 and 30 respectively, which identifies the approved changes.

The enclosed information supercedes the original issued permit and should be incorporated on a page-by-page basis.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, PO Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 1-800-654-5984. Appeals must be filed with the Environmental Hearing Board within thirty (30) days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in Braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

We should notify consol of Fed Requirement for permit + full (Discuss) Recd Scott 12/2002

DEC 0 9 2002

If you want to challenge this action, your appeal must reach the Board within 30 days. You do not need a lawyer to file an appeal with the Board. Important legal rights are at stake, however, so you should show this document to a lawyer at once. If you cannot afford a lawyer, you may qualify for free Pro Bono representation. Call the Secretary to the Board (717) 787-3483) for more information.

If you have any questions about the permit, please contact me at the above number.

Sincerely,

Joseph F. Leone

Joseph F. Leone, P.E.
Chief, Bituminous Mine Permit Section
District Mining Operations

Enclosure

DEC 09 2002

JFL/CB/jf: g2 (W) f (W) a (W)

bc: Greensburg District Office File (W)
MCI Tim Hamilton (W)
Deep Mine Safety (W)
Hbg. Monitoring and Compliance (*)
Licensing and Bonding (***)
PA Fish Commission (L)
PA Game Commission (L)
PA Historical/Museum Commission (L)
Richhill Township Supervisors (L)
Greene County Conservation District (L)
Surface Subsidence Agent - c/o Mark Frederick (W)
Colbalt Professional Services, Inc. - Engineer/Consultant (W)
U.S. Army Corp of Engineers (L) ✓

Pennsylvania Department of Environmental Protection

Rachel Carson State Office Building
P.O. Box 8554
Harrisburg, PA 17105-8554
September 26, 2002

Bureau of Waterways Engineering

Telephone: 717-787-8568
Telecopier: 717-772-0409

Mr. Jonathan M. Pachter
Consol Pennsylvania Coal Company
1800 Washington Road
Pittsburgh, PA 15241

Re: Bailey Mine Disposal Areas 3 & 4
Lower and Upper Sediment Pond Dams
Richhill Township, Greene County
DEP File No. D30-060 & D30-062

Dear Mr. Pachter:

We have completed a review of the breach analysis and supplemental information received from Baker Environmental, Inc., (Baker) on September 6 and 13, 2002, for the Bailey Mine Disposal Areas 3 and 4, Lower and Upper Sediment Pond Dams.

In addition to the Lower Sediment Pond Dam, it has been determined that the Upper Sediment Pond Dam is also a jurisdictional dam regulated by this office under the Department's Chapter 105 regulations. Our review of the Baker breach analysis for both the Lower Sediment Pond Dam (D30-060) and the Upper Sediment Pond Dam (D30-062) indicates that both dams are Size Class C, Hazard Potential Category 3 dams. Therefore, in accordance with Section 105.12(a)(4) of the Department's Dam Safety Waterway Management Regulations, requirements for obtaining Dam Permits for both dams are waived. Your Dam Permit Application for the Lower Sediment Pond Dam is, therefore, considered to be withdrawn and the file has been closed.

Gannett Fleming, Inc., our geo-technical engineer for this project, had previously been requested to conduct a geotechnical review of these dams. They have completed their geotechnical review of the Area 3 and 4 Sediment Pond Dams. When we receive their written comments we will send them to you for your information. If you have any questions, do not hesitate to call.

Sincerely,

Dennis R. Dickey

Dennis R. Dickey, P.E.
Chief
Project Review Section
Division of Dam Safety

cc: Paul Lewis, P.E., Gannett Fleming, Inc.
Michele Stewart, P.E., Michael Baker Jr., Inc.
Greene County Conservation District
Ron Tibbott, Pennsylvania Fish and Boat Commission
Albert Rogalla, Chief, Pittsburgh U.S. Army Corps of Engineers

Rec'd 9/30/2002
Scott Christy Nancy

Module 14

43 Please revise module to include refuse final clay cap requirements.

44 14.4. Please revise the quality assurance and quality control procedures for this section and section 15, appendix B of the technical specifications as follows:

*Confirmatory testing will be conducted on the constructed refuse disposal area liners and caps as follows:

1) Moisture-Density Relationship (ASTM D698), one test per acre;
2) Grain size distribution (ASTM D422), one test per acre;
3) **In-Place Density (D2922, D3017, or D1556), one test per acre;
4) Atterberg Limits (ASTM D4318), one test per acre;
5) Total liner/cap thickness verification, one test per acre.

*Confirmatory testing will be conducted on the constructed treatment pond liner as follows:

1) Grain size distribution (ASTM D422), one test on bottom and each side;
2) Moisture-Density Relationship (ASTM D698), one test on bottom and each side;
3) **In-Place Density (D2922, D3017, or D1556), one test on bottom and each side;
4) Atterberg Limits (ASTM D4318), one test on bottom and each side;
5) Permeability (ASTM D5084), one test on bottom and one side;
6) Total liner thickness verification, one test on bottom and each side.

*The mine conservation inspector or his/her designee will be present for the selection of random soil liner and cap sample locations. All constructed soil liners and caps shall be approved by the mine conservation inspector or his/her designee and the PADEP McMurray District Mining Office, before covering with refuse/soil or impoundment of water.

**Soils are to be compacted to attain a dry density corresponding to 95% of the maximum dry density or higher, if required to achieve the desired permeability.

45. 14.5. Revise to include discussion regarding protection of liner and underdrains in areas where concentration of surface runoff will occur. Soil cover or refuse have been shown to not provide adequate protection against accelerated erosion in areas of concentrated flows.

Module 15

46. Wetlands appear to exist in proximity to the conveyor sump, near the headwater of Fletcher Run. Wetlands in the headwaters of Fletcher Run are to be avoided if at all possible, as Fletcher Run is a high quality watershed. Please address.

47. Attachment 15.2.C. – stream mitigation plans

a. The schedule for stream mitigation should be developed relative to the issuance date of the permit. The stream mitigation plan schedule is to be initiated immediately upon issuance of the refuse permit.
b. The proposed schedule does not mitigate for the stream and terrestrial habitat losses as soon as practical, as the stream bank fencing and border-edge cuts are not currently proposed to be completed until late 2005. In addition, the proposed warm season grass planting will not occur until the completion of the refuse disposal project. The final reclamation of the facility may not occur for 20 years or more.
c. The current narrative only states that assistance will be provided to CONSOL with the planting of grasses to increase wildlife habitat. Definitive seeding plans are to be identified in the mitigation plan for the final reclamation of the site, including but not limited to seed types and aerial extent. In addition, what assessment technique will be utilized to measure warm season grass planting success?
d. Warm season grasses have very deep and extensive root systems, which may compromise the integrity of the final clay cap. The clay cap will be constructed approximately 1 foot below the top of the final soil cover. Please specify the type of warm season grasses proposed for use on the disposal areas at final reclamation and indicate the anticipated depth of the roots for the selected species.
e. The restoration activities provide for 20 border-edge cuts on farms throughout the watershed, however; the plan states the number and size are determined by the amount of grasses planted and the availability of timber on the property to be restored. Currently, warm season grass plantings are only proposed during final reclamation of the refuse disposal site. In addition, the "benefits" section states that native grasses will be restored throughout the watershed. Please reconcile and clarify.
f. The schedule narrative provides a disclaimer that states timing of restoration activities may be extended beyond those proposed, dependent upon inclement weather and in an appropriate fashion. The disclaimer is very vague and may extend the implementation of the mitigation plan unnecessarily. An aggressive schedule must be proposed to complete the implementation of the project as soon as practical. Deviations from the approved schedule will only be approved by the Department, if sufficient justification is provided.
g. The December 2005 – June 2009 schedule provides for the completion of part 4 of restoration activity. Part 4 is the planting of native grasses during final reclamation of the refuse site, which is not to occur until 2020+. Please reconcile.
h. The proposal narrative states that the impacts of restoration will be assessed for plant, fish, wildlife, and macroinvertebrate communities. There is no description of the assessment tools that will be used. Specific assessment techniques and statistical tools must be provided.

i. The bio monitoring provides for water samples to be collected and tested, however; the location and frequency of testing is not specified. What are the parameters to be tested to demonstrate an improvement of water quality that should result from the stream mitigation?

j. The mitigation plan must demonstrate measurable improvements will result from the implementation of the mitigation plans (minimum of 20%) and the time frames improvements are to be accomplished. The executive summary states that restoration/protection will be considered successful, if measured biological variables improve or do not decline over pre-restoration values. The proposed threshold values proposed to define "success" do not adequately mitigate the proposed stream losses. Specify the improvement goals for the parameters to be assessed in the bio monitoring plan and what remedial measures will be initiated if the goals are not attained in the specified time frames.

In summary, the proposed stream mitigation plans submitted in conjunction with the permit application, are not currently adequate to mitigate for the 2.5 miles of stream loss. A revised mitigation plan must be submitted to address the deficiencies outlined above.

48. Attachment 15.5 – Wetland mitigation plan

a The total wetland impacts are specified in the introduction at 1.46 acres and in the conclusion at 1.36 acres. Please reconcile.

b. The narrative discusses detailed construction plans that will be required to perform the wetland mitigation work. The plans are to be submitted for review in conjunction with the permit application as the wetlands mitigation plans are to be initiated immediately subsequent to permit issuance.

c. Revise the plan to include the following monitoring/reporting requirements and performance standards: The permittee shall monitor the mitigated wetlands for at least five years. A monitoring report shall be submitted to the McMurray District Mining Office every six months for the first two years after construction and annually for three years thereafter. The reports shall be submitted in conjunction with the quarterly certifications of the facility design and construction. The monitoring reports shall contain; a) information describing the success of the site at the time of inspection, b) an inventory of the surviving plant species and percent area coverage, c) photographs of the mitigated wetlands with plans showing the location and orientation of each of the photographs, and d) plans to correct any deficiencies identified during the monitoring phase. Remedial work is to be conducted after two years from completion of the constructed wetlands should the establishment of the wetlands prove unsuccessful. The replacement wetlands shall be considered successful when 85 percent of the hydrophytic vegetation has been established and survived following two growing seasons.

d. The mitigation plans must provide for a 1:1 replacement for the impacted wetlands, excluding the existing wetlands at the proposed mitigation sites. Open water areas in excess of 18 inches may not be considered as replacement wetlands.
e. Existing wetlands may not be eliminated to develop the proposed wetland mitigation plans.
f. The final mitigation plan maps are to clearly identify/label the surface areas of the replacement wetlands.

Module 18

49. 18.1

a. Man-made features were not shown on the map (section 6).
b. All roadways are to be reclaimed prior to final abandonment.
c. Culverts should be eliminated and replaced with open channels to promote long-term stability of the refuse piles. Culverts may plug or collapse, causing uncontrolled runoff from the piles. Please address.
d. The existing land uses identified on the map are not land uses defined in §90.1. The prominent pre-mining land uses within the permit boundary are: pastureland or land occasionally cut for hay, forestland, and unmanaged natural habitat.
e. The proposed post-mining land uses and vegetative cover types are to be identified on the map. The areas within the footprint of the disposal areas may be reclaimed to unmanaged natural habitat. All support areas must be restored to the pre-mining land uses or a change in land use must be requested and approved.
f. Stockpile areas should be shown restored to approximate original contour.

A drawing(s) should be provided to represent the final configuration of the disposal areas at final abandonment (subsequent to treatment pond removal).

50. 18.3. Revise sections a) and c) to be consistent with defined land uses and comments listed above in module 18.1.

51. 18.4. Revise sections a) and b) to be consistent with comments listed above in Module 18.1 and 18.3.

52. 18.5.

a. c). Please specify type of tall fescue. The use of K-31 is to be avoided.
b. d). Woody species are to be restored in the existing forested areas.
c. f). Please revise to be consistent with §90.159.

Baker

Michael Baker Jr., Inc.
A Unit of Michael Baker Corporation

Airport Office Park, Building 3
420 Rouser Road
Coraopolis, PA 15108

(412) 269-6000
FAX (412) 269-6100

November 15, 2002

Mr. Joseph Szunyog, Hydrogeologist
Pennsylvania Department of Environmental Protection
District Mining Operations
3913 Washington Road
McMurray, PA 15317

Re: Consol Pennsylvania Coal Company
Bailey Central Mine Complex
Proposed Coal Refuse Disposal Areas No. 3 and No. 4
Coal Refuse Disposal Permit Application Number 30020701
Public Notice No. 200200371; September 23, 2002
Richhill Township, Greene County

Dear Mr. Szunyog:

Attached for the Department's review are an original and three copies of replacement pages/drawings for the subject permit application. These documents are attachments to our document entitled "Response to PADEP July 24, 2002 Comments" which was provided to you under separate cover on October 31, 2000. Note that the enclosed documents include a replacement page 4 for the comment response. This page was revised to reflect a new response to Comment No. 30.

Please feel free to call me at (724) 269-6022 or Jonathan Pachter of CONSOL at (724) 206-2053 if you have any questions or comments or require additional information. We are providing replacement pages and drawings to other review agencies that received copies of the subject permit application as indicated below.

Sincerely,

MICHAEL BAKER JR., INC.

Michele Stewart

Michele Stewart, P.E.
Engineering Manager

cc: Jonathan M. Pachter, Consol Pennsylvania Coal Company – three copies
Donald Martino, Division of Dam Safety – original & two copies
Joseph J. Garcia, Mine Safety and Health Administration – original and two copies of replacement design report narrative and drawings
Albert H. Rogalla, U.S. Army Corps of Engineers – one copy
William J. Hoffman, U. S. EPA, Region III – one copy
David Densmore, U.S. Fish & Wildlife Service – one copy

AR Rec'd 11/26/2002 gz

5600-PM-MR0324 Rev. 4/2001

Revised October, 2002

DEP USE ONLY
Date Received
Permit Number

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF MINING AND RECLAMATION

MODULE 1: APPLICATION FOR BITUMINOUS UNDERGROUND MINE, COAL PREPARATION PLANT AND/OR COAL REFUSE DISPOSAL AREA

Before completing this form, read the step-by-step instructions provided with this Permit Application Package.

SECTION A. PROJECT INFORMATION

Operation Name: *Bailey Central Mine Complex Coal Refuse Disposal Areas No. 3 and No. 4*

Permit No. (existing site):

SECTION B. APPLICANT INFORMATION

Applicant Name
Consol Pennsylvania Coal Company (CPCC)

Mailing Address
1800 Washington Road
(Street # and Name or P.O. Box)

Pittsburgh (City) *PA.* (State) *15241-1421* (Zip Code + Four)

412-831-4000 (Telephone #) *412-831-4513* (FAX #) - VOLUNTARY - (Social Security Number) (if individual) *25-1402386* (Federal Tax ID #)

Applicant Type
- ☐ Individual
- ☐ PA Corporation
- ☒ Non-PA Corporation
- ☐ General Partnership
- ☐ Limited Partnership
- ☐ Municipality
- ☐ Other
- ☐ Pending

4305 Mining Operators License #)

Application Contact
Pachter (Last Name) *Jonathan* (First Name) *M* (MI) (Social Security #) Voluntary

Manager, Environmental Permits (Title)

Mailing Address
1800 Washington Road
(Street # and Name or P.O. Box)

Pittsburgh (City) *PA.* (State) *15241-1421* (Zip Code + Four)

Type of Mining Activity
- ☐ Underground Mine
- ☐ Coal Preparation
- ☒ Refuse Disposal
- ☐ Refuse Reprocessing

Blasting Anticipated Yes ☒ No ☐

Application Type
☒ New Permit ☐ Permit Revision ☐ Permit Transfer ☐ Renewal

SECTION C. SITE INFORMATION

Location of Operation – for underground mines provide main portal location

County(ies)	Municipality(ies)	County Code
Greene	*Richhill Township*	*30*
Greene	*Gray Township*	*30*

The following are the names and addresses of each tract owner within 1,000 feet of the proposed permit boundary.

Parcel No. 2210 – 121
Consol Pennsylvania Coal Co.
1800 Washington Road
Pittsburgh, PA 15241

Parcel No. 2209 – 162
Consol Pennsylvania Coal Co.
1800 Washington Road
Pittsburgh, PA 15241

Parcel No. 2210– 130
Sandra Harris
193 Crouse Road
Graysville, PA 15337

Parcel No. 2210 – 124
Consol Pennsylvania Coal Co.
1800 Washington Road
Pittsburgh, PA 15241

Parcel No. 2210– 123
Consol Pennsylvania Coal Co.
1800 Washington Road
Pittsburgh, PA 15241

Parcel No. 2210-131
Gerald L. Anderson
RD 1, Box 110 Crouse Road
Graysville, PA 15337

Parcel No. 1001-137
Charles and James Browell
Stringtown Road
Graysville, PA 15337

5.2 ***Underground Permit Area.*** For each coal tract within the area to be mined underground, provide the following information (identify each parcel and key to the maps in Module 6.3 and the listing at 22.7):

a) the names and addresses of every legal or equitable owner of record, the holder of record of any leasehold interest, and any purchaser of record under a real estate contract.

b) descriptions of the documents on which the applicant bases the legal right to enter upon the property and commence activities, including:

1) the type of document;

2) the date of execution;

3) the specific lands and coal seams to which the document pertains;

4) the legal rights claimed by the applicant;

5) whether or not the applicant's right of entry is subject of current or pending court litigation.

c) the name and address of the owner of the seam to be mined on each subsurface tract contiguous to the underground permit boundary.

Not applicable since no underground mining is proposed with this permit application.

5.3 ***Anticipated Permits.*** Identify any contiguous coal tracts or surface lands for which it is anticipated that individual permits for mining will be sought as a result of interest in lands, options or pending bids on interest held or made by the applicant.

No individual mining permits are anticipated for any contiguous coal tracts or surface lands in the future.

5.4 ***Structure Inventory.***

Provide the following information for each building which lies within 1000 feet of the boundaries of a surface mining activity site, and, if the application is for an underground mine, each building which is located within the subsidence control plan boundary and within a 30-degree angle of draw projected from that boundary. List structures in ascending order by their identification numbers.

a) Structure identification number.

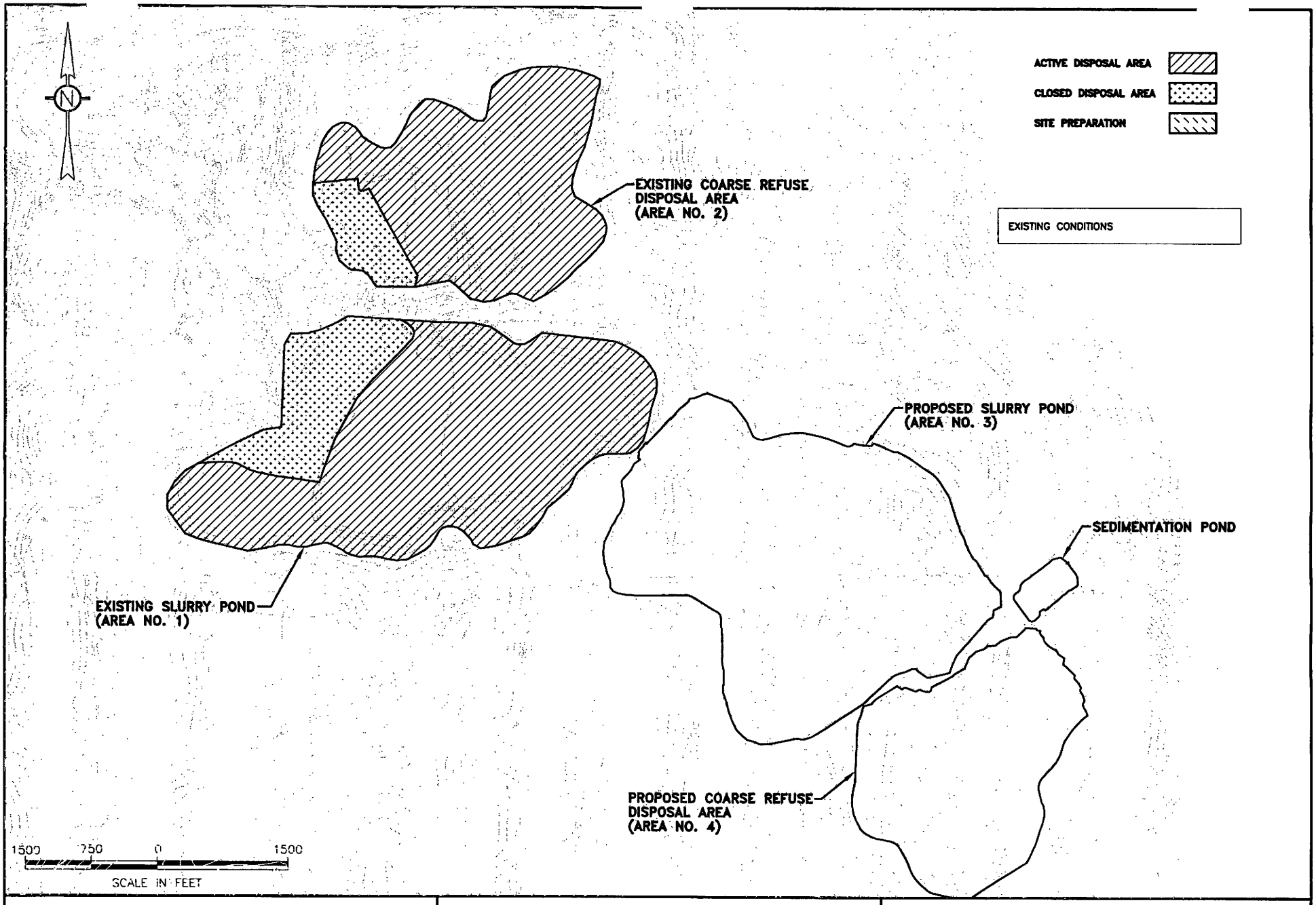
b) Owner.

c) Current use.

d) Current resident (if structure is a dwelling).

ATTACHMENT 10.3

PROPOSED CLOSURE SEQUENCING

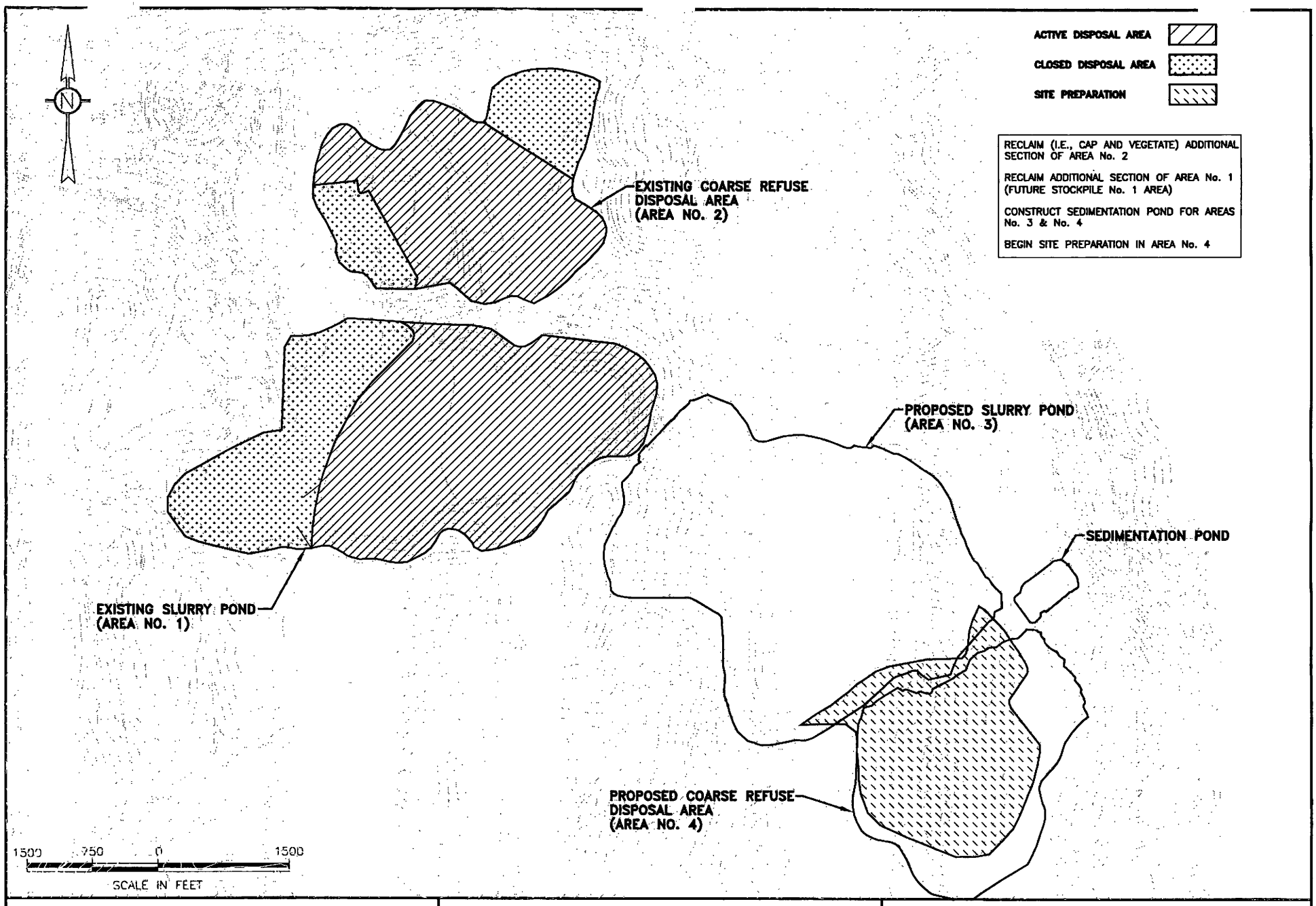


Baker
Baker Environmental Inc.

MICHAEL BAKER JR., INC.
CORAOPOLIS, PENNSYLVANIA
412 269-6000
MBAKERCORP.COM

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

ATTACHMENT 10.3
FACILITY SEQUENCE DRAWINGS
STAGE 1

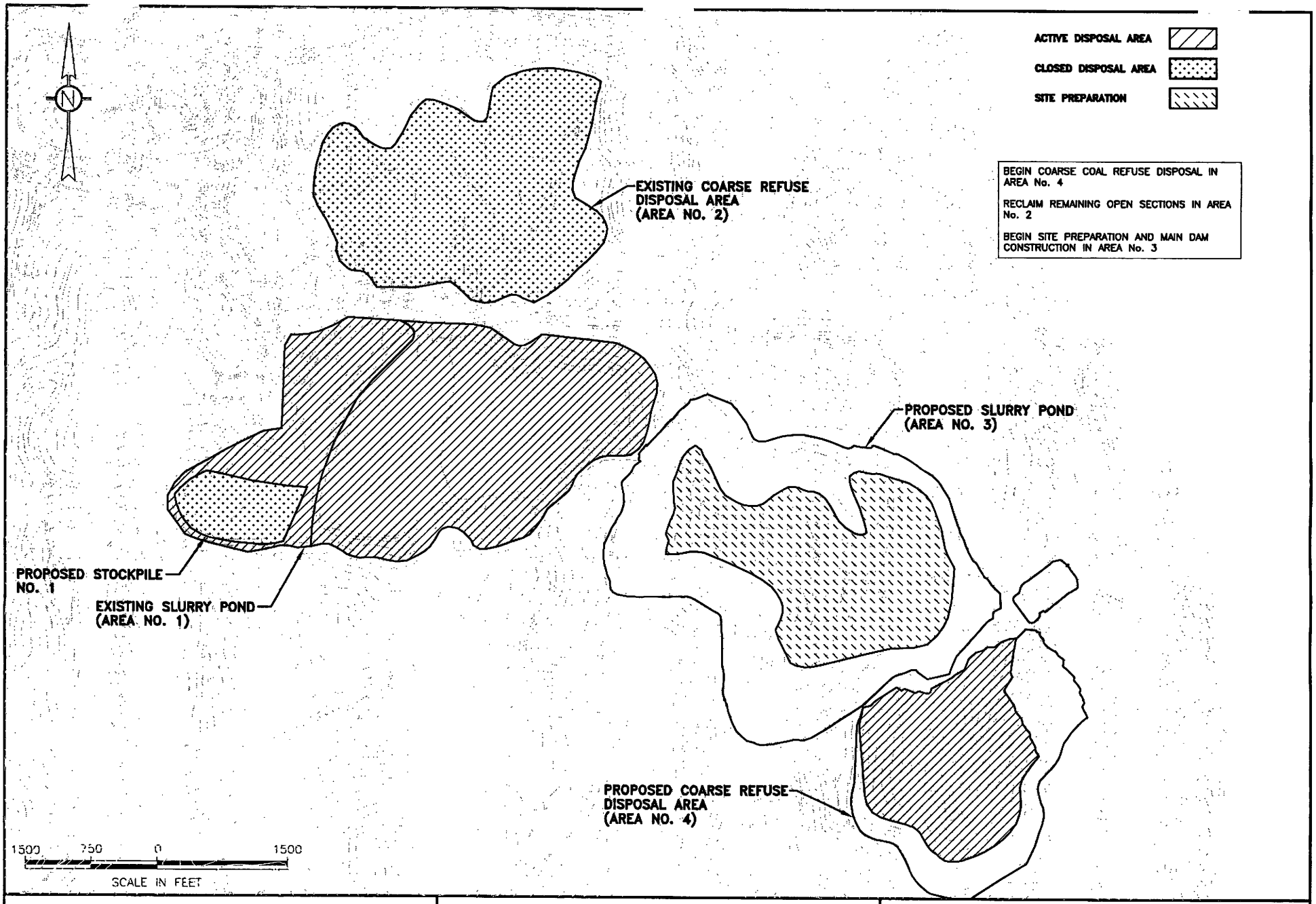


Baker
Baker Environmental Inc.

MICHAEL BAKER JR., INC.
CORAOPOLIS, PENNSYLVANIA
412 269-6000
MBAKERCORP.COM

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

ATTACHMENT 10.3
FACILITY SEQUENCE DRAWINGS
STAGE 2

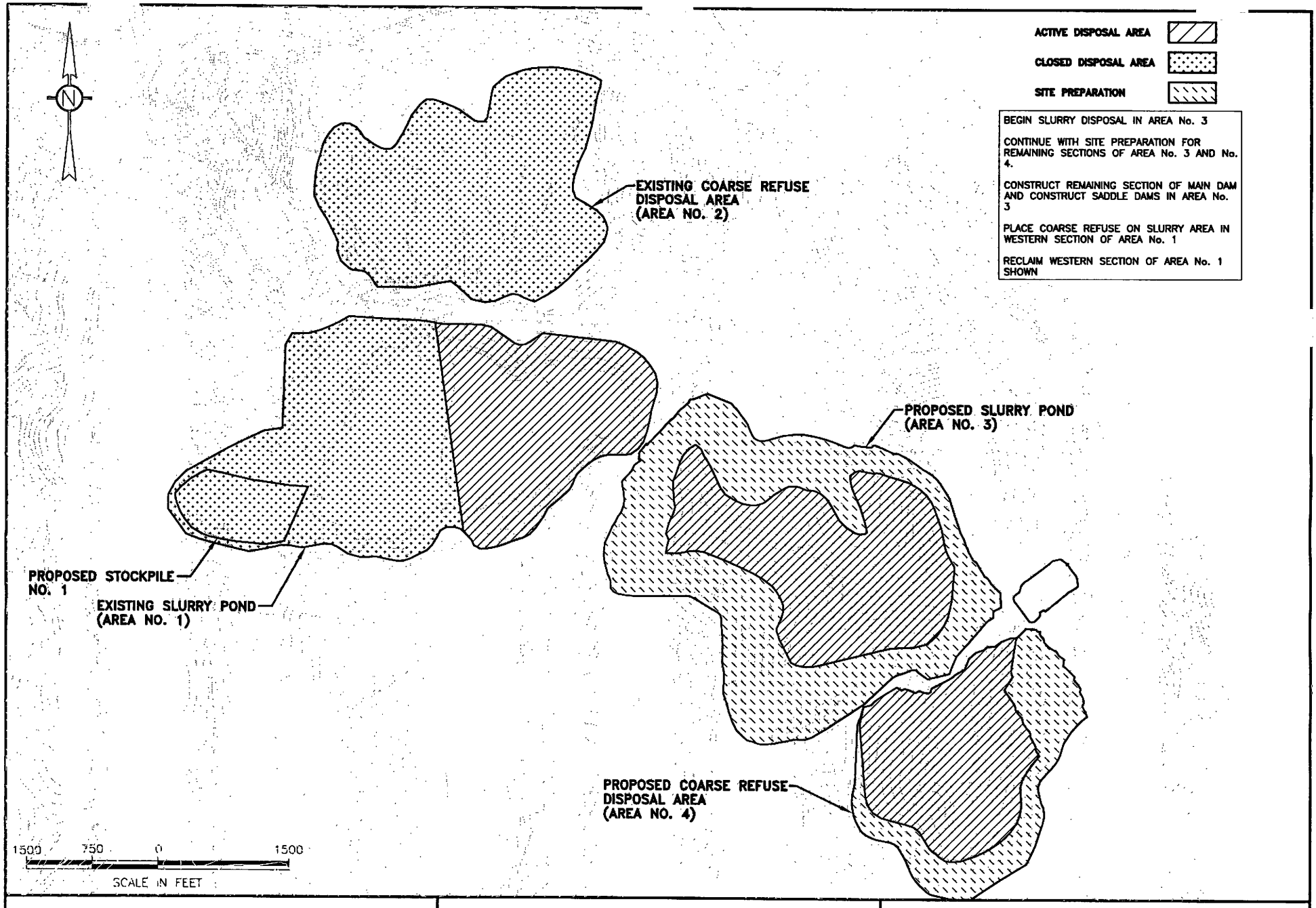


Baker
Baker Environmental Inc

MICHAEL BAKER JR., INC.
CORAOPOLIS, PENNSYLVANIA
412 269-6000
MBAKERCORP.COM

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

ATTACHMENT 10.3
FACILITY SEQUENCE DRAWINGS
STAGE 3

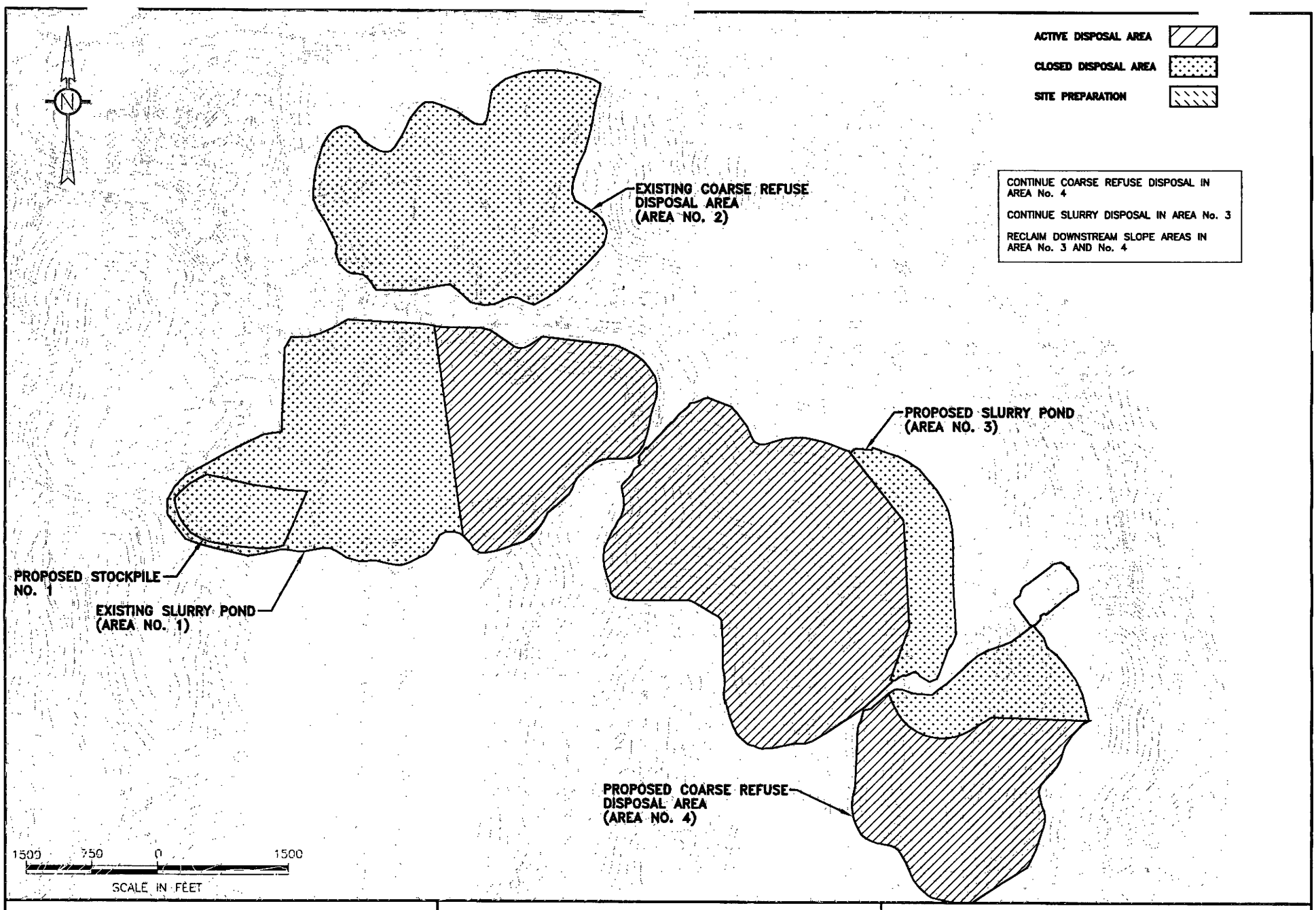


Baker
Baker Environmental Inc.

MICHAEL BAKER JR., INC.
CORAOPOLIS, PENNSYLVANIA
412 269-6000
MBAKERCORP.COM

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

ATTACHMENT 10.3
FACILITY SEQUENCE DRAWINGS
STAGE 4

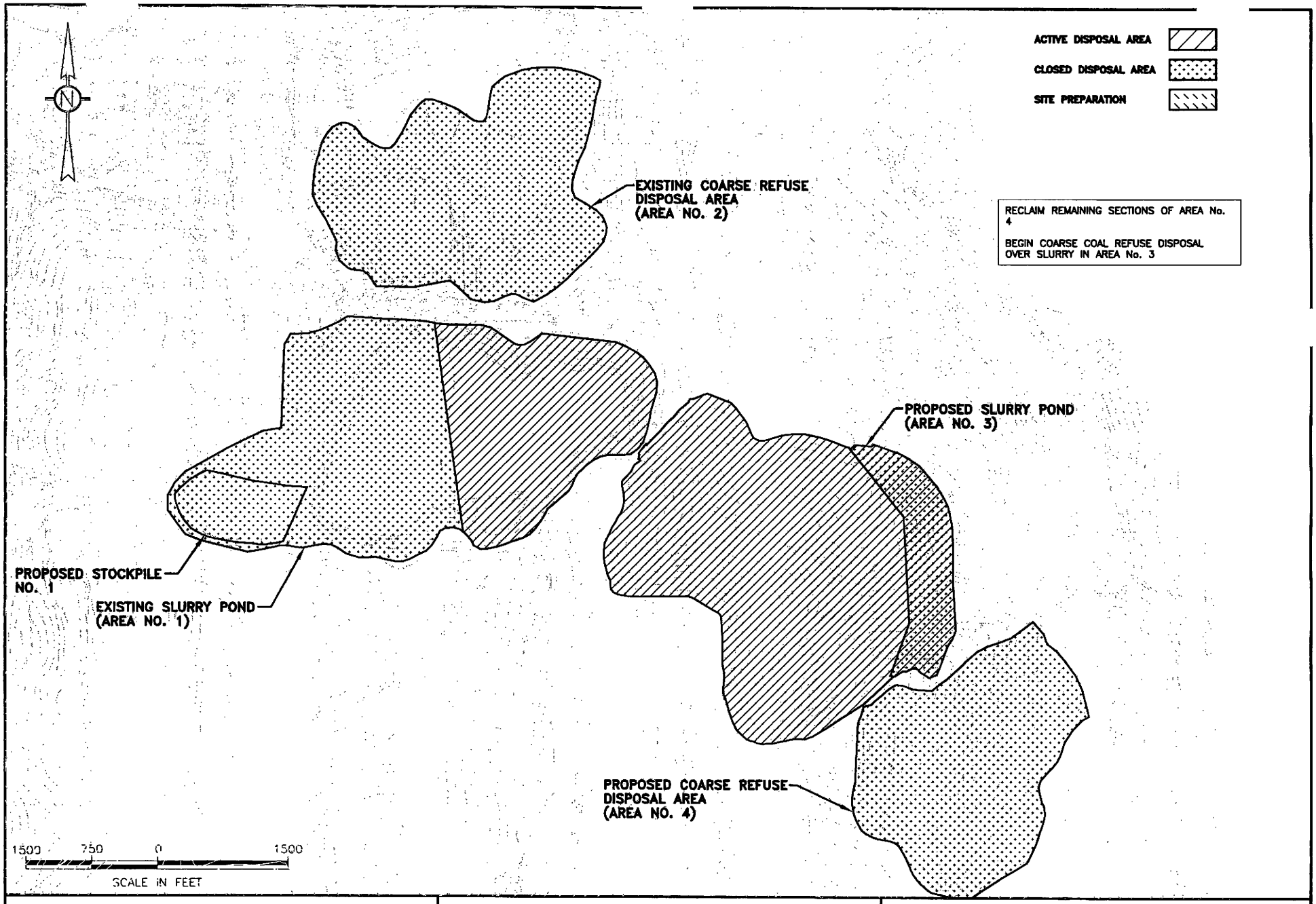


Baker
Baker Environmental, Inc.

MICHAEL BAKER JR., INC.
CORAOPOLIS, PENNSYLVANIA
412 269-6000
MBAKERCORP.COM

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

ATTACHMENT 10.3
FACILITY SEQUENCE DRAWINGS
STAGE 5

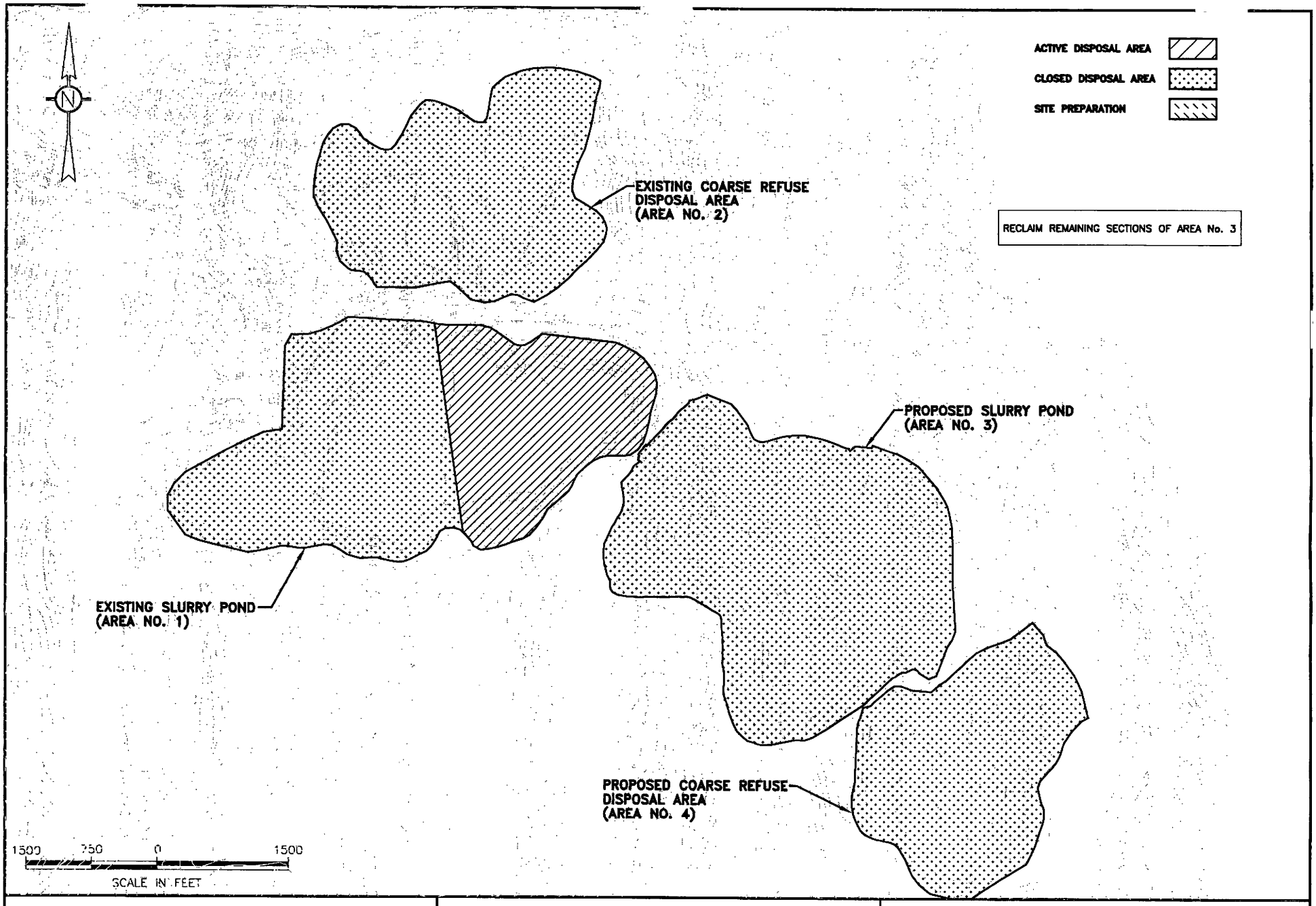


Baker
Baker Environmental Inc.

MICHAEL BAKER JR., INC.
CORAOPOLIS, PENNSYLVANIA
412 269-6000
MBAKERCORP.COM

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

ATTACHMENT 10.3
FACILITY SEQUENCE DRAWINGS
STAGE 6



Baker
Baker Environmental Inc.

MICHAEL BAKER JR., INC.
CORAOPOLIS, PENNSYLVANIA
412 269-6000
MBAKERCORP.COM

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

ATTACHMENT 10.3
FACILITY SEQUENCE DRAWINGS
STAGE 7

2) The size and frequency of the design storm;

3) The hydraulic capacity of the proposed replacement channel;

4) The hydraulic capacity of the stream channel upstream and downstream of the proposed relocation or channel change.

Refer to Module 15.1.c.

e) A stream profile for the existing and proposed channel for a reasonable distance upstream, downstream and within the proposed change, showing bed slopes, pool-riffle ratios, normal and flood water surfaces, and existing obstructions;

A profile of the main unnamed tributary and the major side branch tributary is presented as Attachment 15.2.e Stream conditions are described in the Biological Resources Report (Attachment 15.1). Pool-riffle ratios are not applicable.

f) A detailed plan and cross sections of the existing and proposed channel upstream, downstream and within the proposed channel change showing the limits and configuration of the proposed activities, dimensions, channel linings, and normal and flood water surfaces;

Refer to the Construction Drawings presented in Module 21.

g) A description of the construction methods and sequence including: water handling during construction, erosion and sedimentation controls, and measures to be taken to prevent adverse impacts to water quality and quantity, water users and the aquatic communities, and measures for environmental enhancement if practicable.

Refer to the Construction Drawings presented in Module 21.

h) A characterization of the existing water quality and quantity of the stream, including downstream water uses and 25 PA Code Chapter 93 Protection Water Use Classification.

Refer to Module 15.1.g.

15.3 Wetland Related Information. Provide the name, address, and phone no. of person conducting the wetland delineation.

a) Complete Form 15A to provide inventory and classification information on all wetlands which occur on or within the permit area of surface mining activity sites. In completing the form, answer "yes" or "no" to the following questions as they pertain to each wetland.

<u>Exceptional Value Wetland Characteristics</u>

1) Does the wetlands serve as habitat for flora and fauna listed as "threatened" or "endangered" under the Endangered Species Act of 1973, or Wild Resource Conservation Act, Fish and Boat Code, or Game and Wildlife Code?

2) Is the wetland hydrologically connected to or located within 1/2 mile of another wetland which serves as habitat of "threatened" or "endangered" species, and does it serve to maintain the habitat in that wetland?

3) Is the wetland located in or along the floodplain of a wild trout stream (as designated by the Pennsylvania Fish and Boat Commission), or the floodplain of a tributary to a wild trout stream?

4) Is the wetland located in or along the floodplain of a stream listed as exceptional value (under Chapter 93) or the floodplain of a tributary to an exceptional value stream?

5) Is the wetland within the corridor of a waterway which has been designated as a wild or scenic river in accordance with the Wild and Scenic Rivers Act of 1968 or the PA Scenic Rivers Act?

6) Is the wetland part of, or located along, an existing public or private drinking water supply and does it maintain the quality or quantity of the drinking water supply?

7) Is the wetland located in an area designated by the Department as "natural" or "wild" area within state forest, game or park lands?

8) Is the wetland located in an area designated as a Federal Wilderness Area under the Wilderness Act or the Federal Eastern Wilderness Act of 1975?

9) Is the wetland located in an area designated as a National Natural Landmark by the Secretary of the Interior under the Historic Sites Act of 1935?

NOTE: If a "yes" response is indicated for any question in (1) through (9) above, the wetlands would be "exceptional value"(as defined in 25 PA Code Section 105.17) and a demonstration must be made that the requirements of subsection (a) of 25 PA Code Section 105.18(a) have been met (See copy of Section 105.18(a) at the end of this Module).

Wetland Functions

10) Does the wetland serve natural biological functions, including food chain production; general habitat; and nesting, spawning, rearing or resting sites for aquatic or land species?

11) Does the wetland provide areas for study of the environment, or as sanctuaries or refuges?

12) Does the wetland aid in, or maintain natural drainage characteristics, natural water filtration processes, current (flow) patterns or other environmental characteristics?

13) Does the wetland serve as a storage area for flood and storm waters, or does it shield other areas from erosion or storm damage?

14) Does the wetland provide recharge to local streams that maintains minimum baseflows?

15) Does the wetland serve as a prime natural discharge area where surface water and groundwater are directly connected?

16) Does the wetland aid in the prevention of pollution?

17) Is the wetland used for, or does it provide the opportunity to be used for recreation?

15.4 Wetland Impact Analysis/Assessment

a) Describe the alternatives to the proposed surface mining activities that have been considered to avoid or minimize impacts on wetlands. An alternative analysis should include alternatives to the proposed surface mining activities, including alternative locations, routings or designs to avoid adverse impacts on the wetlands (i.e. relocating spoil/topsoil storage areas, rerouting haul roads).

Refer to the Alternatives Analysis that was submitted for this project to PADEP McMurray District Mining Office and approved on August 1, 2001.

Construction of the runoff collection sump will remove a very small (600 s.f.) wetland within the headwaters of Fletcher Run. The sump is located in a low areas relative to the proposed drainage structures. Moving the sump to avoid the wetland area will result in an increase in earthwork and subsequent disturbance within the watershed. Avoiding the wetland during construction and during sump maintenance activities also would be impractical.

b) Discuss whether any of the alternatives considered in (a) are practical to achieve the basic purposes of the project taking into account availability, cost, technology and logistics of the other possible project sites which would not affect wetlands?

Wetland impacts at the site are unavoidable. Refer Section 15.4a above and to the Alternatives Analysis that was submitted for this project to PADEP McMurray District Mining Office and approved on August 1, 2001.

c) If any wetlands will be directly affected, provide the following:

1) Identify the wetland and the areal extent of the impact.

All of the wetlands listed on Form 15A will be completely impacted and removed by the proposed activities. Figure 2, Figure 3 and Figure A of Attachment 15.1 shows the location and approximate extent of the existing wetland areas.

2) Submit a cross-sectional view showing the wetland and the proposed disturbed area.

Cross sectional views of valley bottom areas where the wetlands are located are included with the Module 21 Construction Drawings

3) Explain how the proposed activities will directly affect the hydrology, functions and values of the wetlands.

i) If the proposed surface mining activities will affect less than 1.0 acre of wetland and the wetland is not an exceptional value wetland (in accordance with 25 PA Code Section 105.17), provide a description and probable degree of impact to the wetland functions and values which will be impacted by the proposed mining activities. NOTE: If a "yes" response is indicated for any question in 15.3 (a)(1)-(9), the wetlands would be exceptional value (as defined in Section 105.17).

ii) If the proposed surface mining activities will affect 1.0 or more acres of wetlands or may affect an exceptional value wetland, provide a detailed assessment of the wetland functions and values identified in 15.3 (a)(10)-(17). Provide extent or degree of impact to each function and value.

A detailed assessment of wetland functions is included in Attachment 15.5. As indicated by that report and the Attachment 15.1 report, very few of the Area No. 3 wetlands are in a natural state and most have been highly disturbed by cattle traffic. Wetland areas encompassing springs and seeps serve as groundwater discharge areas. Proposed construction provides for spring and seep flow to be intercepted and carried under the project site in an underdrain. Erosion and sedimentation and flood control provided by the wetlands will be replaced by proposed facilities detailed in the Module 21 Construction Drawings.

A small (0.013 acres) wetland (S-20 on Figure A of Attachment 15.1) in the Fletcher Run watershed will be impacted by the stormwater collection ion sump construction. Wetland S-20 is a small isolated palustrine emergent wetland. This wetland is located high in the watershed and is not associated with the floodplain of any drainage system. Dominant vegetation includes sedges (Carex spp.) and soft rush (Juncus effusus). Hydrology to this wetland is primarily supplied from runoff that becomes detained for short durations in a small-depressed area. Due to its relatively small size, lack of woody vegetation, and lack of permanent water, the only principle wetland function provided by this wetland is ground water recharge.

d) If any wetlands will be indirectly affected by surface mining activities (e.g. altering the wetland hydrology):

1) Identify the wetland and provide an estimate of the total wetland acreage affected. Describe the functions or values to be impacted and the degree of impact.

2) Provide a description of how the proposed surface mining activities will indirectly affect the wetlands' functions and values.

No indirect wetland impacts are anticipated.

e) Indicate whether the cumulative impact of the proposed and anticipated surface mining activities result in a major impairment of the wetland resource in the general area, provide an explanation of the determination and identify any contacts with state or federal agencies involved in making the determination.

Cumulative impacts of the proposed surface mining activities will not result in a major impairment of wetland resources in the general area. Any wetland impacts will be mitigated/replaced as described in Module 15.5. The proposed activity will be primarily contained within the watershed of the two unnamed tributaries. Recharge contributed by wetlands and streams within the project site to areas downstream will be maintained by discharge from the proposed sedimentation pond.

f) Where a wetland's hydrology is at risk of being altered by underground coal extraction, as determined by the assessment under Module 8.5, information concerning wetland delineation ad functions must be provided as outlined in Sections 15.3 and 15.4 of this module.

Not Applicable.

15.5 Wetland Mitigation/Replacement. (Sites where less than 0.5 acres of wetland is affected may qualify for mitigation options provided under the Pennsylvania Wetland Replacement Project. Contact the DEP permitting office for details.)

a) If wetland mitigation measures or wetland replacement are proposed, address the following items:

1) Identify the wetlands where mitigation measures will be employed, wetlands that will be replaced, and sites where replacement wetlands will be constructed along with the respective area of each.

2) Provide a plan for mitigation/replacement following the guidelines in the DEP's technical guidance document, entitled "Design Criteria for Wetlands Replacement". (This guidance is available from DEP's Bureau of Water Quality Protection, Post Office Box 8465, Harrisburg, Pennsylvania 17105-8465, telephone 717-787-2666 or through the Department's web site under Technical Guidance # 363-0300-001.

3) Show all affected wetlands, mitigation areas, and replacement sites on Exhibit 9.1; and, in addition, show replacement sites on Exhibit 18.1.

4) Provide a wetlands functions and values comparison of current vs. replacement wetland acreage. In the case of mitigation, a comparison of the known wetlands functions and values and degree of impact to each must be compared to the functions and values of the proposed mitigation site when completed. This comparison of "currently existing" to "probable replacement" allows for a basis of the 1:1 replacement ratio.

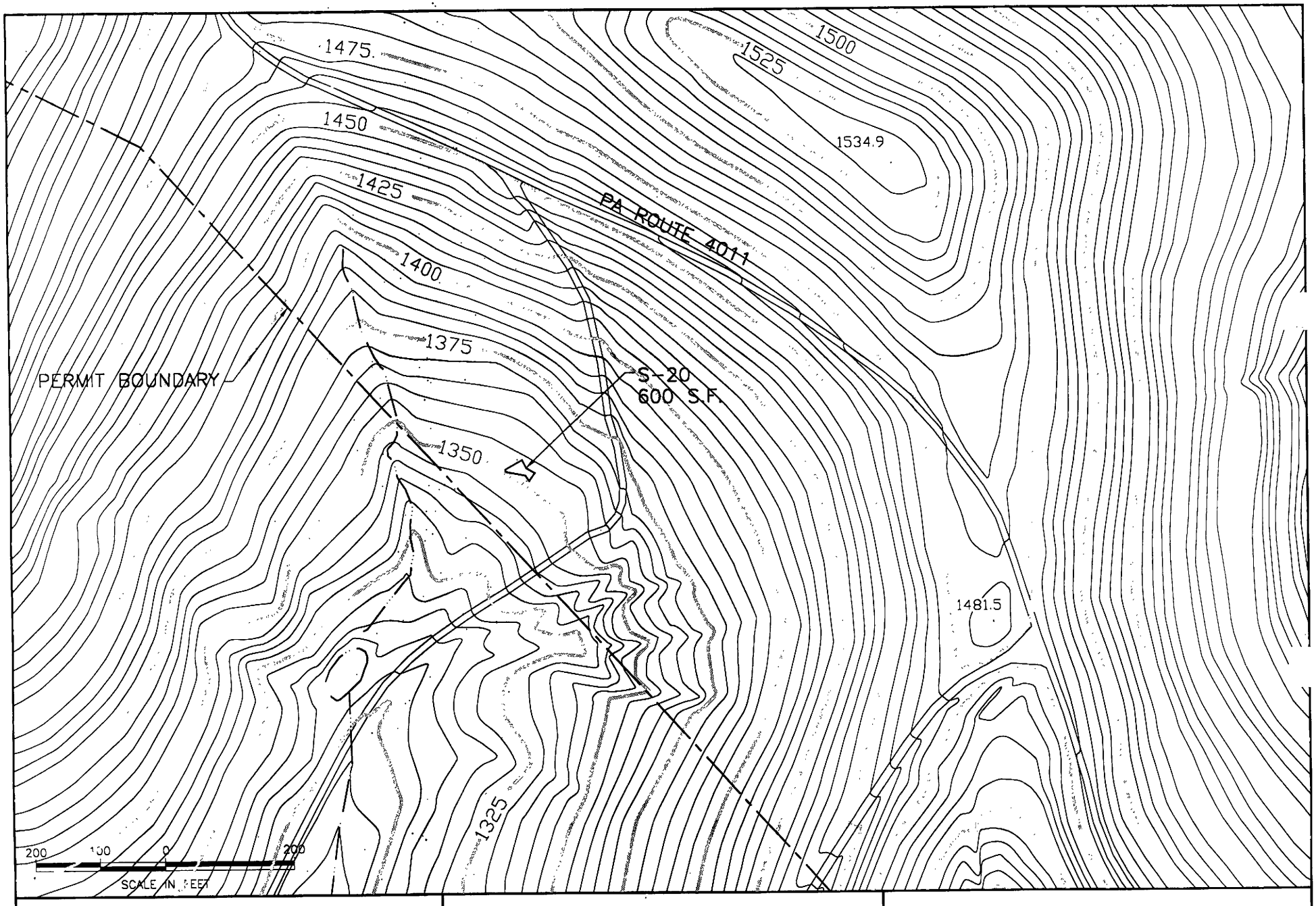
Refer to the Attached Wetland Mitigation Plan (Attachment 15.5) for descriptions of affected wetlands and replacement wetlands, including a comparison of functions and values. Affected wetlands also are shown on Exhibit 9.1 and 18.1. The wetland (S-20 Figure A of Attachment 15.1) in the Fletcher Run Watershed will impact 0.013 acres, increasing the total impacted wetland acreage to 1.38 acres which is less than the acreage proposed for mitigation.

NOTES: At a minimum, wetland replacement must be at a 1:1 ratio (replacement acres: affected acres), although the Department may require the ratio to exceed 1:1 based on the functions and values of the wetlands to be affected.

Wetland replacement sites will generally not be approved unless the site is located within the same general area as the existing wetland to be replaced.

FORM 15A - WETLAND INVENTORY

Surface Site I.D.	Wetland I.D.	Acreage (acres)	Provide a positive (Y) or negative response (N) to each question under 15.3 as it applies to each wetland. (Column numbers correspond to question numbers).																
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Area No. 3	S-1	0.055	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-2	0.008	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-3	0.067	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-4	0.209	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	N	Y	N
	S-5	0.050	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-6	0.022	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-7	0.090	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-8	0.013	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-9	0.020	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-10	0.435	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-11	0.048	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-12	0.004	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-13	0.048	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-14	0.021	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-15	0.080	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-16	0.031	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-17	0.009	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-18	0.045	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-19	0.012	N	N	N	N	N	N	N	N	N	N	N	Y	Y	N	Y	Y	N
	S-20	0.013	N	N	N	N	N	N	N	N	N	Y	N	Y	N	N	Y	Y	N
	Total	**1.280**																	



Baker
Baker Environmental Inc.

MICHAEL BAKER JR., INC.
CORAOPOLIS, PENNSYLVANIA
412 269-6000
MBAKERCORP.COM

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

ATTACHMENT 15.1
FIGURE A
FLETCHER RUN WATERSHED WETLAND

Mitigation Proposal for Bailey Coal Refuse Disposal Site, Greene County, Pennsylvania

Prepared by

The Partners for Fish and Wildlife
California University of Pennsylvania

First Draft: January 2002
Revised Draft: October 2002

Biological and Environmental Sciences Department and
The Foundation for California University of Pennsylvania
California University of Pennsylvania
California, PA 15419

Executive Summary

CONSOL Energy Inc., (CONSOL) is proposing to fill in 2.5 miles of stream in Greene County, Pennsylvania with coal refuse from its Bailey Central Preparation Plant. As required by law, CONSOL must mitigate for their environmental impact to surrounding streams. CONSOL proposes to fund the enhancement of fish and wildlife habitat in a nearby watershed(s) in Greene County (yet to be determined) and to fund biological monitoring of these habitat improvements to mitigate these losses. Mr. José Taracido, the Partners for Fish and Wildlife Farmland Habitat Program Management Supervisor, will oversee the restoration portion of this project. Restoration will include wetland creation, restoration, and protection, native grassland planting, and border-edge cutting. In addition, streambank fencing will be used to improve streambank stability and to improve water quality. The project will be similar to, but separate from, the Farmland Habitat Restoration Project being directed by California University of Pennsylvania's Partners for Fish and Wildlife Program. Dr. David Argent and Dr. Thad Yorks, Assistant Professors of Biology at California University of Pennsylvania, will direct the biomonitoring portion of this project. Responses to habitat improvements within the watershed will be documented by examining plant, fish, and aquatic invertebrate communities in restored portions of the watershed before and after restoration, and by comparing the same parameters in restored and unrestored portions of the watershed. Water samples will also be collected during the project. The restoration/protection program will be considered successful if measured biological variables improve (by a minimum of 20%) or do not decline over pre-restoration values. California University of Pennsylvania will conduct the watershed restoration and direct monitoring activities with funding from CONSOL. Funding provided by CONSOL will be administered by the Foundation for California University of Pennsylvania. Preliminary work will begin in September 2002 to enroll potential landowners into the restoration program and restoration will formally begin in September 2003 concurrent with the issued permit. Biomonitoring activities will commence during 2003 and continue until 2007.

Objectives

1. To mitigate the loss of fish and wildlife habitat that will occur as result of the new Bailey coal refuse disposal area.
2. To restore, protect, and create fish and wildlife habitat
3. To monitor environmental changes in plants, fish, and macroinvertebrates in response to habitat enhancement
4. To collect water samples before, during and after restoration activities have occurred.

Scope of Activity

Part I – Restoration Activity

1. We will develop and maintain landowner contacts to participate in this habitat restoration program (September 2002-March 2003). Participants will sign an agreement with The Partners for Fish and Wildlife at California University of Pennsylvania to permit restoration (mitigation) activities to occur and to grant us access to their property for biomonitoring work.

2. We will protect existing streams, wetlands, and spring developments within the watershed with the use of streambank fencing on agriculturally (grazed) impacted properties. This will include approximately 12.5 miles of fencing with 2 crossings per mile of stream (This work will commence as soon as a permit has been issued and an aggressive schedule will be maintained to target completion by September 2004).

3. We will establish 20 border-edge cuts on farms throughout the watershed (s) (this work will commence during winter 2003 and will be completed by spring 2004). This is a complimentary wildlife management tool used in conjunction with grass planting and riparian fencing that creates soft edges for wildlife species to transition between established habitats. The number and size are determined by the availability of timber on the property to be restored.

4. We will assist CONSOL with the planting of native warm-season grasses on the reclamation site to increase wildlife habitat. The warm-season grass mix to be applied on the cap shall consist of 4 lb. little bluestem, 2 lb. big bluestem, 0.5 lb. Indian grass, 0.5 lb. shelter switchgrass, and 2 lb. of forb mix along with 5 lb. annual rye grass and half a bushel of oats or wheat. This is per acre, total. These ratios will establish a pasture-like landscape. Our target will be one plant per square yard. Native warm-season grasses are adapted to soils with low nutrient levels, and low organic matter levels, conditions often found on reclaimed mine sites with heavily compacted soils. Their extensive root systems will not interfere with the integrity of the reclaimed area rather they will enhance it by providing new soil layers that promote natural succession on the reclamation site thereby creating excellent wildlife habitat and increasing the stability of existing soils. Seeding will be included, as part of CONSOL's reclamation of the refuse area (i.e., <u>they are not considered in the time frame of 2003-2007 with this project proposal</u>) and costs for this activity and level of involvement will be negotiated as the reclamation work unfolds.

5. In addition to assisting CONSOL with initial seeding we will assist with maintenance seeding to ensure proper establishment of native grasses (timing and need will vary depending upon success of initial seeding and progress with the development of the reclamation site). One hundred, random 0.25-meter square plots will be monitored to assess the cover density of seeded plants. If 80% of the plots contain at least 1 plant,

seeding will be considered successful.

Part II – Bio monitoring (to be completed by 2007):

1. We will assess the impacts of riparian restoration by monitoring plant; fish, wildlife, and macroinvertebrate communities before and after streambank restoration, and in both restored and unrestored streams. Initial assessments will occur before streambank restoration activity has begun to provide a statistical benchmark to document the expected improvements. These assessments will begin in spring 2003, prior to initial restoration activity. During this time 100-m reaches will be established as permanent reference points at each site. Sites will be sampled during spring, summer, and fall seasons. We will monitor restored sites until December 2007. Additionally, a representative number of unrestored and unprotected stream sections of similar stream order, plant composition, and surrounding land-use will serve as controls. These 100-m stream sections will serve as the experimental units for all analyses.

2. Water samples will be collected by California University of Pennsylvania during the spring (March - June), summer (July - September) and fall (October – December) seasons. A third party (as yet to be named) and California University of Pennsylvania will process collected samples, which will include: NH_4, NO_3, K, turbidity, pH, dissolved oxygen, temperature, conductivity, and fecal coliforms. California University of Pennsylvania has the equipment and expertise to process samples for NH_4, NO_3, turbidity, pH, dissolved oxygen, temperature, conductivity, and fecal coliforms. Phosphate samples will need to be processed by a third party. These parameters were selected because many serve as a good barometer for stream health in an agriculturally impacted stream. California University of Pennsylvania will use a Hydrolab® to measure NH_4, NO_3, turbidity, pH, dissolved oxygen, temperature, and conductivity. In addition, automated temperature recorders will be placed in the streams to monitor stream temperatures daily to document seasonal shifts as the riparian corridor becomes better established. Fecal coliform colonies will be counted on filtered paper that is incubated using standard water testing procedures. A 20% reduction in fecal coliform colonies, turbidity, NH_4, NO_3, and phosphates will be used as a benchmark of success. Other monitored variables (e.g., conductivity) may change, but are not expected to shift dramatically in response to restoration.

3. Fish and macroinvertebrate populations will be surveyed during the spring (March - June), summer (July - September) and fall (October – December) seasons. Fish will be sampled using backpack electro-shocking equipment following the EPA's Rapid Bioassessment Protocol. One-pass along a 100-m section will be made. Each section will be demarcated with fixed reference points to permit repeated seasonal sampling. Each specific section will be chosen apriori at random (i.e., not during an on-site visit) and marked accordingly. Macro-invertebrate populations will be sampled using both kick nets (qualitative) and Hess-samplers (quantitative). Three random samples will be made in each 100-m section during each sampling season with each apparatus. Samples will be processed at California University of Pennsylvania. Fish and macroinvertebrates will be

identified to the species and genus level where possible, respectively, enumerated, and a reference collection maintained at California University of Pennsylvania. These sampling techniques will permit abundance estimates to be made for both fish and macroinvertebrates. Success among these variables will be determined by examining the shifts in community composition among fish and macroinvertebrates and changes in both density and abundance.

5. The plant community will be sampled to determine herbaceous and woody plant cover and richness. The plant community will also be sampled at these times to determine herbaceous plant cover and richness (by identifying species and estimating % coverage in 6, 1 m^2 plots/section; 3 plots will be randomly located within the stream bed and 3 on the bank) and shrub stem density and richness (by identifying and counting woody stems<2.54 cm dbh in 6, 1 x 5 m plots/section; 3 plots will be randomly located within the stream bed and 3 on the bank; plots will be oriented with the long axis parallel to the stream channel).

6. Statistical analyses will include a comparison of before and after treatment effects and a comparison among treatment and reference sites using a nested ANOVA design (standard parametric procedures). In addition, regression analyses may be used to explore the relationships between the various water chemistry parameters and the biological parameters (e.g., macroinvertebrates and fish) collected.

7. We expect to document a minimum of a 20% improvement in the biological and physical parameters monitored. Benchmarks for success will include 20% improvements in water quality parameters like fecal coliforms and nitrogen; other parameters are not expected to change considerably over the life of this project, but will be monitored. We expect to document functional shifts in macroinvertebrate populations from tolerant to intolerant individuals and from autochthonous to allochthonous feeders. With respect to fishes, we anticipate an increase in biomass and abundance because fish will have better spawning habitat and more stable habitat conditions. Lastly, we anticipate a large shift in the plant community because cattle will no longer have grazing access. Over the course of the biomonitoring work we expect to see an increase in diversity, density, and height of herbaceous plants with recruitment of woody plants.

Part III – Schedule*

August 2002 – March 2003

Site surveys and landowner contact and sign-up in designated area(s) – See Attachment for Sub-Contract detailing activities and services to be provided

March 2003 – October 2003

Initiate pre-restoration biomonitoring activities.

September 2003 – November 2003

Streambank fencing restoration
November 2003 – April 2004

Border edge cuts completed

April 2004 – September 2004

Streambank fencing restoration

October 2003 – December 2007

Post-restoration biomonitoring work.

December 2007

We will submit a final report to CONSOL.

* All restoration work will be done with an aggressive schedule to implement restoration as soon as practical. Should inclement weather deter completion of restoration activities by the timeline outlined – work will be completed as soon as possible. The Pennsylvania Department of Environmental Protection will review any deviations from the approved schedule, with justification(s) provided.

* Annual reports will be submitted to CONSOL on 31 December of each year and seasonal reports will be submitted to CONSOL April, July, and October.

Part IV – Project Administration and Responsibility

Dr. David G. Argent, Dr. Thad Yorks, and Mr. José Taracido will direct the Project with funding from CONSOL. Mr. Taracido will oversee the fieldwork and management of field crews and Drs. Argent and Yorks will oversee the biomonitoring portion of this project. Administration of project funds will be through the Foundation for California University of Pennsylvania (Mrs. Denise Hines), and the office for this program will be housed at California University of Pennsylvania. CONSOL agrees to complete the outlined project to the best of its ability. Should a landowner leave the program or remove habitat restorations, CONSOL Resources will restore other areas to maintain the amount of restoration discussed in this proposal for the life of the coal refuse disposal site being mitigated.

Part V – Environmental Impacts of Proposed Project and Mitigation

Losses

1. Several thousand feet of stream (including annual and perennial) will be lost through filling in the streams in the proposed coal refuse disposal valley.

Benefits

1. Degraded streams, wetlands, and spring developments in the watershed will be restored and protected improving water quality and fish and wildlife habitat.

2. Native grasslands will be restored throughout the watershed, providing habitat for numerous wildlife species and acting as a bio-filter for agricultural run-off to riparian areas. This restoration technique is used in conjunction with streambank fencing to provide habitat for the whole watershed, not just the stream because agricultural effects will be seen outside of the corridor and it is important to address them in the restoration plan.

3. Border-edge cuts will provide shrub land habitats for numerous wildlife species, many of which are declining in Pennsylvania.

4. Improved landowner cooperation and satisfaction with conservation efforts and CONSOL.

5. Data on impacts of watershed restoration project.

6. Educational opportunities for students at California University of Pennsylvania who will have access to all data collected in support of this mitigation for thesis work.

Baker

Michael Baker Jr., Inc.

REPLACEMENT PAGES

Modules

APRIL 03

S.O. No.: 24379-000-0000-ENG03
Subject: CPCC Bailey Mine New Coal Refuse Disposal Area
Storm Storage Calculations for Slurry Impoundment
Computed By: GAH **Date:** 9/11/03

Baker

Sheet No. 3 **of** 37
Checked By:_____ **Date:**_____

In addition to the inlets that will be provided as discussed above, additional inlets will be provided to limit the total amount of water that can be stored in the facility. The additional inlets will ensure that the volume of water in the impoundment never exceeds the volume of water used in the Main Slurry Dam and the Saddle Dam A breach analyses. These dam breach analyses assumed a worst-case operating pool from elevation 1460 to 1485. As shown on the stage-storage graph on Sheet No. 12, the total storage between elevations 1460 and 1485 is 6,910,000 CY. Therefore, additional inlets will be added to ensure that the total possible storage volume is significantly less than 6,910,000 cubic yards. Storage volumes between each riser are shown on the table below.

Decant Inlet Elevation	Water Surface Elevation	Storage at Water Elevation (CY)	Storage Between Inlets (CY)
1205	1205	0	
			2,364,700
1300	1301	2,364,700	
			2,222,400
1329	1330	4,587,100	
			2,864,600
1356	1357	7,451,700	
			2,989,900
1378	1379	10,441,600	
			2,770,300
1395	1396	13,211,900	
			2,770,100
1410	1411	15,982,000	
			2,629,900
1423	1424	18,611,900	
			3,197,400
1438	1439	21,809,300	
			3,110,900
1451	1452	24,920,200	
			3,073,700
1463	1464	27,993,900	
			2,988,700
1474	1475	30,982,600	
			2,856,400
1484	1485	33,839,000	

Revised September 2003

S.O. No.: 24379-000-0000-ENG03
Subject: CPCC Bailey Mine New Coal Refuse Disposal Area
Storm Storage Calculations for Slurry Impoundment
Computed By: GAH **Date:** 9/11/07

Baker

Sheet No. 36 **of** 369
Checked By:_____ **Date:**_____

The minimum crest elevations for the highest decant for Stages 1, 2, and 3 (i.e., 1329, 1423, and 1484) were determined on preceding sheets. The minimum crest elevations corresponding to the other decants were calculated in the same manner. The Stage 1 HEC-1 model (Sheets 4-14 through 4-22) was used to determine the ending water surface elevation for the other Stage 1 inlet (1300). The Stage 2 HEC-1 model (Sheets 4-23 through 4-31) was used to determine the ending water surface elevation for the other Stage 2 inlets (1356, 1378, 1395, and 1410). The Stage 3 HEC-1 model (Sheets 4-32 through 4-38) was used to determine the ending water surface elevation for the other Stage 3 inlets (1438, 1451, 1463, and 1474). A summary of all of the routing for each decant inlet is provided in the following table:

Decant Invert Elev.	Starting Water Elev.	Elev. after 100-year	Elev. after 1st PMP	Elev. after 2nd PMP	Min Crest Elev.	Freeboard (feet)
1300	1301	1302.5	1313.6	1323.3	1327.0	3.7
1329	1330	1331.0	1339.1	1346.3	1350.0	3.7
1356	1357	1358.0	1364.4	1370.6	1374.0	3.4
1378	1379	1379.8	1385.0	1390.2	1394.0	3.8
1395	1396	1396.7	1401.4	1405.8	1409.0	3.2
1410	1411	1411.6	1415.8	1419.9	1423.0	3.1
1423	1424	1424.6	1428.6	1432.6	1436.0	3.4
1438	1439	1439.6	1443.4	1447.2	1451.0	3.8
1451	1452	1452.6	1456.2	1459.8	1463.0	3.2
1463	1464	1464.5	1467.9	1471.2	1475.0	3.8
1474	1475	1475.5	1478.7	1481.8	1485.0	3.2
1484	1485	1485.5	1488.6	1491.6	1495.0	3.4

S.O. No. 243790000000- 001

Subject: Consol Bailey Areas 3 & 4
Fabriform Anchor Design

Sheet No. 1 of

Drawing No.

Computed by GAH Checked By Date 9/5/03

Baker

Verify anchor spacing requirements for fabriform channels.
Use "Armorform Design Manual" by Nicolon as reference

Channel D (39% slope)

$$M = \frac{(\gamma_c - \gamma_w)(\tan\delta - S_o)}{\sqrt{1+S_o^2}} \qquad \text{(Eq 16)}$$

where M = Resisting shear (lbs/sf/ft)
γ_c = unit weight of concrete = 135 lb/cf
γ_c = unit weight of water = 62.4 lb/cf
δ = angle of friction = 30°
S_o = 0.39

$$M = \frac{(135-62.4)(\tan 30 - .39)}{\sqrt{1+.39^2}} = 12.7$$

$$T = F_s \times R \times \gamma_w \times S_o \qquad \text{(Eq 19)}$$

where T = Tractive Shear Stress (lb/sf)
F_s = Factor of Safety = 1.5
γ_w = 62.4
S_o = 0.39
R = Hydraulic Radius = $\frac{\text{flow area}}{\text{wetted perimeter}} = \frac{11.1}{11.6} = 0.96$

$$T = 1.5 \times .96 \times 62.4 \times .39 = 35.0$$

$$A = T - Mt = 35 - 12.7 \times .183 = 32.7$$

where:
A = Resistance force required by anchors
t = one mat thickness = .183 ft

S.O. No. 2437900000001 00001

Subject: Consol Bailey Area 3 & 4

Fabriform Anchor Design

Sheet No. 2 of

Drawing No.

Computed by GAH Checked By Date 9/5/03

Baker

$$A \leq \frac{A_s \phi f_s}{l^2} \quad \text{(Eq 27)}$$

where = A_s = area of anchor = .196

ϕ = shear capacity reduction factor = 0.85

f_s = allowable steel shear stress = 20,000 psi

l = distance between anchors = 9 ft (current design)

$$A \leq \frac{.196 \times .85 \times 20{,}000}{9^2}$$

$32.7 \leq 41.1$ O.K.

Channel D (5%)

$$m = \frac{(135-62.4)(\tan 30 - .05)}{\sqrt{1+.05^2}} = 38.2$$

$$T = 1.5 \times \frac{23.8}{16.7} \times 62.4 \times .05 = 6.7$$

$m > T$ no anchors required O.K.

S.O. No. 243790000000 001

Subject: Consol Bailey Area 3 & 4

Fabriform Anchor Design

Sheet No. 3 of

Drawing No.

Computed by GAH Checked By Date 9/5/03

Baker

Channel C

$$m = \frac{(135-62.4)(\tan 30 - .05)}{\sqrt{1+.05^2}} = 38.2$$

$$T = 1.5 \times \frac{7.2}{8.5} \times 62.4 \times .05 = 4.0$$

$m > T \Rightarrow$ No anchors required o.k.

Channel E (32%)

$$m = \frac{(135-62.4)(\tan 30 - .32)}{\sqrt{1+.32^2}} = 17.8$$

$$T = 1.5 \times \frac{1.0}{3.2} \times 62.4 \times .32 = 9.4$$

$m < T \Rightarrow$ anchors needed

$$A = 9.4 - 17.6 \times .183 = 6.1$$

$$6.1 \leq \frac{.196 \times .85 \times 20{,}000}{16^2} = 13.0$$ = current anchor design o.k.

↳ current anchor spacing

Channel E (10%)

$$m = \frac{(135-62.4)(\tan 30 - .10)}{\sqrt{1+.10^2}} = 34.5$$

$$T = 1.5 \times \frac{1.6}{3.9} \times 62.4 \times .10 = 3.8$$

$m > T$ no anchors needed o.k.

Note: Since the channel slope anchoring specified in the design is much more conservative than what was recommended by Geostar and no changes are required in the channel bottom anchors, the channel side-slope anchoring does not need to be verified.

Baker

Michael Baker Jr., Inc.

ATTACHMENT A

Dam Breach Analysis

S.O. No.: 24379-000-0000-ENG03
Subject: CPCC Bailey Mine New Coal Refuse Disposal Area
Dam Break Calculations for Sediment Pond

Baker

Computed By: GAH **Date:** 12/5/01 **Checked By:** SJK **Date:** 3/07/02

These sheets present the dam break calculations for the sedimentation pond at Consol Pennsylvania Coal Company's (CPCC) Bailey Mine New Coal Refuse Disposal Area. HEC-1 was used for the hydrology/routing/dam breach simulation.

Refer to the sedimentation pond design calculations for design parameters and information (stage-storage, stage-discharge, dam geometry, rainfall amounts, pond routing, etc..). Cross section geometry downstream of the dam was obtained from USGS 7.5 minute quadrangles. Approximate channel dimensions and Manning's n values were estimated based on field observations.

Curve numbers were estimated from guidance provided in TR-55 and observations during the field reconnaissance. Based on the Greene County Soil Survey, the soils in the area are predominately type C (Dormont) with some soil type B areas (Cullecka). Soil Type C was used to estimate the curve numbers. A CN of 91 was used for disturbed areas, 98 was used for water/impervious areas, and 70 was used for woods/grass areas.

The time of concentration/lag time for each subarea was estimated using methods presented in TR-55. The T'c/lag time calculations are presented on Sheet Nos. 4 through 6.

Stage-storage calculations for the railroad embankment are provided on Sheet 7. Stage-discharge calculations for the railroad embankment are provided on Sheet Nos. 8 through 12.

The rainfall amount for the 100-yr, 24-hour storm is 5.2 inches (from Table 2-1 of the Engineering Manual for Mining Operations). The analyses assumes a 100-year storm event was occurring in the entire watershed during the breach.

Output from the HEC-1 model with no breach is provided on Sheet Nos. 13 through 33.

The following dam breach parameters were used:
Bottom of breach elevation – 1134 (which corresponds to the bottom of the pond, this is conservative since it assumes that the entire sediment storage volume is water)
Bottom of breach width – 85 feet (which is approximately 3 times the dam height)
Breach side slopes – 1H:1V (PADEP recommendation for earthen dams)
Time for breach to develop – 0.5 hour (PADEP recommendation for earthen dams)

This analyses does not take into account the breach outflow submergence caused by the railroad embankment located just downstream. This is a very conservative assumption, since the tailwater caused by the railroad embankment would significantly reduce the breach discharge.

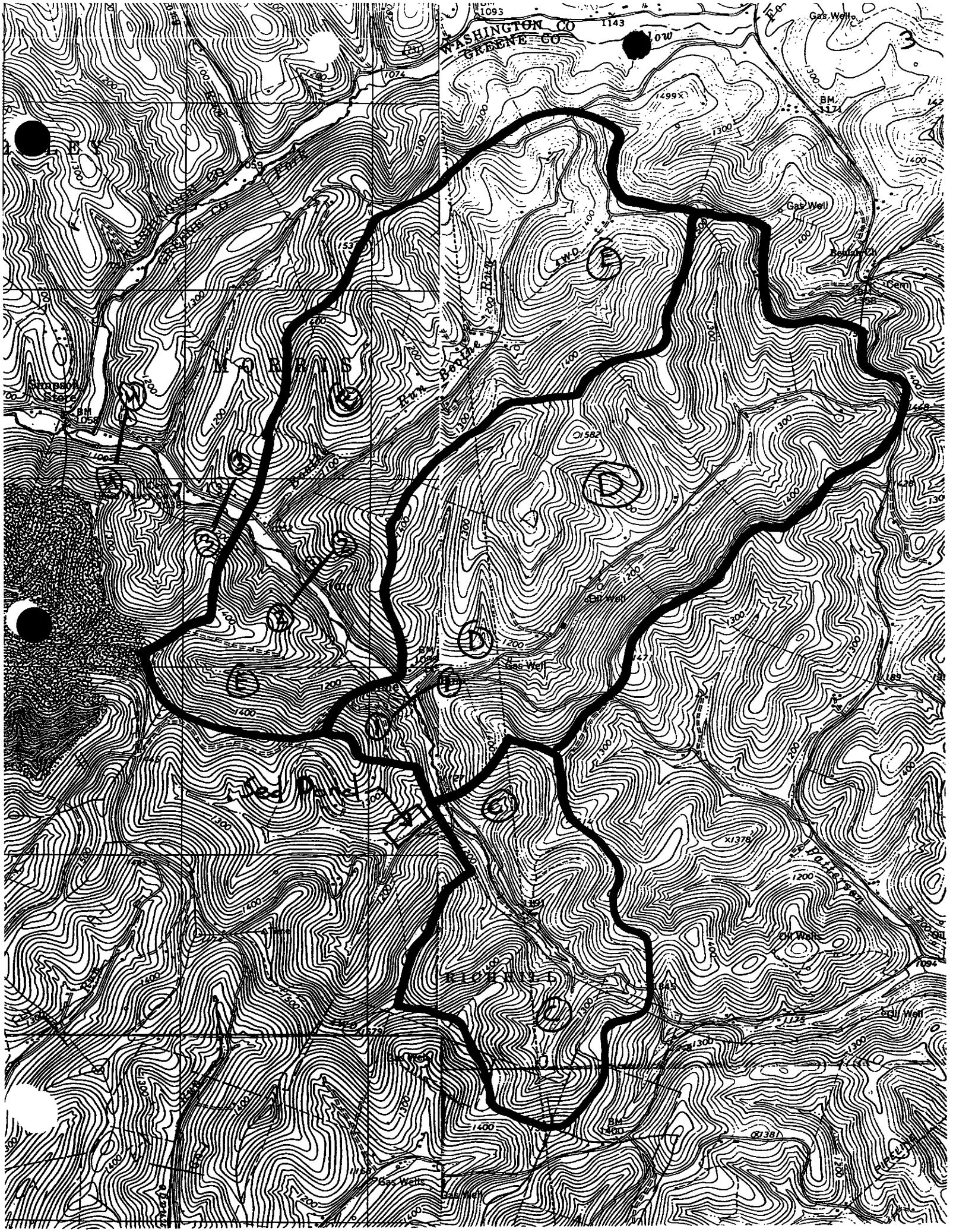
The trigger elevation for the breach is 1158.1, which corresponds to the maximum water elevation during the 100-year storm as determined in the no-breach HEC-1 model.

Sheet No. 3 provides the downstream drainage subarea boundaries and the cross section locations.

Output from the HEC-1 model with a breach is provided on Sheet Nos. 34 through 54. A summary table of peak flows and peak elevations for the dam breach analysis is provided below.

Location	Peak Discharge With No Breach	Peak Discharge With Breach	Peak Elevation With No Breach	Peak Elevation With Breach
Sediment Pond	**228**	**3033**	**1158.2**	**1158.2**
Railroad Embankment	**240**	**1509**	**1129.2**	**1163.6**
Section 1	**615**	**1580**	**1099.3**	**1101.4**
Section 2	**1749**	**1918**	**1062.3**	**1062.6**
Section 3	**1723**	**2037**	**1043.1**	**1043.5**
Section 4	**2767**	**2767**	**1029.8**	**1029.8**

As shown on the above table, there will be no loss of life or serious property damage in case of failure. The breach peak elevation is less than 1 foot above the no breach condition by Section 2 and the peak discharge/elevation is equal to no-breach conditions by Section 4. There are no structures or highways inundated by the dam breach, which demonstrates that a C-3 classification for the sedimentation pond is justified. Based on PADEP Chapter 105.91, a C-3 classification is for dams that have less than 1000 ac-ft storage, are less than 40 feet high, will not result in loss of life, and will have minimal economic loss during a failure. The design flood for a Class C-3 dam is a 50-year to 100-year (Chapter 105.98). A 100-year, 24-hour storm event has been selected for the sedimentation pond design storm. MSHA guidance document IR1109 ("Design Guidelines for Coal Refuse Pile and Water, Sediment, or Slurry Impoundments and Impounding Structures") allow a minimum 100-year design storm for structures that would not cause loss of life or serious property damage in the event of failure.


WASHINGTON CO
GREENE CO
MORRIS
RICHFIELD
Simpson Store
Sed Pond
Gas Well
Oil Well
Gas Wells
Oil Wells
Bethel Ch
Cem
Bethel Run
Beech Run
Pattersons Run
Pipeline
BM
1143
1074
1059
1499
1171
1582
1378
1381
1400
1300
1200
1100
1094
1845
1125
1191
1147
1428
1448
1628
1130
1189
1094

Quick TR-55 Ver.5.46 S/N:
Executed: 08:25:51 11-18-2001 c:\24379\SED-BRK.TCT

Consol Bailey Mine Coal Refuse Disposal Area
Tc Calculations for areas downstream of sed pond
Calcs By: GAH 11/18/01

Tc COMPUTATIONS FOR: C

SHEET FLOW (Applicable to Tc only)

Segment ID		1	
Surface description		Grass/Woods	
Manning's roughness coeff., n		0.4000	
Flow length, L (total < or = 300)	ft	200.0	
Two-yr 24-hr rainfall, P2	in	2.600	
Land slope, s	ft/ft	0.0500	

$$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$$ hrs 0.48 = 0.48

SHALLOW CONCENTRATED FLOW

Segment ID		2	
Surface (paved or unpaved)?		Unpaved	
Flow length, L	ft	1000.0	
Watercourse slope, s	ft/ft	0.1000	

$$Avg.V = Csf * (s)^{0.5}$$ ft/s 5.1022

where: Unpaved Csf = 16.1345
Paved Csf = 20.3282

T = L / (3600*V) hrs 0.05 = 0.05

CHANNEL FLOW

Segment ID		3	4
Cross Sectional Flow Area, a	sq.ft	33.00	75.00
Wetted perimeter, Pw	ft	17.00	50.00
Hydraulic radius, r = a/Pw	ft	1.941	1.500
Channel slope, s	ft/ft	0.0300	0.0150
Manning's roughness coeff., n		0.0400	0.0400

$$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$$ ft/s %10.0399 5.9781

Flow length, L	ft	1000	5000

T = L / (3600*V) hrs 0.03 + 0.23 = 0.26

::

TOTAL TIME (hrs) 0.79

Lag Time = 0.6 x 0.79 = .47

```
Quick TR-55 Ver.5.46   S/N:
Executed: 08:25:51   11-18-2001    c:\24379\SED-BRK.TCT

            Consol Bailey Mine Coal Refuse Disposal Area
          Tc Calculations for areas downstream of sed pond
                   Calcs By:  GAH     11/18/01


                 Tc COMPUTATIONS FOR: D

 SHEET FLOW (Applicable to Tc only)
    Segment ID                                   1
    Surface description                     Woods/Grass
    Manning's roughness coeff., n              0.4000
    Flow length, L (total < or = 300)   ft     200.0
    Two-yr 24-hr rainfall, P2           in     2.600
    Land slope, s                     ft/ft   0.0500
                    0.8
         .007 * (n*L)
    T =  --------------                 hrs     0.48              =  0.48
             0.5    0.4
           P2   *  s

 SHALLOW CONCENTRATED FLOW
    Segment ID                                   2
    Surface (paved or unpaved)?                 Unpaved
    Flow length, L                      ft    1000.0
    Watercourse slope, s              ft/ft   0.1000

                     0.5
    Avg.V =  Csf *  (s)                ft/s   5.1022
    where:   Unpaved Csf = 16.1345
             Paved   Csf = 20.3282

    T = L / (3600*V)                    hrs     0.05              =  0.05


 CHANNEL FLOW
    Segment ID                                  3          4
    Cross Sectional Flow Area, a      sq.ft    33.00      75.00
    Wetted perimeter, Pw                ft     17.00      50.00
    Hydraulic radius, r = a/Pw          ft     1.941      1.500
    Channel slope, s                  ft/ft   0.0300     0.0150
    Manning's roughness coeff., n             0.0400     0.0400

                  2/3    1/2
         1.49  *  r   *  s
    V =  --------------------          ft/s   %10.0399  5.9781
                  n

    Flow length, L                      ft      3500       9000

    T = L / (3600*V)                    hrs     0.10  +    0.42   =  0.52

   ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                             TOTAL TIME (hrs)        1.05
```

Lag Time = 0.6 x 1.05 = 0.63

Quick TR-55 Ver.5.46 S/N:
Executed: 09:31:12 11-18-2001 c:\24379\SED-BRK.TCT

Consol Bailey Mine Coal Refuse Disposal Area
Tc Calculations for areas downstream of sed pond
Calcs By: GAH 11/18/01

Tc COMPUTATIONS FOR: E

SHEET FLOW (Applicable to Tc only)

Segment ID		1	
Surface description		Woods/Grass	
Manning's roughness coeff., n		0.4000	
Flow length, L (total < or = 300)	ft	200.0	
Two-yr 24-hr rainfall, P2	in	2.600	
Land slope, s	ft/ft	0.0500	
$T = \dfrac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.48	= 0.48

SHALLOW CONCENTRATED FLOW

Segment ID		2	
Surface (paved or unpaved)?		Unpaved	
Flow length, L	ft	700.0	
Watercourse slope, s	ft/ft	0.1500	
$Avg.V = Csf * (s)^{0.5}$	ft/s	6.2489	
where: Unpaved Csf = 16.1345			
Paved Csf = 20.3282			
T = L / (3600*V)	hrs	0.03	= 0.03

CHANNEL FLOW

Segment ID		3	4	
Cross Sectional Flow Area, a	sq.ft	33.00	75.00	
Wetted perimeter, Pw	ft	17.00	50.00	
Hydraulic radius, r = a/Pw	ft	1.941	1.500	
Channel slope, s	ft/ft	0.0300	0.0200	
Manning's roughness coeff., n		0.0400	0.0400	
$V = \dfrac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	%10.0399	6.9030	
Flow length, L	ft	3500	5500	
T = L / (3600*V)	hrs	0.10 +	0.22	= 0.32

:::

TOTAL TIME (hrs) 0.83

Lag Time = 0.6 + 0.83 = 0.50

POND-2 Version: 5.20
S/N:

Consol Bailey Mine New Coal Refuse Disposal Area
Stage-Storage Calcs for Railroad Embankment - for Dam Break
Calcs By: GAH 11/11/01

CALCULATED 11-18-2001 09:00:10
DISK FILE: c:\24379\RR-EMBK2.VOL

Planimeter scale: 1 inch = 1 ft.

Elevation (ft)	Planimeter (sq.in.)	Area (acres)	A1+A2+sqr(A1*A2) (acres)	* Volume (acre-ft)	Volume Sum (acre-ft)
1,125.00	0.00	0.00	0.00	0.00	0.00
1,130.00	4,090.00	0.09	0.09	0.16	0.16
1,135.00	11,510.00	0.26	0.52	0.86	1.02
1,140.00	19,330.00	0.44	1.05	1.75	2.77
1,145.00	27,730.00	0.64	1.61	2.69	5.45
1,150.00	37,050.00	0.85	2.22	3.70	9.16
1,155.00	48,995.00	1.12	2.95	4.92	14.08
1,160.00	62,370.00	1.43	3.83	6.38	20.46
1,162.00	67,000.00	1.54	4.45	2.97	23.43
1,165.00	476,200.00	10.93	16.57	16.57	40.00
1,170.00	510,200.00	11.71	33.96	56.60	96.60
1,180.00	599,300.00	13.76	38.16	127.22	223.81
1,190.00	709,600.00	16.29	45.02	150.06	373.88
1,200.00	836,800.00	19.21	53.19	177.30	551.18
1,210.00%	1,011,000.00	23.21	63.54	211.78	762.96

* Incremental volume computed by the Conic Method for Reservoir Volumes.

Volume = (1/3) * (EL2-EL1) * (Area1 + Area2 + sq.rt.(Area1*Area2))

where: EL1, EL2 = Lower and upper elevations of the increment
Area1,Area2 = Areas computed for EL1, EL2, respectively
Volume = Incremental volume between EL1 and EL2

Outlet Structure File: RR .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Consol Bailey Mine New Coal Refuse Disposal Facility
Stage-Discharge Calcs for Railroad Embankment - Dam Break
Calcs By: GAH 11/13/01
****

***** COMPOSITE OUTFLOW SUMMARY ****

Elevation (ft)	Q (cfs)	Contributing Structures
1120.00	0.0	
1125.00	11.1	1
1130.00	274.7	1
1135.00	608.8	1
1140.00	839.2	1
1145.00	1018.5	1
1150.00	1170.7	1
1155.00	1305.4	1
1160.00	1427.5	1
1162.00	1473.2	1
1165.00	1539.6	1
1170.00	1644.5	1
1175.00	1742.9	1
1180.00	1836.0	1
1185.00	1924.5	1
1190.00	2009.2	1
1195.00	2090.5	1
1200.00	2168.8	1
1205.00	2244.4	1
1210.00	2823.2	1 +2
1215.00	5644.2	1 +2
1220.00	9640.2	1 +2
1225.00	14425.8	1 +2
1230.00	0.0	

Outlet Structure File: RR .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Consol Bailey Mine New Coal Refuse Disposal Facility
Stage-Discharge Calcs for Railroad Embankment - Dam Break
Calcs By: GAH 11/13/01
****

>>>>>> Structure No. 1 <<<<<<
(Input Data)

CULVERT-CR
Circular Culvert (With Inlet Control)

E1 elev.(ft)?	1124
E2 elev.(ft)?	1230
Diam. (ft)?	8
Inv. el.(ft)?	1124
Slope (ft/ft)?	.02
T1 ratio?	
T2 ratio?	
K Coeff.?	.0078
M Coeff.?	2.0
c Coeff.?	.0379
Y Coeff.?	0.69
Form 1 or 2?	1
Slope factor?	-.5

```
Outlet Structure File: RR      .STR

POND-2 Version: 5.20           S/N:
Date Executed:                 Time Executed:


*********************************************************
  Consol Bailey Mine New Coal Refuse Disposal Facility
Stage-Discharge Calcs for Railroad Embankment - Dam Break
              Calcs By:  GAH      11/13/01

*********************************************************


            >>>>>> Structure No. 2 <<<<<<
                     (Input Data)

             WEIR-VR
             Weir - Vertical Rectangular


             E1 elev.(ft)?           1208
             E2 elev.(ft)?           1230
             Weir coefficient?       3.0
             Weir elev.(ft)?         1208
             Length (ft)?            60
             Contracted/Suppressed (C/S)?  C
```

Outlet Structure File: RR .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Consol Bailey Mine New Coal Refuse Disposal Facility
Stage-Discharge Calcs for Railroad Embankment - Dam Break
Calcs By: GAH 11/13/01
****

Outflow Rating Table for Structure #1
CULVERT-CR Circular Culvert (With Inlet Control)

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
1120.00	0.0	E < Inv.El.= 1124
1125.00	11.1	Equ.1: HW =1.0 dc=.804 Ac=2.634
1130.00	274.7	Equ.1: HW =6.0 dc=4.178 Ac=26.554
1135.00	608.8	Submerged: HW =11.0
1140.00	839.2	Submerged: HW =16.0
1145.00	1018.5	Submerged: HW =21.0
1150.00	1170.7	Submerged: HW =26.0
1155.00	1305.4	Submerged: HW =31.0
1160.00	1427.5	Submerged: HW =36.0
1162.00	1473.2	Submerged: HW =38.0
1165.00	1539.6	Submerged: HW =41.0
1170.00	1644.5	Submerged: HW =46.0
1175.00	1742.9	Submerged: HW =51.0
1180.00	1836.0	Submerged: HW =56.0
1185.00	1924.5	Submerged: HW =61.0
1190.00	2009.2	Submerged: HW =66.0
1195.00	2090.5	Submerged: HW =71.0
1200.00	2168.8	Submerged: HW =76.0
1205.00	2244.4	Submerged: HW =81.0
1210.00	2317.4	Submerged: HW =86.0
1215.00	2388.4	Submerged: HW =91.0
1220.00	2457.0	Submerged: HW =96.0
1225.00	2524.0	Submerged: HW =101.0
1230.00	0.0	E = or > E2=1230

Used Unsubmerged Equ. Form (1) for elev. less than 1133.0 ft
Used Submerged Equation for elevations greater than 1134.29 ft
HW=Headwater (ft) dc=Critical depth (ft) Ac=Area (sq.ft) at dc

Transition flows interpolated from the following values:

E1=1133.0 ft; Q1=497.6 cfs; Dc=5.69 ft; E2=1134.29 ft; Q2=568.69 cfs

Outlet Structure File: RR .STR

POND-2 Version: 5.20 S/N:
Date Executed: Time Executed:

****
Consol Bailey Mine New Coal Refuse Disposal Facility
Stage-Discharge Calcs for Railroad Embankment - Dam Break
Calcs By: GAH 11/13/01
****

Outflow Rating Table for Structure #2
WEIR-VR Weir - Vertical Rectangular

***** INLET CONTROL ASSUMED *****

Elevation (ft)	Q (cfs)	Computation Messages
1120.00	0.0	E < Inv.El.= 1208
1125.00	0.0	E < Inv.El.= 1208
1130.00	0.0	E < Inv.El.= 1208
1135.00	0.0	E < Inv.El.= 1208
1140.00	0.0	E < Inv.El.= 1208
1145.00	0.0	E < Inv.El.= 1208
1150.00	0.0	E < Inv.El.= 1208
1155.00	0.0	E < Inv.El.= 1208
1160.00	0.0	E < Inv.El.= 1208
1162.00	0.0	E < Inv.El.= 1208
1165.00	0.0	E < Inv.El.= 1208
1170.00	0.0	E < Inv.El.= 1208
1175.00	0.0	E < Inv.El.= 1208
1180.00	0.0	E < Inv.El.= 1208
1185.00	0.0	E < Inv.El.= 1208
1190.00	0.0	E < Inv.El.= 1208
1195.00	0.0	E < Inv.El.= 1208
1200.00	0.0	E < Inv.El.= 1208
1205.00	0.0	E < Inv.El.= 1208
1210.00	505.7	H =2.0
1215.00	3255.9	H =7.0
1220.00	7183.2	H =12.0
1225.00	11901.8	H =17.0
1230.00	0.0	E = or > E2=1230

C = 3 L (ft) = 60
H (ft) = Table elev. - Invert elev. (1208 ft)
Q (cfs) = C * (L-.2H) * (H**1.5) -- Contracted Weir

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *           VERSION 4.1                *
 *                                      *
 *  RUN DATE   18NOV01  TIME  09:43:12  *
 *                                      *
 ****************************************
```

```
****************************************
*                                      *
*   U.S. ARMY CORPS OF ENGINEERS       *
*   HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET            *
*      DAVIS, CALIFORNIA 95616         *
*          (916) 756-1104              *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID        Consol Bailey Mine New Coal Refuse Disposal Area
  2           ID        Sedimentation Pond
  3           ID        100 Year Storm W/ NO Dam Break
  4           ID        Filename: SP-NB.HC1
  5           ID        Calcs By:  GAH   11/18/01
  6           IT       5       0       0     300
  7           IO       3       0
              * ***********************************************

  8           KK   Run-A  Sediment Pond Watershed
  9           KM          Runoff into Sed Pond
 10           BA   0.711
 11           PB     5.2
              *  SCS, Type III 24-hour storm distribution
 12           IN      12       0       0
 13           PC    .000    .002    .004    .006    .008    .010    .013    .015    .017    .020
 14           PC    .022    .024    .027    .029    .032    .034    .037    .040    .042    .045
 15           PC    .048    .051    .054    .057    .060    .063    .066    .070    .073    .076
 16           PC    .080    .084    .087    .091    .095    .099    .103    .107    .111    .116
 17           PC    .120    .125    .130    .135    .141    .147    .153    .160    .166    .173
 18           PC    .181    .190    .199    .209    .221    .235    .251    .270    .307    .431
 19           PC    .663    .699    .725    .743    .759    .772    .784    .794    .804    .812
 20           PC    .820    .827    .834    .841    .847    .854    .859    .865    .870    .875
 21           PC    .880    .884    .889    .893    .898    .902    .906    .910    .914    .917
 22           PC    .921    .924    .928    .931    .935    .938    .941    .944    .947    .949
 23           PC    .952    .955    .957    .960    .962    .965    .967    .970    .972    .975
 24           PC    .977    .979    .982    .984    .986    .989    .992    .994    .997   1.000
 25           LS       0      80
```

```
26          UD    0.25
            * ***********************************************

27          KK   Rte-A  Sediment Pond - 1
28          KM          Route Flow through Upper Chamber of Sediment Pond
29          RS       1    ELEV  1149.0
30          SV     0.0    0.66    1.71    3.17    3.75    4.39    5.08    5.82    6.62    7.48
31          SV    8.39    9.36   10.40   11.49   12.65   13.87   15.16
32          SQ     0.0     0.0     0.0     0.0     0.8     1.9     3.3     4.8     6.6     8.5
33          SQ    64.2   151.7   189.9   331.5   531.0   848.6  1301.6
34          SE    1140    1143    1146    1149    1150    1151    1152    1153    1154    1155
35          SE    1156    1157    1158    1159    1160    1161    1162
            * ***********************************************

36          KK   Rte-B  Sediment Pond - 2
37          KM          Route Flow through Lower Chamber of Sediment Pond
38          RS       1    ELEV  1141.5
39          SV     0.0   10.64   13.15   18.50   24.28   30.51   37.19   44.34   51.97   55.98
40          SV   60.11   64.37   66.55   68.76   73.28   77.94
41          SQ     0.0     0.0     0.6     2.8     5.9     9.8    14.2    19.2    24.7    27.6
42          SQ    30.6    86.7   132.6   197.3   367.6   578.2
43          SE    1134    1141    1142    1144    1146    1148    1150    1152    1154    1155
44          SE    1156    1157  1157.5    1158    1159    1160
            * ***********************************************
```



```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

45          KK   Run-B  Railroad Embankment Watershed
46          KM          Runoff downstream of Sed Pond
47          BA   0.070
48          LS       0      70
49          UD    0.15
            * ***********************************************

50          KK   Add-1  Add Sediment Pond Outlet and Railraod Embankment Flows
51          KM    Combine Hydrographs
52          HC       2
            * ***********************************************

53          KK   Rte-C  Railroad
54          KM          Route Flows through Railroad Embankment
55          RS       1    ELEV  1124.0
56          SV     0.0     0.2     1.0     2.8     5.5     9.2    14.1    20.5    23.4    40.0
57          SQ     0.0   274.7   608.8   839.2  1018.5  1170.7  1305.4  1427.5  1473.2  1539.6
58          SE    1124    1130    1135    1140    1145    1150    1155    1160    1162    1165
            * ***********************************************

59          KK   Run-C  Upper Watershed of Unnamed Trib to Enlow Fork
60          KM          Area C Watershed
61          BA    0.66
62          LS       0      70
63          UD    0.45
            * ***********************************************

64          KK   Add-2
65          KM    Combine Hydrographs
66          HC       2
            * ***********************************************

67          KK   Rch-1
68          KM          Cross Section 1
69          RS       1    ELEV
70          RC     .08     .04     .08    1900    .006
71          RX       0     150     190     195     205     210     300     350
```

```
 72          RY    1140    1100    1099    1094    1094    1099    1100    1140
             * ***********************************************

 73          KK   Run-D  Unnamed Trib to Enlow Fork
 74          KM          Area D Watershed
 75          BA    1.61
 76          LS       0      70
 77          UD     0.6
             * ***********************************************

 78          KK   Add-3
 79          KM    Combine Hydrographs
 80          HC       2
             * ***********************************************
1                                   HEC-1 INPUT                                    PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 81          KK   Rch-2
 82          KM          Cross Section 2
 83          RS       1    ELEV
 84          RC     .08     .04     .08    2500    .007
 85          RX       0      50     115     120     130     135     400     500
 86          RY    1120    1080    1059    1054    1054    1059    1080    1120
             * ***********************************************

 87          KK   Rch-3
 88          KM          Cross Section 3
 89          RS       1    ELEV
 90          RC     .08     .04     .08    2200    .008
 91          RX       0     125     140     145     155     160     400     550
 92          RY    1100    1060    1040    1035    1035    1040    1060    1100
             * ***********************************************

 93          KK   Run-E  Boothe Run Watershed
 94          KM          Area E Watershed
 95          BA    1.56
 96          LS       0      70
 97          UD     0.5
             * ***********************************************

 98          KK   Add-4
 99          KM    Combine Hydrographs
100          HC       2
             * ***********************************************

101          KK   Rch-4
102          KM          Cross Section 4
103          RS       1    ELEV
104          RC     .08     .04     .08    2200    .007
105          RX       0     150     190     195     205     210     425     600
106          RY    1100    1040    1025    1020    1020    1025    1040    1060
             * ***********************************************
107          ZZ
1*****************************************                  *****************************************
*                                         *                  *                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)     *                  *    U.S. ARMY CORPS OF ENGINEERS       *
*              JUN   1998                 *                  *    HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.1                   *                  *          609 SECOND STREET            *
*                                         *                  *       DAVIS, CALIFORNIA 95616         *
*  RUN DATE   18NOV01  TIME  09:43:12     *                  *          (916) 756-1104               *
*                                         *                  *                                       *
*****************************************                  *****************************************
```

```
                    Consol Bailey Mine New Coal Refuse Disposal Area
                    Sedimentation Pond
                    100 Year Storm W/ NO Dam Break
                    Filename: SP-NB.HC1
                    Calcs By:  GAH   11/18/01

 7 IO        OUTPUT CONTROL VARIABLES
                  IPRNT          3  PRINT CONTROL
                  IPLOT          0  PLOT CONTROL
                  QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT        HYDROGRAPH TIME DATA
                   NMIN          5  MINUTES IN COMPUTATION INTERVAL
                  IDATE      1   0  STARTING DATE
                  ITIME       0000  STARTING TIME
                     NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE      2   0  ENDING DATE
                 NDTIME       0055  ENDING TIME
                  ICENT         19  CENTURY MARK

             COMPUTATION INTERVAL     .08 HOURS
                  TOTAL TIME BASE   24.92 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 8 KK     *     Run-A  *       Sediment Pond Watershed
          *            *
          **************
                           Runoff into Sed Pond

12 IN        TIME DATA FOR INPUT TIME SERIES
                  JXMIN         12  TIME INTERVAL IN MINUTES
                 JXDATE      1   0  STARTING DATE
                 JXTIME          0  STARTING TIME

             SUBBASIN RUNOFF DATA

10 BA        SUBBASIN CHARACTERISTICS
                  TAREA        .71  SUBBASIN AREA

             PRECIPITATION DATA

11 PB             STORM       5.20  BASIN TOTAL PRECIPITATION

13 PI          INCREMENTAL PRECIPITATION PATTERN
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                 .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
```

```
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .01   .01
.01   .01   .01   .01   .01   .01   .01   .02   .02   .04
.05   .07   .10   .10   .01   .02   .01   .01   .01   .01
.01   .01   .01   .01   .01   .01   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00   .00   .00   .00   .00
.00   .00   .00   .00   .00   .00
```

```
25 LS        SCS LOSS RATE
                  STRTL        .50  INITIAL ABSTRACTION
                 CRVNBR      80.00  CURVE NUMBER
                  RTIMP        .00  PERCENT IMPERVIOUS AREA

26 UD        SCS DIMENSIONLESS UNITGRAPH
                   TLAG        .25  LAG

                                          ***

                                     UNIT HYDROGRAPH
                                 17 END-OF-PERIOD ORDINATES
          209.    714.   1137.   1137.    886.    530.    330.    214.    133.     83.
           52.     33.     21.     13.      9.      5.      2.

   ***          ***          ***          ***          ***

                 HYDROGRAPH AT STATION    Run-A

   TOTAL RAINFALL =    5.20, TOTAL LOSS =    2.13, TOTAL EXCESS =    3.07

  PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR      72-HR     24.92-HR
+   (CFS)       (HR)
                            (CFS)
+    1259.     12.17                189.        59.        56.         56.
                         (INCHES)  2.472     3.068      3.068       3.068
                          (AC-FT)    94.       116.       116.        116.

                         CUMULATIVE AREA =     .71 SQ MI
```

*** ***

```
          **************
          *            *
27 KK     *    Rte-A   *      Sediment Pond - 1
```

```
*            *
**************
```

Route Flow through Upper Chamber of Sediment Pond

HYDROGRAPH ROUTING DATA

```
29 RS        STORAGE ROUTING
                 NSTPS          1  NUMBER OF SUBREACHES
                  ITYP       ELEV  TYPE OF INITIAL CONDITION
                RSVRIC    1149.00  INITIAL CONDITION
                     X        .00 WORKING R AND D COEFFICIENT

30 SV          STORAGE        .0       .7      1.7      3.2      3.8      4.4      5.1      5.8      6.6      7.5
                             8.4      9.4     10.4     11.5     12.6     13.9     15.2

32 SQ         DISCHARGE       0.       0.       0.       0.       1.       2.       3.       5.       7.       9.
                             64.     152.     190.     332.     531.     849.    1302.

34 SE         ELEVATION    1140.00  1143.00  1146.00  1149.00  1150.00  1151.00  1152.00  1153.00  1154.00  1155.00
                           1156.00  1157.00  1158.00  1159.00  1160.00  1161.00  1162.00

                                                        ***

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      849. TO     1302.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

     ***            ***            ***            ***            ***
```

HYDROGRAPH AT STATION Rte-A

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.92-HR
	(CFS)	(HR)					
			(CFS)				
+	1245.	12.17		188.	57.	55.	55.
			(INCHES)	2.461	2.962	2.962	2.962
			(AC-FT)	93.	112.	112.	112.

	PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	24.92-HR
+	(AC-FT)	(HR)				
	15.	12.17	9.	6.	6.	6.

	PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	24.92-HR
+	(FEET)	(HR)				
	1161.87	12.17	1156.94	1153.34	1153.18	1153.18

CUMULATIVE AREA = .71 SQ MI

*** ***

```
             **************
             *            *
36 KK        *     Rte-B  *      Sediment Pond - 2
             *            *
             **************
```

Route Flow through Lower Chamber of Sediment Pond

HYDROGRAPH ROUTING DATA

```
 38 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC    1141.50  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

 39 SV            STORAGE        .0     10.6     13.1     18.5     24.3     30.5     37.2     44.3     52.0     56.0
                               60.1     64.4     66.6     68.8     73.3     77.9

 41 SQ          DISCHARGE        0.       0.       1.       3.       6.      10.      14.      19.      25.      28.
                                31.      87.     133.     197.     368.     578.

 43 SE          ELEVATION   1134.00  1141.00  1142.00  1144.00  1146.00  1148.00  1150.00  1152.00  1154.00  1155.00
                            1156.00  1157.00  1157.50  1158.00  1159.00  1160.00

                                                                  ***

     ***            ***            ***            ***            ***

                      HYDROGRAPH AT STATION    Rte-B

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                          (CFS)
+     228.     12.92                 97.         34.         32.         32.
                        (INCHES)   1.268      1.752       1.753       1.753
                         (AC-FT)     48.         66.         66.         66.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     24.92-HR
+  (AC-FT)      (HR)
      70.      12.92                 64.         39.         38.         38.

  PEAK STAGE    TIME                        MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     24.92-HR
+   (FEET)      (HR)
   1158.18     12.92            1156.96     1149.46     1149.17     1149.17

                        CUMULATIVE AREA =     .71 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 45 KK      *    Run-B   *      Railroad Embankment Watershed
            *            *
            **************
                                Runoff downstream of Sed Pond

              SUBBASIN RUNOFF DATA

 47 BA          SUBBASIN CHARACTERISTICS
                     TAREA         .07  SUBBASIN AREA

                PRECIPITATION DATA

 11 PB               STORM        5.20  BASIN TOTAL PRECIPITATION

 13 PI            INCREMENTAL PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .01    .01
.01    .01    .01    .01    .01    .01    .01    .02    .02    .04
.05    .07    .10    .10    .01    .02    .01    .01    .01    .01
.01    .01    .01    .01    .01    .01    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00
```

```
48 LS          SCS LOSS RATE
                    STRTL        .86  INITIAL ABSTRACTION
                   CRVNBR      70.00  CURVE NUMBER
                    RTIMP        .00  PERCENT IMPERVIOUS AREA

49 UD          SCS DIMENSIONLESS UNITGRAPH
                    TLAG        .15  LAG

                                                  ***

                                              UNIT HYDROGRAPH
                                         11 END-OF-PERIOD ORDINATES
              65.     173.     152.      77.      39.      19.       9.       5.       2.       1.
               0.

     ***            ***            ***            ***            ***

                      HYDROGRAPH AT STATION    Run-B

    TOTAL RAINFALL =    5.20, TOTAL LOSS =    3.01, TOTAL EXCESS =    2.19

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                          (CFS)
+     110.     12.08                13.          4.          4.          4.
                        (INCHES)  1.781       2.186       2.186       2.186
                         (AC-FT)     7.          8.          8.          8.

                      CUMULATIVE AREA =     .07 SQ MI


** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
```

```
            *           *
  50 KK     *    Add-1  *      Add Sediment Pond Outlet and Railraod Embankment Flows
            *           *
            **************
                              Combine Hydrographs

  52 HC          HYDROGRAPH COMBINATION
                       ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

      ***            ***            ***            ***            ***

                         HYDROGRAPH AT STATION    Add-1

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)      (HR)
                           (CFS)
+    240.     12.92                 106.        38.         36.         36.
                        (INCHES)    1.268       1.791       1.792       1.792
                         (AC-FT)     53.         75.         75.         75.

                         CUMULATIVE AREA =     .78 SQ MI
```

*** ***

```
            **************
            *           *
  53 KK     *    Rte-C  *      Railroad
            *           *
            **************
                              Route Flows through Railroad Embankment

             HYDROGRAPH ROUTING DATA

  55 RS          STORAGE ROUTING
                       NSTPS          1  NUMBER OF SUBREACHES
                        ITYP       ELEV  TYPE OF INITIAL CONDITION
                      RSVRIC    1124.00  INITIAL CONDITION
                           X        .00 WORKING R AND D COEFFICIENT

  56 SV           STORAGE         .0        .2       1.0       2.8       5.5       9.2      14.1      20.5      23.4      40.0

  57 SQ          DISCHARGE         0.      275.      609.      839.     1019.     1171.     1305.     1428.     1473.     1540.

  58 SE          ELEVATION     1124.00   1130.00   1135.00   1140.00   1145.00   1150.00   1155.00   1160.00   1162.00   1165.00

                                                                  ***

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN        0. TO      609.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

      ***            ***            ***            ***            ***

                         HYDROGRAPH AT STATION    Rte-C

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
```

```
                                        6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                            (CFS)
     240.     12.92                     106.         38.         36.         36.
                         (INCHES)     1.267      1.791       1.791       1.791
                          (AC-FT)      53.         75.         75.         75.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR       72-HR     24.92-HR
+  (AC-FT)      (HR)
       0.     12.92                       0.          0.          0.          0.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR       72-HR     24.92-HR
+   (FEET)      (HR)
   1129.25     12.92                  1126.32     1124.82     1124.79     1124.79

                          CUMULATIVE AREA =     .78 SQ MI
```

*** ***

```
            **************
            *            *
  59 KK     *     Run-C  *       Upper Watershed of Unnamed Trib to Enlow Fork
            *            *
            **************
                                 Area C Watershed

               SUBBASIN RUNOFF DATA

  61 BA          SUBBASIN CHARACTERISTICS
                      TAREA          .66  SUBBASIN AREA

                 PRECIPITATION DATA

  11 PB                STORM        5.20  BASIN TOTAL PRECIPITATION

  13 PI            INCREMENTAL PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .01       .01
                      .01       .01       .01       .01       .01       .01       .01       .02       .02       .04
                      .05       .07       .10       .10       .01       .02       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00

 62 LS        SCS LOSS RATE
                STRTL        .86  INITIAL ABSTRACTION
               CRVNBR      70.00  CURVE NUMBER
                RTIMP        .00  PERCENT IMPERVIOUS AREA

 63 UD        SCS DIMENSIONLESS UNITGRAPH
                TLAG        .45  LAG

                                                  ***

                                              UNIT HYDROGRAPH
                                          29 END-OF-PERIOD ORDINATES
            51.     154.     316.     509.     622.     648.     609.     529.     422.     302.
           228.     174.     134.     101.      77.      59.      44.      33.      25.      19.
            15.      11.       8.       7.       5.       4.       3.       2.       1.

    ***          ***          ***          ***          ***

                   HYDROGRAPH AT STATION    Run-C

   TOTAL RAINFALL =    5.20, TOTAL LOSS =    3.01, TOTAL EXCESS =    2.19

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                          (CFS)
+     587.     12.33                126.        39.        37.         37.
                        (INCHES)    1.775     2.185      2.185       2.185
                         (AC-FT)     62.        77.        77.         77.

                       CUMULATIVE AREA =     .66 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 64 KK      *    Add-2   *
            *            *
            **************
                      Combine Hydrographs

 66 HC        HYDROGRAPH COMBINATION
                ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

    ***          ***          ***          ***          ***

                   HYDROGRAPH AT STATION    Add-2

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                          (CFS)
+     652.     12.33                232.        76.        74.         74.
                        (INCHES)    1.497     1.971      1.971       1.971
```

```
                    (AC-FT)      115.        151.        152.        152.

                    CUMULATIVE AREA =    1.44 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 67 KK    *     Rch-1  *
          *            *
          **************
                              Cross Section 1

             HYDROGRAPH ROUTING DATA

 69 RS          STORAGE ROUTING
                      NSTPS           1  NUMBER OF SUBREACHES
                       ITYP        ELEV  TYPE OF INITIAL CONDITION
                     RSVRIC         .00  INITIAL CONDITION
                          X         .00 WORKING R AND D COEFFICIENT

 70 RC          NORMAL DEPTH CHANNEL
                        ANL        .080  LEFT OVERBANK N-VALUE
                       ANCH        .040  MAIN CHANNEL N-VALUE
                        ANR        .080  RIGHT OVERBANK N-VALUE
                      RLNTH       1900.  REACH LENGTH
                        SEL      .0060  ENERGY SLOPE
                      ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                        CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 72 RY       ELEVATION   1140.00   1100.00   1099.00   1094.00   1094.00   1099.00   1100.00   1140.00
 71 RX       DISTANCE        .00    150.00    190.00    195.00    205.00    210.00    300.00    350.00

                                                          ***

                                        COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      1.31      3.13     15.42     32.56     50.99     70.69     91.67    113.93    137.47
          OUTFLOW        .00    127.67    434.47   1492.02   3829.45   7168.72  11428.23  16574.38  22593.95  29484.55
        ELEVATION    1094.00   1096.42   1098.84   1101.26   1103.68   1106.11   1108.53   1110.95   1113.37   1115.79

          STORAGE     162.28    188.38    215.75    244.40    274.33    305.54    338.02    371.79    406.83    443.15
          OUTFLOW   37250.35  45899.70  55443.88  65896.10  77271.13  89584.71 102853.40 117094.50 132325.50 148564.30
        ELEVATION    1118.21   1120.63   1123.05   1125.47   1127.89   1130.32   1132.74   1135.16   1137.58   1140.00


*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN    22594. TO   148564.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

     ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION    Rch-1

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR     24.92-HR
   (CFS)       (HR)
                          (CFS)
+    615.     12.50                232.         76.         73.         73.
                        (INCHES)   1.494       1.967       1.967       1.967
                         (AC-FT)    115.        151.        151.        151.
```

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
5.	12.50	2.	1.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1099.26	12.50	1097.02	1095.10	1095.06	1095.06

CUMULATIVE AREA = 1.44 SQ MI

*** ***

```
              **************
              *            *
  73 KK       *     Run-D  *       Unnamed Trib to Enlow Fork
              *            *
              **************
                                  Area D Watershed

                SUBBASIN RUNOFF DATA

  75 BA           SUBBASIN CHARACTERISTICS
                        TAREA        1.61  SUBBASIN AREA

                  PRECIPITATION DATA

  11 PB                 STORM        5.20  BASIN TOTAL PRECIPITATION

  13 PI             INCREMENTAL PRECIPITATION PATTERN
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .01       .01
                        .01       .01       .01       .01       .01       .01       .01       .02       .02       .04
                        .05       .07       .10       .10       .01       .02       .01       .01       .01       .01
                        .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                        .00       .00       .00       .00       .00       .00
```

```
76 LS          SCS LOSS RATE
                    STRTL        .86  INITIAL ABSTRACTION
                   CRVNBR      70.00  CURVE NUMBER
                    RTIMP        .00  PERCENT IMPERVIOUS AREA

77 UD          SCS DIMENSIONLESS UNITGRAPH
                     TLAG        .60  LAG

                                                    ***

                                              UNIT HYDROGRAPH
                                         38 END-OF-PERIOD ORDINATES
              62.     187.     361.     615.     896.    1100.    1202.    1208.    1151.    1044.
             911.     740.     572.     460.     371.     305.     248.     201.     162.     130.
             107.      86.      68.      56.      45.      37.      30.      24.      19.      16.
              13.      11.       9.       7.       6.       4.       2.       1.

     ***            ***            ***            ***            ***

                      HYDROGRAPH AT STATION    Run-D

    TOTAL RAINFALL =    5.20, TOTAL LOSS =    3.01, TOTAL EXCESS =    2.19

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                         (CFS)
+    1189.     12.50                306.         94.         91.         91.
                        (INCHES)   1.770      2.182       2.182       2.182
                         (AC-FT)    152.       187.        187.        187.

                       CUMULATIVE AREA =    1.61 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
78 KK       *     Add-3  *
            *            *
            **************
                          Combine Hydrographs

80 HC          HYDROGRAPH COMBINATION
                    ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                    ***

     ***            ***            ***            ***            ***

                      HYDROGRAPH AT STATION    Add-3

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                         (CFS)
+    1804.     12.50                538.        171.        164.        164.
                        (INCHES)   1.639      2.080       2.081       2.081
                         (AC-FT)    267.       339.        339.        339.

                       CUMULATIVE AREA =    3.05 SQ MI
```

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *

          **************
          *            *
  81 KK   *    Rch-2   *
          *            *
          **************
                                Cross Section 2

             HYDROGRAPH ROUTING DATA

  83 RS        STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC        .00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

  84 RC        NORMAL DEPTH CHANNEL
                       ANL       .080  LEFT OVERBANK N-VALUE
                      ANCH       .040  MAIN CHANNEL N-VALUE
                       ANR       .080  RIGHT OVERBANK N-VALUE
                     RLNTH      2500.  REACH LENGTH
                       SEL      .0070  ENERGY SLOPE
                     ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                      CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  86 RY       ELEVATION   1120.00   1080.00   1059.00   1054.00   1054.00   1059.00   1080.00   1120.00
  85 RX       DISTANCE        .00     50.00    115.00    120.00    130.00    135.00    400.00    500.00

                                                          ***

                                      COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      2.69      8.25     23.78     50.19     87.48    135.66    194.71    263.55    335.97
          OUTFLOW        .00    258.61   1044.44   2902.94   6371.54  11913.68  19939.15  30823.98  45949.66  65168.64
        ELEVATION    1054.00   1057.47   1060.95   1064.42   1067.89   1071.37   1074.84   1078.32   1081.79   1085.26

          STORAGE     410.97    488.58    568.78    651.58    736.98    824.97    915.56   1008.75   1104.53   1202.91
          OUTFLOW   87319.84 112314.40 140095.10 170625.80 203885.30 239863.30 278557.70 319972.70 364117.60 411005.80
        ELEVATION    1088.74   1092.21   1095.68   1099.16   1102.63   1106.10   1109.58   1113.05   1116.53   1120.00


*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN    65169. TO   411006.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

     ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION    Rch-2

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                            (CFS)
+    1749.     12.67                    537.        170.        164.        164.
                         (INCHES)     1.636       2.077       2.077       2.077
                          (AC-FT)      266.        338.        338.        338.

 PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR       72-HR     24.92-HR
+  (AC-FT)      (HR)
       14.      12.67                     5.          2.          1.          1.
```

```
 PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                    6-HR       24-HR       72-HR     24.92-HR
  (FEET)       (HR)
 1062.26      12.67                1058.32     1055.57     1055.51     1055.51

                        CUMULATIVE AREA =    3.05 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
 87 KK      *     Rch-3  *
            *            *
            **************
                                Cross Section 3

              HYDROGRAPH ROUTING DATA

 89 RS          STORAGE ROUTING
                      NSTPS           1  NUMBER OF SUBREACHES
                       ITYP        ELEV  TYPE OF INITIAL CONDITION
                     RSVRIC         .00  INITIAL CONDITION
                          X         .00 WORKING R AND D COEFFICIENT

 90 RC          NORMAL DEPTH CHANNEL
                        ANL        .080  LEFT OVERBANK N-VALUE
                       ANCH        .040  MAIN CHANNEL N-VALUE
                        ANR        .080  RIGHT OVERBANK N-VALUE
                      RLNTH       2200.  REACH LENGTH
                        SEL       .0080  ENERGY SLOPE
                      ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 92 RY        ELEVATION   1100.00   1060.00   1040.00   1035.00   1035.00   1040.00   1060.00   1100.00
 91 RX        DISTANCE        .00    125.00    140.00    145.00    155.00    160.00    400.00    550.00

                                                                  ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      2.32      6.74     18.02     36.84     63.19     97.09    138.51    186.64    239.00
          OUTFLOW        .00    269.12   1068.97   2844.31   6013.23  10950.85  17990.04  27436.97  40460.54  56669.61
        ELEVATION    1035.00   1038.42   1041.84   1045.26   1048.68   1052.11   1055.53   1058.95   1062.37   1065.79

          STORAGE     295.42    355.91    420.46    489.07    561.75    638.49    719.30    804.17    893.10    986.09
          OUTFLOW   75662.53  97479.02 122180.70 149840.30 180536.80 214353.00 251374.10 291686.90 335378.70 382537.40
        ELEVATION    1069.21   1072.63   1076.05   1079.47   1082.89   1086.32   1089.74   1093.16   1096.58   1100.00


*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN    40461. TO   382537.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

     ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION    Rch-3

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                    6-HR       24-HR       72-HR     24.92-HR
+  (CFS)       (HR)
```

```
                          (CFS)
+    1723.     12.75                536.        170.        164.        164.
                        (INCHES)   1.635       2.074       2.075       2.075
                         (AC-FT)    266.        338.        338.        338.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     24.92-HR
+  (AC-FT)      (HR)
       11.     12.67                  4.          1.          1.          1.

  PEAK STAGE    TIME                        MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     24.92-HR
+   (FEET)      (HR)
   1043.10     12.75             1039.19     1036.51     1036.45     1036.45

                        CUMULATIVE AREA =    3.05 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
  93 KK    *     Run-E  *       Boothe Run Watershed
           *            *
           **************
                                Area E Watershed

             SUBBASIN RUNOFF DATA

  95 BA          SUBBASIN CHARACTERISTICS
                      TAREA        1.56  SUBBASIN AREA

               PRECIPITATION DATA

  11 PB               STORM        5.20  BASIN TOTAL PRECIPITATION

  13 PI            INCREMENTAL PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .01       .01
                      .01       .01       .01       .01       .01       .01       .01       .02       .02       .04
                      .05       .07       .10       .10       .01       .02       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00

 96 LS        SCS LOSS RATE
                STRTL        .86  INITIAL ABSTRACTION
               CRVNBR      70.00  CURVE NUMBER
                RTIMP        .00  PERCENT IMPERVIOUS AREA

 97 UD        SCS DIMENSIONLESS UNITGRAPH
                TLAG        .50  LAG

                                                  ***

                                              UNIT HYDROGRAPH
                                          32 END-OF-PERIOD ORDINATES
          94.     277.     568.     953.    1247.    1381.    1381.    1264.    1103.     882.
         651.     504.     390.     311.     243.     187.     146.     114.      88.      69.
          53.      42.      33.      25.      20.      15.      13.      10.       8.       5.
           3.       1.

    ***          ***          ***          ***          ***

                  HYDROGRAPH AT STATION    Run-E

   TOTAL RAINFALL =    5.20, TOTAL LOSS =    3.01, TOTAL EXCESS =    2.19

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                         (CFS)
+    1301.     12.42                298.         92.         88.         88.
                        (INCHES)    1.774       2.184       2.184       2.184
                         (AC-FT)    148.        182.        182.        182.

                        CUMULATIVE AREA =    1.56 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
 98 KK     *     Add-4  *
           *            *
           **************
                      Combine Hydrographs

100 HC        HYDROGRAPH COMBINATION
                ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                  ***

    ***          ***          ***          ***          ***

                  HYDROGRAPH AT STATION    Add-4

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
   (CFS)        (HR)
                         (CFS)
+    2821.     12.58                832.        262.        252.        252.
                        (INCHES)    1.678       2.111       2.112       2.112
                         (AC-FT)    413.        519.        519.        519.
```

```
                    CUMULATIVE AREA =    4.61 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 101 KK   *    Rch-4   *
          *            *
          **************
                              Cross Section 4

             HYDROGRAPH ROUTING DATA

 103 RS        STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC        .00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

 104 RC        NORMAL DEPTH CHANNEL
                       ANL       .080  LEFT OVERBANK N-VALUE
                      ANCH       .040  MAIN CHANNEL N-VALUE
                       ANR       .080  RIGHT OVERBANK N-VALUE
                     RLNTH      2200.  REACH LENGTH
                       SEL      .0070  ENERGY SLOPE
                     ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                     CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 106 RY       ELEVATION   1100.00   1040.00   1025.00   1020.00   1020.00   1025.00   1040.00   1060.00
 105 RX       DISTANCE        .00    150.00    190.00    195.00    205.00    210.00    425.00    600.00

                                                   ***

                                     COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      3.02     12.27     36.50     75.95    130.47    196.50    272.61    358.79    455.05
          OUTFLOW        .00    364.34   1686.13   5034.88  11380.81  21712.07  36827.73  56448.41  80889.36 110474.60
        ELEVATION    1020.00   1024.21   1028.42   1032.63   1036.84   1041.05   1045.26   1049.47   1053.68   1057.90

          STORAGE     560.40    668.97    779.77    892.81   1008.10   1125.62   1245.37   1367.37   1491.61   1618.08
          OUTFLOW  148267.80 194409.70 246010.10 302934.80 365082.40 432375.40 504753.90 582172.40 664596.10 751999.60
        ELEVATION    1062.11   1066.32   1070.53   1074.74   1078.95   1083.16   1087.37   1091.58   1095.79   1100.00


*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN    80889. TO   752000.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

      ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION    Rch-4

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                            (CFS)
+    2767.     12.67                 831.        261.        252.        252.
                         (INCHES)   1.676       2.109       2.109       2.109
                          (AC-FT)   412.        519.        519.        519.
```

PEAK STORAGE (AC-FT)	TIME (HR)	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	24.92-HR
20.	12.67	6.	2.	2.	2.

PEAK STAGE (FEET)	TIME (HR)	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	24.92-HR
1029.78	12.67	1025.28	1021.94	1021.87	1021.87

CUMULATIVE AREA = 4.61 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	Run-A	1259.	12.17	189.	59.	56.	.71		
ROUTED TO	Rte-A	1245.	12.17	188.	57.	55.	.71	1161.87	12.17
ROUTED TO	Rte-B	228.	12.92	97.	34.	32.	.71	1158.18	12.92
HYDROGRAPH AT	Run-B	110.	12.08	13.	4.	4.	.07		
2 COMBINED AT	Add-1	240.	12.92	106.	38.	36.	.78		
ROUTED TO	Rte-C	240.	12.92	106.	38.	36.	.78	1129.25	12.92
HYDROGRAPH AT	Run-C	587.	12.33	126.	39.	37.	.66		
2 COMBINED AT	Add-2	652.	12.33	232.	76.	74.	1.44		
ROUTED TO	Rch-1	615.	12.50	232.	76.	73.	1.44	1099.26	12.50
HYDROGRAPH AT	Run-D	1189.	12.50	306.	94.	91.	1.61		
2 COMBINED AT	Add-3	1804.	12.50	538.	171.	164.	3.05		
ROUTED TO	Rch-2	1749.	12.67	537.	170.	164.	3.05	1062.26	12.67
ROUTED TO	Rch-3	1723.	12.75	536.	170.	164.	3.05	1043.10	12.75

```
        HYDROGRAPH AT
+                       Run-E     1301.   12.42       298.       92.       88.      1.56
        2 COMBINED AT
+                       Add-4     2821.   12.58       832.      262.      252.      4.61
        ROUTED TO
+                       Rch-4     2767.   12.67       831.      261.      252.      4.61
+                                                                                 1029.78      12.67


 *** NORMAL END OF HEC-1 ***
```

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
              JUN   1998               *
           VERSION 4.1                 *
*                                      *
*  RUN DATE   18NOV01  TIME  09:33:18  *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
```

```
X     X  XXXXXXX   XXXXX          X
X     X  X       X     X        XX
X     X  X       X               X
XXXXXXX  XXXX    X       XXXXX   X
X     X  X       X               X
X     X  X       X     X         X
X     X  XXXXXXX   XXXXX        XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1 HEC-1 INPUT PAGE 1

```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1           ID        Consol Bailey Mine New Coal Refuse Disposal Area
  2           ID        Sedimentation Pond
  3           ID        100 Year Storm W/ Dam Break
  4           ID        Filename: SP-B.HC1
  5           ID        Calcs By:  GAH   11/18/01
  6           IT       5       0       0     300
  7           IO       3       0
              * ***********************************************

  8           KK   Run-A  Sediment Pond Watershed
  9           KM          Runoff into Sed Pond
 10           BA   0.711
 11           PB     5.2
              *  SCS, Type III 24-hour storm distribution
 12           IN      12       0       0
 13           PC    .000    .002    .004    .006    .008    .010    .013    .015    .017    .020
 14           PC    .022    .024    .027    .029    .032    .034    .037    .040    .042    .045
 15           PC    .048    .051    .054    .057    .060    .063    .066    .070    .073    .076
 16           PC    .080    .084    .087    .091    .095    .099    .103    .107    .111    .116
 17           PC    .120    .125    .130    .135    .141    .147    .153    .160    .166    .173
 18           PC    .181    .190    .199    .209    .221    .235    .251    .270    .307    .431
 19           PC    .663    .699    .725    .743    .759    .772    .784    .794    .804    .812
 20           PC    .820    .827    .834    .841    .847    .854    .859    .865    .870    .875
 21           PC    .880    .884    .889    .893    .898    .902    .906    .910    .914    .917
 22           PC    .921    .924    .928    .931    .935    .938    .941    .944    .947    .949
 23           PC    .952    .955    .957    .960    .962    .965    .967    .970    .972    .975
 24           PC    .977    .979    .982    .984    .986    .989    .992    .994    .997   1.000
 25           LS       0      80
```

```
26          UD    0.25
            * ***********************************************

27          KK   Rte-A  Sediment Pond - 1
28          KM          Route Flow through Upper Chamber of Sediment Pond
29          RS       1    ELEV  1149.0
30          SV     0.0    0.66    1.71    3.17    3.75    4.39    5.08    5.82    6.62    7.48
31          SV    8.39    9.36   10.40   11.49   12.65   13.87   15.16
32          SQ     0.0     0.0     0.0     0.0     0.8     1.9     3.3     4.8     6.6     8.5
33          SQ    64.2   151.7   189.9   331.5   531.0   848.6  1301.6
34          SE    1140    1143    1146    1149    1150    1151    1152    1153    1154    1155
35          SE    1156    1157    1158    1159    1160    1161    1162
            * ***********************************************

36          KK   Rte-B  Sediment Pond - 2
37          KM          Route Flow through Lower Chamber of Sediment Pond
38          KM          Breach Dam @ Elev 1158.1
39          RS       1    ELEV  1141.5
40          SV     0.0   10.64   13.15   18.50   24.28   30.51   37.19   44.34   51.97   55.98
41          SV   60.11   64.37   66.55   68.76   73.28   77.94
42          SQ     0.0     0.0     0.6     2.8     5.9     9.8    14.2    19.2    24.7    27.6
43          SQ    30.6    86.7   132.6   197.3   367.6   578.2
44          SE    1134    1141    1142    1144    1146    1148    1150    1152    1154    1155
45          SE    1156    1157  1157.5    1158    1159    1160
46          ST    1162     320     3.0     1.5
47          SB    1134      85       1      .5  1158.1
            * ***********************************************
1                                   HEC-1 INPUT                                          PAGE  2

LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


48          KK   Run-B  Railroad Embankment Watershed
49          KM          Runoff downstream of Sed Pond
50          BA   0.070
51          LS       0      70
52          UD    0.15
            * ***********************************************

53          KK   Add-1  Add Sediment Pond Outlet and Railraod Embankment Flows
54          KM    Combine Hydrographs
55          HC       2
            * ***********************************************

56          KK   Rte-C  Railroad
57          KM          Route Flows through Railroad Embankment
58          RS       1    ELEV  1124.0
59          SV     0.0     0.2     1.0     2.8     5.5     9.2    14.1    20.5    23.4    40.0
60          SQ     0.0   274.7   608.8   839.2  1018.5  1170.7  1305.4  1427.5  1473.2  1539.6
61          SE  1124.0    1130    1135    1140    1145    1150    1155    1160    1162    1165
            * ***********************************************

62          KK   Run-C  Upper Watershed of Unnamed Trib to Enlow Fork
63          KM          Area C Watershed
64          BA    0.66
65          LS       0      70
66          UD    0.45
            * ***********************************************

67          KK   Add-2
68          KM    Combine Hydrographs
69          HC       2
            * ***********************************************

70          KK   Rch-1
71          KM          Cross Section 1
```

```
 72          RS       1    ELEV
 73          RC     .08     .04     .08    1900    .006
 74          RX       0     150     190     195     205     210     300     350
 75          RY    1140    1100    1099    1094    1094    1099    1100    1140
             * ***********************************************

 76          KK   Run-D  Unnamed Trib to Enlow Fork
 77          KM          Area D Watershed
 78          BA    1.61
 79          LS       0      70
 80          UD     0.6
             * ***********************************************

 81          KK   Add-3
 82          KM    Combine Hydrographs
 83          HC       2
             * ***********************************************
1                                   HEC-1 INPUT                                    PAGE  3

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 84          KK   Rch-2
 85          KM          Cross Section 2
 86          RS       1    ELEV
 87          RC     .08     .04     .08    2500    .007
 88          RX       0      50     115     120     130     135     400     500
 89          RY    1120    1080    1059    1054    1054    1059    1080    1120
             * ***********************************************

 90          KK   Rch-3
 91          KM          Cross Section 3
 92          RS       1    ELEV
 93          RC     .08     .04     .08    2200    .008
 94          RX       0     125     140     145     155     160     400     550
 95          RY    1100    1060    1040    1035    1035    1040    1060    1100
             * ***********************************************

 96          KK   Run-E  Boothe Run Watershed
 97          KM          Area E Watershed
 98          BA    1.56
 99          LS       0      70
100          UD     0.5
             * ***********************************************

101          KK   Add-4
102          KM    Combine Hydrographs
103          HC       2
             * ***********************************************

104          KK   Rch-4
105          KM          Cross Section 4
106          RS       1    ELEV
107          RC     .08     .04     .08    2200    .007
108          RX       0     150     190     195     205     210     425     600
109          RY    1100    1040    1025    1020    1020    1025    1040    1060
             * ***********************************************
110          ZZ
1*****************************************                    *****************************************
*                                         *                    *                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)     *                    *   U.S. ARMY CORPS OF ENGINEERS        *
*              JUN   1998                 *                    *   HYDROLOGIC ENGINEERING CENTER       *
            VERSION 4.1                   *                    *         609 SECOND STREET             *
*                                         *                    *      DAVIS, CALIFORNIA 95616          *
*  RUN DATE   18NOV01  TIME  09:33:18     *                    *         (916) 756-1104                *
*                                         *                    *                                       *
```

```
****************************************                                    ****************************************

                              Consol Bailey Mine New Coal Refuse Disposal Area
                              Sedimentation Pond
                              100 Year Storm W/ Dam Break
                              Filename: SP-B.HC1
                              Calcs By:  GAH   11/18/01

  7 IO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN           5  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2    0  ENDING DATE
                     NDTIME        0055  ENDING TIME
                     ICENT          19  CENTURY MARK

                 COMPUTATION INTERVAL     .08 HOURS
                      TOTAL TIME BASE   24.92 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
  8 KK    *     Run-A  *       Sediment Pond Watershed
          *            *
          **************
                              Runoff into Sed Pond

 12 IN          TIME DATA FOR INPUT TIME SERIES
                      JXMIN          12  TIME INTERVAL IN MINUTES
                     JXDATE      1    0  STARTING DATE
                     JXTIME           0  STARTING TIME

            SUBBASIN RUNOFF DATA

 10 BA          SUBBASIN CHARACTERISTICS
                      TAREA         .71  SUBBASIN AREA

              PRECIPITATION DATA

 11 PB                STORM        5.20  BASIN TOTAL PRECIPITATION

 13 PI            INCREMENTAL PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .01    .01
.01    .01    .01    .01    .01    .01    .01    .02    .02    .04
.05    .07    .10    .10    .01    .02    .01    .01    .01    .01
.01    .01    .01    .01    .01    .01    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00    .00    .00    .00    .00
.00    .00    .00    .00    .00    .00
```

```
25 LS        SCS LOSS RATE
                 STRTL        .50  INITIAL ABSTRACTION
                CRVNBR      80.00  CURVE NUMBER
                 RTIMP        .00  PERCENT IMPERVIOUS AREA

26 UD        SCS DIMENSIONLESS UNITGRAPH
                 TLAG        .25  LAG

                                        ***

                                   UNIT HYDROGRAPH
                              17 END-OF-PERIOD ORDINATES
        209.    714.   1137.   1137.    886.    530.    330.    214.    133.     83.
         52.     33.     21.     13.      9.      5.      2.

   ***         ***         ***         ***         ***

                 HYDROGRAPH AT STATION    Run-A

   TOTAL RAINFALL =   5.20, TOTAL LOSS =   2.13, TOTAL EXCESS =   3.07

  PEAK FLOW    TIME                    MAXIMUM AVERAGE FLOW
                                 6-HR      24-HR      72-HR    24.92-HR
+   (CFS)      (HR)
                        (CFS)
+   1259.     12.17                189.       59.       56.       56.
                      (INCHES)   2.472    3.068     3.068     3.068
                       (AC-FT)     94.      116.      116.      116.

                 CUMULATIVE AREA =    .71 SQ MI

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
```

```
              **************
              *            *
   27 KK      *    Rte-A   *      Sediment Pond - 1
              *            *
              **************
                                  Route Flow through Upper Chamber of Sediment Pond

                 HYDROGRAPH ROUTING DATA

   29 RS            STORAGE ROUTING
                          NSTPS          1  NUMBER OF SUBREACHES
                           ITYP       ELEV  TYPE OF INITIAL CONDITION
                          RSVRIC    1149.00  INITIAL CONDITION
                              X        .00 WORKING R AND D COEFFICIENT

   30 SV            STORAGE        .0      .7     1.7     3.2     3.8     4.4     5.1     5.8     6.6     7.5
                                  8.4     9.4    10.4    11.5    12.6    13.9    15.2

   32 SQ           DISCHARGE       0.      0.      0.      0.      1.      2.      3.      5.      7.      9.
                                  64.    152.    190.    332.    531.    849.   1302.

   34 SE           ELEVATION    1140.00 1143.00 1146.00 1149.00 1150.00 1151.00 1152.00 1153.00 1154.00 1155.00
                                1156.00 1157.00 1158.00 1159.00 1160.00 1161.00 1162.00

                                                                  ***

 *** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN      849. TO     1302.
                 THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                 THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

      ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION    Rte-A

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                          (CFS)
+    1245.     12.17                 188.        57.         55.         55.
                        (INCHES)    2.461       2.962       2.962       2.962
                         (AC-FT)     93.        112.        112.        112.

 PEAK STORAGE   TIME                       MAXIMUM AVERAGE STORAGE
                                      6-HR       24-HR       72-HR     24.92-HR
+  (AC-FT)      (HR)
      15.      12.17                   9.          6.          6.          6.

  PEAK STAGE    TIME                        MAXIMUM AVERAGE STAGE
                                      6-HR       24-HR       72-HR     24.92-HR
+   (FEET)      (HR)
   1161.87     12.17               1156.94     1153.34     1153.18     1153.18

                        CUMULATIVE AREA =     .71 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


              **************
              *            *
   36 KK      *    Rte-B   *      Sediment Pond - 2
              *            *
              **************
                                  Route Flow through Lower Chamber of Sediment Pond
```

Breach Dam @ Elev 1158.1

HYDROGRAPH ROUTING DATA

```
39 RS        STORAGE ROUTING
                  NSTPS          1  NUMBER OF SUBREACHES
                   ITYP       ELEV  TYPE OF INITIAL CONDITION
                 RSVRIC    1141.50  INITIAL CONDITION
                      X        .00 WORKING R AND D COEFFICIENT

40 SV          STORAGE        .0      10.6      13.1      18.5      24.3      30.5      37.2      44.3      52.0      56.0
                             60.1      64.4      66.6      68.8      73.3      77.9

42 SQ        DISCHARGE        0.        0.        1.        3.        6.       10.       14.       19.       25.       28.
                             31.       87.      133.      197.      368.      578.

44 SE        ELEVATION    1134.00   1141.00   1142.00   1144.00   1146.00   1148.00   1150.00   1152.00   1154.00   1155.00
                          1156.00   1157.00   1157.50   1158.00   1159.00   1160.00

46 ST        TOP OF DAM
                  TOPEL    1162.00  ELEVATION AT TOP OF DAM
                 DAMWID     320.00  DAM WIDTH
                   COQD       3.00  WEIR COEFFICIENT
                   EXPD       1.50  EXPONENT OF HEAD

47 SB        BREACH DATA
                   ELBM    1134.00  ELEVATION AT BOTTOM OF BREACH
                  BRWID      85.00  WIDTH OF BREACH BOTTOM
                      Z       1.00  BREACH SIDE SLOPE
                  TFAIL        .50  TIME FOR BREACH TO DEVELOP
                 FAILEL    1158.10  W.S. ELEVATION TO TRIGGER FAILURE

                                                   ***

BEGIN DAM FAILURE AT 12.83 HOURS

     ***          ***          ***          ***          ***

                    HYDROGRAPH AT STATION    Rte-B

PEAK OUTFLOW IS     3043. AT TIME  13.16 HOURS


 PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)      (HR)
                          (CFS)
+    3033.     13.17                222.         63.         61.         61.
                        (INCHES)   2.898      3.302       3.303       3.303
                        (AC-FT)    110.        125.        125.        125.

 PEAK STORAGE  TIME                       MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     24.92-HR
+  (AC-FT)     (HR)
      70.      12.91                 21.          9.          9.          9.

 PEAK STAGE    TIME                        MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     24.92-HR
+   (FEET)     (HR)
   1158.17     12.91              1144.29     1138.99     1138.81     1138.81

                        CUMULATIVE AREA =     .71 SQ MI
```

*** ***

```
          **************
          *            *
48 KK     *     Run-B  *       Railroad Embankment Watershed
          *            *
          **************
                              Runoff downstream of Sed Pond

             SUBBASIN RUNOFF DATA

50 BA          SUBBASIN CHARACTERISTICS
                    TAREA          .07  SUBBASIN AREA

               PRECIPITATION DATA

11 PB               STORM        5.20  BASIN TOTAL PRECIPITATION

13 PI            INCREMENTAL PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .01       .01
                    .01       .01       .01       .01       .01       .01       .01       .02       .02       .04
                    .05       .07       .10       .10       .01       .02       .01       .01       .01       .01
                    .01       .01       .01       .01       .01       .01       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00

51 LS          SCS LOSS RATE
                    STRTL          .86  INITIAL ABSTRACTION
                   CRVNBR        70.00  CURVE NUMBER
                    RTIMP          .00  PERCENT IMPERVIOUS AREA

52 UD          SCS DIMENSIONLESS UNITGRAPH
                    TLAG          .15  LAG

                                                  ***

                                              UNIT HYDROGRAPH
                                          11 END-OF-PERIOD ORDINATES
             65.      173.      152.      77.       39.       19.       9.        5.        2.        1.
              0.

   ***          ***          ***          ***          ***
```

```
                    HYDROGRAPH AT STATION    Run-B

   TOTAL RAINFALL =    5.20, TOTAL LOSS =    3.01, TOTAL EXCESS =    2.19

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                          (CFS)
+     110.     12.08                 13.         4.          4.          4.
                        (INCHES)    1.781       2.186       2.186       2.186
                         (AC-FT)      7.         8.          8.          8.

                        CUMULATIVE AREA =     .07 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
   53 KK    *    Add-1   *      Add Sediment Pond Outlet and Railraod Embankment Flows
            *            *
            **************
                             Combine Hydrographs

   55 HC          HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                ***

      ***             ***             ***             ***             ***

                    HYDROGRAPH AT STATION    Add-1

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                          (CFS)
+    3044.     13.17                232.        67.         65.         65.
                        (INCHES)    2.760       3.202       3.203       3.203
                         (AC-FT)    115.        133.        133.        133.

                        CUMULATIVE AREA =     .78 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
   56 KK    *    Rte-C   *      Railroad
            *            *
            **************
                               Route Flows through Railroad Embankment

              HYDROGRAPH ROUTING DATA

   58 RS          STORAGE ROUTING
                        NSTPS           1  NUMBER OF SUBREACHES
                         ITYP        ELEV  TYPE OF INITIAL CONDITION
                       RSVRIC     1124.00  INITIAL CONDITION
```

```
                    X        .00 WORKING R AND D COEFFICIENT

 59 SV        STORAGE        .0       .2      1.0      2.8      5.5      9.2     14.1     20.5     23.4     40.0

 60 SQ       DISCHARGE       0.      275.     609.     839.    1019.    1171.    1305.    1428.    1473.    1540.

 61 SE       ELEVATION    1124.00  1130.00  1135.00  1140.00  1145.00  1150.00  1155.00  1160.00  1162.00  1165.00

                                                        ***

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN       0. TO      609.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

     ***          ***          ***          ***          ***

                    HYDROGRAPH AT STATION    Rte-C

 PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                                   6-HR       24-HR      72-HR     24.92-HR
+   (CFS)      (HR)
                          (CFS)
+    1509.    13.33          232.        67.        65.        65.
                       (INCHES)   2.763      3.205      3.206      3.206
                        (AC-FT)   115.       134.       134.       134.

 PEAK STORAGE   TIME                     MAXIMUM AVERAGE STORAGE
                                   6-HR       24-HR      72-HR     24.92-HR
+  (AC-FT)     (HR)
      32.     13.33            2.          1.         1.         1.

 PEAK STAGE    TIME                      MAXIMUM AVERAGE STAGE
                                   6-HR       24-HR      72-HR     24.92-HR
+   (FEET)     (HR)
   1163.60    13.33         1129.41    1125.56    1125.50    1125.50

                       CUMULATIVE AREA =     .78 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 62 KK    *     Run-C  *       Upper Watershed of Unnamed Trib to Enlow Fork
          *            *
          **************
                              Area C Watershed

            SUBBASIN RUNOFF DATA

 64 BA        SUBBASIN CHARACTERISTICS
                    TAREA         .66  SUBBASIN AREA

              PRECIPITATION DATA

 11 PB              STORM        5.20  BASIN TOTAL PRECIPITATION

 13 PI          INCREMENTAL PRECIPITATION PATTERN
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                    .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.01	.01
.01	.01	.01	.01	.01	.01	.01	.02	.02	.04
.05	.07	.10	.10	.01	.02	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00				

```
65 LS          SCS LOSS RATE
                    STRTL        .86  INITIAL ABSTRACTION
                   CRVNBR      70.00  CURVE NUMBER
                    RTIMP        .00  PERCENT IMPERVIOUS AREA

66 UD          SCS DIMENSIONLESS UNITGRAPH
                     TLAG        .45  LAG

                                          ***

                                      UNIT HYDROGRAPH
                                 29 END-OF-PERIOD ORDINATES
          51.     154.     316.     509.     622.     648.     609.     529.     422.     302.
         228.     174.     134.     101.      77.      59.      44.      33.      25.      19.
          15.      11.       8.       7.       5.       4.       3.       2.       1.

    ***          ***          ***          ***          ***

                    HYDROGRAPH AT STATION    Run-C

   TOTAL RAINFALL =    5.20, TOTAL LOSS =    3.01, TOTAL EXCESS =    2.19

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                         (CFS)
+     587.      12.33                126.         39.         37.         37.
                        (INCHES)    1.775      2.185       2.185       2.185
                         (AC-FT)     62.         77.         77.         77.

                       CUMULATIVE AREA =     .66 SQ MI

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
```

```
              **************
              *            *
   67 KK      *    Add-2   *
              *            *
              **************
                                Combine Hydrographs

   69 HC          HYDROGRAPH COMBINATION
                        ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

       ***             ***             ***             ***             ***

                          HYDROGRAPH AT STATION    Add-2

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                            (CFS)
+    1649.      13.25                358.        106.        102.        102.
                         (INCHES)   2.308       2.738       2.738       2.738
                          (AC-FT)    177.        210.        210.        210.

                         CUMULATIVE AREA =    1.44 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


              **************
              *            *
   70 KK      *    Rch-1   *
              *            *
              **************
                                Cross Section 1

                HYDROGRAPH ROUTING DATA

   72 RS          STORAGE ROUTING
                        NSTPS           1  NUMBER OF SUBREACHES
                         ITYP        ELEV  TYPE OF INITIAL CONDITION
                        RSVRIC         .00  INITIAL CONDITION
                             X         .00 WORKING R AND D COEFFICIENT

   73 RC          NORMAL DEPTH CHANNEL
                           ANL        .080  LEFT OVERBANK N-VALUE
                          ANCH        .040  MAIN CHANNEL N-VALUE
                           ANR        .080  RIGHT OVERBANK N-VALUE
                         RLNTH       1900.  REACH LENGTH
                           SEL       .0060  ENERGY SLOPE
                         ELMAX          .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                        CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
   75 RY        ELEVATION   1140.00   1100.00   1099.00   1094.00   1094.00   1099.00   1100.00   1140.00
   74 RX        DISTANCE        .00    150.00    190.00    195.00    205.00    210.00    300.00    350.00

                                                                  ***

                                        COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

              STORAGE        .00      1.31      3.13     15.42     32.56     50.99     70.69     91.67    113.93    137.47
              OUTFLOW        .00    127.67    434.47   1492.02   3829.45   7168.72  11428.23  16574.38  22593.95  29484.55
```

ELEVATION	1094.00	1096.42	1098.84	1101.26	1103.68	1106.11	1108.53	1110.95	1113.37	1115.79
STORAGE	162.28	188.38	215.75	244.40	274.33	305.54	338.02	371.79	406.83	443.15
OUTFLOW	37250.35	45899.70	55443.88	65896.10	77271.13	89584.71	102853.40	117094.50	132325.50	148564.30
ELEVATION	1118.21	1120.63	1123.05	1125.47	1127.89	1130.32	1132.74	1135.16	1137.58	1140.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 22594. TO 148564.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** *** *** *** ***

HYDROGRAPH AT STATION Rch-1

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1580.	13.42		357.	106.	102.	102.
		(INCHES)	2.305	2.736	2.737	2.737
		(AC-FT)	177.	210.	210.	210.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
16.	13.42	3.	1.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1101.35	13.42	1097.30	1095.14	1095.10	1095.10

CUMULATIVE AREA = 1.44 SQ MI

*** ***

```
              **************
              *            *
76 KK         *    Run-D   *      Unnamed Trib to Enlow Fork
              *            *
              **************
```

Area D Watershed

SUBBASIN RUNOFF DATA

78 BA SUBBASIN CHARACTERISTICS
TAREA 1.61 SUBBASIN AREA

PRECIPITATION DATA

11 PB STORM 5.20 BASIN TOTAL PRECIPITATION

13 PI INCREMENTAL PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.01	.01
.01	.01	.01	.01	.01	.01	.01	.02	.02	.04
.05	.07	.10	.10	.01	.02	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00				

```
79 LS          SCS LOSS RATE
                    STRTL        .86  INITIAL ABSTRACTION
                   CRVNBR      70.00  CURVE NUMBER
                    RTIMP        .00  PERCENT IMPERVIOUS AREA

80 UD          SCS DIMENSIONLESS UNITGRAPH
                     TLAG        .60  LAG

                                                  ***

                                              UNIT HYDROGRAPH
                                          38 END-OF-PERIOD ORDINATES
            62.     187.     361.     615.     896.    1100.    1202.    1208.    1151.    1044.
           911.     740.     572.     460.     371.     305.     248.     201.     162.     130.
           107.      86.      68.      56.      45.      37.      30.      24.      19.      16.
            13.      11.       9.       7.       6.       4.       2.       1.

    ***            ***            ***            ***            ***

                     HYDROGRAPH AT STATION    Run-D

    TOTAL RAINFALL =    5.20, TOTAL LOSS =    3.01, TOTAL EXCESS =    2.19

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                              (CFS)
+    1189.      12.50                  306.         94.         91.         91.
                            (INCHES)  1.770      2.182       2.182       2.182
                             (AC-FT)   152.        187.        187.        187.

                     CUMULATIVE AREA =    1.61 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
81 KK     *    Add-3   *
          *            *
          **************
```

Combine Hydrographs

```
 83 HC          HYDROGRAPH COMBINATION
                     ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                          ***

     ***            ***            ***            ***            ***

                       HYDROGRAPH AT STATION    Add-3

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                          (CFS)
+    1996.     13.42                664.        200.        193.        193.
                        (INCHES)   2.022       2.444       2.444       2.444
                         (AC-FT)    329.        398.        398.        398.

                        CUMULATIVE AREA =    3.05 SQ MI
```

*** ***

```
          **************
          *            *
 84 KK    *     Rch-2  *
          *            *
          **************
                          Cross Section 2

            HYDROGRAPH ROUTING DATA

 86 RS          STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC        .00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

 87 RC          NORMAL DEPTH CHANNEL
                       ANL       .080  LEFT OVERBANK N-VALUE
                      ANCH       .040  MAIN CHANNEL N-VALUE
                       ANR       .080  RIGHT OVERBANK N-VALUE
                     RLNTH      2500.  REACH LENGTH
                       SEL      .0070  ENERGY SLOPE
                     ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                   CROSS-SECTION DATA
                        --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
 89 RY       ELEVATION  1120.00   1080.00   1059.00   1054.00   1054.00   1059.00   1080.00   1120.00
 88 RX       DISTANCE       .00     50.00    115.00    120.00    130.00    135.00    400.00    500.00

                                                          ***

                                   COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      2.69      8.25     23.78     50.19     87.48    135.66    194.71    263.55    335.97
          OUTFLOW        .00    258.61   1044.44   2902.94   6371.54  11913.68  19939.15  30823.98  45949.66  65168.64
        ELEVATION    1054.00   1057.47   1060.95   1064.42   1067.89   1071.37   1074.84   1078.32   1081.79   1085.26

          STORAGE     410.97    488.58    568.78    651.58    736.98    824.97    915.56   1008.75   1104.53   1202.91
          OUTFLOW   87319.84 112314.40 140095.10 170625.80 203885.30 239863.30 278557.70 319972.70 364117.60 411005.80
        ELEVATION    1088.74   1092.21   1095.68   1099.16   1102.63   1106.10   1109.58   1113.05   1116.53   1120.00
```

```
*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN    65169. TO   411006.
                THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
                THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

     ***            ***            ***            ***            ***

                        HYDROGRAPH AT STATION    Rch-2

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR       24-HR       72-HR     24.92-HR
+   (CFS)       (HR)
                          (CFS)
+    1945.     13.50                663.        200.        193.         193.
                        (INCHES)   2.020       2.442       2.442        2.442
                         (AC-FT)    329.        397.        397.         397.

 PEAK STORAGE   TIME                       MAXIMUM AVERAGE STORAGE
                                     6-HR       24-HR       72-HR     24.92-HR
+  (AC-FT)      (HR)
      16.      13.50                  6.          2.          2.           2.

  PEAK STAGE    TIME                        MAXIMUM AVERAGE STAGE
                                     6-HR       24-HR       72-HR     24.92-HR
+   (FEET)      (HR)
   1062.63     13.50             1058.61     1055.62     1055.56      1055.56

                        CUMULATIVE AREA =    3.05 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
  90 KK    *     Rch-3  *
           *            *
           **************
                                Cross Section 3

             HYDROGRAPH ROUTING DATA

  92 RS        STORAGE ROUTING
                     NSTPS          1  NUMBER OF SUBREACHES
                      ITYP       ELEV  TYPE OF INITIAL CONDITION
                    RSVRIC        .00  INITIAL CONDITION
                         X        .00 WORKING R AND D COEFFICIENT

  93 RC        NORMAL DEPTH CHANNEL
                       ANL       .080  LEFT OVERBANK N-VALUE
                      ANCH       .040  MAIN CHANNEL N-VALUE
                       ANR       .080  RIGHT OVERBANK N-VALUE
                     RLNTH      2200.  REACH LENGTH
                       SEL      .0080  ENERGY SLOPE
                     ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                     CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
  95 RY       ELEVATION   1100.00   1060.00   1040.00   1035.00   1035.00   1040.00   1060.00   1100.00
  94 RX       DISTANCE        .00    125.00    140.00    145.00    155.00    160.00    400.00    550.00

                                                                                  ***
```

COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

STORAGE	.00	2.32	6.74	18.02	36.84	63.19	97.09	138.51	186.64	239.00
OUTFLOW	.00	269.12	1068.97	2844.31	6013.23	10950.85	17990.04	27436.97	40460.54	56669.61
ELEVATION	1035.00	1038.42	1041.84	1045.26	1048.68	1052.11	1055.53	1058.95	1062.37	1065.79
STORAGE	295.42	355.91	420.46	489.07	561.75	638.49	719.30	804.17	893.10	986.09
OUTFLOW	75662.53	97479.02	122180.70	149840.30	180536.80	214353.00	251374.10	291686.90	335378.70	382537.40
ELEVATION	1069.21	1072.63	1076.05	1079.47	1082.89	1086.32	1089.74	1093.16	1096.58	1100.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 40461. TO 382537.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** *** *** *** ***

HYDROGRAPH AT STATION Rch-3

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 1918.	13.58		662.	200.	193.	193.
		(INCHES)	2.018	2.440	2.440	2.440
		(AC-FT)	328.	397.	397.	397.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
12.	13.58	5.	1.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1043.48	13.58	1039.49	1036.56	1036.50	1036.50

CUMULATIVE AREA = 3.05 SQ MI

*** ***

```
              **************
              *            *
  96 KK       *    Run-E   *      Boothe Run Watershed
              *            *
              **************
```

Area E Watershed

SUBBASIN RUNOFF DATA

98 BA SUBBASIN CHARACTERISTICS
TAREA 1.56 SUBBASIN AREA

PRECIPITATION DATA

11 PB STORM 5.20 BASIN TOTAL PRECIPITATION

13 PI INCREMENTAL PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.01	.01
.01	.01	.01	.01	.01	.01	.01	.02	.02	.04
.05	.07	.10	.10	.01	.02	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00				

```
 99 LS          SCS LOSS RATE
                     STRTL        .86  INITIAL ABSTRACTION
                    CRVNBR      70.00  CURVE NUMBER
                     RTIMP        .00  PERCENT IMPERVIOUS AREA

100 UD          SCS DIMENSIONLESS UNITGRAPH
                      TLAG        .50  LAG

                                                  ***

                                              UNIT HYDROGRAPH
                                          32 END-OF-PERIOD ORDINATES
             94.     277.     568.     953.    1247.    1381.    1381.    1264.    1103.     882.
            651.     504.     390.     311.     243.     187.     146.     114.      88.      69.
             53.      42.      33.      25.      20.      15.      13.      10.       8.       5.
              3.       1.

    ***          ***          ***          ***          ***

                     HYDROGRAPH AT STATION    Run-E

   TOTAL RAINFALL =    5.20, TOTAL LOSS =    3.01, TOTAL EXCESS =    2.19

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                      6-HR       24-HR       72-HR     24.92-HR
+   (CFS)      (HR)
                          (CFS)
+    1301.     12.42                 298.         92.         88.         88.
                         (INCHES)   1.774      2.184       2.184       2.184
                         (AC-FT)    148.        182.        182.        182.

                     CUMULATIVE AREA =    1.56 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
```

```
            *            *
101 KK      *     Add-4  *
            *            *
            **************
                          Combine Hydrographs

103 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                  ***

     ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION    Add-4

PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                   6-HR       24-HR       72-HR     24.92-HR
+   (CFS)     (HR)
                          (CFS)
+   2821.     12.58                958.        292.        281.        281.
                        (INCHES)   1.932       2.353       2.353       2.353
                         (AC-FT)   475.        579.        579.        579.

                        CUMULATIVE AREA =    4.61 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
104 KK      *     Rch-4  *
            *            *
            **************
                                Cross Section 4

              HYDROGRAPH ROUTING DATA

106 RS          STORAGE ROUTING
                      NSTPS           1  NUMBER OF SUBREACHES
                       ITYP        ELEV  TYPE OF INITIAL CONDITION
                      RSVRIC        .00  INITIAL CONDITION
                           X        .00 WORKING R AND D COEFFICIENT

107 RC          NORMAL DEPTH CHANNEL
                        ANL       .080  LEFT OVERBANK N-VALUE
                       ANCH       .040  MAIN CHANNEL N-VALUE
                        ANR       .080  RIGHT OVERBANK N-VALUE
                      RLNTH      2200.  REACH LENGTH
                        SEL      .0070  ENERGY SLOPE
                      ELMAX         .0  MAX. ELEV. FOR STORAGE/OUTFLOW CALCULATION

                                          CROSS-SECTION DATA
                          --- LEFT OVERBANK --- + ------ MAIN CHANNEL ------- + --- RIGHT OVERBANK ---
109 RY        ELEVATION   1100.00   1040.00   1025.00   1020.00   1020.00   1025.00   1040.00   1060.00
108 RX        DISTANCE        .00    150.00    190.00    195.00    205.00    210.00    425.00    600.00

                                                                  ***

                                          COMPUTED STORAGE-OUTFLOW-ELEVATION DATA

          STORAGE        .00      3.02     12.27     36.50     75.95    130.47    196.50    272.61    358.79    455.05
          OUTFLOW        .00    364.34   1686.13   5034.88  11380.81  21712.07  36827.73  56448.41  80889.36 110474.60
        ELEVATION    1020.00   1024.21   1028.42   1032.63   1036.84   1041.05   1045.26   1049.47   1053.68   1057.90
```

STORAGE	560.40	668.97	779.77	892.81	1008.10	1125.62	1245.37	1367.37	1491.61	1618.08
OUTFLOW	148267.80	194409.70	246010.10	302934.80	365082.40	432375.40	504753.90	582172.40	664596.10	751999.60
ELEVATION	1062.11	1066.32	1070.53	1074.74	1078.95	1083.16	1087.37	1091.58	1095.79	1100.00

*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY UNSTABLE FOR OUTFLOWS BETWEEN 80889. TO 752000.
THE ROUTED HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS GREATER THAN PEAK INFLOWS.
THIS CAN BE CORRECTED BY DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A LONGER REACH.)

*** *** *** *** ***

HYDROGRAPH AT STATION Rch-4

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.92-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2767.	12.67		957.	292.	281.	281.
		(INCHES)	1.931	2.351	2.351	2.351
		(AC-FT)	475.	578.	578.	578.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	24.92-HR
+ (AC-FT)	(HR)				
20.	12.67	7.	2.	2.	2.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	24.92-HR
+ (FEET)	(HR)				
1029.78	12.67	1025.56	1021.99	1021.92	1021.92

CUMULATIVE AREA = 4.61 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	Run-A	1259.	12.17	189.	59.	56.	.71		
+	ROUTED TO	Rte-A	1245.	12.17	188.	57.	55.	.71		
+									1161.87	12.17
+	ROUTED TO	Rte-B	3033.	13.17	222.	63.	61.	.71		
+									1158.17	12.91
+	HYDROGRAPH AT	Run-B	110.	12.08	13.	4.	4.	.07		
+	2 COMBINED AT	Add-1	3044.	13.17	232.	67.	65.	.78		
+	ROUTED TO	Rte-C	1509.	13.33	232.	67.	65.	.78		
+									1163.60	13.33
+	HYDROGRAPH AT	Run-C	587.	12.33	126.	39.	37.	.66		

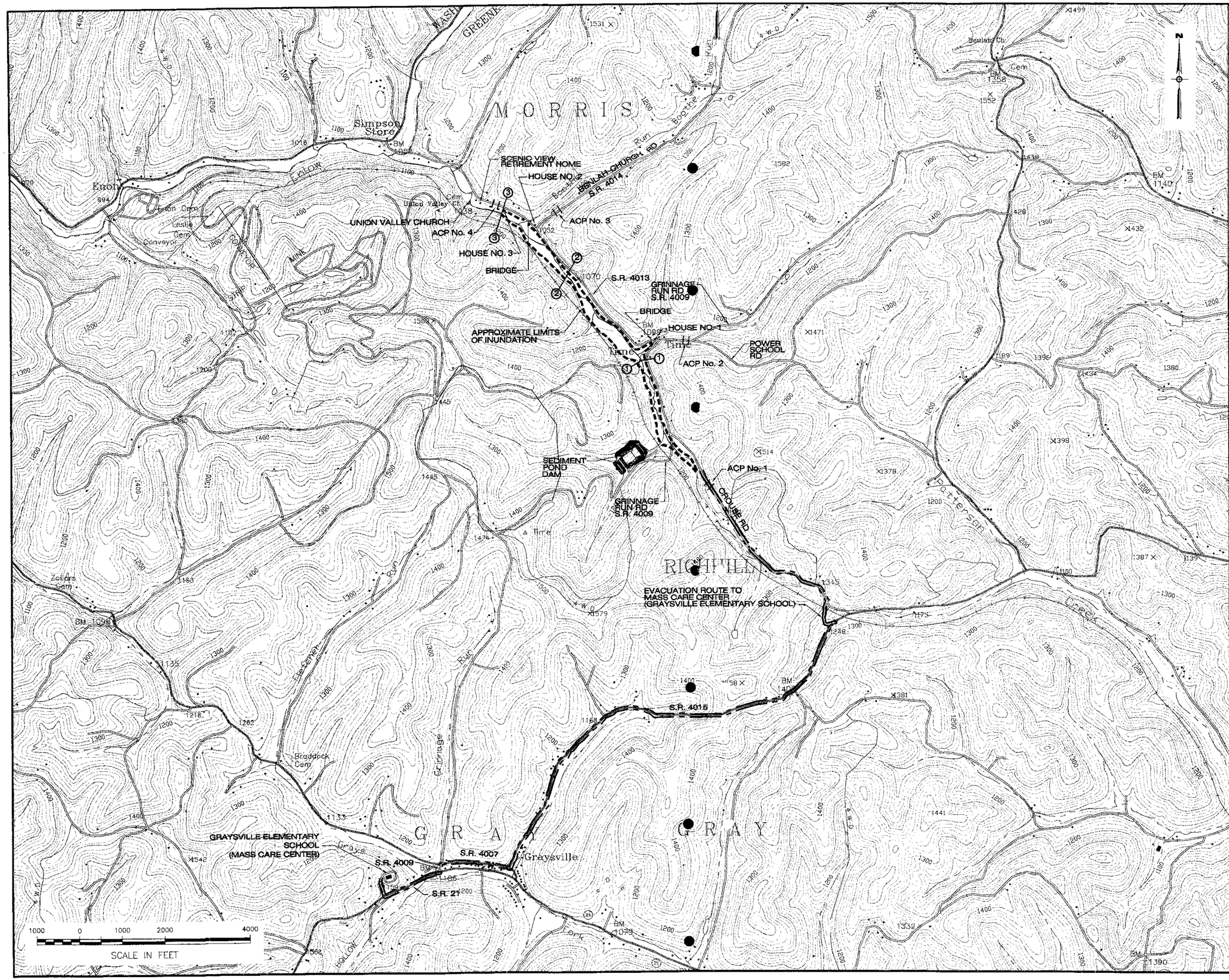
```
        2 COMBINED AT
+                       Add-2    1649.  13.25     358.     106.     102.    1.44
        ROUTED TO
+                       Rch-1    1580.  13.42     357.     106.     102.    1.44
+                                                                          1101.35     13.42
        HYDROGRAPH AT
+                       Run-D    1189.  12.50     306.      94.      91.    1.61
        2 COMBINED AT
+                       Add-3    1996.  13.42     664.     200.     193.    3.05
        ROUTED TO
+                       Rch-2    1945.  13.50     663.     200.     193.    3.05
+                                                                          1062.63     13.50
        ROUTED TO
+                       Rch-3    1918.  13.58     662.     200.     193.    3.05
+                                                                          1043.48     13.58
        HYDROGRAPH AT
+                       Run-E    1301.  12.42     298.      92.      88.    1.56
        2 COMBINED AT
+                       Add-4    2821.  12.58     958.     292.     281.    4.61
        ROUTED TO
+                       Rch-4    2767.  12.67     957.     292.     281.    4.61
+                                                                          1029.78     12.67
1                   SUMMARY OF DAM OVERTOPPING/BREACH ANALYSIS FOR STATION    Rte-B
                 (PEAKS SHOWN ARE FOR INTERNAL TIME STEP USED  DURING BREACH FORMATION)


PLAN  1 ...............                INITIAL VALUE     SPILLWAY CREST     TOP OF DAM
                            ELEVATION       1141.50           1162.00          1162.00
                            STORAGE              12.              87.             87.
                            OUTFLOW               0.             999.            999.


              RATIO     MAXIMUM     MAXIMUM    MAXIMUM    MAXIMUM    DURATION    TIME OF     TIME OF
               OF       RESERVOIR   DEPTH      STORAGE    OUTFLOW    OVER TOP    MAX OUTFLOW FAILURE
              PMF       W.S.ELEV    OVER DAM   AC-FT      CFS        HOURS       HOURS       HOURS

              1.00      1158.17       .00        70.      3043.        .00        13.16       12.83


*** NORMAL END OF HEC-1 ***
```



LEGEND

ACP - ACCESS CONTROL POINTS
TCP - TRAFFIC CONTROL POINTS
S.R. - STATE ROUTE NUMBERS
(2) - TIME/CROSS SECTION LINES
- EMERGENCY EVACUATION ROUTE
- APPROXIMATE LIMITS OF INUNDATION

REFERENCE

1. USGS TOPOGRAPHIC MAP, 7.5 MINUTE SERIES WIND RIDGE, PA QUADRANGLES DATED 1964, PHOTO REVISED 1994
2. PENNDOT GENERAL HIGHWAY MAP 1995 GREEN COUNTY, PA 1995 WASHINGTON COUNTY, PA

MICHELE STEWART

Baker MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412. 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4
CONSOL PENNSYLVANIA COAL COMPANY

SEDIMENT POND INUNDATION MAP

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
BGN	GEC	BGN	DEC. 2001	1" = 1000'

FILE: EMERGENCY DAM
k:_consol\24379\drawings\final\

DRAWING NO.

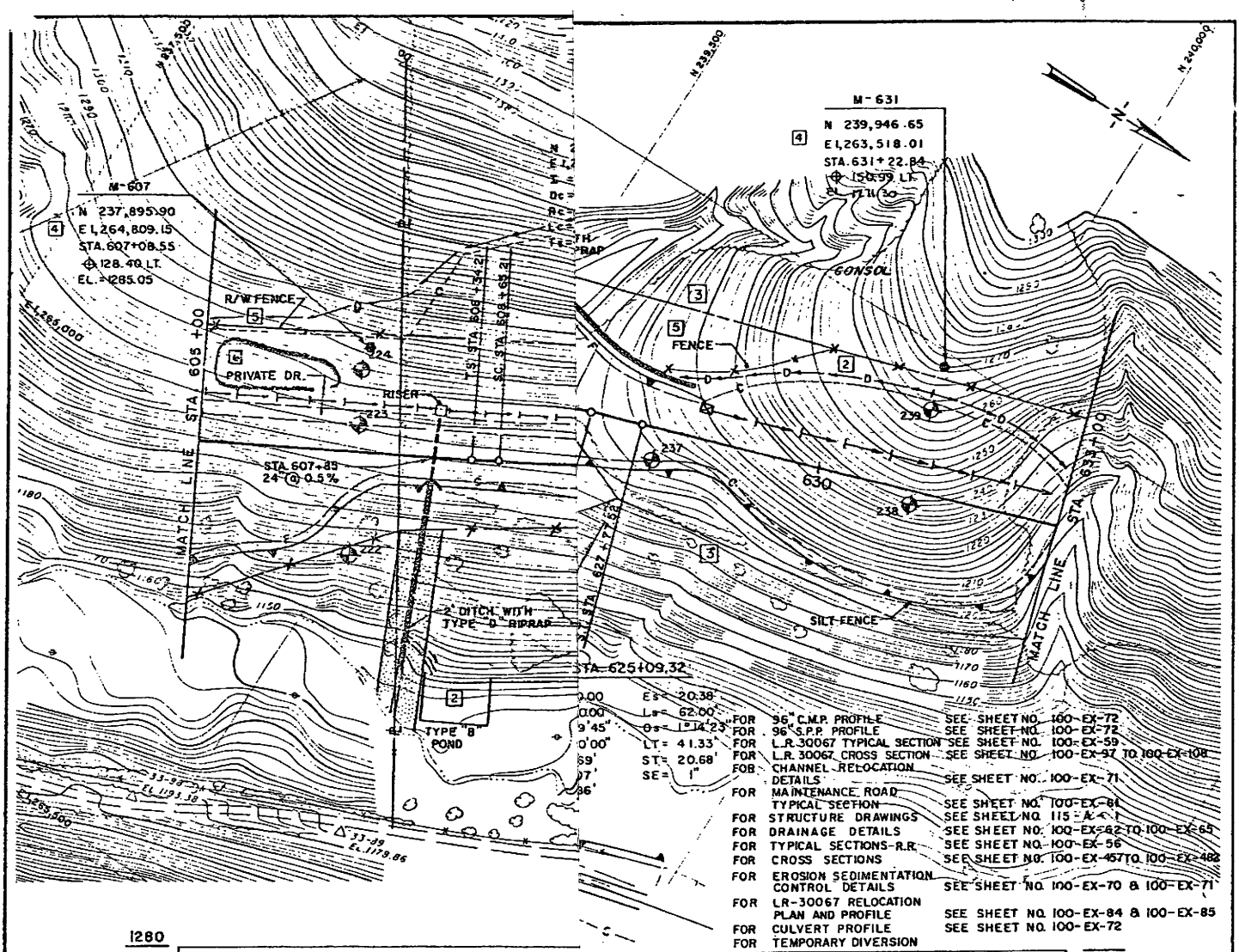
January 22, 2002 5:05:08 p.m. LOGIN NAME : gcarrocci
Drawing: J:\PROJECTS_CONSOL\24379\DRAWINGS\FINAL\EMERGENCY DAM.DWG-(SADDLE A 3042)
Attached Xrefs: BDR3042.DWG
S.O. No.: 24379-000-0000-ENG03

Baker

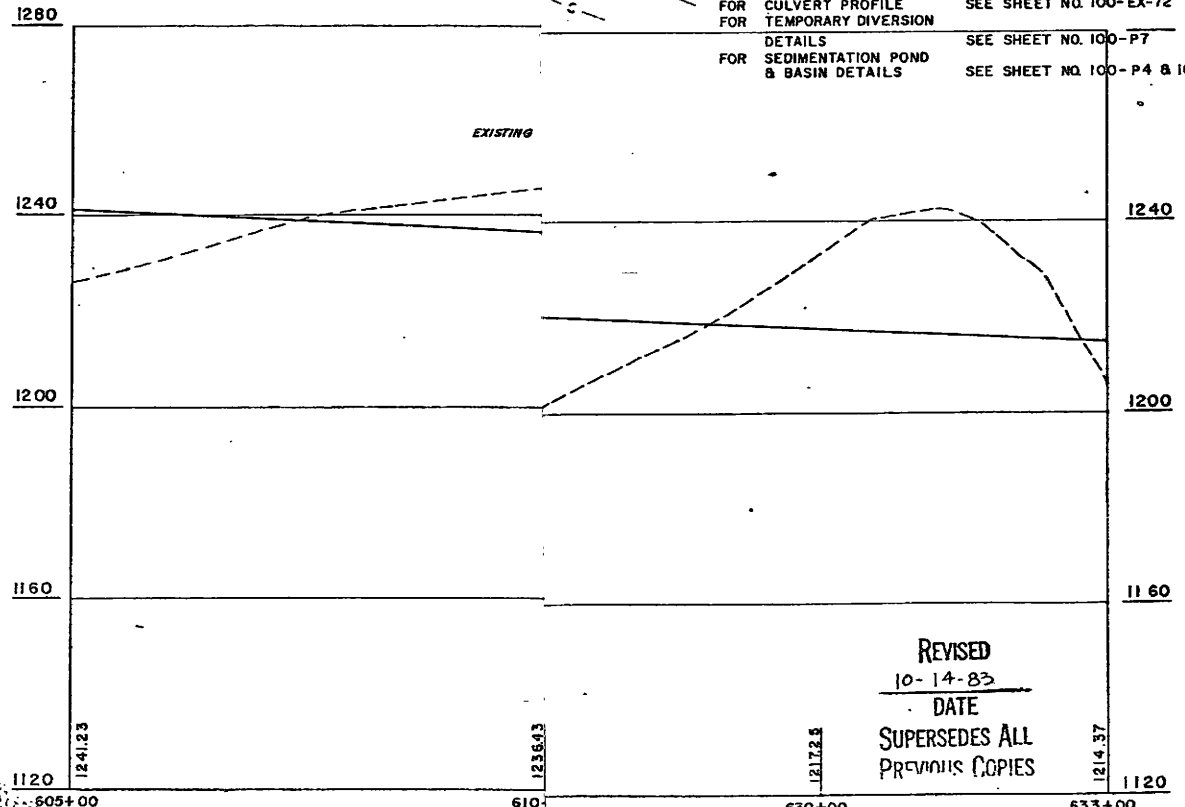
Michael Baker Jr., Inc.

ATTACHMENT B

Railroad Drawings



FOR	96" C.M.P. PROFILE	SEE SHEET NO. 100-EX-72
FOR	96" S.P.P. PROFILE	SEE SHEET NO. 100-EX-72
FOR	L.R. 30067 TYPICAL SECTION	SEE SHEET NO. 100-EX-59
FOR	L.R. 30067 CROSS SECTION	SEE SHEET NO. 100-EX-97 TO 100-EX-108
FOR	CHANNEL RELOCATION DETAILS	SEE SHEET NO. 100-EX-71
FOR	MAINTENANCE ROAD TYPICAL SECTION	SEE SHEET NO. 100-EX-81
FOR	STRUCTURE DRAWINGS	SEE SHEET NO. 115-A-1
FOR	DRAINAGE DETAILS	SEE SHEET NO. 100-EX-62 TO 100-EX-65
FOR	TYPICAL SECTIONS-R.R.	SEE SHEET NO. 100-EX-56
FOR	CROSS SECTIONS	SEE SHEET NO. 100-EX-457 TO 100-EX-482
FOR	EROSION SEDIMENTATION CONTROL DETAILS	SEE SHEET NO. 100-EX-70 & 100-EX-71
FOR	LR-30067 RELOCATION PLAN AND PROFILE	SEE SHEET NO. 100-EX-84 & 100-EX-85
FOR	CULVERT PROFILE	SEE SHEET NO. 100-EX-72
FOR	TEMPORARY DIVERSION DETAILS	SEE SHEET NO. 100-P7
FOR	SEDIMENTATION POND & BASIN DETAILS	SEE SHEET NO. 100-P4 & 100-P5



REVISED
10-14-83
DATE
SUPERSEDES ALL PREVIOUS COPIES

APPROVED FOR CONSTRUCTION

REV	DESCRIPTION
5	ADDED RIGHT
4	CONTROL M
3	ADD PRIVAT
2	SEDIMENTATIO
1	CHANNEL IO

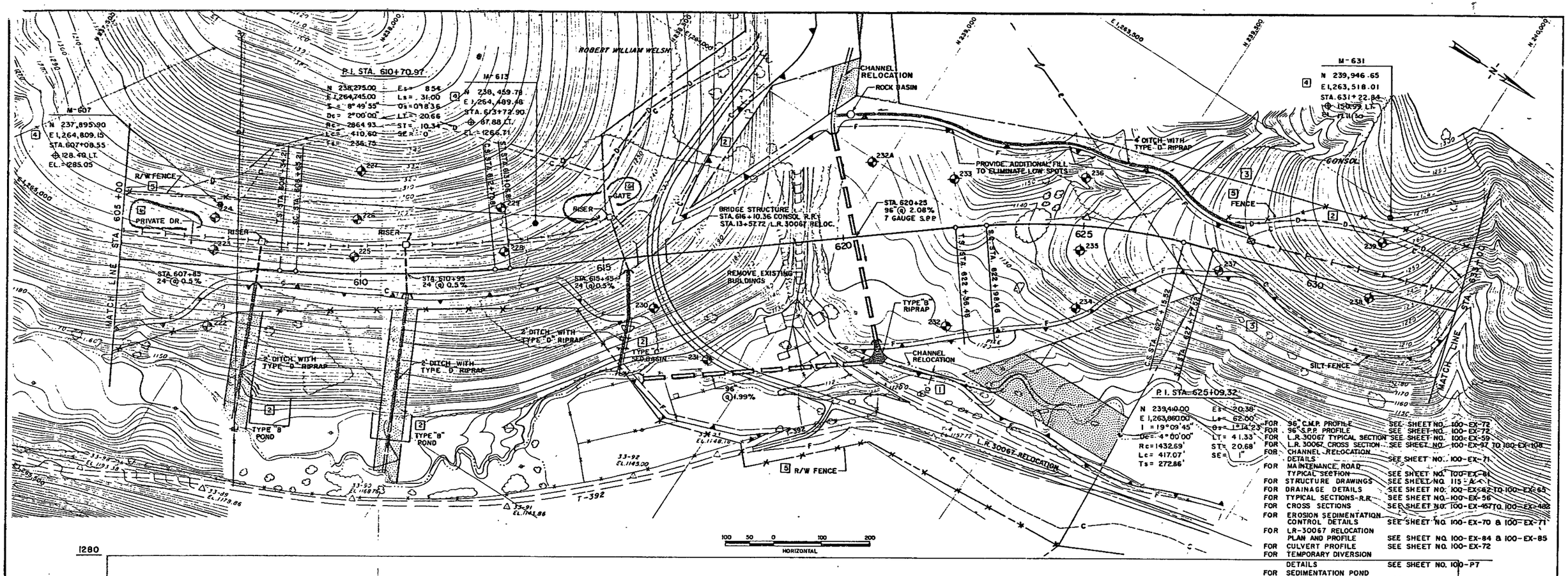
Prepared By
MICHAEL BAKER, JR., INC.
Consulting Engineers
BEAVER, PENNSYLVANIA

RAILROAD SPUR
PLAN AND PROFILE
STA. 605 + 00 TO STA. 633 + 00

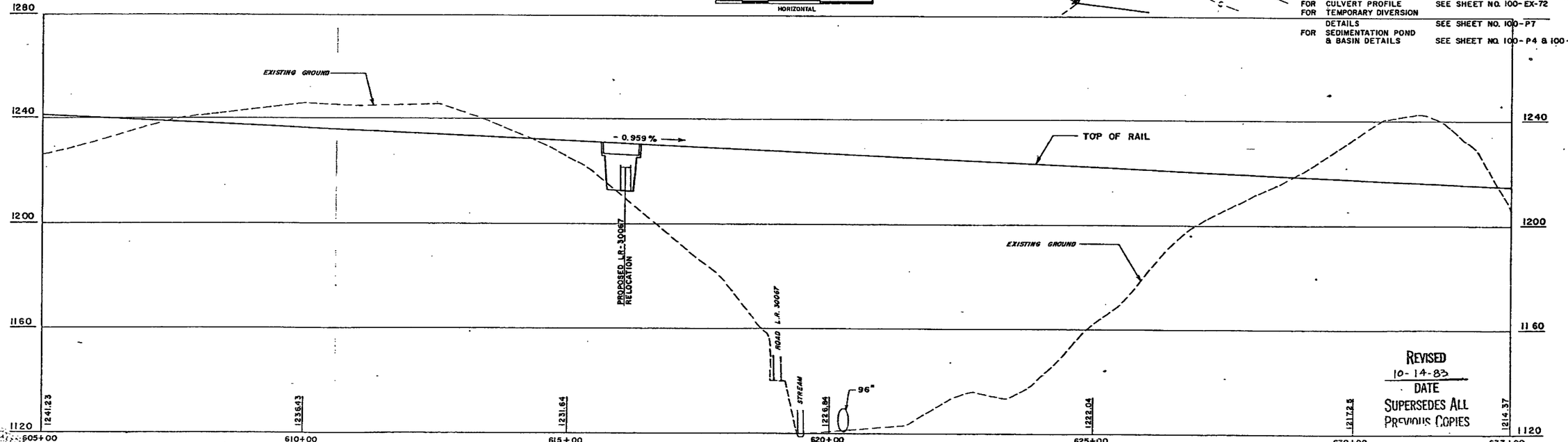
NO DWGS THIS PROJECT

SCALE	PROJECT NO.
AS SHOWN	053-09-01
DRAWING NO	FILE NO.
100-EX-44	81-1

05-242



FOR	96" C.M.P. PROFILE	SEE SHEET NO. 100-EX-72
FOR	96" S.P.P. PROFILE	SEE SHEET NO. 100-EX-73
FOR	L.R. 30067 TYPICAL SECTION	SEE SHEET NO. 100-EX-59
FOR	L.R. 30067 CROSS SECTION	SEE SHEET NO. 100-EX-97 TO 100-EX-108
FOR	CHANNEL RELOCATION DETAILS	SEE SHEET NO. 100-EX-71
FOR	MAINTENANCE ROAD TYPICAL SECTION	SEE SHEET NO. 100-EX-81
FOR	STRUCTURE DRAWINGS	SEE SHEET NO. 115-A-1
FOR	DRAINAGE DETAILS	SEE SHEET NO. 100-EX-62 TO 100-EX-65
FOR	TYPICAL SECTIONS-R.R.	SEE SHEET NO. 100-EX-56
FOR	CROSS SECTIONS	SEE SHEET NO. 100-EX-457 TO 100-EX-482
FOR	EROSION SEDIMENTATION CONTROL DETAILS	SEE SHEET NO. 100-EX-70 & 100-EX-71
FOR	LR-30067 RELOCATION PLAN AND PROFILE	SEE SHEET NO. 100-EX-84 & 100-EX-85
FOR	CULVERT PROFILE	SEE SHEET NO. 100-EX-72
FOR	TEMPORARY DIVERSION DETAILS	SEE SHEET NO. 100-P7
FOR	SEDIMENTATION POND & BASIN DETAILS	SEE SHEET NO. 100-P4 & 100-P5



REVISED
10-14-83
DATE
SUPERSEDES ALL PREVIOUS COPIES

APPROVED FOR CONSTRUCTION

REV	REVISION DESCRIPTION	MADE BY	CHECKED BY	DATE
6	REV PRIVATE DR. AND INCLUDED STA 605+00 TO 615+60	EAM		10-14-83
5	ADDED RIGHT-OF-WAY FENCE	E.A.M.		8-26-82
4	CONTROL MONUMENTS	R.M.C.		6/30/82
3	ADD PRIVATE DRIVE /ADD R/W	K.N.H.		6/11/82
2	SEDIMENTATION & EROSION CONTROL	K.N.H.		5/25/82
1	CHANNEL 10'	K.N.H.		2/16/82

Prepared By
MICHAEL BAKER, JR., INC.
Consulting Engineers
BEAVER, PENNSYLVANIA

05-242

THIS DRAWING IS THE PROPERTY OF CONSOL PENNSYLVANIA COAL COMPANY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH OUR WORK. ALL RIGHTS OF DESIGN OR INVENTION RESERVED

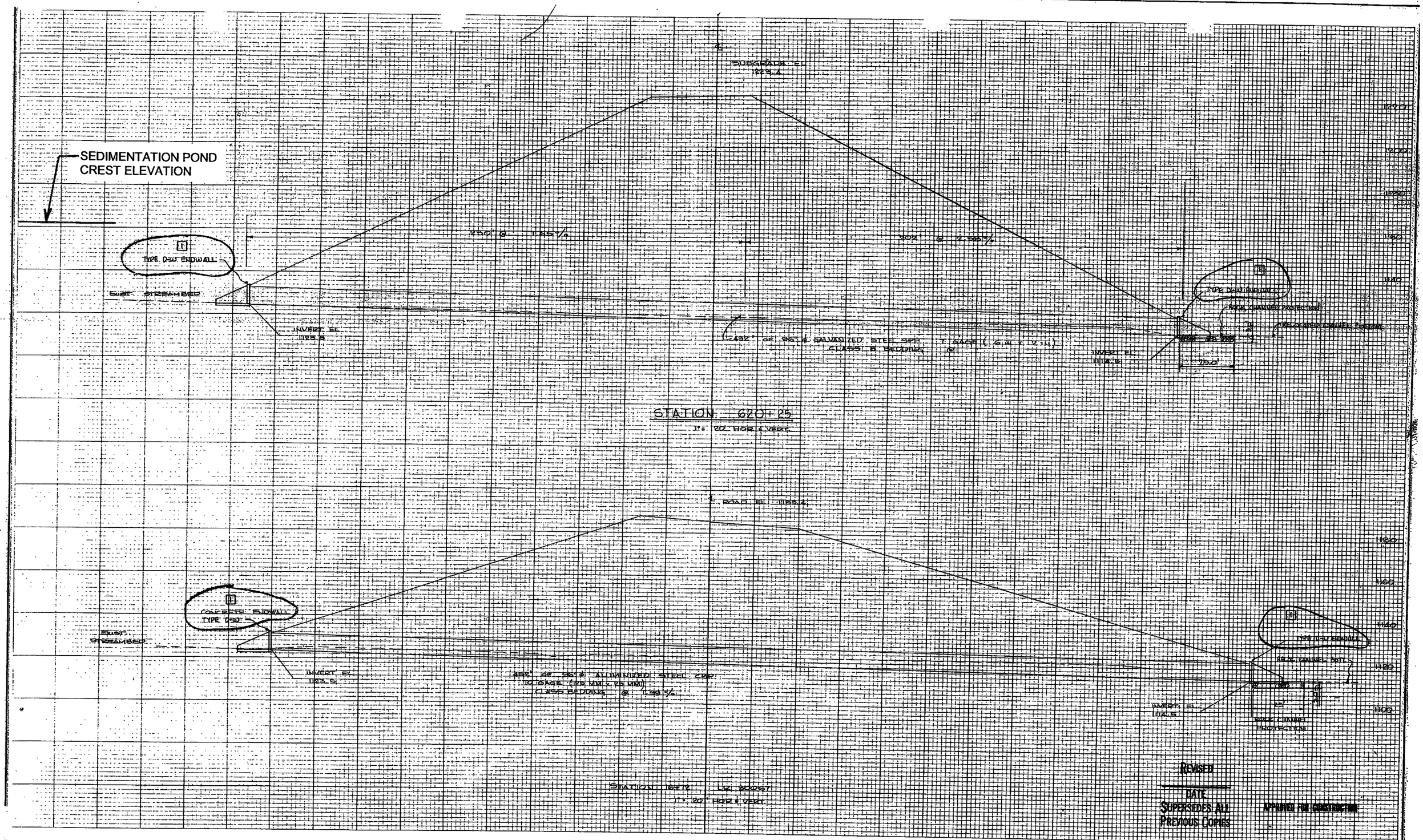
CONSOL PENNSYLVANIA COAL COMPANY
PITTSBURGH, PENNSYLVANIA

DRAWN BY
DESIGNED BY
CHECKED BY
APPROVED BY 11/15/83

RAILROAD SPUR
PLAN AND PROFILE
STA. 605 + 00 TO STA. 633 + 00

NO. DWGS. THIS PROJECT

SCALE: AS SHOWN
PROJECT NO. 053-09-01
DRAWING NO. 100-EX-44
FILE NO. 81-1



REV.	REVISION DESCRIPTION	MADE BY	CHECKED BY	DATE
4				
3				
2				
1	REV. ENDWALL TO READ TYPE D-W	E.A.M.		8-20-82

THIS DRAWING IS THE PROPERTY OF CONSOL PENNSYLVANIA COAL COMPANY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH OUR WORK
ALL RIGHTS OF DESIGN OR INVENTION RESERVED

CONSOL PENNSYLVANIA COAL CO.
PITTSBURGH PA.
OFFICE
CENTRAL ENGINEERING

DRAWN BY	BDP	DATE 3-2-82
DESIGNED BY	RAW	DATE 3-2-82
CHECKED BY	G.C.	DATE 3-4-82
APPROVED BY	RAW	DATE 3-4-82

RAILROAD SPUR
DRAINAGE DETAILS

NO. DWGS. THIS PROJECT

SCALE: AS NOTED
DRAWING NO. 100-EX-736
PROJECT NO. 053-09-01
FILE NO. 81-1

Baker

Michael Baker Jr., Inc.

ATTACHMENT C

PADEP Correspondence

OBSERVER-REPORTER

Greene County

Proof of Publication

In compliance with the Newspaper Advertising Act of July 9, 1976, P.L. 877, No. 160, as amended.

COMMONWEALTH OF PENNSYLVANIA, COUNTY OF WASHINGTON,SS:

Before me, a Notary Public in and for said County and State, personally appeared

David .F. Lyle who being duly sworn according to law, depóses and

says that he is the CFO of the Observer Publishing Company, a Pennsylvania corporation , and its agent in this behalf; that the said Company is the owner and publisher of the Observer-Reporter, a newspaper of general circulation, having its place of business at Waynesburg, Greene County, Pennsylvania, where it or its predecessors have been established for more than six months prior to the publication of the notice hereto attached; that the printed notice or advertisement hereto attached is a copy of an official advertisement, official notice, legal notice or legal advertisement, exactly as printed or published in the Observer-Reporter in its regular edition on the following date or dates

Dec 13,20,27,2002 & Jan 3 2003 that neither the affiant nor the Observer Publishing Company is interested in the subject matter of said notice or advertising and that all of the allegations of this affidavit as to the time, place and character of publication are true.

Sworn to and subscribed before me this 3 day of Jan 2003.

Edith W. Sanders

Notarial Seal
Edith W. Sanders, Notary Public
Washington, Washington County
My Commission Expires Feb. 14, 2005

mber, Pennsylvania Association of Notaries

Notice

PUBLIC NOTICE

Pursuant to the PENNSYLVANIA CLEAN STREAMS LAW, the PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION Rules and Regulations, the SURFACE MINING CONSERVATION and RECLAMATION ACT and the Bituminous Mine Subsidence and Land Conservation Act as amended and the COAL REFUSE DISPOSAL CONTROL ACT as amended, notice is hereby given that Consol Pennsylvania Coal Company doing business at 1800 Washington Road, Pittsburgh, PA has made application to the Pennsylvania Department of Environmental Protection to permit a new coal refuse disposal facility for the Bailey Central Mine Complex , which is currently under review. The new disposal facility is comprised of two coal refuse disposal areas - Coal Refuse Disposal Areas No. 3 and No. 4 and the application was advertised in the Observer Reporter - Greene County Edition on May 2, 9, 16, 23, 30 and June 6, 2002. This is a supplement to the new coal refuse disposal facility advertisement for a request for a variance to affect within 100 feet of Fletchers Run.

The variance area encompasses Fletchers Run beginning at the headwaters at a point approximately 350 feet west of the intersection of PA Route 4011 and Fletcher Run Road and continuing downstream for approximately 420 feet. The proposed operation within the stream variance area will include an above ground conveyor system to transport coarse coal refuse to the disposal areas with associated grading, ditch and culvert construction.

A copy of the application is available for public inspection, and copying for a fee, by appointment at the Greene County Conservation District, Greene County Office Building, Room 215, 93 East High Street, Waynesburg, PA 15370, and by appointment at the Pennsylvania Department of Environmental Protection, McMurray District Mining Office, 3913 Washington Road, McMurray, PA 15317. Written comments, objections, or a request for an informal conference may be submitted to the Department of Environmental Protection, District Mining Operations, at the above address, no later than thirty (30) days following the final publication date of this notice.

GR:12-13,20,27;1

collector water with the leachate collection water at the sampling location. The water exiting from both the spring and leachate collectors discharge into the treatment pond from the rock drains. The leachate collector is located immediately above the spring collector. Separation of the two water flows has not been possible for many years and the spring collector water is mixed with the leachate water. The water quality data for the spring collector samples listed on the 8.4A forms represent commingled spring collector water and leachate collector water and are not representative of the spring water alone.

The Group 1 monitoring points located within the footprint of the existing Bailey CRDA do not indicate a continuing trend of ground or surface water degradation based on the discharge limits for iron, manganese, total suspended solids or pH.

Group 2 – S-5A, S-6A, S-7A, S-8A, S-10, S-11 and Spring E
Wells and springs on the hillside east and downdip of the coarse refuse area and across a surface water divide (see Exhibit 8.2A)

The water quality data for the Group 2 monitoring points indicate that the existing Bailey CRDA has not adversely impacted these springs with respect to iron, manganese, suspended solids or pH; however, suspended solids have exceeded the discharge limits on several occasions. These excursions are attributed to the physical conditions of the sampling site and not the migration of suspended solids from the existing Bailey CRDA. In most cases, the flow from the sampled springs was very low, the watercourse was very shallow and the substrate was composed of silt and clay. During sampling in this setting the substrate may have been disturbed and a small amount of mud may have been unintentionally included in the sample. The occasional elevated suspended solids reported on the 8.4A Forms can be attributed to these sampling conditions.

Group 3 – S-14, S-15, S-16 and S-17
Springs in unnamed tributary east of the coarse refuse area and north of new CRDA (See Exhibit 8.2A)

The water quality data for these monitoring points indicate that the existing Bailey CRDA has not adversely impacted the springs with respect to iron, manganese, suspended solids or pH. On one occasion, the total suspended solids exceeded the discharge limits in S-16. The flow from the sampled springs was very low, the watercourse was very shallow and the substrate was composed of silt and clay. During sampling in this setting the substrate may have been disturbed and a small amount of mud may have been unintentionally included in the sample. The occasional elevated suspended solids reported on the 8.4A Forms can be attributed to these sampling conditions.

Group 4 – S-18, S-19, S-20 and S-30
Springs southeast of the existing refuse disposal area and within new CRDA (See Exhibit 8.2A)

The water quality data for these monitoring points indicate the existing Bailey CRDA has not adversely impacted the springs with respect to iron, manganese, suspended solids or pH. On one occasion, the total suspended solids exceeded the discharge limits in

iv) Contaminated seepage or underdrain discharges following site closure.

The leachate collection system will continue to operate as designed (see Module 21) and the NPDES discharge will continue after the site is closed. A detailed monitoring network of ten monitoring wells and piezometers, two springs, two spring collector drains, two leachate collection drains, three saddle dam toe drain outlets and twelve surface water monitoring points is proposed in section 8.6 below to verify that no underdrain discharges go undetected.

8.6 Hydrologic Monitoring Plan.

Monitoring points must be clearly marked and identified (with durable markers) in the field. The field identification scheme should correspond with the identification scheme in the application.

All monitoring points will be marked and identified in the field following the approval of this monitoring plan by the Department.

a) Complete Form 8.6A identifying the points which will be used in the monitoring program, the parameters to be measured at each point, and the period and frequency of sampling at each point. (At a minimum, chemical sampling and water level or flow measurements must be conducted and reported to the Department every three months for each monitoring location).

See Form 8.6A

The quarterly monitoring data for all of the monitoring points listed on the Form 8.6A will be submitted to the PADEP quarterly. In the event that sulfate concentrations reach or exceed a threshold value in monitoring wells MW K-S, MW K-I, MW K-D, MW L-S, MW L-I and MW L-D, the PADEP will be notified in writing within 30 days of such an occurrence. This notification will serve as an alert only. An initial threshold sulfate concentration, in the six listed wells, of 250 mg/l will be assumed. This threshold concentration may be changed after a review of the existing water quality in the monitoring wells or after sufficient samples have been obtained to determine a reasonable variance in ground water quality over time that accommodates possible seasonal influences or variations. If the sulfate concentration in one of the six monitoring well listed exceeds the threshold value, the monitoring plan or frequency may be changed after consideration by the PADEP and CONSOL.

A table listing the elevation, latitude and longitude of the monitoring points is attached to this module as APPENDIX 8.6 – A.

b) Attach a narrative describing how the proposed monitoring points relate to the detection and mitigation of impacts discussed under 8.5.

A total of twelve monitoring wells and piezometers, two springs, two spring collector drains, two leachate collection drains, three saddle dam toe drain outlets and twelve surface water monitoring points are proposed as the hydrologic monitoring points for the proposed new CRDA. The location of the proposed monitoring points are shown on the Exhibit 8.2A Hydrologic Data Map and the details of the monitoring points are outlined herein. Monitoring of the surface water monitoring points has begun and the data collected to date

are included in the 8.4A Forms. The proposed monitoring wells and piezometers will be installed upon issuance of the permit to construct the refuse disposal facility.

Ground Water Monitoring Points (See Exhibit 8.2A – Hydrologic Data Map)

Piezometers Cluster H (Two Piezometers)-East Side (down-dip) Side of Refuse Area

This piezometer cluster will be located on the south side of the unnamed tributary in a fill area west of the railroad grade and east of the road guardrail. These are the most down-gradient ground water monitoring points proposed and are intended to monitor ground water moving parallel to the valley toward the points of ground water discharge to the east.

<u>Piezometer H-Shallow (MW H – S)</u>
To be completed to a depth of ten feet below the elevation of the streambed (total depth estimated at 20 feet). This piezometer will be screened from 5 to 20 feet below land surface and will monitor the shallowest ground water flow system leaving the proposed refuse disposal area.

<u>Piezometer H- Deep (MW H-D)</u>
This piezometer will be screened from 40 to 50 feet below land surface and will monitor the ground water flow system immediately below the flow system monitored by MW H-S.

Piezometer Cluster I (Two Piezometers) - West Side (up-dip) Side of Refuse Area

This piezometer cluster will be located along the ridgeline between the existing slurry pond and the new area. This is the most up-gradient ground water monitoring point.

<u>Piezometer I-Shallow (MW I – S)</u>
This piezometer will be completed to the approximate bottom elevation of 1460 msl, which is twenty feet above the maximum planned elevation of the existing slurry pond. Final elevation of existing slurry pond is projected to be 1420 msl. and the surface elevation is approximately 1480 msl. Piezometer I-Shallow will be 40 feet deep with a screened interval from 20 to 40 feet. This piezometer is intended to monitor the quality of any ground water in the shallow subsurface that may be moving through the ridge separating the existing and proposed new disposal facilities. In the event the water table is below the bottom elevation of the piezometer, the monitoring point will be maintained to document any changes in the shallow ground water flow system that may occur in the future.

<u>Piezometer I-Deep (MW I – D)</u>
The surface elevation of this piezometer is approximately 1480 msl and the projected elevation of the slurry pond to the west is 1420 msl. The screened interval of this piezometer will be 40 feet from an elevation of 1420 to an elevation of 1380 feet and is intended to monitor any deeper migration of water from the slurry pond through the ridge separating the valleys.

Monitoring Well J (MW – J) - North Side of Refuse Area
This monitoring well will be located between the unnamed tributary to the north and the proposed refuse area. This well will be completed to a depth of 100 feet with 20 feet of casing and a monitoring interval from 20 to 100 feet. This well is intended to monitor any migration of ground water that may occur in the near surface fracture flow zone between the refuse area and the unnamed tributary valley to the north.

Piezometer Cluster K (Three Piezometers) – Southwest side of refuse area – Between the refuse area and Fletcher Run

Monitoring Piezometer Cluster K (MW K - S) - Southwest Side of Refuse Area
This monitoring well will be competed on the ridgeline between the proposed refuse area and Fletcher Run to the southwest. This well will be completed to a depth of 100 feet with 20 feet of casing and a monitoring interval from 20 to 100 feet. This well is intended to monitor any migration of ground water that may occur in the near surface fractured flow zone between the refuse area and streams to the southwest and is designated as the shallow monitoring well of this piezometer cluster.

Monitoring Piezometer Cluster K (MW K - I) - Southwest Side of Refuse Area
This monitoring well will be competed on the ridgeline between the proposed refuse area and Fletcher Run to the southwest. This well will be completed to a depth of 280 feet with 180 feet of casing and a monitoring interval from 180 to 280 feet. This well is intended to monitor any migration of ground water that may occur in the near intermediate flow zone between the refuse area and streams to the southwest and is designated as the intermediate monitoring well of this piezometer cluster.

Monitoring Piezometer Cluster K (MW K - D) - Southwest Side of Refuse Area
This monitoring well will be completed on the ridgeline between the proposed refuse area and Fletcher Run to the southwest. The well will be completed to a depth of 400 feet or at a bottom hole elevation of 1120 msl. This bottom hole elevation is equivalent to the lowest elevation of the proposed refuse area located in the valley bottom on the eastern side of the area. The well is intended to detect any migration of contaminated ground water that may occur at the lowest elevation of the refuse area. The surface elevation at this location is approximately 1520msl. The screened interval of this piezometer will be 40 feet from an elevation of 1120 to an elevation of 1160 feet.

Piezometer Cluster L (Three Piezometers) – South side of refuse area – Between the refuse area and Grinnage Run

Monitoring Piezometer Cluster L (MW L - S) - South Side of Refuse Area
This monitoring well will be located on the ridgeline between the proposed refuse area and Grinnage Run to the southwest. This well will be completed to a depth of 100 feet with 20 feet of casing and a monitoring interval from 20 to 100 feet. This well is intended to monitor any migration of ground water that may occur in the near surface fractured flow zone between the refuse area and streams to the southwest and is designated as the shallow monitoring well of this piezometer cluster.

Monitoring Piezometer Cluster K (MW L - I) - South Side of Refuse Area
This monitoring well will be competed on the ridgeline between the proposed refuse area and Grinnage Run to the southwest. This well will be completed to a depth of 310 feet with 210 feet of casing and a monitoring interval from 210 to 310 feet. This well is intended to monitor any migration of ground water that may occur in the near intermediate flow zone between the refuse area and streams to the southwest and is designated as the intermediate monitoring well of this piezometer cluster.

Monitoring Piezometer Cluster L (MW L - D) - South Side of Refuse Area
This monitoring well will be completed on the ridgeline between the proposed refuse area and Grinnage Run to the south. The well will be completed to a depth of 380 feet or at a bottom hole elevation of 1120 msl. This bottom hole elevation is equivalent to the lowest elevation of the proposed refuse area located in the valley bottom on the eastern side of the area. The well is intended to detect any migration of contaminated ground water that may occur at the lowest elevation of the refuse area. The surface elevation at this location is approximately 1500msl. The screened interval of this piezometer will be 40 feet from an elevation of 1120 to an elevation of 1160 feet.

Monitoring Well M (MW – M) - Southeast Side of Refuse Area
This monitoring well will be located on the ridgeline between the proposed refuse area and tributary valleys to the southeast. This well will be completed to a depth of 100 feet with 20 feet of casing and a monitoring interval from 20 to 100 feet. This well is intended to monitor any migration of ground water that may occur in the near surface fractured flow zone between the refuse area and the valleys to the southeast.

All of the ground water monitoring wells and piezometers will be completed with four-inch diameter PVC casing and well screen. The annular space throughout the screened monitoring interval will be gravel packed with clean silica sand. The annular space between the highest monitoring elevation and the surface will be sealed with a bentonite plug and cement grout. The top of the monitoring wells will be fitted with a steel protective casing with a locking cap and will be clearly marked and identified with durable markers.

In general the permeability of rocks decreases by one order of magnitude for every 100 feet of depth (Stoner and others, 1987). For this reason no monitoring wells or piezometers will be completed deeper than 100 feet from the land surface. Below this depth the permeability of the rocks decreases substantially and very little ground water circulation occurs.

A diagram depicting the typical construction for the piezometers and monitoring wells is attached to the Module 8 as FIGURE 8.6 - B.

Pumping tests will be conducted on each monitoring well and piezometer when they are installed and the pumping test data will be submitted as supplemental information to this module.

Surface Water Monitoring Points (See Exhibit 8.2A – Hydrologic Data Map)

Unnamed tributary immediately downgradient of the refuse area -SW-N
This surface water monitoring point is located at the east end of the culvert passing under the railroad grade immediately below the proposed refuse area.

Kerr Run - SW-O
This surface water monitoring point is located in Kerr Run approximately halfway between the headwaters and the confluence with Owens Run.

Kerr Run - SW-P
This surface water monitoring point is located on Kerr Run near the confluence of Kerr Run with Owens Run.

Fletcher Run - SW-Q
This surface water monitoring point is located approximately halfway between the headwaters of Fletcher Run and the confluence with Owens Run.

Fletcher Run - SW-R
This surface water monitoring point is located on Fletcher Run near the confluence of Fletcher Run and Owens Run.

Grinnage Run - SW-S
This surface water monitoring point is located on Grinnage Run halfway between the headwaters of Grinnage Run and the confluence with Owens Run.

Grinnage Run - SW-T
This monitoring point is located on Grinnage Run near the confluence of Grinnage Run with Owens Run.

South Branch of Enlow Fork East of the Site - SW-U
This surface water monitoring point is located on the South Branch of Enlow Fork approximately 1000 feet up-stream from the confluence of the unnamed tributary draining the site.

South Branch of Enlow Fork East of the Site - SW-V
This surface water monitoring point is located on the South Branch of Enlow Fork approximately 1000 feet down-stream from the confluence of the unnamed tributary draining the site.

Unnamed Tributary to the South Branch of Enlow Fork North of the Site - SW-W
This surface water monitoring point is located on the unnamed tributary north of the proposed refuse area near the confluence of the unnamed tributary with the South Branch of Enlow Fork.

Unnamed Tributary to the South Branch of Enlow Fork Southeast of the Site – SW-X
This surface water monitoring point is located on the unnamed tributary southeast of the proposed refuse area near the point where the stream crossed under the railroad berm. This monitoring point is intended to detect any migration of leachate from the facility though the ridge southeast of the site.

Unnamed Tributary to the South Branch of Enlow Fork Southeast of the Site – SW-Y
This surface water monitoring point is located near the headwaters of the unnamed tributary southeast of the proposed refuse area. This monitoring point is intended to detect any migration of leachate from the facility though the ridge southeast of the site.

Spring Z
This spring is located southeast of the facility and is intended to detect any migration of leachate from the facility though the ridge southeast of the site.

Spring AA
This spring is located southeast of the facility and is intended to detect any migration of leachate from the facility though the ridge southeast of the site.

Spring Collector Underdrains: BB (Coarse Refuse) and CC (Slurry Pond)
An underdrain system of rock drains and collector pipes will be installed at the base of the coarse refuse pile and slurry pond to prevent spring water from coming in contact with the refuse or refuse leachate at the base of the facility. The spring water collected in these drain systems will be conveyed to the toe of the sites. When installed, the water discharged from these drains will be sampled on a quarterly basis and tested for the parameters shown on Form 8.6A. These monitoring points will have the added benefit of detecting changes in spring water quality that may indicate the liner systems are leaking.

Leachate Collector Underdrains: DD (Coarse Refuse) and EE (Slurry Pond)
A leachate collector drain system will be installed at the base of the coarse refuse pile and the slurry pond to convey leachate water to the treatment pond at the toe of the sites. When installed, the water discharged from these drains will be sampled on a quarterly basis and tested for the parameters shown on Form 8.6A. These monitoring points will characterize the quality of leachate through time from both the coarse refuse disposal area and the slurry area.

Saddle Dam Toe Drain Outlets: SD-B, SD-C and SD-D
A toe drain will be installed at the base of each of the three saddle dams (Saddle Dam B, C & D). When installed the water discharged from these drains, if any occurs, will be sampled on a quarterly basis and tested for the parameters shown on Form 8.6A.

FORM 8.3A
GROUND WATER INVENTORY

Sample Point No.	Well/Spring	Owner	Use	Surface Elevation (MSL)	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Static Water Elevation MSL or Flow, Date of Measurement	Type of treatment if any (iron filter, etc.)
Greene 1	well	Charles Greene	Domestic	1185'	~130	8	N/A	N/A	None
Greene 2	well	Charles Greene	Domestic	1185'	~130	8	N/A	N/A	None
Webb	well	Olive Webb	Domestic	1465'	~250	8	N/A	N/A	None
WE-A	well	CPCC	N/A	1002'	N/A	N/A	N/A	967.7, 10 year avg.	None
WE-B	well	CPCC	N/A	1088.5'	N/A	N/A	N/A	1073.9, 10 year avg.	None
WE-C	well	CPCC	N/A	1119'	N/A	N/A	N/A	1085.1, 10 year avg.	None
SP-D	spring	CPCC	N/A	1330'	N/A	N/A	N/A	0.35, 10 year avg.	None
SP-E	spring	CPCC	N/A	1220'	N/A	N/A	N/A	0.44, 10 year avg.	None
Spring Collector No. 2	spring	CPCC	N/A	N/A	N/A	N/A	N/A	23.6, 8 year avg.	None
S1	spring	CPCC	N/A	1060'	N/A	N/A	N/A	1.4, 4 year avg.	None
S2	spring	CPCC	N/A	980'	N/A	N/A	N/A	380.3, 14 year avg.	None
S1A	spring	CPCC	N/A	1310'	N/A	N/A	N/A	N/A	None
S2A	spring	CPCC	N/A	1310'	N/A	N/A	N/A	N/A	None
S3A	spring	CPCC	N/A	1220'	N/A	N/A	N/A	N/A	None
S5A	spring	CPCC	N/A	1200'	N/A	N/A	N/A	N/A	None
S6A	spring	CPCC	N/A	1290'	N/A	N/A	N/A	N/A	None
S7	spring	CPCC	N/A	1220'	N/A	N/A	N/A	N/A	None
S7A	spring	CPCC	N/A	1290'	N/A	N/A	N/A	N/A	None
S8	spring	CPCC	N/A	1200'	N/A	N/A	N/A	N/A	None
S8A	spring	CPCC	N/A	1220'	N/A	N/A	N/A	N/A	None
S9	spring	CPCC	N/A	N/A	N/A	N/A	N/A	N/A	None
S10	spring	CPCC	N/A	1280'	N/A	N/A	N/A	N/A	None
S11	spring	CPCC	N/A	1220'	N/A	N/A	N/A	N/A	None

FORM 8.3A
GROUND WATER INVENTORY

Sample Point No.	Well/Spring	Owner	Use	Surface Elevation (MSL)	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Static Water Elevation MSL or Flow, Date of Measurement	Type of treatment if any (iron filter, etc.)
S14	spring	CPCC	N/A	1350'	N/A	N/A	N/A	N/A	None
S15	spring	CPCC	N/A	1380'	N/A	N/A	N/A	N/A	None
S16	spring	CPCC	N/A	1370'	N/A	N/A	N/A	N/A	None
S17	spring	CPCC	N/A	1350'	N/A	N/A	N/A	N/A	None
S18	spring	CPCC	Livestock	1330'	N/A	N/A	N/A	0.61, 12/19/01	None
S19	spring	CPCC	Livestock	1350'	N/A	N/A	N/A	2.88, 12/19/01	None
S20	spring	CPCC	Livestock	1480'	N/A	N/A	N/A	DRY, 12/20/01	None
S21	spring	CPCC	Livestock	1320'	N/A	N/A	N/A	0.13, 12/19/01	None
S22	spring	CPCC	Livestock	1260'	N/A	N/A	N/A	N/A	None
S23	spring	CPCC	Livestock	1340'	N/A	N/A	N/A	DRY, 12/19/01	None
S24	spring	CPCC	Livestock	1330'	N/A	N/A	N/A	DRY, 12/19/01	None
S25	spring	CPCC	Livestock	1380'	N/A	N/A	N/A	0.04, 12/19/01	None
S26	spring	CPCC	Livestock	1250'	N/A	N/A	N/A	0.88, 12/19/01	None
S27	spring	CPCC	Livestock	1280'	N/A	N/A	N/A	0.79, 12/19/01	None
S28	spring	CPCC	Livestock	N/A	N/A	N/A	N/A	~2, 12/19/01	None
S30	spring	CPCC	Livestock	1350'	N/A	N/A	N/A	DRY, 12/19/01	None
S31	spring	CPCC	Livestock	1290'	N/A	N/A	N/A	5.28, 12/19/01	None
S32	spring	CPCC	Livestock	1290'	N/A	N/A	N/A	DRY, 12/19/01	None
S33	spring	CPCC	Livestock	1330'	N/A	N/A	N/A	1.59, 12/19/01	None
S34	spring	CPCC	Livestock	1360'	N/A	N/A	N/A	0.61, 12/19/01	None
S35	spring	CPCC	Livestock	1330'	N/A	N/A	N/A	1.13, 12/19/01	None
S36	spring	CPCC	Livestock	1290'	N/A	N/A	N/A	0.61, 12/20/01	None
S37	spring	CPCC	Livestock	1280'	N/A	N/A	N/A	0.72, 12/20/01	None
S38	spring	CPCC	None	1170'	N/A	N/A	N/A	1.59, 12/18/01	None
S39	spring	CPCC	None	1300'	N/A	N/A	N/A	1.13, 12/18/01	None
S40	spring	CPCC	None	1280'	N/A	N/A	N/A	1.98, 12/18/01	None
S41	spring	CPCC	None	1320'	N/A	N/A	N/A	1.59, 12/18/01	None

FORM 8.3A
GROUND WATER INVENTORY

Sample Point No.	Well/Spring	Owner	Use	Surface Elevation (MSL)	Depth of Well (feet)	Diameter of Well (inches)	Depth of Casing (feet)	Static Water Elevation MSL or Flow, Date of Measurement	Type of treatment if any (iron filter, etc.)
S42	spring	CPCC	None	1240'	N/A	N/A	N/A	4.53, 12/18/01	None
S43	spring	CPCC	None	1310'	N/A	N/A	N/A	N/A	None
S44	spring	CPCC	None	1330'	N/A	N/A	N/A	N/A	None
S45	spring	CPCC	None	1290'	N/A	N/A	N/A	0.66, 12/20/01	None
S46	spring	CPCC	Livestock	1390'	N/A	N/A	N/A	0.88, 12/20/01	None
S47	spring	CPCC	Livestock	1320'	N/A	N/A	N/A	N/A	None
S48	spring	CPCC	None	1350'	N/A	N/A	N/A	1.98, 12/20/01	None
S49	spring	CPCC	None	1290'	N/A	N/A	N/A	0.79, 12/20/01	None
S50	spring	CPCC	Livestock	1300'	N/A	N/A	N/A	N/A	None
S51	spring	CPCC	Livestock	1300'	N/A	N/A	N/A	N/A	None
S52	spring	CPCC	Livestock	1330'	N/A	N/A	N/A	0.72, 12/18/01	None
S53	spring	CPCC	Livestock	1340'	N/A	N/A	N/A	0.66, 12/18/01	None
P54	pond	CPCC	Livestock	1320'	N/A	N/A	N/A	3.60, 12/18/01	None
S55	spring	CPCC	Livestock	1280'	N/A	N/A	N/A	N/A	None
P56	pond	CPCC	Livestock	1270'	N/A	N/A	N/A	N/A	None
S57	spring	CPCC	Livestock	1280'	N/A	N/A	N/A	N/A	None
S58	spring	CPCC	Livestock	1320'	N/A	N/A	N/A	N/A	None
S59	spring	CPCC	None	1330'	N/A	N/A	N/A	N/A	None
WE-53	well	CPCC	N/A	1125'	N/A	N/A	N/A	1222.1, 4 year avg.	None

FORM 8.3B
STREAM INVENTORY

Stream Name	Segment (From/To)	Flow Status ----- Basis	Uses	*Average Annual Flow (CFS or GPM)	General Quality Characteristics
Unnamed tributary to South Branch Enlow Fork	Enlow Fork to Headwaters	PD / e	3	29 gpm	See Form 8.4A - SW - N
Grinnage Run	from 1000' boundary to north east headwaters	PD/ e	3	48 gpm	See Form 8.4A - SW - S
Fletcher Run	from 1000' boundary north east to headwaters	PD / e	3	50 gpm	See Form 8.4A - SW - Q
South Branch of Enlow Fork	From SW - U to SW - V	PD / e	3	1537 gpm	See Form 8.4A - SW – U & SW - V
Unnamed drainage to South Branch of Enlow Fork	S Branch Enlow Fork to Headwaters	PD/b	3	38 gpm	See Form 8.4A - SW – Y

Status/Basis

PD = Perennial (per 89.141)
PS = Perennial (per 87.1, 89.5, 90.1)
I - Intermittent
E = Ephemeral
a = by joint inspection with DEP staff
b = by flow measurements
c = by g/w level measurements
d = by aquatic survey
e = by photographs

Uses

1 = Cold Water
2 = Trout Stocked Fishery
3 = Warm Water Fishery
4 = Potable Water Supply
5 = Industrial Water Supply
6 = Wildlife Water Supply
7 = Livestock Water Supply
8 = Boating, Navigation
9 = Swimming
10 = Irrigation
11 = Recreational Fishery
12 = Waterfowl Habitat

Flow

* Indicate method of computing average annual flow

Average of recorded flows_____
_____
_____

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S - AA
Description: Spring - Unnamed drainage to South Branch of Enlow Fork upstream of proposed refuse drainage
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:15 W80:22:23
Elevation: 1280

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/18/02	Dry												water present, not moving
11/25/02	0.57	7.4	8.3	9.0	155	-145	0.1	0.03	0.10	45	<5.0	217.0	
12/20/02	1.26	6.9	7.5	10.0	129	-121	<0.03	<0.01	<0.03	35	6.0	187.0	
1/30/03	2.79	7.1	8.1	6.5	167	-159	0.1	<0.01	0.20	40	<5.0	217.0	
2/24/03	~10	6.4	7.3	6.6	72	-68	0.07	<0.01	0.30	33	<5.0	153.0	Too much to measure
3/19/03	1.04	6.6	8.1	9.4	147	-143	<0.03	<0.01	0.20	36	5.0	195.0	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S - Z
Description: Spring - Unnamed drainage to South Branch of Enlow Fork upstream of proposed refuse drainage
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:18 W80:22:19
Elevation: 1220

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/18/02	0.37	7.4	8.1	15.0	219	-209	0.2	0.01	0.08	37	7.0	280.0	
11/25/02	1.13	7.3	8.1	10.0	163	-152	0.3	0.04	0.30	36	12.0	220.0	
12/20/02	3.41	6.8	7.4	12.0	113	-99	0.2	<0.01	0.20	28	<5.0	196.0	
1/30/03	3.99	7.2	8.1	9.2	174	-169	0.06	<0.01	0.10	39	<5.0	247.0	
2/24/03	~10	6.4	7.6	10.2	88	-85	0.1	<0.01	0.40	32	8.0	170.0	Too much to measure
3/19/03	12.00	6.7	7.6	11.3	171	-167	0.1	0.02	0.20	39	5.0	224.0	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Spring-D
Description: Spring - Upgradient of Existing Bailey Surface Facility
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:30 W80:23:56
Elevation: 1370

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
9/28/92	0.00												
12/30/92	0.13	6.6	6.4	9.7	20	-13	5.40	0.09	2.91	36	177	164	
3/29/93	0.75	6.7	6.5	7.6	12	-3	0.08	0.01	0.18	34	1	143	
6/28/93	0.00												
9/29/93	0.00												
12/27/93	0.00												
3/28/94	3.75	6.1	6.1	6.0	6	1	0.12	0.02	0.09	0	0	118	
6/7/94	0.00												
9/29/94	0.00												
10/27/94	0.00												
3/15/95	0.00												
6/20/95	0.00												
8/28/95	0.00												
12/18/95	0.00												
3/18/96	0.50	6.0	6.2	8.5	8	-1	0.39	0.05	0.31	28	2	140	
6/10/96	0.00												
8/12/96	0.00												
11/5/96	0.00												
1/21/97	0.00												
5/20/97	0.53	6.5	6.3	15.3	13	-1	0.69	0.02	0.06	30	2	130	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Spring-D
Description: Spring - Upgradient of Existing Bailey Surface Facility
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:30 W80:23:56
Elevation: 1370

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
9/23/97	0.00												
11/20/97	0.00												
2/3/98	<0.10	7.3	7.2	9.5	12	1	2.29	0.05	1.64	33	5	152	
6/2/98	0.00												
9/21/98	0.00												
10/6/98	0.00												
1/19/99	2.00	6.0	6.0	10.5	4	3	0.14	0.07	0.18	35	0	151	
6/9/99	0.00												
8/10/99	0.00												
10/19/99	0.00												
2/15/00	3.00	8.0	5.6	N/A	4	-10	0.40	0.02	N/A	29	<5	120	
4/20/00	0.50	6.7	6.9	N/A	8	-5	0.10	<0.01	N/A	48	18	90	
7/5/00	0.00												
11/8/00	0.00												
2/6/00	0.00												
3/27/01	0.00	N/A	8.4	N/A	11	-9	0.20	<0.01	0.10	37	12	150	
4/24/01	1.00	6.5	6.3	N/A	14	-5	0.30	0.03	N/A	24	5	520	
10/30/01	ND	7.8	7.4	11.0	219	-203	0.03	1.00	0.20	530	7	2272	
11/27/01	ND	7.9	7.6	11.0	129	-117	0.30	0.70	0.10	537	35	1770	
12/19/01	1.98	7.1	7.6	7.0	142	-141	0.09	0.20	0.10	544	<5	1641	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Spring-D
Description: Spring - Upgradient of Existing Bailey Surface Facility
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:30 W80:23:56
Elevation: 1370

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
1/29/02	2.64	7.4	7.7	11.0	173	-160	0.08	0.70	0.06	480	8	2136	
2/28/02	3.17	7.5	7.9	4.0	167	-155	0.20	0.60	0.10	541	<5.0	2285	
3/26/02	3.29	7.0	7.7	7.0	34	-21	0.70	0.20	1.10	40	82	249	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S1
Description: Stream - Upstream Talley Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:04 W80:24:41
Elevation: 1060

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
1/29/98	1.10	8.2	7.6	N/A	290	-280	0.30	1.34	0.10	775	6	4690	
4/29/98	1.10	8.0	7.8	N/A	296	-283	0.42	0.64	0.18	1075	13	5390	
7/29/98	1.16	7.8	7.8	N/A	277	0	0.24	0.24	N/A	950	0	6320	
10/28/98	1.10	8.0	8.3	N/A	271	-245	0.44	0.33	N/A	1100	5	6940	
1/26/99	1.50	8.2	8.1	N/A	241	-222	0.55	0.94	N/A	925	20	4660	
4/14/99	1.10	8.2	8.1	N/A	235	-219	0.73	0.58	N/A	900	13	5370	
8/11/99	0.89	7.9	8.1	N/A	264	-264	0.99	0.66	N/A	1225	1	6990	
11/1/99	0.67	8.0	8.2	N/A	303	-291	0.37	0.41	N/A	925	3	6270	
2/16/00	2.20	8.0	8.0	N/A	189	-183	0.30	0.80	N/A	1201	8	2900	
6/9/00	0.61	8.1	8.0	N/A	313	-309	0.30	0.30	N/A	847	5	4330	
8/28/00	0.91	8.0	7.9	N/A	324	-322	0.20	0.50	N/A	1157	<5	4600	
10/30/00	1.40	8.2	8.1	N/A	351	-344	0.50	0.60	N/A	1238	<5	4040	
3/23/01	2.70	8.3	8.2	N/A	321	-319	0.90	0.80	N/A	1143	18	3010	
6/8/01	2.70	8.2	8.2	N/A	255	-251	0.30	0.40	N/A	1124	37	3440	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S2
Description: Stream - Downstream Talley Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:21 W80:25:18
Elevation: 1000

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
1/6/86	0.67	N/A	8.0	N/A	110	-100	0.09	0.14	0.12	550	55	1700	
5/29/86	0.56	N/A	8.0	N/A	168	-163	0.74	<0.20	0.45	117	46	4470	
7/3/86	0.28	N/A	8.4	N/A	137	-109	1.32	0.07	0.03	350	51	1710	
12/18/86	1.65	N/A	8.4	N/A	159	-138	0.18	0.03	0.17	560	2	2990	
12/4/86	N/A	N/A	8.2	N/A	139	-125	<0.20	<0.20	<0.20	500	24	2400	
2/4/87	1.28	N/A	8.4	N/A	156	-134	0.15	0.18	0.19	292	10	1180	
3/11/87	0.76	N/A	8.2	N/A	187	-171	0.04	0.20	0.11	265	2	2150	
4/2/87	4.90	N/A	7.9	N/A	136	-133	5.01	0.33	6.20	190	173	1167	
5/6/87	1.65	N/A	8.3	N/A	156	-146	<0.50	<0.50	<0.50	3000	11	1570	
6/3/87	1.87	N/A	8.4	N/A	158	-151	0.94	<0.30	<0.30	500	6	1858	
7/8/87	N/A	N/A	8.4	N/A	173	-167	<0.30	<0.30	<0.30	450	14	2030	
8/6/87	0.90	N/A	8.3	N/A	136	-136	<0.40	<0.20	<0.80	380	9	2200	
9/2/87	1.32	N/A	8.4	N/A	192	-184	<0.30	<0.30	<0.30	668	2	2430	
9/16/87	N/A	N/A	8.2	N/A	169	-158	<0.30	<0.30	<0.30	583	29	2190	
10/14/87	1.08	N/A	8.2	N/A	186	-177	<0.30	<0.30	<0.30	419	8	2030	
10/20/87	N/A	N/A	8.3	N/A	135	-127	<0.30	<0.30	1.12	292	16	1932	
11/4/87	0.99	N/A	8.4	N/A	195	-190	<0.30	<0.30	<0.30	147	10	1900	
11/19/87	N/A	N/A	8.4	N/A	179	-172	<0.30	<0.30	<0.30	610	8	N/A	
12/2/87	2.50	N/A	8.4	N/A	196	-187	0.66	0.34	0.34	611	35	2320	
12/30/87	N/A	N/A	8.5	N/A	184	-177	<0.30	<0.30	<0.30	567	12	2110	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S2
Description: Stream - Downstream Talley Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:21 W80:25:18
Elevation: 1000

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
1/13/88	0.67	N/A	8.2	N/A	222	-218	<0.30	0.37	<0.30	442	19	2080	
1/28/88	N/A	N/A	8.3	N/A	183	-177	<0.30	0.41	<0.30	432	1	1990	
2/10/88	2.95	N/A	8.4	N/A	213	-198	<0.80	<0.80	<0.80	479	16	2530	
2/18/88	N/A	N/A	8.4	N/A	180	-172	<0.30	0.30	<0.30	416	5	1891	
3/2/88	1.46	N/A	8.5	N/A	197	-188	<0.30	<0.30	<0.30	430	14	1990	
3/29/88	N/A	N/A	8.5	N/A	174	-165	<0.30	<0.30	<0.30	157	13	1645	
4/5/88	1.25	N/A	8.4	N/A	167	-156	<0.30	<0.30	<0.30	344	16	1478	
5/2/88	1.00	N/A	8.2	N/A	181	-176	<0.30	<0.30	<0.30	395	14	1930	
6/6/88	0.62	N/A	8.4	N/A	169	-163	0.20	0.14	<0.05	371	5	2290	
7/14/88	0.50	N/A	8.2	N/A	163	-147	0.12	0.09	<0.05	401	2	2451	
8/3/88	1.50	N/A	8.4	N/A	176	-171	0.46	0.55	<0.20	787	35	4827	
9/16/88	0.66	N/A	8.3	N/A	186	-174	0.12	0.56	<0.05	697	11	2935	
10/27/88	0.33	N/A	8.2	N/A	176	-169	<0.20	1.01	<0.20	658	3	3060	
11/14/88	0.89	N/A	8.3	N/A	218	-211	0.39	0.73	<0.05	692	10	3097	
12/9/88	1.56	N/A	8.3	N/A	223	-21	<0.20	0.69	<0.20	633	1	3044	
1/25/89	3.00	N/A	8.3	N/A	200	-193	0.07	0.47	<0.05	647	4	2297	
2/17/89	5.00	N/A	8.2	N/A	143	-133	0.29	0.25	0.15	462	15	1609	
3/10/89	9.70	N/A	8.4	N/A	168	-158	0.31	0.32	0.18	510	14	1888	
4/29/89	2.80	N/A	8.4	N/A	170	-160	0.07	0.25	<0.05	471	14	1932	
5/22/89	3.00	N/A	8.2	N/A	196	-180	0.26	0.25	0.21	463	17	1887	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S2
Description: Stream - Downstream Talley Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:21 W80:25:18
Elevation: 1000

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
6/2/89	2.50	N/A	8.4	N/A	204	-196	0.35	<0.20	<0.20	436	8	2474	
7/21/89	0.62	N/A	8.3	N/A	211	-211	0.57	1.00	0.16	614	27	2722	
8/23/89	1.12	N/A	8.3	N/A	138	-136	0.35	0.25	0.14	511	7	2625	
9/27/89	997.00	N/A	8.4	N/A	188	-177	<0.20	<0.20	<0.20	876	4	2990	
10/27/89	996.00	N/A	8.3	N/A	180	-170	0.09	<0.05	<0.05	714	5	3037	
12/15/89	1.25	N/A	8.4	N/A	203	-196	0.12	0.13	<0.05	554	18	2649	
1/30/90	6.00	N/A	8.2	N/A	148	-142	1.12	0.13	0.62	279	65	1524	
2/21/90	2.66	N/A	8.3	N/A	194	-184	<0.05	0.23	<0.05	554	2	2056	
3/5/90	1.25	N/A	8.3	N/A	194	-184	<0.05	0.17	<0.05	487	2	2213	
4/9/90	1.25	N/A	8.2	N/A	174	-168	0.14	0.20	0.07	457	14	2163	
5/23/90	1.69	N/A	8.4	N/A	201	-191	0.11	0.67	0.09	608	6	2574	
6/28/90	1.46	N/A	8.4	N/A	185	-156	0.26	0.09	0.15	547	17	2673	
7/25/90	1.69	N/A	8.2	N/A	133	-121	0.36	0.07	<0.05	161	8	851	
11/5/90	1.13	N/A	8.0	N/A	178	-170	0.08	0.20	0.05	584	2	2596	
2/15/91	2.44	N/A	8.2	N/A	169	-159	0.16	0.13	0.09	398	24	1810	
5/23/91	561.00	N/A	8.2	N/A	204	-193	0.29	0.78	0.13	525	62	2783	
9/9/91	617.00	N/A	8.2	N/A	183	-177	<0.20	<0.20	<0.20	632	15	4334	
3/30/92	1495.00	N/A	8.2	N/A	160	-151	<0.05	0.08	0.07	671	21	2657	
6/22/92	898.00	N/A	8.3	N/A	219	-214	<0.21	<0.21	0.32	741	11	3917	
9/3/92	1572.00	N/A	8.2	N/A	197	-190	0.28	0.62	0.24	1149	8	4164	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S2
Description: Stream - Downstream Talley Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:21 W80:25:18
Elevation: 1000

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
12/18/92	1863.00	N/A	8.1	N/A	164	-157	0.81	0.31	0.86	528	42	1930	
2/20/93	748.00	N/A	8.3	N/A	209	-199	0.14	0.35	0.16	651	10	2517	
5/28/93	561.00	N/A	8.2	N/A	193	-189	0.25	0.27	0.22	635	24	3310	
8/4/93	1010.00	N/A	8.2	N/A	163	-145	<0.21	0.58	<0.21	1134	7	3852	
11/8/93	1092.00	N/A	8.3	N/A	167	-157	<0.21	0.30	<0.21	913	11	4088	
2/10/94	1497.00	N/A	8.3	N/A	209	-197	0.28	0.83	0.15	724	16	2741	
6/21/94	2019.00	N/A	8.0	N/A	209	-174	0.06	0.09	0.04	925	7	4000	
6/16/94	2244.00	N/A	7.9	N/A	270	-269	<0.21	0.23	<0.21	597	6	4000	
11/3/94	N/A	N/A	7.9	N/A	215	-215	0.29	0.44	0.17	608	36	2860	
3/31/95	673.00	N/A	7.7	N/A	262	-262	0.21	0.70	0.16	714	4	3220	
6/15/95	1885.00	N/A	8.0	N/A	203	-203	0.79	0.53	0.44	947	15	3720	
8/25/95	449.00	N/A	7.7	N/A	244	-243	<0.21	<0.21	<0.21	648	7	4440	
11/20/95	1870.00	N/A	8.1	N/A	185	-136	1.19	2.60	1.70	1475	34	4820	
1/29/98	1122.00	N/A	7.8	N/A	272	-262	0.15	0.73	0.10	675	33	3530	
1/29/98	2.50	8.3	7.7	N/A	243	-231	0.17	0.75	0.00	700	3	4000	
4/29/98	1400.00	N/A	8.0	N/A	239	-239	0.22	0.28	0.14	737	12	3700	
4/29/98	3.10	7.9	7.8	N/A	228	-219	0.20	0.27	0.15	775	6	4020	
5/27/98	842.00	N/A	7.9	N/A	220	-215	0.25	0.19	0.24	893	22	5050	
6/17/98	1234.00	N/A	7.8	N/A	272	-263	0.41	0.57	N/A	1150	36	5550	
7/22/98	1010.00	N/A	7.7	N/A	253	-238	0.12	0.14	<0.05	988	12	5790	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S2
Description: Stream - Downstream Talley Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:21 W80:25:18
Elevation: 1000

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
7/29/98	1.05	8.2	7.9	N/A	235	-222	0.14	0.10	N/A	975	0	6150	
8/19/98	842.00	N/A	7.7	N/A	195	-169	<0.21	<0.21	0.21	4260	10	5500	
9/21/98	561.00	N/A	7.7	N/A	211	-202	0.21	0.21	0.09	1010	17	5530	
10/28/98	539.00	N/A	7.7	N/A	253	-246	0.15	0.17	<0.05	1040	4	6090	
10/28/98	1.20	8.1	8.3	N/A	227	-208	0.19	0.16	N/A	1025	6	6420	
11/11/98	617.00	N/A	7.6	N/A	241	-238	0.19	0.16	0.14	1060	17	6230	
1/26/99	898.00	N/A	7.8	N/A	194	-188	0.32	0.52	0.22	619	22	3150	
1/26/99	2.00	8.1	8.1	N/A	199	-187	0.34	0.46	N/A	713	12	3740	
4/14/99	898.00	N/A	7.8	N/A	213	-208	0.33	0.34	0.33	792	1	3710	
4/14/99	2.00	8.3	8.1	N/A	205	-191	0.39	0.31	N/A	725	5	4380	
8/11/99	299.00	N/A	7.8	N/A	226	-221	0.17	0.16	0.12	1050	21	5440	
8/11/99	0.67	8.1	8.3	N/A	209	-209	0.24	0.16	N/A	1150	1	6440	
11/1/99	448.00	N/A	7.6	N/A	253	-247	0.16	0.23	<0.05	1020	14	5360	
11/1/99	1.00	8.2	8.2	N/A	253	-241	0.18	0.20	N/A	675	2	6520	
2/16/00	4.40	8.3	8.3	N/A	163	-158	0.40	0.50	N/A	830	9	2270	
3/1/00	504.00	N/A	8.2	N/A	220	-214	0.60	0.30	0.10	1042	13	3510	
6/9/00	0.67	8.2	8.1	N/A	242	-239	0.20	0.04	N/A	1199	15	3920	
8/28/00	1.06	8.2	8.1	N/A	261	-256	0.10	0.20	N/A	967	<5	4500	
10/18/00	673.00	N/A	8.0	N/A	271	-265	0.30	0.40	0.30	865	46	4160	
10/30/00	1.50	8.3	8.3	N/A	271	-265	0.50	1.20	N/A	1159	13	4150	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S2
Description: Stream - Downstream Talley Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:21 W80:25:18
Elevation: 1000

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
2/6/01	700.00	N/A	8.2	N/A	284	-269	0.60	0.90	0.30	1566	16	3870	
3/23/01	4.50	8.5	8.5	N/A	261	-256	0.50	0.40	N/A	800	23	2290	
6/8/01	2.70	8.4	8.4	N/A	217	-212	0.30	0.30	N/A	1066	32	3080	
8/1/01	N/A	N/A	8.1	N/A	347	-331	N/A	N/A	N/A	N/A	23	N/A	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S7
Description:Upstream of 1 South on Unnamed Tributary to Kerr Road Valley Tributary
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:31 W80:25:01
Elevation: 1220

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
1/28/98	0.11	7.7	7.5	N/A	116	-100	0.12	0.02	0.04	63	0	357	
5/27/98	0.06	7.9	8.6	N/A	163	-151	0.32	0.04	0.27	55	3	414	
7/29/98	trickle	8.2	8.5	N/A	187	-171	0.38	0.01	N/A	53	1	460	
1/27/98	0.31	7.9	7.8	N/A	94	-77	0.15	0.02	N/A	63	1	337	
4/14/99	0.02	7.9	8.0	N/A	100	-88	0.56	0.04	N/A	55	10	323	
11/3/99	0.01	7.7	8.2	N/A	94	-76	0.15	0.04	N/A	165	2	518	
1/12/00	0.02	8.2	7.8	N/A	118	-113	0.03	<0.01	N/A	117	6	420	
6/2/00	0.01	8.1	8.1	N/A	162	-157	0.07	<0.01	N/A	49	7	380	
8/28/00	0.00	8.0	8.0	N/A	182	-177	0.09	0.07	N/A	193	<5	460	
10/30/00	<0.001	7.5	7.4	N/A	209	-202	0.40	0.20	N/A	676	5	430	
3/23/01	0.41	8.1	N/A	N/A	87	-80	0.30	0.01	N/A	84	9	190	
6/8/01	0.15	8.0	7.9	N/A	146	-138	0.20	0.01	N/A	68	9	360	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S8
Description:Downstream of 1 South Shaft on Unnamed Tributary to Kerr Road Valley Tributary
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:23 W80:24:59
Elevation: 1220

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
1/28/98	0.13	7.4	7.3	N/A	114	-100	0.07	0.01	0.03	63	0	350	
5/27/98	0.07	8.0	8.5	N/A	161	-146	0.44	0.04	0.35	55	6	412	
7/29/98	trickle	7.9	8.0	N/A	185	-170	0.15	0.02	N/A	51	0	454	
1/27/99	0.33	8.2	7.9	N/A	89	-74	0.21	0.02	N/A	63	0	330	
4/14/99	0.02	8.0	8.1	N/A	99	-88	0.61	0.03	N/A	51	6	320	
11/3/99	0.01	7.8	8.2	N/A	93	-81	0.21	0.02	N/A	153	2	500	
1/12/00	0.02	8.2	7.9	N/A	123	-110	<0.03	1.40	N/A	113	5	370	
6/2/00	0.01	8.0	8.1	N/A	167	-163	0.20	0.02	N/A	60	9	370	
8/28/00	0.00	7.4	7.5	N/A	194	-189	0.09	0.10	N/A	157	5	450	
10/30/00	<0.001	7.5	7.4	N/A	214	-207	0.40	0.10	N/A	163	12	330	
3/23/01	0.54	7.7	7.8	N/A	85	-77	0.60	0.03	N/A	81	9	190	
6/8/01	0.17	8.2	7.9	N/A	124	-116	0.30	0.02	N/A	64	20	320	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S27
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:27 W80:23:15
Elevation: 1280

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
9/25/01	ND	7.9	7.8	14.0	302	-289	0.40	0.03	0.20	100	26	400	
10/23/01	ND	8.4	8.0	18.0	256	-242	0.20	0.05	0.20	106	21	419	
11/28/01	ND	8.2	7.9	9.0	233	-220	<0.03	0.05	0.07	115	26	397	
12/19/01	~0.79	7.3	7.9	9.0	276	-263	0.10	0.02	0.06	104	<5	360	
1/30/02	~1.22	7.1	7.6	8.0	224	-210	0.10	0.07	0.20	91	56	342	
2/21/02	~1.98	7.2	7.8	6.0	230	-226	<0.03	0.02	<0.03	113	24	347	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S28
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:24 W80:23:23
Elevation: 1440

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
12/19/01	~2	7.4	8.0	6.0	136	-125	0.08	0.90	0.06	69	17	1423	
1/30/02	N/A	7.1	7.8	8.0	113	-97	0.50	0.30	0.70	59	164	110	
2/21/02	~1.44	7.3	8.0	4.0	131	-126	0.10	0.40	0.06	72	<5.0	233	
3/28/02	N/A	7.6	8.5	12.0	119	-105	1.80	0.30	2.30	38	175	179	
4/16/02	N/A	7.6	7.8	25.0	143	-138	0.60	0.30	0.30	59	165	223	
7/23/02	Dry												

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S38
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:22 W80:22:48
Elevation: 1280

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
9/20/01	ND	8.2	8.2	17.0	240	-226	0.07	<0.01	0.20	51	30	306	
10/25/01	ND	8.4	7.7	14.0	272	-257	0.09	<0.01	0.10	82	37	369	
11/29/01	ND	8.5	8.2	13.0	235	-223	0.20	<0.01	0.09	83	27	347	
12/18/01	1.59	7.7	8.2	8.0	223	-211	0.20	0.01	0.10	103	44	336	
1/30/02	1.98	7.5	8.2	8.0	209	-192	0.10	0.01	0.08	81	83	300	
2/21/02	2.26	7.7	8.3	4.0	242	-230	0.50	0.02	0.60	87	<5.0	340	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S39
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:20 W80:22:51
Elevation: 1300

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
9/27/01	ND	8.1	8.5	11.0	281	-270	0.05	<0.01	0.20	43	256	478	
10/25/01	ND	8.8	8.1	14.0	223	-209	1.00	0.03	1.20	87	5	299	
11/29/01	ND	8.4	8.2	11.0	218	-206	0.10	<0.01	0.08	95	15	314	
12/18/01	1.13	7.6	8.2	7.0	178	-165	0.10	<0.01	0.10	101	16	306	
1/30/02	1.76	7.5	8.2	8.0	198	-182	0.05	0.01	0.08	99	115	321	
2/21/02	2.64	7.7	8.3	7.0	206	-192	0.04	0.01	<0.03	98	24	295	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S40
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:16 W80:22:51
Elevation: 1280

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
9/27/01	ND	8.0	8.4	12.0	245	-233	0.05	0.01	0.20	75	<5	365	
10/25/01	ND	8.5	7.9	12.0	224	-211	0.10	0.01	0.20	93	22	337	
11/29/01	ND	8.4	8.0	11.0	173	-162	0.10	<0.01	0.09	88	17	288	
12/18/01	1.98	7.2	7.9	9.0	137	-125	0.20	0.10	0.20	67	77	213	
1/30/02	2.64	7.3	8.0	8.0	176	-163	0.10	0.01	0.05	79	219	276	
2/21/02	1.98	7.2	7.9	8.0	170	-154	0.30	0.01	0.30	73	22	300	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S41
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:07 W80:22:57
Elevation: 1320

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
9/27/01	ND	8.1	8.6	11.0	124	-111	0.06	0.01	0.20	74	39	583	
10/25/01	ND	8.8	8.2	11.0	240	-227	0.30	<0.01	0.30	96	7	373	
11/29/01	ND	8.4	8.2	11.0	200	-188	0.10	0.02	0.10	76	18	261	
12/18/01	1.59	7.3	8.1	9.0	117	-104	0.10	<0.01	0.10	57	23	172	
1/30/02	3.96	7.3	8.1	9.0	117	-99	0.07	0.01	0.04	48	87	176	
2/21/02	5.28	7.5	8.2	6.0	126	-121	<0.03	0.01	<0.03	61	13	242	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No.: S42
Description: Main Valley of New Refuse Disposal Area
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:07 W80:22:51
Elevation: 1240

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
9/27/01	ND	8.5	8.4	10.0	184	-176	0.04	0.03	0.20	31	<5	352	
10/25/01	ND	7.8	7.8	10.0	115	-101	0.10	<0.01	0.20	40	8	179	
11/29/01	ND	8.4	7.9	10.0	120	-104	0.09	<0.01	0.10	50	5	150	
12/18/01	4.53	7.2	7.8	8.0	61	-51	0.10	<0.01	0.10	43	33	131	
1/30/02	5.28	7.0	7.8	7.0	78	-67	0.03	0.01	<0.03	46	23	136	
2/21/02	5.28	7.1	7.9	6.0	106	-97	0.20	0.02	0.20	47	13	155	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S45
Description: Spring Grinnage Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:56:57 W80:23:06
Elevation: 1380

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/1/01	ND	7.6	8.2	14.0	247	-235	<0.03	<0.01	0.20	78	18	423	
10/26/01	ND	7.1	7.5	10.0	250	-236	0.20	0.01	0.04	112	<5	346	
11/30/01	ND	7.7	7.4	11.0	148	-138	0.20	<0.01	0.20	99	8	261	
12/20/01	0.66	7.0	7.7	10.0	173	-161	0.05	<0.01	0.10	93	<5	278	
1/29/02	1.59	7.4	8.0	10.0	163	-149	0.06	0.01	0.09	95	7	266	
2/27/02	3.17	7.4	8.1	3.0	162	-152	<0.03	<0.01	0.05	99	<5.0	282	
3/26/02	2.04	6.7	7.7	7.0	30	-20	0.70	0.05	1.00	45	168	42	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S46
Description: Spring Grinnage Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:00 W80:23:19
Elevation: 1280

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/1/01	ND	8.0	8.5	15.0	249	-236	0.07	0.04	0.20	120	103	440	
10/26/01	ND	7.8	8.0	10.0	288	-275	0.10	0.03	0.30	148	8	438	
11/29/01	ND	8.3	8.1	11.0	219	-207	0.20	0.09	0.10	89	18	337	
12/20/01	0.88	7.6	8.3	6.0	244	-233	0.05	0.10	0.20	152	9	394	
1/29/02	2.64	7.7	8.2	10.0	219	-205	0.05	0.01	0.05	144	60	371	
2/27/02	5.28	7.5	8.2	2.0	235	-229	0.09	0.01	0.10	120	10	351	
3/26/02	3.11	6.9	7.8	6.0	48	-34	1.30	0.20	1.50	48	760	68	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No:S48
Description: Spring Time Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:54 W80:23:19
Elevation: 1350

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/25/01	ND	8.7	7.9	10.0	121	-107	0.09	0.01	0.20	40	27	198	
11/27/01	ND	7.9	7.7	12.0	64	-54	0.30	<0.01	0.20	38	28	218	
12/20/01	1.98	7.2	8.1	6.0	78	-67	0.10	0.01	0.09	40	5	127	
1/28/02	3.17	7.0	7.3	10.0	75	-63	0.08	0.01	0.09	37	<5.0	160	
2/28/02	2.75	7.1	8.1	3.0	124	-117	0.07	<0.01	0.09	47	<5.0	212	
3/28/02	2.46	7.2	7.6	8.0	33	-27	0.05	<0.01	0.50	27	<5.0	93	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S49
Description: Spring Time Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:51 W80:23:01
Elevation: 1280

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/25/01	ND	8.8	8.0	11.0	141	-129	0.30	0.01	0.30	44	22	222	
11/27/01	ND	8.2	8.1	12.0	97	-86	0.20	0.01	0.20	67	13	220	
12/20/01	0.79	7.1	8.1	6.0	116	-105	0.06	<0.01	0.10	59	27	209	
1/28/02	2.64	7.1	7.9	6.0	103	-90	0.20	0.01	0.10	47	<5.0	216	
2/28/02	2.15	7.4	8.1	2.0	108	-96	0.09	<0.01	0.09	60	<5.0	174	
3/28/02	2.98	7.5	8.5	10.0	114	-103	0.07	<0.01	0.50	40	35	175	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: S52
Description: Spring Fletcher Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:15 W80:23:35
Elevation: 1330

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/26/01	ND	8.0	8.0	6.0	258	-252	0.30	0.20	0.07	118	89	404	
11/27/01	ND	8.2	8.0	11.0	184	-172	0.20	0.10	0.20	119	19	331	
12/18/01	0.72	7.5	7.6	8.0	247	-235	0.10	0.03	0.04	137	21	480	
1/29/02	2.64	6.9	7.4	10.0	258	-244	0.40	0.20	0.04	113	6	388	
2/21/02	3.17	7.1	8.0	10.0	255	-243	0.10	0.03	0.05	121	<5.0	406	
3/28/02	3.48	7.0	8.0	10.0	207	-197	0.10	0.02	0.50	100	9	300	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No:S53
Description: Spring Fletcher Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:18 W80:23:34
Elevation: 1340

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/26/01	ND	8.2	8.0	8.0	244	-239	0.10	0.05	0.07	107	44	411	
11/27/01	ND	7.9	7.6	10.0	88	-73	1.10	0.05	1.00	83	125	228	
12/18/01	0.66	7.4	8.4	8.0	166	-154	0.20	0.05	0.10	118	46	323	
1/29/02	1.44	7.5	8.1	11.0	257	-242	0.20	0.02	0.10	121	51	397	
2/21/02	1.76	7.5	8.2	9.0	257	-243	0.05	0.01	<0.03	155	10	421	
3/28/02	2.15	7.6	8.6	10.0	227	-215	0.06	0.01	0.50	129	32	361	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: P54
Description: Pond Fletcher Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:18 W80:23:37
Elevation: 1320

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/26/01	ND	7.6	7.6	7.0	238	-228	2.30	0.44	0.10	45	11	421	
11/27/01	ND	8.1	7.9	10.0	165	-151	0.30	0.10	0.20	42	34	286	
12/18/01	3.60	7.3	7.9	6.0	122	-110	0.40	0.20	0.20	70	11	279	
1/29/02	2.26	7.2	7.8	10.0	205	-190	0.20	0.06	0.10	97	17	353	
2/21/02	15.85	7.4	8.1	7.0	208	-196	0.30	0.05	0.20	70	26	328	
3/28/02	8.47	7.6	8.6	14.0	140	-130	0.06	0.01	0.50	81	5	243	

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No:S60
Description: Spring Fletcher Run Valley
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:23 W80:23:38
Elevation: 1360

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/18/02	Dry												
11/25/02	Dry												
12/20/02	2.38	6.80	7.0	12.0	154	-142	0.06	<0.01	0.03	120	14.0	296.0	
1/30/03	Dry												
2/24/03	Dry												
3/19/03	Dry												

ND - Not Determined

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW-N
Description: New Refuse Area Valley Stream
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:35 W80:22:29
Elevation: 1100

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
8/1/01	35.00	N/A	8.0	N/A	139	-125	1.00	0.06	1.10	56	26	360	
10/11/01	23.45	8.0	7.9	17.0	177	-164	0.30	0.30	0.10	79	11	299	
11/29/01	140.51	7.9	7.7	12.0	130	-119	0.20	0.10	0.10	81	<5	277	
12/19/01	364.50	7.4	8.0	8.0	115	-104	0.08	0.08	0.06	77	8	239	
1/28/02	240.48	6.9	7.8	6.0	118	-105	0.20	0.08	0.07	80	<5.0	246	
2/27/02	287.12	7.2	8.0	1.0	129	-117	0.07	0.07	0.02	96	<5.0	238	
3/25/02	374.35	7.0	7.7	6.0	49	-33	1.90	0.07	2.00	23	8910	210	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - O
Description: Kerr Road Valley Stream
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:15 W80:24:24
Elevation: 1200

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/11/01	0.23	8.5	8.1	13.0	202	-190	0.10	0.04	0.10	598	<5	1518	
11/29/01	37.50	8.4	8.0	12.0	130	-119	0.07	0.05	0.01	167	5	808	
12/19/01	68.49	8.1	8.1	6.0	129	-114	0.09	0.07	0.20	110	20	466	
1/29/02	46.15	7.4	8.1	10.0	141	-128	0.10	0.04	0.10	164	<5	676	
2/28/02	51.88	8.0	8.3	3.0	134	-124	0.09	0.06	0.08	178	<5.0	687	
3/26/02	67.23	6.9	8.0	7.0	56	-43	0.80	0.08	1.20	43	140	163	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - P
Description: Kerr Road Stream Valley at Owen's Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:56:51 W80:25:14
Elevation: 1095

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
8/1/01	71.00	N/A	8.2	N/A	194	-180	0.07	0.04	0.20	49	6	540	
10/11/01	26.80	8.0	8.0	13.0	249	-237	0.10	0.02	0.08	94	<5	389	
11/29/01	245.11	8.4	8.1	12.0	177	-166	<0.03	<0.01	0.06	114	<5	436	
12/19/01	427.97	7.8	8.3	7.0	149	-137	0.09	0.02	0.07	89	<5	284	
1/29/02	443.61	7.8	8.4	9.0	156	-143	0.08	0.03	0.05	85	<5	348	
2/28/02	387.23	7.8	8.5	3.0	148	-138	0.05	0.02	0.06	93	<5.0	351	
3/26/02	452.11	7.0	8.0	8.0	50	-34	1.20	0.06	1.70	31	488	51	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - Q
Description: Fletcher Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:56:55 W80:23:58
Elevation: 1220

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/11/01	4.33	8.1	8.0	14.0	231	-217	0.20	0.20	0.10	70	10	282	
11/30/01	58.50	7.9	7.7	12.0	147	-136	0.30	0.20	0.10	67	10	244	
12/19/01	89.30	7.5	8.0	8.0	143	-130	0.20	0.20	0.10	75	14	206	
1/29/02	69.07	7.3	7.9	8.0	162	-142	0.30	0.10	0.20	93	<5.0	267	
2/28/02	67.51	7.5	8.1	3.0	161	-151	0.10	0.10	0.08	85	21	264	
3/26/02	78.42	6.8	7.8	8.0	55	-39	1.90	0.20	2.00	39	784	65	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - R
Description: Fletcher Run at Grays Fork
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:56:19 W80:24:23
Elevation: 1160

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
8/1/01	115.00	N/A	7.9	N/A	193	-184	0.50	0.20	0.40	45	10	450	
10/11/01	1.30	7.4	7.3	11.0	266	-255	0.40	3.00	0.10	30	73	344	
11/30/01	163.69	8.1	7.9	11.0	162	-150	0.30	0.08	0.20	66	23	254	
12/19/01	333.84	7.7	8.2	8.0	163	-150	0.20	0.10	0.20	70	12	242	
1/29/02	185.76	7.4	8.1	10.0	177	-164	0.40	0.10	0.40	75	12	267	
2/28/02	202.97	7.8	8.4	4.0	172	-162	0.40	0.10	0.30	81	<5.0	257	
3/26/02	221.34	6.9	7.8	7.0	56	-53	2.10	0.20	2.10	48	1082	120	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - S
Description: Grinnage Run
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:56:47 W80:23:22
Elevation: 1220

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m mho)	Comments
10/11/01	1.97	8.1	8.0	12.0	226	-217	0.09	0.05	0.07	79	13	317	
11/30/01	46.00	8.0	7.7	11.0	122	-112	0.20	0.02	0.20	73	<5	205	
12/20/01	96.50	7.2	8.3	5.0	141	-129	0.07	0.03	0.20	78	9	210	
1/29/02	68.98	7.4	8.0	9.0	147	-138	0.20	0.02	0.10	91	<5	264	
2/27/02	71.33	7.5	8.2	1.0	148	-135	0.10	0.03	0.20	94	<5.0	266	
3/26/02	79.12	6.9	7.6	7.0	39	-25	1.10	0.20	1.00	36	770	116	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - T
Description: Grinnage Run at Grays Fork
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:55:57 W80:23:32
Elevation: 1110

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/11/01	22.70	8.4	8.3	12.0	230	-219	0.10	0.07	0.07	86	<5	315	
11/30/01	314.83	8.2	7.9	11.0	132	-121	0.30	0.05	0.20	71	16	212	
12/19/01	392.37	7.8	8.2	8.0	119	-117	0.10	0.07	0.10	68	16	203	
1/29/02	236.51	7.7	8.3	9.0	139	-127	0.20	0.06	0.10	82	<5	227	
2/28/02	301.47	7.8	8.4	4.0	134	-124	0.20	0.06	0.10	87	<5.0	238	
3/26/02	358.11	6.8	7.8	7.0	41	-29	1.40	0.20	1.50	31	766	51	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - U
Description: South Branch of Enlow Fork upstream of unnamed tributary
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:30 W80:22:21
Elevation: 1140

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/11/01	25.20	8.0	7.8	16.0	183	-171	0.10	0.20	0.10	105	5	289	
11/29/01	266.42	8.2	8.0	12.0	112	-103	0.20	0.02	0.09	88	6	230	
12/19/01	456.13	7.6	8.2	8.0	93	-82	0.10	0.03	0.10	83	10	182	
1/28/02	213.73	7.1	7.9	7.0	99	-84	0.30	0.04	0.20	73	6	196	
2/27/02	299.45	7.4	8.2	1.0	117	-113	0.20	0.04	0.10	77	<5.0	197	
3/25/02	387.16	7.0	7.8	6.0	47	-34	1.60	0.08	1.60	16	4948	168	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - V
Description: South Branch of Enlow Fork downstream of unnamed tributary
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:44 W80:22:32
Elevation: 1090

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
1/20/99	5027.23	8.0	7.7	N/A	51	-41	0.51	0.06	0.37	56	3	234	
4/26/99	3231.79	8.1	8.0	N/A	74	-60	0.27	0.03	0.11	44	0	250	
7/9/99	98.75	7.9	8.3	N/A	124	-103	0.35	0.07	0.22	50	5	358	
10/16/99	4.49	7.8	7.9	N/A	112	-90	0.19	0.02	0.12	95	10	434	
2/25/00	2334.07	8.0	8.0	N/A	69	-65	0.08	<0.01	0.20	47	5	240	
5/25/00	3186.91	8.0	8.1	N/A	116	-111	0.30	0.03	N/A	32	7	260	
7/14/00	6.73	7.9	7.9	N/A	135	-132	<0.03	<0.01	<0.04	35	10	320	
10/11/01	11.17	8.3	7.9	12.0	200	-188	0.10	0.10	0.10	107	10	340	
11/29/01	465.83	8.2	8.0	10.0	126	-114	0.10	0.05	0.06	99	7	257	
12/19/01	1003.20	7.6	8.2	8.0	109	-93	0.09	0.06	0.10	94	9	207	
1/28/02	420.22	7.0	8.0	7.0	105	-90	0.30	0.06	0.10	95	<5.0	234	
2/27/02	546.23	7.3	8.1	1.0	116	-106	0.10	0.05	0.10	93	<5.0	168	
3/25/02	789.10	7.0	7.8	6.0	55	-38	1.50	0.05	1.60	22	5220	116	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW - W
Description: Time Valley Stream
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:58:02 W80:22:51
Elevation: 1100

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
8/1/01	42.00	N/A	8.0	N/A	144	-129	1.00	0.05	1.10	72	21	340	
11/30/01	24.00	8.3	8.1	10.0	108	-97	0.20	0.02	0.10	78	<5	235	
12/19/01	44.05	7.7	8.1	6.0	108	-104	0.05	0.01	0.08	78	17	235	
1/28/02	36.55	7.1	7.8	4.0	84	-71	0.20	0.01	0.05	65	<5.0	196	
2/27/02	49.12	7.2	8.1	1.0	85	-76	0.10	<0.01	0.10	70	<5.0	202	
3/25/02	86.30	7.2	7.8	6.0	44	-31	1.90	0.07	1.80	18	1608	188	
4/16/02	127.63	7.5	7.7	16.0	67	-61	0.10	0.02	0.20	36	11	154	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW -X
Description: Upstream - Unnamed drainage to South Branch of Enlow Fork upstream of proposed refuse drainage
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:08 W80:22:26
Elevation: 1280

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/18/02	Dry												
11/25/02	Dry												
12/20/02	Dry												
1/30/03	Dry												
2/24/03	Dry												
3/19/03	Dry												

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: SW -Y
Description: Downstream - Unnamed drainage to South Branch of Enlow Fork upstream of proposed refuse drainage
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:18 W80:22:15
Elevation: 1180

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/18/02	0.27	7.9	7.8	18.0	178	-168	0.3	0.07	0.2	60	26.0	255.0	
11/25/02	7.12	6.6	7.6	8.0	65	-55	0.5	0.10	0.4	34	<5.0	121.0	
12/20/02	45.74	6.8	7.4	8.0	57	-47	0.6	<0.01	0.4	30	7.0	129.0	
1/30/03	27.48	6.5	7.7	3.2	99	-95	0.2	0.03	0.2	40	7.0	164.0	
2/24/03	114.57	7.0	7.4	3.5	38	-33	0.1	<0.01	0.5	30	8.0	120.0	
3/19/03	36.29	6.8	7.6	9.4	71	-66	0.2	0.01	0.2	33	15.0	148.0	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Greene 1
Description: Well
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:35 W80:22:20
Elevation: 1185

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
9/20/01	ND	7.6	7.6	23.0	179	-167	0.10	<0.01	0.05	33	<5	190	
10/30/01	ND	7.8	7.7	23.0	185	-174	0.06	0.03	0.10	44	8	460	
11/28/01	29.48	7.9	7.9	18.0	194	-184	0.10	0.03	0.07	43	<5	259	
12/20/01	29.82	7.1	7.9	22.0	196	-194	0.30	0.08	0.10	47	8	240	
1/30/02	30.75	6.5	7.5	21.0	173	-159	0.40	0.02	0.06	49	<5	239	
2/21/02	29.02	7.0	7.7	15.0	216	-196	0.10	0.01	<0.03	87	<5.0	356	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Greene 2
Description: Well
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:36 W80:22:17
Elevation: 1200

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/30/01	ND	8.0	7.7	16.0	234	-221	0.10	0.01	0.10	92	<5	336	
11/28/01	39.75	8.1	7.5	13.0	235	-224	0.01	<0.10	0.09	90	<5	309	
12/20/01	30.48	7.0	7.8	12.0	240	-237	0.05	0.01	0.10	91	<5	315	
1/29/02	28.22	6.9	7.5	16.0	227	-213	0.20	0.01	0.03	80	<5.0	311	
2/21/02	31.42	7.0	7.7	12.0	148	-122	0.20	0.02	<0.03	46	<5.0	235	
3/26/02	37.19	7.0	8.1	20.0	212	-200	<0.03	0.01	0.20	74	<5.0	294	

MODULE 8.4A
BACKGROUND/MONITORING POINT

Operator: Consol Pennsylvania Coal Company
Mine Name: BAILEY MINE
Permit No:
Municipality: Richhill Township
County: Greene

Monitoring Point No: Webb 1
Description:Well
Method of Flow Measurement (Weir, Meter, Etc.)
Coordinates: N39:57:16 W80:23:18
Elevation: 1410

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

Date Sampled	Flow (gpm)/ Static Water Elevation	Field pH	Lab pH	Field Temp (C)	Alkalinity (mg/L)	Acidity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Aluminum (mg/L)	Sulfate (mg/L)	Suspended Solids (mg/L)	Tot. Dis. Solids (mg/l) or Spec. Cond.(m-mho)	Comments
10/30/01	ND	8.3	8.1	13.0	421	-406	0.10	0.06	0.20	73	<5	466	
11/28/01	ND	8.4	8.3	13.0	418	-407	0.10	<0.01	0.06	69	<5	712	
12/19/01	ND	7.5	8.1	11.0	161	-150	0.06	<0.01	0.20	178	<5	400	
1/30/02	ND	7.0	7.6	14.0	224	-211	0.10	0.01	0.06	113	<5	420	
2/21/02	ND	7.1	7.8	7.0	260	-256	0.08	<0.01	<0.03	146	<5.0	469	
3/26/02	ND	7.0	8.1	8.0	246	-232	0.05	<0.01	0.20	98	<5.0	387	

FORM 8.6A
MONITORING PROGRAM SUMMARY

Monitoring Point No. (4 digits max.)	Description	Flow	Water Elev.	Field pH	Lab pH	Tempera-ture	Alka-linity	Acidity	Iron	Manganese	Aluminum	Sulfate	Sus. Solids	Dis. Solids	Spec. Cond.	Start Date	End Date	Frequency
MW-H-S (Shallow)	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-H-D (Deep)	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-I- S (Intermediate)	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-I -D (Deep)	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-J	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-K-S (Shallow)	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-K-I (Intermediate)	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-K-D (Deep)	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-L-S (Shallow)	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-L-I (Shallow)	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-L-D (Deep)	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
MW-M	Monitoring Well		*	*	*	*	*	*	*	*	*	*	*	*	*	1	2	Quarterly
S-Z	Spring	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
S-AA	Spring	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-N	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-O	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-P	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-Q	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-R	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-S	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-T	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly

Monitoring Point No. (4 digits max.)	Description	Flow	Water Elev.	Field pH	Lab pH	Tempera-ture	Alka-linity	Acidity	Iron	Manganese	Aluminum	Sulfate	Sus. Solids	Dis. Solids	Spec. Cond.	Start Date	End Date	Frequency
SW-U	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-V	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-W	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-X	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
SW-Y	Stream Point	*		*	*	*	*	*	*	*	*	*	*	*	*	3	2	Quarterly
Spring Drain BB (Coarse)	Spring Collector Drain	*		*	*	*	*	*	*	*	*	*	*	*	*	4	2	Quarterly
Spring Drain CC (Slurry)	Spring Collector Drain	*		*	*	*	*	*	*	*	*	*	*	*	*	4	2	Quarterly
Leachate Drain DD (Coarse)	Leachate Collector Drain	*		*	*	*	*	*	*	*	*	*	*	*	*	4	2	Quarterly
Leachate Drain EE (Slurry)	Leachate Collector Drain	*		*	*	*	*	*	*	*	*	*	*	*	*	4	2	Quarterly
Saddle Dam B	Toe Drain Outlet	*		*	*	*	*	*	*	*	*	*	*	*	*	4	2	Quarterly
Saddle Dam C	Toe Drain Outlet	*		*	*	*	*	*	*	*	*	*	*	*	*	4	2	Quarterly
Saddle Dam D	Toe Drain Outlet	*		*	*	*	*	*	*	*	*	*	*	*	*	4	2	Quarterly

1- Monitoring wells will be installed and monitoring will begin upon approval of the monitoring plan and issuance of the permit
2- Monitoring will continue throughout the life and closure of the facility
3- Monitoring will begin upon approval of the monitoring plan and will continue throughout the life and closure of the facility
4- Monitoring will begin when drain system / outlet is installed.

APPENDIX 8.6-A
Locations and elevation of proposed monitoring points in the hydrologic monitoring plan

Monitoring Point No.	Description	Elevation	Latitude	Longitude
MW-H-S (Shallow)	Monitoring Well	1140	39:57:32	80:22:20
MW-H-D (Deep)	Monitoring Well	1140	39:57:50	80:23:29
MW-I- S (Intermediate)	Monitoring Well	1480	39:57:50	80:23:29
MW-I -D (Deep)	Monitoring Well	1480	39:57:50	80:23:29
MW-J	Monitoring Well	1420	39:57:47	80:22:58
MW-K-S (Shallow)	Monitoring Well	1520	39:57:26	80:23:29
MW-K-I (Intermediate)	Monitoring Well	1520	39:57:26	80:23:29
MW-K-D (Deep)	Monitoring Well	1520	39:57:26	80:23:29
MW-L-S (Shallow)	Monitoring Well	1500	39:57:02	80:23:05
MW-L-I (Intermediate)	Monitoring Well	1500	39:57:02	80:23:05
MW-L-D (Deep)	Monitoring Well	1500	39:57:02	80:23:05
MW-M	Monitoring Well	1470	39:57:09	80:22:35
S-Z	Spring	1320	39:57:17	80:22:19
S-AA	Spring	1380	39:57:14	80:22:22
SW-N	Stream Point	1120	39:57:34	80:22:29
SW-O	Stream Point	1200	39:57:15	80:24:24
SW-P	Stream Point	1100	39:56:51	80:25:15
SW-Q	Stream Point	1220	39:56:54	80:23:57
SW-R	Stream Point	1160	39:56:18	80:24:24
SW-S	Stream Point	1220	39:56:46	80:23:21
SW-T	Stream Point	1120	39:55:56	80:23:32
SW-U	Stream Point	1140	39:57:29	80:22:20

APPENDIX 8.6-A
Locations and elevation of proposed monitoring points in the hydrologic monitoring plan

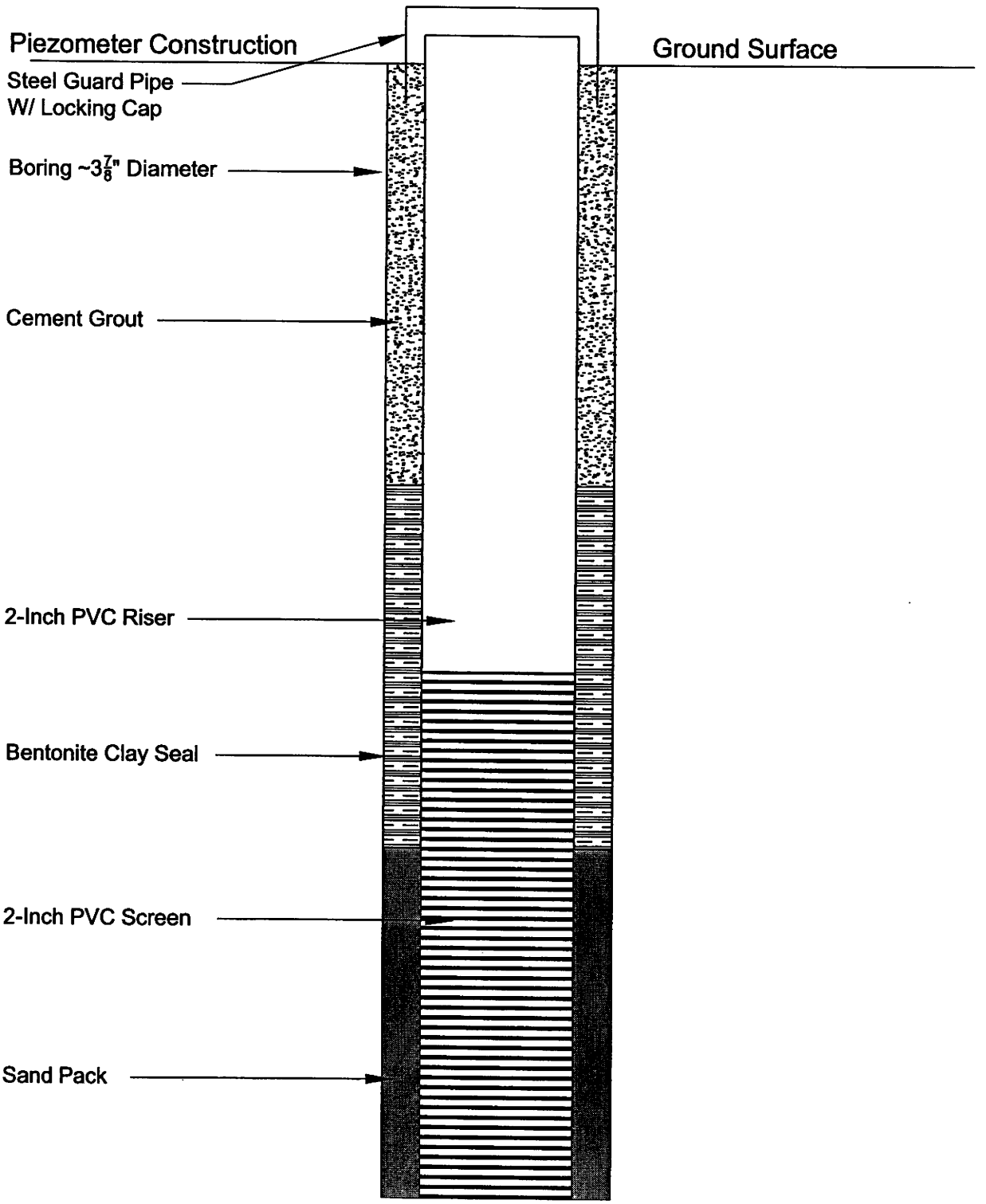
Monitoring Point No.	Description	Elevation	Latitude	Longitude
MW-H-S (Shallow)	Monitoring Well	1140	39:57:32	80:22:20
MW-H-D (Deep)	Monitoring Well	1140	39:57:50	80:23:29
MW-I- S (Intermediate)	Monitoring Well	1480	39:57:50	80:23:29
MW-I -D (Deep)	Monitoring Well	1480	39:57:50	80:23:29
MW-J	Monitoring Well	1420	39:57:47	80:22:58
MW-K-S (Shallow)	Monitoring Well	1520	39:57:26	80:23:29
MW-K-I (Intermediate)	Monitoring Well	1520	39:57:26	80:23:29
MW-K-D (Deep)	Monitoring Well	1520	39:57:26	80:23:29
MW-L-S (Shallow)	Monitoring Well	1500	39:57:02	80:23:05
MW-L-I (Shallow)	Monitoring Well	1500	39:57:02	80:23:05
MW-L-D (Deep)	Monitoring Well	1500	39:57:02	80:23:05
MW-M	Monitoring Well	1470	39:57:09	80:22:35
S-Z	Spring	1320	39:57:17	80:22:19
S-AA	Spring	1380	39:57:14	80:22:22
SW-N	Stream Point	1120	39:57:34	80:22:29
SW-O	Stream Point	1200	39:57:15	80:24:24
SW-P	Stream Point	1100	39:56:51	80:25:15
SW-Q	Stream Point	1220	39:56:54	80:23:57
SW-R	Stream Point	1160	39:56:18	80:24:24
SW-S	Stream Point	1220	39:56:46	80:23:21
SW-T	Stream Point	1120	39:55:56	80:23:32
SW-U	Stream Point	1140	39:57:29	80:22:20

APPENDIX 8.6-A
Locations and elevation of proposed monitoring points in the hydrologic monitoring plan

SW-V	Stream Point	1110	39:57:44	80:22:31
SW-W	Stream Point	1100	39:58:01	80:22:51
SW-X	Stream Point	1280	39:51:06	80:22:26
SW-Y	Stream Point	1270	39:57:17	80:22:15
Spring Drain BB (Coarse)	Spring Collector Drain	1160	39:57:26	80:22:40
Spring Drain CC (Slurry)	Spring Collector Drain	1160	39:57:29	80:22:42
Leachate Drain DD (Coarse)	Leachate Collector Drain	1160	39:57:26	80:22:40
Leachate Drain EE (Slurry)	Leachate Collector Drain	1160	39:57:29	80:22:42
SD-B	Saddle Dam Toe Drain Outlet	1470	39:57:28	80:23:40
SD-C	Saddle Dam Toe Drain Outlet	1470	39:57:19	80:23:95
SD-D	Saddle Dam Toe Drain Outlet	1470	39:57:12	80:23:18

Figure 8.6b-1
Bailey Mine CRDA

Typical Piezometer Construction



(Not to Scale)

1) location (map reference);

The culvert location is shown on Sheet 27 of the Exhibit 21.1 drawings.

2) description of current condition;

The culvert is in excellent condition

3) demonstration of compliance with current design and administrative requirements;

Calculations demonstrating the culvert's capacity to pass sedimentation pond discharge are presented in Appendix G of the Module 21 Design Report.

4) if modifications are required to achieve compliance -

   i) design details;

   ii) construction schedule;

   iii) monitoring provisions;

   iv) demonstration that there will be no significant risk to public health or the environment during the reconstruction period.

No modifications to the culvert are required.

10.3 Construction Schedule.

Provide a construction schedule addressing site preparation and facility installation at each surface mining activity site. Identify critical steps where close engineering supervision or certification is required by regulation.

Site preparation for the new disposal facility is expected to be initiated during the fall of 2003. CPCC plans to initiate development of Area No. 3, Area No. 4, or both facilities during the fall of 2003. Selection of the disposal area or areas to be developed at that time will be based on remaining disposal capacity in Area Nos. 1 and 2 compared to projected coal refuse generation rates. At this time, CPCC expects that initial site preparation will focus on development of Area No. 4.

CPCC proposes to close existing Area Nos. 1 and 2 incrementally prior to and during development of the new disposal areas. Presented as Attachment 10.3 are diagrams depicting the following proposed closure sequencing for existing Areas No. 1 and 2 and proposed Areas No. 3 and 4.

- *Stage 1 presents existing conditions and identifies areas closed to date.*
- *Stage 2 reflects the site preparation phase for Area No. 4. During this phase of facility development, disposal operations will be ongoing in Area Nos. 1 and 2. Sections of Area Nos. 1 and 2 reaching final grade during this period will be closed as indicated.*
- *Stage 3 reflects the site preparation phase for Area No. 3. During this period, coarse coal refuse disposal operations will be ongoing in Area No. 4. Coarse coal refuse slopes of Area No. 1 will be closed and stockpile areas for excess liner/cover soil from Area No. 3 will be developed in the southwest corner. Area No. 2 will be completely closed as indicated when the Area Nos. 3 and 4 working surface is large enough to accommodate all coarse coal refuse disposal operations.*
- *Stage 4 reflects the beginning of slurry disposal in Area No. 3, reclamation of the western portion of Area No. 1, and continued construction/site preparation in Area Nos. 3 and 4.*
- *Stages 5, 6, and 7 depict the sequenced closure of Areas No. 3 and No. 4.*

Initial site preparation for the new disposal facility is expected to begin during 2003 for Area No. 4 and be followed by coarse coal refuse placement within Area No. 4 during 2005 or sooner. Coarse coal refuse placement for Area No. 3 dam construction is expected to occur a few years later when the remaining fine coal refuse disposal capacity in Area No. 1 is almost exhausted. Slurry placement can begin when the first stage of dam construction is completed; approximately 6 to 7 months after coarse coal refuse placement for dam construction begins. Slurry placement in Area No. 3 will not commence until slurry disposal in refuse Area 1 has ceased. Coal Refuse

Disposal Area No. 4 will be active and available to receive coal refuse during the period of Area No. 3 dam construction. When the coal refuse dams are complete, coarse coal refuse disposal will be diverted to the western "beach" portion of Area No. 1. However, if the volume of coarse coal refuse exceeds the capacity of the existing conveyor, the overflow coarse coal refuse will be disposed in Area No. 4 at this time. After the coarse coal refuse cap in the western section of Area 1 is completed as indicated on Stage 4, all coarse coal refuse will be disposed in Area No. 4. Coal refuse placement at the disposal facility (both areas) is expected to be complete by approximately 2020. Final stages of cap construction (soil cover placement) will occur after coal refuse placement is complete.

Presented as Sheet 15 of Exhibit 21.1 is a staging diagram for development of Area No. 3. Sheet 15 shows coarse and fine coal refuse slurry levels/elevations for each year of development. The staging diagram depicts disposal of all suitable coarse coal refuse in Area No. 3 until dam construction is complete. A 75%/25% suitable/non-suitable coarse coal refuse ratio has been assumed.

Refer to Sheets 41 through 55 of Exhibit 21.1 for proposed Area No. 3 and No. 4 construction sequencing. These drawings show the sequenced development of each area from site preparation through closure.

The following items require supervision during development of this site:

- *Cutoff trench construction and dam foundation preparation.*
- *Installation of the rock drain and any spring drains.*
- *Installation of the decant pipe.*
- *Construction of the sedimentation ponds which will require certification.*
- *Liner installation (soil and HDPE)which will require certification.*
- *Piezometer installation.*
- *Installation of the dam internal drains.*
- *Installation of dewatering borehole discharge pipe, conduit, and outlet pipe protection.*
- *Saddle Dams B, C, and D. Periodic inspection of Main Dam and Saddle Dam A construction will be in accordance with the dam permits and MSHA requirements.*
- *Coal refuse cap construction which will require certification*

Federal and State regulations require certification that construction, operation, and maintenance of the slurry pond, sedimentation pond, and associated dams have been conducted in accordance with the approved plan.

10.4 Special Handling of Toxic and Pollution Forming Materials

For each surface mining activity site where earth moving will take place, describe the manner in which toxic or pollution-forming materials will be monitored and handled.

Toxic or pollution-forming materials are not expected to be encountered at the project site during site preparation. Any that may be encountered will be removed and disposed of off site.

10.5 Oil and Gas Wells

Where surface mining activities are proposed to be conducted within 125 feet of any oil or gas well identify the location on Exhibits 6.2, 9.1, and 18.1and provide a description of the activity. Provide a demonstration that the

well has been sealed; or describe the measures to be taken to ensure the integrity of the well, ensure access to the well is provided at all times, and provide notice of the proposed activity to the well owner.

Five abandoned gas wells are located within Coal Refuse Disposal Area No. 3 (slurry impoundment site). See Exhibits 6.2, 9.1, 18.1, and Sheet 2 of Exhibit 21.1 for their locations. Documentation that three of the wells (566, 567 and 659) have been sealed is presented as Attachment 10.5. The remaining two gas wells (569 and 660) will be sealed in accordance with the Oil and Gas Act, prior to disposal facility construction.

10.6 Wells, Exploration Holes and Bore Holes

Describe the manner in which, exploration holes, monitoring wells, and exposed underground openings will be cased, sealed or otherwise managed.

Soil borings and test pits were drilled at the project site during 2001 for facility design purposes (refer to Exhibits 6.2 and 21.1). None of these borings penetrated the mine. All were grouted their full length with cement grout.

Three exploration boreholes (F-20, MB-85-1, and MB-85-2) and three degas boreholes (1A-1, 2A-1, 2A-2, and 3A-1) were drilled within Coal Refuse Disposal Area No. 3 at the locations shown on Exhibit 6.2 and Sheet 2 of Exhibit 21.1. The exploration boreholes have been grouted their full length with cement grout. Degas boreholes also have been sealed. Certificates of degas borehole sealing are included as Attachment 10.6.

A mine dewatering borehole located within the Area No. 3 main dam area will remain active during disposal facility development. Access to this borehole will be provided by extending the borehole casing, drive shaft, and electrical conduit incrementally through the dam during coal refuse placement. The borehole pump will be moved to the top of the casing as it is extended.

10.7 Utilities

Where proposed surface mining activities may adversely affect services provided by oil, gas, and water wells; oil, gas, and coal slurry pipelines; railroads; electric and telephone lines; and water and sewage lines, provide a demonstration of the measures which will be taken to minimize these impacts. If excavating will occur within 100 feet of a pipeline, attach a copy of the notification sent to the pipeline owner which describes precautionary measures to be taken (any proposal for conducting mining activities within a pipeline right-of-way or easement must include the written approval of the pipeline owner). (Technical Guidance Document 562-2112-503 titled, Coal Surface Mining and Blasting Near Underground Utility Lines and Pipelines provides additional information. Copies are available through the District Office or on the DEP Homepage (www.dep.state.pa.us) under PUBLIC PARTICIPATION/FINAL TECHNICAL GUIDANCE.)

An existing 6 inch Columbia Gas transmission line crosses the site. CPCC is working with Columbia Gas to relocate this line around proposed limits of work. A letter documenting Columbia Gas' approval for the gas line to be relocated and for CPCC to conduct activities within the existing pipeline right-of-way area will be provided prior to the coal refuse permit approval, as Attachment 10.7.

Two overhead power lines owned by Allegheny Power also cross the project site. CPCC is working with Allegheny Power to relocate these lines around proposed limits of work. A letter documenting Allegheny Power approval for the power lines to be relocated will be provided prior to the coal refuse permit approval, as Attachment 10.7..

10.8 Storage Tanks

If above-ground fixed fuel or chemical storage tanks will be located on a surface mining activity site, identify the location on Exhibit 9.1 and describe the measures which will be taken to prevent adverse impacts of leaks and spills (Note: Underground storage tanks are subject to the requirements of the Storage Tank and Spill Prevention Act).

There is one above ground fuel storage tank proposed at the new refuse site within the proposed refuse maintenance building. No underground storage tanks are proposed with this application. Fuel will be stored in a 15,000 gallon above-ground tank at the Baily Mine Complex Refuse Disposal Areas No. 3 and No. 4 facility at the location shown on the Module 21 Construction Drawings. The tank will have double walls or a secondary containment for control of leaks. It will be situated on a concrete pad to deter infiltration of any spills that may occur during discharge or filling of the tank. Any spills that occur will have absorbing material applied and will be cleaned by CPCC before they migrate from the pad.

10.9 Public Parks and Historic Places

Where the proposed mining or refuse disposal activities may adversely affect any publicly owned park, state forest, state game land, or historic place listed on the National Register of Historic Places, provide a demonstration of the measures which will be taken to minimize or prevent these impacts.

Not applicable. There are no publicly owned parks, state forests, state game lands, or historic place listed on the National Register of Historic Places that will be affected by the refuse disposal activities.

10.10 Fish and Wildlife Protection

Describe measures which will be taken to protect fish and wildlife during the active phase of operations.

The proposed facility design includes measures to reduce uncontrolled discharge to area groundwater and surface water. The facility will be provided with a final vegetated soil cover designed to reduce infiltration and prevent exposure of coal refuse to area wildlife. Disposed coal refuse will be separated from stream base flows and springs by a soil liner. Stream flow and springs will be collected and conveyed under the facility in a system of drains. Runoff from coal refuse will be collected and conveyed to a lined sedimentation pond. Drains installed within the coarse coal refuse will intercept leachate and convey it to the sedimentation pond. Slurry impoundment supernatant will be recycled to the preparation plant, similar to the current operation of the existing Bailey Mine Complex disposal area.

Fletcher Run, a high quality watershed area, will be protected from impacts by the belt conveyor crossing by implementing a design that provides for no discharge of coal refuse contact water to Fletcher Run. The conveyor will cross the top of the watershed. As shown on Sheets 3 and 4 of Exhibit 21.1, runoff below the conveyor belt will be collected and conveyed to a collection sump for sedimentation. The sump will have no discharge but will be pumped to coal Refuse Disposal Area No. 3 instead.

10.11 Sanitary Facilities

If sanitary facilities will be provided, identify their location and describe the means of sewage disposal. If sewage will be treated and discharged to surface water, provide the NPDES permit number.

Not applicable. Sanitary facilities are not included as part of this permit application.

10.12 Fire Hazards/Combustible Materials

a) Identify any material which has a low ignition point or otherwise poses a potential fire hazard that will be stored or disposed of at any surface activity site. Describe the measures and contingency plans which will be used to prevent the sustained combustion of these materials and ensure that they are isolated from coal refuse and exposed coal seams.

Combustible materials and coal refuse generated at the mine are stored separately. Nevertheless, coarse coal refuse delivered to the disposal facility will be visually inspected for combustible materials when it is placed. Any combustible materials that may be present will be removed and will be disposed off site by a private contractor.

Module 11: Erosion and Sedimentation Controls

'rovide the following information for each surface mining activity site. Organize the information by completing separate ,ets of answers to items 11.1 through 11.3 for each site. Narrative descriptions should reference the information on Exhibit 9.1.

11.1 Erosion & Sedimentation Controls.

a) Provide a narrative description of erosion and sediment controls which will be used during site preparation, operation, and reclamation.

Site erosion and sedimentation (E&S) will be controlled during each phase of facility development by using a system of collection and diversion ditches and sedimentation control structures/devices consisting of ponds, sediment traps and straw bale/silt fence barriers. E&S controls proposed for each phase of construction are discussed below and are shown on the Construction Drawings as part of Module 21.

***Site Preparation**. Site construction will be initiated by installing the sedimentation pond. During this phase of site preparation, E&S will be controlled with sediment traps, sediment barrier, and ditches. Temporary diversion channels and pipes will be used to divert offsite runon away from the work area. The sedimentation pond will provide E&S control during remaining phases of site preparation. Runoff from stockpile areas not draining to the sedimentation pond generally will be passed through a sediment trap. A small section of stockpile area will be controlled with sediment barrier. Sediment barrier also will be used to control construction of the runoff collection sump.*

***Operation**. Runoff from most areas of site operation will be passed through the sedimentation pond. Runoff from the outside face of Saddle Dam A will be discharged into the existing Bailey slurry impoundment (Coal Refuse Disposal Area No. 1). The existing Bailey sedimentation pond will receive runoff from Stockpile Area No. 1 (refer to Module 21 Construction Drawings, sheet 37). Runoff from the Fletcher Run conveyor crossing will be collected by the runoff collection sump and automatically pumped to the slurry impoundment. The sump has been designed to contain all runoff from a 10-year storm event with no discharge into Fletcher Run.*

***Reclamation**. Runoff from Coal Refuse Disposal Area No. 4 and a large section of Coal Refuse Disposal Area No. 3 will pass through the sedimentation pond. The slurry impoundment cap design incorporates channels to reduce drainage lengths and thereby reduce erosion. The remaining section of slurry impoundment will discharge into Coal Refuse Disposal Area No. 1. E&S controls to be implemented during pond reclamation are presented on Drawing No. 30A of the Module 21 Construction Drawings.*

b) Using Form 11.1A, **Diversion/Collection Ditch Data Sheet,** provide detailed design and construction information for all channels and diversions.

See Form 11.1A attached to this Module for detailed design and construction information for proposed channels.
Design calculations are presented in Appendix G of the Module 21 Design Report.

c) Provide design criteria and capacity calculations for all drainage pipes and culverts, including those which are part of road drainage systems.

See calculations appended to the Module 21 Design Report, for design criteria and capacity calculations for all drainage pipes and culverts proposed as part of this application. The design storm event for permanent culverts is the 100-year, 24-hour storm. The design storm for temporary culverts within the disposal areas is the 100-year, 24 hour storm.

d) Provide design criteria and capacity calculations for sedimentation control ponds and their discharge structures. (Details regarding pond construction should be addressed under Module 13)

One sedimentation pond having a dual chamber is proposed as part of this operation. The pond will be constructed during initial site preparation and will remain in service throughout the life of the facility. The design storm for the pond is the 100 year, 24 hour storm event. Refer to Module 13 and Attachment 21.1

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title: Coal Disposal Areas No. 3 and No. 4 Collection Channels	Site: Bailey Central Mine Complex, Greene County	Company: CONSOL	Permit Number:
Prepared By: JMB	Telephone Number:	Date: November 2002; Revised April, 2003; Revised September 2003	Sheet 3 of 5
Channel Cross-section Type: Type C Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard: Channel Depth	With Freeboard: Top Channel Width	With Freeboard: Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
C2	13.2	100	5	84	72	5.0	0.5	FP220 Fabricform	0.03	0	2/2	7.2	1.9	7.6	10.0	82.26	2.5	10.0	149.1
	13.2	2	5	91	35	5.0	0.5	FP220 Fabricform	0.03	0	2/2	4.2	1.5	5.8	8.3	82.26	2.5	10.0	149.1
C3	14.2		28			5.8		FP220 Fabricform											
	14.2		28			5.8		FP220 Fabricform											
C4	9.7		32			7.4		FP220 Fabricform											
C5	22.8	100	42	84	124	9.2	0.7	FP220 Fabricform	0.03	0	2/2	8.7	2.1	8.3	14.3	152.8	2.75	10.0	315.6
	"	"	"	"	"	39.5	1.1	FP220 Fabricform	"	"	"	5.9	1.7	6.9	26.1	316.5	2.75	"	540.5
	22.8	2	42	91	61	9.2-39.5		FP220 Fabricform											
C6	4.5		40			5.0		FP220 Fabricform											
C7	9.6		30			5.0		FP220 Fabricform											

* Channel C-1 has been removed from this table and the design drawings.

Channels are designed for 100-year storm event in accordance with Chapter 90.122(n). The peak discharge for the worst case channel was used as the basis of design for all channels. Channel C2 was used as the basis of design for Channels C2, C3, C4, C6, and C7. Note that although Channel C3 has a larger drainage area than Channel C2, Channel C2 was selected because it has a flatter slope, which results in a larger channel. A separate calculations was performed for C5. The higher flow between a 100-year storm w/ a coarse refuse watershed and 2-year storm w/ a bare soil watershed was used for the worst case design.

Rev. Sept. 2003

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number:
Coal Disposal Areas No. 3 and No. 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By: JMB	Telephone Number:	Date: November 2002; Revised April, 2003; Revised September 2003	Sheet 3 of 5
Channel Cross-section Type: Type C Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard: Channel Depth	With Freeboard: Top Channel Width	With Freeboard: Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
C2	13.2	100	5	84	72	5.0	0.5	FP220 Fabricform	0.03	0	2/2	7.2	1.9	7.6	10.0	82.26	2.5	10.0	149.1
	13.2	2	5	91	35	5.0	0.5	FP220 Fabricform	0.03	0	2/2	4.2	1.5	5.8	8.3	82.26	2.5	10.0	149.1
C3	14.2		28			5.8		FP220 Fabricform											
	14.2		28			5.8		FP220 Fabricform											
C4	9.7		32			7.4		FP220 Fabricform											
C5	22.8	100	42	84	124	9.2	0.7	FP220 Fabricform	0.03	0	2/2	8.7	2.1	8.3	14.3	152.8	2.75	10.0	315.6
	"	"	"	"	"	39.5	1.1	FP220 Fabricform	"	"	"	5.9	1.7	6.9	26.1	316.5	2.75	"	540.5
	22.8	2	42	91	61	9.2-39.5		FP220 Fabricform											
C6	4.5		40			5.0		FP220 Fabricform											
C7	9.6		30			5.0		FP220 Fabricform											

* Channel C-1 has been removed from this table and the design drawings.

Channels are designed for 100-year storm event in accordance with Chapter 90.122(n). The peak discharge for the worst case channel was used as the basis of design for all channels. Channel C2 was used as the basis of design for Channels C2, C3, C4, C6, and C7. Note that although Channel C3 has a larger drainage area than Channel C2, Channel C2 was selected because it has a flatter slope, which results in a larger channel. A separate calculations was performed for C5. The higher flow between a 100-year storm w/ a coarse refuse watershed and 2-year storm w/ a bare soil watershed was used for the worst case design.

6-136

Revised Sept. 2003

Rear April 2003

Quick TR-55 Version: 5.46 S/N:

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 04-07-2003 13:11:21
Watershed file: --> C:\PROJECTS\CONSOL\CHANNELS\C-2 100 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\CHANNELS\C-2 100.HYD

Bailey Mine Complex
New Coal Disposal Area
Collection Channel C-2 100 Year Peak Flow (Refuse)
April 2003

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
	13.20	84.0	0.10	0.00	5.20	3.45	I.07	.10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 13.20 acres or 0.02062 sq.mi
Peak discharge = 72 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.10	0.00	**	**	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

P u April 2003

Quick TR-55 Version: 5.. S/N:

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 04-07-2003 14:28:28
Watershed file: --> C:\PROJECTS\CONSOL\CHANNELS\C-5 100 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\CHANNELS\C-5 100.HYD

Bailey Mine Complex
New Coal Disposal Area
Collection Channel C-5 100 Year Peak Flow)Refuse)
April 2003

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
	22.80	84.0	0.10	0.00	5.20	3.45	I.07	.10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 22.80 acres or 0.03562 sq.mi
Peak discharge = 124 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.10	0.00	**	**	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

6-142

Revised Sept. 2003

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: C-5 100 Peak Flow

Comment: Collection Channel C-5 100 Year Peak Flow

Solve For Depth

Given Input Data:

Left Side Slope..	2.00:1 (H:V)
Right Side Slope.	2.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0920 ft/ft
Discharge.....	124.00 cfs

Computed Results:

Depth.....	2.08 ft
Velocity.....	14.32 fps
Flow Area.....	8.66 sf
Flow Top Width...	8.32 ft
Wetted Perimeter.	9.31 ft
Critical Depth...	2.99 ft
Critical Slope...	0.0133 ft/ft
Froude Number....	2.47 (flow is Supercritical)

Stable Flow ∴ Use min freeboard (0.5')
Total Channel Depth = 2.75'

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Revised Sept. 2003

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: C-5 100 Peak Flow

Comment: Collection Channel C-5 Avail. Flow

Solve For Discharge

Given Input Data:

Left Side Slope..	2.00:1 (H:V)
Right Side Slope.	2.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0920 ft/ft
Depth.....	2.75 ft

Computed Results:

Discharge.....	260.85 cfs
Velocity.....	17.25 fps
Flow Area.....	15.13 sf
Flow Top Width...	11.00 ft
Wetted Perimeter.	12.30 ft
Critical Depth...	4.03 ft
Critical Slope...	0.0121 ft/ft
Froude Number....	2.59 (flow is Supercritical)

Open Channel Flow Module, Version 3.11 (c) 199

Quick TR-55 Version: 5.46 S/N:

New April 2003

Return Frequency: 2 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 04-07-2003 14:28:46
Watershed file: --> C:\PROJECTS\CONSOL\CHANNELS\C-5 2 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\CHANNELS\C-5 2.HYD

Bailey Mine Complex
New Coal Disposal Area
Collection Channel C-5 2 Year Peak Flow (Bare Soil)
April 2003

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	22.80	91.0	0.10	0.00	2.60	1.70	I.08 .10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 22.80 acres or 0.03562 sq.mi
Peak discharge = 61 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.10	0.00	**	**	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

Revised September 2003

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: C-5 2 Year Peak Flow

Comment: Collection Channel C-5 2 Year Peak Flow

Solve For Depth

Given Input Data:

Left Side Slope..	2.00:1 (H:V)
Right Side Slope.	2.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0920 ft/ft
Discharge.....	61.00 cfs

Computed Results:

Depth.....	1.59 ft
Velocity.....	11.99 fps
Flow Area.....	5.09 sf
Flow Top Width...	6.38 ft
Wetted Perimeter.	7.13 ft
Critical Depth...	2.25 ft
Critical Slope...	0.0146 ft/ft
Froude Number....	2.37 (flow is Supercritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number:
Coal Disposal Areas No. 3 and No. 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By: JMB	Telephone Number:	Date: January 2002 Revised April, 2003	Sheet 4 of 5
Channel Cross-section Type: Type D Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard: Channel Depth	With Freeboard: Top Channel Width	With Freeboard: Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
D1	146.2	100	40	77	334	11.0-39.0	0.5	FP220 Fabricform	0.03	3	2.5/2.5	17.75	2.1	13.7	30.1	476.5	3.0	18.0	721.0
D2	99.1		40			8.38-36.0		FP220 Fabricform											
D3	64.0		40			3.62-29.9		FP220 Fabricform											
D4	74.1		19			8.65 - 21.1		FP220 Fabricform											
D5	42.2		36			5.39 - 34.2		FP220 Fabricform											
D6	116.3		25			23.1		FP220 Fabricform											
D7	107.9		10			11.6		FP220 Fabricform											
D8	20.9		10			1.15-11.6		FP220 Fabricform											

Channels are designed for 100-year storm event in accordance with Chapter 90.122(n). The peak discharge for the worst case channel (D1) was used as the basis of design for all channels. The worst case for Channel D1 is the entire top of Area 3 (75 acres) is coarse refuse and the remaining area is vegetated. This assumption is very conservative since the top of Area 3 will be reclaimed in stages and very large areas area will not be open at once.

D-127

Rev April 2003

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number:
Coal Disposal Areas No. 3 and No. 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By:	**Telephone Number:**	**Date:**	**Sheet 1of 5**
JMB		November 2002 Revised April, 2003	
Channel Cross-section Type:			
Type A Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard: Channel Depth	With Freeboard: Top Channel Width	With Freeboard: Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
A1	12.6	100	40	70	24	2	0.5	Veg./Syn.	0.06	0	3/3	8.1	1.6	9.9	3.0	40.6	2.5	15.0	73.6
	12.6	2	40	91	34	2	0.5	Veg./Syn.	0.025	0	3/3	5.5	1.4	8.1	6.2	97.4	2.5	15.0	176.6
A2	6.3		40			2		Veg./Syn.											
A3	5.3		40			2		Veg./Syn.											
A4	1.8		40			2		Veg./Syn.											
A5	3.8		40			2		Veg./Syn.											
A6	5.6		40			2		Veg./Syn.											
A7	5.1		40			2		Veg./Syn.											
A8	3.1		40			2		Veg./Syn.											
A9	1.7		40			2		Veg./Syn.											
A10	1.3		35			2		Veg./Syn.											
A11	2.3		35			2		Veg./Syn.											
A12	5.9		40			2		Veg./Syn.											
A13	6.9		40			2		Veg./Syn.											
A14	7.9		40			2		Veg./Syn.											
A15	8.3		40			2		Veg./Syn.											
A16	1.3		20			2		Veg./Syn.											
A17	2.9		40			2		Veg./Syn.											
A19	8.0		11			2		Veg./Syn.											
A24	1.5		14			2		Veg./Syn.											
A25	0.6		14			2		Veg./Syn.											
A18	6.8		11			1		Veg./Syn.											
A20	6.2		11			1		Veg./Syn.											
A21	6.7		11			1		Veg./Syn.											
A22	8.0	100	11	70	14	1	0.5	Veg./Syn.	0.06	0	3/3	7.01	1.53	9.17	2	28.7	2.5	15	52
	8.0	2	11	91	21	1	0.5	Veg./Syn.	0.025	0	3/3	5.08	1.3	7.8	4.14	66.2	2.5	15	120.1
A23	7.0		11			1		Veg./Syn.											
A27	2.3		28			1		Veg./Syn.											
A29	6.6		15			1		Veg./Syn.											
A30	4.3		25			1		Veg./Syn.											
A31	7.6		31			1		Veg./Syn.											
A32	2.3		10			1		Veg./Syn.											
A33	3.4		10			1		Veg./Syn.											
A34	1.8		10			1		Veg./Syn.											
A35	2.2		10			1		Veg./Syn.											
A36	2.1		10			1		Veg./Syn.											
A37	2.8		10			1		Veg./Syn.											
A38	6.2		10			1		Veg./Syn.											

Channels are designed for 100-year storm event in accordance with Chapter 90.122(n). The peak discharge for the worst case channel was used as the basis of design for all channels. Channel A1 was used as the basis of design for all of the channels with 2% slopes. Channel A22 was used as the basis of design for all channels with 1% slopes. All type A channels are built on top of the final cover. Since the final cover will be constructed within one construction season for each watershed, the higher flow between 100-year storm w/ a vegetated watershed and 2-year storm w/ a bare soil watershed was used for the worst case design.

Channels A-26 and A-28 have been removed.

Rev April 2003

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number:
Coal Disposal Areas No. 3 and No. 4 Collection Chann	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By: JMB	Telephone Number:	Date: January 2002 Revised April, 2003	Sheet 2 of 5
Channel Cross-section Type: Type B Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Top Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)		cfs
B1	58.2	100	5	75	137	1	0.5	Veg./Syn.	0.06	4	3/3	38.9	3.0	22.0	3.5	137.5	3.5	23.5	195.6
B2	19.8		5			1		Veg./Syn.											
B3	32.5		5			1		Veg./Syn.											
B4	29.8		5			1		Veg./Syn.											
B5	47.8		4			1		Veg./Syn.											
B6	23.9		4			1		Veg./Syn.											
B7	35.2		4			1		Veg./Syn.											
B8	27.7		10			1		Veg./Syn.											
B9	22.6		27			1-2		Veg./Syn.											
B10	13.0		24			1		Veg./Syn.											
B11	12.8		15			1		Veg./Syn.											

Channels are designed for 100-year storm event in accordance with Chapter 90.122(n). The peak discharge for the worst case channel (B1) was used as the basis of design for all channels. The worst case for Channel B1 is the top of the last two stages of cap placement (22 acres) is coarse refuse and the remaining area is vegetated. This assumption is very conservative since the top of Area 3 will be reclaimed in stages and very large areas area will not be open at once.

Rev April 2003

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number:
Coal Disposal Areas No. 3 and No. 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By: JMB	Telephone Number:	Date: November 2002 Revised April, 2003	Sheet 3 of 5
Channel Cross-section Type: Type C Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Top Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
C2	13.2	100	5	84	72	5.0	0.5	FP220 Fabricform	0.03	0	2/2	7.24	1.9	7.61	9.95	82.26	2.5	10.0	149.14
	13.2	2	5	91	35	5.0	0.5	FP220 Fabricform	0.03	0	2/2	4.21	1.45	5.81	8.3	82.26	2.5	10.0	149.14
C3	14.2		28			5.8		FP220 Fabricform											
	14.2		28			5.8		FP220 Fabricform											
C4	9.7		32			7.4		FP220 Fabricform											
C5	22.8	100	42	84	124	9.2-39.5	0.5	FP220 Fabricform	0.03	0	2/2	9.3	1.8	10.6	13.3	174.1	2.5	10.0	315.6
	22.8	2	42	91	61	9.2-39.5	0.5	FP220 Fabricform	0.03	0	2/2	5.5	1.4	8.1	11.2	174.1	2.5	10.0	315.6
C6	4.5		40			5.0		FP220 Fabricform											
C7	9.6		30			5.0		FP220 Fabricform											

* Channel C-1 has been removed from this table and the design drawings.

Channels are designed for 100-year storm event in accordance with Chapter 90.122(n). The peak discharge for the worst case channel was used as the basis of design for all channels. Channel C2 was used as the basis of design for Channels C2, C3, C4, C6, and C7. A separate calculations was performed for C5. The higher flow between a 100-year storm w/ a coarse refuse watershed and 2-year storm w/ a bare soil watershed was used for the worst case design.

Rev April 2003

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number:
Coal Disposal Areas No. 3 and No. 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By: JMB	Telephone Number:	Date: January 2002 Revised April, 2003	Sheet 4 of 5
Channel Cross-section Type: Type D Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard: Channel Depth	With Freeboard: Top Channel Width	With Freeboard: Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
D1	146.2	100	40	77	334	11.0-39.0	0.5	FP220 Fabricform	0.03	3	2.5/2.5	17.75	2.1	13.7	30.1	476.5	3.0	18.0	721.0
D2	99.1		40			8.38-36.0		FP220 Fabricform											
D3	64.0		40			3.62-29.9		FP220 Fabricform											
D4	74.1		19			8.65 - 21.1		FP220 Fabricform											
D5	42.2		36			5.39 - 34.2		FP220 Fabricform											
D6	116.3		25			23.1		FP220 Fabricform											
D7	107.9		10			11.6		FP220 Fabricform											
D8	20.9		10			1.15-11.6		FP220 Fabricform											

Channels are designed for 100-year storm event in accordance with Chapter 90.122(n). The peak discharge for the worst case channel (D1) was used as the basis of design for all channels. The worst case for Channel D1 is the entire top of Area 3 (75 acres) is coarse refuse and the remaining area is vegetated. This assumption is very conservative since the top of Area 3 will be reclaimed in stages and very large areas area will not be open at once.

Rec April 2003

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number:
Coal Disposal Areas No. 3 and No. 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By: JMB	Telephone Number:	Date: November 2002 Revised April, 2003	Sheet 5 of 5
Channel Cross-section Type: Type E Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard: Channel Depth	With Freeboard: Top Channel Width	With Freeboard: Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
E1	0.2		40			2-40		FP220 Fabricform											
E2	1.0		40			2-15		FP220 Fabricform											
E3	1.2		50			5-28		FP220 Fabricform											
E4	2.4	100	50	84	13.0	2-32	0.5	FP220 Fabricform	0.03	0	2/2	2.8	1.2	4.8	13.0	14.9	1.75	7.0	36.4
	2.4	2	50	91	6.0	2-32	0.5	FP220 Fabricform	0.03	0	2/2	1.6	0.9	3.6	10.7	14.9	1.75	7.0	36.4
E5	0.8		40			2-35		FP220 Fabricform											

Channels are designed for 100-year storm event in accordance with Chapter 90.122(n). The peak discharge for the worst case channel (E4) was used as the basis of design for all channels. The higher flow between 100-year storm w/ a coarse refuse watershed and 2-year storm w/ a bare soil watershed was used for the worst case design.

Rev April 2003

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title: Sed Pond and Initial Site Prep Temporary Channels	Site: Bailey Central Mine Complex, Coal Disposal Areas 3 & 4	Company: CONSOL	Permit Number:
Prepared By: Greg Heliman, P.E.	Telephone Number: 412-269-6096	Date: January 14, 2002; Revised October, 2002; April, 2003	Sheet ___ of ___
Channel Cross-section Type:			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
T1	5.5	10	32	70	6	20	0.9	Grouted R-3 Riprap	0.04	0	2	0.8	0.6	2.6	7.2	19.4	1.5	6	57
T2	5.5	10	23	70	6	2	0.6	Veg/Curled Wood	0.06	0	2	2.7	1.2	4.6	2.3	7.4	1.75	7	18
T3	8.7	100	31	70	25	2	0.5	Veg/Curled Wood	0.06	0	2	7.8	2	7.9	3.2	26.0	2.5	10	47.2
T4	9.5	2	26	70	4	0.6	0.6	Veg/Curled Wood	0.06	0	2	3.09	1.2	5.0	1.3	4.1	1.75	7	10.0
T5	290.5	2	24	70	100	2	0.9	Veg/Syn Mat	0.06	3	2	22.0	2.6	13.6	4.5	131.8	3.5	17	186.5
T6	149	2	33	70	70	2	0.9	Veg/Syn Mat	0.06	3	2	14.5	2.1	11.2	4.8	85.9	3.0	15	161.4
T7	12.0	2	26	70	10	1	0.9	Veg/Curled Wood	0.06	0	2	5.1	1.6	6.4	2.0	18.4	2.5	10	33.4
T8	52.0	2	30	70	25	2	0.5	Veg/Curled Wood	0.06	0	2	7.8	2.0	7.9	3.2	26.0	2.5	10	47.2
T9	11.6	2	34	70	10	2	0.6	Veg/Curled Wood	0.06	0	2	3.9	1.4	5.6	2.6	12.1	2.0	8	26.0
T11	21.5	10	40	70	30	30	0.6	Grouted R-4 Riprap	0.05	0	2	2.7	1.2	4.6	11.2	34.5	1.75	7	84.7
T52	2.72	2	10	91	7	1	0.5	Veg/Curled Wood	0.06	0	2	3.88	1.4	5.6	3.5	8.5	2.00	8	18.4
T53	1.51	2	13	91	4	1	0.5	Veg/Curled Wood	0.06	0	2	2.55	1.1	4.5	3.0	5.3	1.75	7	12.9
T54	0.66	2	17	91	2	1	0.5	Veg/Curled Wood	0.06	0	2	1.51	0.9	3.5	2.6	2.9	1.50	6	8.5
T55	1.44	2	9	91	4	1-37	0.5	R-4 Riprap	0.048	0	2	2.16	1.0	4.15	6.2	6.4	1.75	7	15.8

Notes :
The 100-year design storm was used for Channel T-3 since this channel diverts runon away from the sedimentation pond, which has a 100 year design storm.
The 10 year design storm was used for Channels T-1, T-2 and T-11since they will be used throughout the life of the facility.

Rev April 2003

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number:
Temporary Haul Road Channels	Bailey Central Mine Complex, Coal Disposal Areas 3 & 4	CONSOL	
Prepared By:	Telephone Number:	Date:	Sheet ___ of ___
Greg Hellman, P.E.	412-269-6096	Janaury 14, 2002 Revised October, 2002	
Channel Cross-section Type:			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
T10	50.5	100	34	72	125	2.0	0.5	Veg/Syn Mat	0.06	0	2	24.3	3.5	13.9	5.1	126.2	4	16	180.2
T23	25.8	100	31	75	84	25	0.6	Grouted R-4 Riprap	0.042	0	2	5.7	1.7	6.8	14.7	92.0	2.25	9	1[illegible]
HR-Type A	43.0	100	30.5	84	157	5.0	0.5	R-4 Riprap	0.045	0	2	17.6	3.0	11.9	8.9	161.7	3.5	14	2[illegible]
HR-Type B	5.5	100	27	91	36	5.0	0.7	R-4 Riprap	0.04	0	2	5.3	1.6	6.5	6.7	43.2	2.25	9	84.5
HR-Type B	"	"	27	"	"	8.0	0.8	"	"	"	"	4.5	1.5	6	8.0	54.6	2.3	9	106.8

Notes:
HR Type A Channels are used for Haul Roads 13, 17, 18, and 19. Calculations are based on Haul Road 18 which is the worst case.
HR Type B Channels are used for all other Haul Roads constructed during initial site preparation. Calculations are based on Haul Road 16 which is the worst case.
The 100-year design storm is used for haul road channels in accordance with PADEP Subchapter D, Section 90.122.

FC.... 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number:
Temporary Slurry Impoundment Channels	Bailey Central Mine Complex, Coal Disposal Areas 3 & 4	CONSOL	
Prepared By:	Telephone Number:	Date:	Sheet ___ of ___
Greg Heilman, P.E.	412-269-6096	January 15, 2002 Revised October 2002	
Channel Cross-section Type:			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
T12	4.1	100	34	84	22	5	0.6	Grouted R-4 Riprap	0.045	0	2	4.0	1.4	5.7	5.5	25.5	2.0	8.0	54.8
"	"	"	"	"	"	35	0.5	Grouted R-4 Riprap	0.045	0	2	1.9	1.0	3.9	11.3	67.4	2.0	8.0	145.1
T13	18.0	100	30	91	94	5	0.5	Grouted R-4 Riprap	0.045	0	2	12.0	2.5	9.8	7.8	99.4	3	12	161.7
"	"	"	"	"	"	10	0.8	Grouted R-4 Riprap	0.045	0	2	9.2	2.2	8.6	10.2	140.6	3	12	22[illegible]
T14	30.6	100	23	88	148	5	0.6	Grouted R-4 Riprap	0.045	0	2	16.9	2.9	11.6	8.8	161.7	3.5	14.0	243.9
"	"	"	"	"	"	20	1.3	Grouted R-4 Riprap	0.045	0	2	10.0	2.2	9.0	14.8	323.4	3.5	14.0	487.8
T15	13.0	100	42	88	63	5	0.6	Grouted R-4 Riprap	0.045	0	2	8.9	2.1	8.4	7.1	75.1	2.75	11.0	128.2
"	"	"	"	"	"	35	1.3	Grouted R-4 Riprap	0.045	0	2	4.3	1.5	5.9	14.7	198.6	2.75	11.0	339.2
T16	19.3	100	33	84	105	5	0.7	Grouted R-4 Riprap	0.045	0	2	13.0	2.6	10.2	8.1	128.2	3.25	13.0	200.2
"	"	"	33	"	"	35	1.5	Grouted R-4 Riprap	0.045	0	2	6.3	1.8	7.1	16.7	339.2	3.25	13.0	529.5
T17	2.1	100	40	84	11	5	0.5	R-3 Riprap	0.035	0	2	2.0	1.0	4.0	5.5	11.1	1.5	6.0	32.7
T18	29.0	100	41	84	125	1.5	0.6	R-3 Riprap	0.035	3	2	19.3	2.5	12.8	6.5	130.8	3.0	15.0	195.6
T19	11.8	100	33	80	45	30	0.7	Grouted R-4 Riprap	0.045	0	2	3.5	1.3	5.3	12.8	62.4	2.0	8.0	134.3
T20	8.9	100	50	75	29	5	0.5	Vegetation & Synthetic Mat	0.06	0	2	6.2	1.8	7.0	4.7	29.5	2.25	9.0	56.3
T21	6.2	100	42	84	34	5	0.6	R-4 Riprap	0.045	0	2	5.6	1.7	6.7	6.1	38.4	2.25	9.0	75.1
T22	3.3	100	40	84	18	5	0.6	R-3 Riprap	0.035	0	2	2.9	1.2	4.8	6.3	20.1	1.75	7.0	4[illegible]
T44	54.0	100	33	80	175	4	0.5	R-4 Riprap	0.045	0	2	20.8	3.2	12.9	8.4	179.0	3.75	15.0	26[illegible]
T48	16.0	100	27	84	87	12	0.5	Grouted R-4 Riprap	0.045	0	2	8.1	2.0	8.0	10.7	87.0	2.50	10.0	154.0
Type A Rock Drain	130.0	100	27	81	434	5	0.5	Grouted R-4 Riprap	0.045	3	2.5	40.3	3.5	20.3	11.2	462.9	4.0	23.0	633.4
Type B Rock Drain	50.0	100	30	85	222	6	0.5	Grouted R-4 Riprap	0.045	0	2.5	22.1	3.0	14.9	10.0	227.0	3.5	17.5	342.4
Type B Rock Drain	"	"	30	"	"	13	0.9	Grouted R-4 Riprap	0.045	0	2.5	16.6	2.6	12.9	13.4	334.1	3.5	17.5	504.0
Type A Temporary	29.0	100	28	84	70	1	1.2	Coarse Refuse Material	0.03	3	2.5	13.6	1.8	12.0	5.2	119.2	3.0	18.0	217.4
Type B Temporary	57.0	100	33	84	120	1	1.7	Coarse Refuse Material	0.03	3	2.5	20.2	2.3	14.5	5.9	217.4	4.0	23.0	424.9

Notes:
The 100-year design storm is used for temporary collection channels in accordance with PADEP Subchapter D, Section 122.
Since Type A and B Temporary Channels will be continuously moving as fill is placed, coarse refuse lining is used.

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title: Temporary Coarse Refuse Channels	Site: Bailey Central Mine Complex, Coal Disposal Areas 3 & 4	Company: CONSOL	Permit Number:
Prepared By: Greg Hellman, P.E.	Telephone Number: 412-269-6096	Date: Janaury 15, 2002; Revised October, 2002; Revised April, 2003	Sheet ___ of ___
Channel Cross-section Type:			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
T24	13.5	100	31	80	35	5	0.5	Grouted R-4 Riprap	0.045	0	2	7.7	2.0	7.8	6.8	54.8	2.5	10.0	99.4
"	"	"	"	"	"	35	1.1	Grouted R-4 Riprap	0.045	0	2	3.7	1.4	5.4	14.0	145.1	2.5	10.0	263.1
T25	100.7	100	30	88	285	7	0.6	FP220 Fabricform	0.03	0	2.5	24.5	3.1	15.6	16.8	455.2	3.75	18.8	666.8
"	"	"	"	"	"	35	1.4	FP220 Fabricform	0.03	0	2.5	13.4	2.3	11.6	30.7	1017.9	3.75	18.8	1490.9
T26	129.0	100	40	82	290	1.5	0.5	R-4 Riprap	0.035	3	2.5	51.8	4.0	23.0	8.6	446.1	4.5	25.5	590.2
T27	71.0	100	33	84	259	1	0.6	R-3 Riprap	0.035	3	2	39.8	3.7	18.1	6.5	259.0	4.25	20.0	340.6
Temp Bench Channel	6.5	100	40	84	35	2	0.8	R-3 Riprap	0.035	0	2.5/2	6.8	1.7	7.8	5.2	50.9	2.5	11.2	92.2

Notes:
The 100-year design storm is used for temporary collection channels in accordance with PADEP Subchapter D, Section 122.

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title: Temporary Saddle Dam A Channels	Site: Bailey Central Mine Complex, Coal Disposal Areas 3 & 4	Company: CONSOL	Permit Number:
Prepared By: Greg Hellman, P.E.	Telephone Number: 412-269-6096	Date: January 23, 2002 Revised October, 2002	Sheet ___ of ___
Channel Cross-section Type:			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
T28	18	100	27	85	67	2	0.7	Vegetation & Synthetic Mat	0.06	0	2	16.3	2.9	11.4	4.1	76.7	3.5	14.0	115.7
T29	18.0	100	33	85	67	20	0.6	Grouted R-4 Riprap	0.045	0	2	5.5	1.7	6.7	12.1	76.8	2.25	9.0	1[illegible]
T30	62.2	100	30	75	150	4.0	0.5	R-4 Riprap	0.045	0	2	18.5	3.0	12.2	8.1	150.0	3.5	14.0	218.1
T31	7.2	100	31	88	44	25	0.6	Grouted R-4 Riprap	0.045	0	2	3.7	1.4	5.5	11.9	56.9	2.0	8.0	122.6
T32	19.0	100	24	75	52	4	0.5	R-4 Riprap	0.043	0	2	8.1	2.0	8.0	6.4	51.3	2.5	8.0	93.1

Notes:
The 100-year design storm is used for temporary collection channels in accordance with PADEP Subchapter D, Section 122.

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title: Runoff Collection Sump Channels	Site: Bailey Central Mine Complex, Coal Disposal Areas 3 & 4	Company: CONSOL	Permit Number:
Prepared By: Greg Heilman, P.E.	Telephone Number: 412-269-6096	Date: March 19, 2002 Revised Oct. 2002; Revised April 2003	Sheet ___ of ___
Channel Cross-section Type:			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
T33	1.3	10	28	70	2	6	0.5	Grouted R-3 Riprap	0.035	0	2	0.5	0.5	2.03	3.9	2.0	1.0	2.0	12.16
"	"	"	"	"	"	20	0.59	Grouted R-3 Riprap	0.035	0	2	0.3	0.4	1.6	6.1	3.5	1.0	2.0	2.
T34	1.1	10	25	70	2	6	0.5	Grouted R-3 Riprap	0.035	0	2	0.5	0.5	2.03	3.9	2.0	1.0	2.0	12.16
"	"	"	"	"	"	20	0.59	Grouted R-3 Riprap	0.035	0	2	0.3	0.4	1.6	6.1	3.5	1.0	2.0	22.21
T35	1.7	10	23	80	5	4	0.6	Vegetation & Synthetic Mat	0.06	0	2	1.8	1.0	3.8	2.8	5.8	1.5	6.0	17.1
"	"	"	"	"	"	20	0.8	Vegetation & Synthetic Mat	0.06	0	2	1.0	0.7	2.8	5.1	13.0	1.5	6.0	38.2
T36	2.8	10	30	80	9	4	0.6	Vegetation & Synthetic Mat	0.06	0	2	2.8	1.2	4.7	3.2	10.5	1.75	7.0	25.77
"	"	"	"	"	"	20	0.9	Vegetation & Synthetic Mat	0.06	0	2	1.5	0.9	3.5	5.9	23.5	1.75	7.0	57.6
T45	0.7	10	29	70	1	3	0.7	Veg/Curled Wood	0.06	0	2	0.6	0.6	2.2	1.7	2.3	1.25	5.0	9.1
"	"	"	"	"	"	10	0.8	"	0.06	0	2	0.4	0.4	1.7	2.6	4.3	1.25	5.0	16.6
T46	1.1	10	33	70	2	2	0.5	Veg/Curled Wood	0.06	0	2	1.2	0.8	3.9	1.7	1.9	1.25	5.0	7.4
"	"	"	"	"	"	10	0.7	"	0.06	0	2	0.6	0.6	2.3	3.1	4.3	1.25	5.0	16.6
T49	4.6	10	31	80	0.2	30	0.8	Veg/Curled Wood	0.06	0	2	0.1	0.2	0.8	2.7	2.5	1.0	4.0	1[illegible]
T50	6.8	10	30	70	13	2	0.5	Grouted R-3 Riprap	0.035	0	2	3.2	1.3	5.0	4.1	13.0	1.75	7.0	31.23
"	"	"	"	"	"	25	0.97	Grouted R-3 Riprap	0.035	0	2	1.2	0.8	3.14	10.6	45.0	1.75	7.0	110.42
T51	8.5	10	30	70	16	2	0.64	Grouted R-3 Riprap	0.035	0	2	3.7	1.4	5.5	4.3	20.7	2.0	8.0	44.59
"	"	"	"	"	"	25	1.15	Grouted R-3 Riprap	0.035	0	2	1.4	0.9	3.4	11.1	73.2	2.0	8.0	157.65

Notes:
The 10-year design storm is used for temporary collection channels in accordance with Section 2.9.1(2) of the Engineering Manual for Mining Operations.

Peak discharge for T49 assumes stormwater collection sump is pumped out in 2 days.

Design of T35 and T36 includes runoff from the saddle dams (worst case).

Rev April 2003

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title: Stockpile Channels	Site: Bailey Central Mine Complex, Coal Disposal Areas 3 & 4	Company: CONSOL	Permit Number:
Prepared By: Greg Hellman, P.E.	Telephone Number: 412-269-6096	Date: March 19, 2002; Revised Oct. 2002; Revsled April 2003	Sheet ___ of ___
Channel Cross-section Type:			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
T37	2.8	10	42	91	10	2	0.6	Vegetation & Curled Wood Mat	0.06	0	2	3.9	1.4	5.6	2.6	12.1	2.0	8.0	26.0
T38	0.5	10	50	91	2	10	0.9	Vegetation & Curled Wood Mat	0.06	0	2	0.6	0.6	2.3	3.1	9.2	1.5	6.0	2[illegible]
T39	1.8	10	50	91	8	2	0.5	Grouted R-3 Riprap	0.035	0	2	2.2	1.0	4.2	3.6	7.0	1.5	6.0	20.7
"	"	"	"	"	"	15	0.78	Grouted R-3 Riprap	0.035	0	2	1.0	0.7	2.9	7.7	19.2	1.5	6.0	56.7
T40	2.2	10	33	91	10	2	0.61	Grouted R-3 Riprap	0.035	0	2	2.6	1.1	4.6	3.8	12.7	1.75	7.0	31.23
"	"	"	"	"	"	25	0.79	Grouted R-3 Riprap	0.035	0	2	1.0	0.7	2.8	9.9	24.8	1.5	6.0	73.2
T41	2.2	10	24	91	10	10	0.5	Vegetation & Synthetic Mat	0.06	0	2	2.1	1.0	4.1	4.7	9.2	1.5	6.0	27.0
T42	18.0	10	33	91	66	1	0.6	R-4 Riprap	0.045	0	2	16.8	2.9	11.6	3.9	72.3	3.5	14.0	109.1
T42	"	"	"	"	"	10	1.6	R-4 Riprap	0.045	0	2	7.1	1.9	7.5	9.3	228.7	3.5	14.0	344.9
T43	11.0	10	33	91	40	3	0.6	Vegetation & Synthetic Mat	0.06	0	2	9.5	2.2	8.7	4.2	43.6	2.75	11.0	74.5
T47	7.5	10	33	91	27	1	0.69	Vegetation & Synthetic Mat	0.06	0	2	10.7	2.3	9.2	2.5	33.4	3.0	12.0	54.2

Rec April 2003

Module 13: Impoundments

Provide the following information for each impoundment that will be used in operations under this permit. Organize the formation by site and facility.

13.1 General.

a) Identify the impoundment so that it can be keyed to Exhibit 9.1.

One sedimentation pond (with two chambers) and one coal refuse slurry impoundment (Coal Refuse Disposal Area No. 3) are proposed with this application. Refer to the Exhibit 9.1, Operation Maps for the impoundment locations and Construction Drawings appended to the Module 21 Design Report.

b) Describe the function of the impoundment.

***Slurry Impoundment**. The slurry impoundment will be used for disposal of coal refuse generated by the Bailey Central Mine Complex. Coarse coal refuse will be placed in embankments constructed across the valley to form an impoundment. Fine coal refuse will be pumped into the impoundment area by water slurry techniques. Water levels within the impoundment will be controlled by a decant pipe that will discharge into the proposed sedimentation pond in conjunction with a pumping system which will recycle pond supernatant to the preparation plant on an as needed basis.*

***Sedimentation Pond**. The sedimentation pond will receive discharge from the slurry pond and also will be used for site sedimentation control during each phase of facility development. Water will not be pumped from the pond by Consol unless the discharge exceeds 200 gpm. The 200 gpm is the approximate average annual flow recorded at the unnamed tributary to South Branch Enlow Fork that the pond discharges to.*

c) Attach site-specific cross sections of the impoundment showing: the principal spillway, dewatering pipe, depth of water, crest of emergency spillway, maximum height of embankment, and existing ground. Label the cross-section Exhibit 13.1 – Impoundment Cross-Section.

Refer to Construction Drawings appended to the Module 21 Design Report for cross sections of the impoundments. As indicated on those documents, the slurry impoundment design does not include an emergency spillway.

d) Describe the potential effect of mine subsidence on the impoundment structure.

The slurry impoundment is located directly over underground workings of the Bailey Mine. There are approximately 700 or more feet of cover between the underground workings and the proposed slurry impoundment. Refer to Section 4.9.6 of the Module 21 Design Report for a discussion of potential mine subsidence impacts.

The sedimentation pond location is not underlain by mine workings.

e) If detailed design plans are not included with the initial submittal of this application, indicate when they will be provided. (Note that design plans must be approved by the Department before construction of the structure begins.)

Not applicable. Detailed design plans are included with this submittal. Refer to the Module 21 Design Report and Construction Drawings.

13.2 Detailed Design Plan.

Include a design report, construction plans, construction specifications and Form 13.2A. If the embankment is more than 20 feet in height as measured from the upstream toe of the embankment to the crest of the emergency spillway, or has a storage volume of 20 acre feet or more provide a stability analysis. Plans must be certified by either a qualified registered professional engineer or land surveyor (except in the case of large impoundments (see §89.111), impoundments on coal refuse disposal sites, and impoundments which will be left as part of the postmining land use, where plans must be certified by a qualified registered professional engineer).

Refer to the Module 21 Design Report, Construction Drawings, and Technical Specifications. Also refer to Form 13.2A at the end of this module.

14.0 MINE WATER CONVEYANCE SYSTEM

14.1 DESCRIPTION

The work shall include replacement of a section of existing mine water conveyance piping with piping capable of supporting increased overburden loads from dam construction. The work shall also include construction of a buried conduit to provide power to the pump. Work shall also include extension of the existing pipe casing and drive shaft as the embankment is placed. Work shall be conducted in accordance with the Contract Drawings and these Specifications and in reasonably close conformity with the lines, grades, and locations as shown on the Contract Drawings and/or as established by the Engineer.

14.2 MATERIALS

14.2.1 The casing shall be wrapped with two layers of 10 mil (minimum) polyethylene sheeting to minimize soil down drag forces.

14.2.2 Such casing, fittings and drive shaft conduit as necessary to extend the pump casing.

14.2.3 Mine water conveyance pipe shall be 6 inch Certa-lok Yelomine pipe of the same dimension ratio as the existing pipe.

14.2.4 Pipe for conduits shall be 4 inch schedule 80 PVC with flush threaded joints or belled solvent welded joints. Sweep bends shall be factory bent to the specified radius. Conduits shall be supplied with spacers to keep the pipe located at the dimensions shown on the contract drawings.

14.2.5 Pipe and conduit encasement shall be Class A concrete Specified in PADOT Publication 408, section 704

14.2.6 Materials to be excavated for installation of the pipe shall be in place material - soil and rock weathered in varying degrees.

Wetland impacts at the site are unavoidable. Refer Section 15.4a above and to the Alternatives Analysis that was submitted for this project to PADEP McMurray District Mining Office and approved on August 1, 2001.

c) If any wetlands will be directly affected, provide the following:

1) Identify the wetland and the areal extent of the impact.

All of the wetlands listed on Form 15A will be completely impacted and removed by the proposed activities. Figure A of Attachment 15.1 and Figures 2 and 3 of the Attachment 15.5 Wetland Characterization report show the location and approximate extent of the existing wetland areas.

2) Submit a cross-sectional view showing the wetland and the proposed disturbed area.

Cross sectional views of valley bottom areas where the wetlands are located are included with the Module 21 Construction Drawings

3) Explain how the proposed activities will directly affect the hydrology, functions and values of the wetlands.

i) If the proposed surface mining activities will affect less than 1.0 acre of wetland and the wetland is not an exceptional value wetland (in accordance with 25 PA Code Section 105.17), provide a description and probable degree of impact to the wetland functions and values which will be impacted by the proposed mining activities. NOTE: If a "yes" response is indicated for any question in 15.3 (a)(1)-(9), the wetlands would be exceptional value (as defined in Section 105.17).

ii) If the proposed surface mining activities will affect 1.0 or more acres of wetlands or may affect an exceptional value wetland, provide a detailed assessment of the wetland functions and values identified in 15.3 (a)(10)-(17). Provide extent or degree of impact to each function and value.

A detailed assessment of wetland functions is included in Attachment 15.5. As indicated by that report and the Attachment 15.1 report, very few of the Area No. 3 wetlands are in a natural state and most have been highly disturbed by cattle traffic. Wetland areas encompassing springs and seeps serve as groundwater discharge areas. Proposed construction provides for spring and seep flow to be intercepted and carried under the project site in an underdrain. Erosion and sedimentation and flood control provided by the wetlands will be replaced by proposed facilities detailed in the Module 21 Construction Drawings.

A small (0.013 acres) wetland (S-20 on Figure A of Attachment 15.1) in the Fletcher Run watershed will be impacted by stormwater collection sump construction. Wetland S-20 is a small isolated palustrine emergent wetland. This wetland is located high in the watershed and is not associated with the floodplain of any drainage system. Dominant vegetation includes sedges (Carex spp.) and soft rush (Juncus effusus). Hydrology to this wetland is primarily supplied from runoff that becomes detained for short durations in a small-depressed area. Due to its relatively small size, lack of woody vegetation, and lack of permanent water, the only principle wetland function provided by this wetland is ground water recharge.

d) If any wetlands will be indirectly affected by surface mining activities (e.g. altering the wetland hydrology):

1) Identify the wetland and provide an estimate of the total wetland acreage affected. Describe the functions or values to be impacted and the degree of impact.

2) Provide a description of how the proposed surface mining activities will indirectly affect the wetlands' functions and values.

No indirect wetland impacts are anticipated.

e) Indicate whether the cumulative impact of the proposed and anticipated surface mining activities result in a major impairment of the wetland resource in the general area, provide an explanation of the determination and identify any contacts with state or federal agencies involved in making the determination.

Cumulative impacts of the proposed surface mining activities will not result in a major impairment of wetland resources in the general area. Wetland impacts will be mitigated/replaced as discussed in Module 15.5. The proposed activity will be primarily contained within the watershed of the two unnamed tributaries. Recharge contributed by wetlands and streams within the project site to areas downstream will be maintained by discharge from the proposed sedimentation pond.

f) Where a wetland's hydrology is at risk of being altered by underground coal extraction, as determined by the assessment under Module 8.5, information concerning wetland delineation ad functions must be provided as outlined in Sections 15.3 and 15.4 of this module.

Not Applicable.

15.5 Wetland Mitigation/Replacement. (Sites where less than 0.5 acres of wetland is affected may qualify for mitigation options provided under the Pennsylvania Wetland Replacement Project. Contact the DEP permitting office for details.)

a) If wetland mitigation measures or wetland replacement are proposed, address the following items:

1) Identify the wetlands where mitigation measures will be employed, wetlands that will be replaced, and sites where replacement wetlands will be constructed along with the respective area of each.

2) Provide a plan for mitigation/replacement following the guidelines in the DEP's technical guidance document, entitled "Design Criteria for Wetlands Replacement". (This guidance is available from DEP's Bureau of Water Quality Protection, Post Office Box 8465, Harrisburg, Pennsylvania 17105-8465, telephone 717-787-2666 or through the Department's web site under Technical Guidance # 363-0300-001.

3) Show all affected wetlands, mitigation areas, and replacement sites on Exhibit 9.1; and, in addition, show replacement sites on Exhibit 18.1.

4) Provide a wetlands functions and values comparison of current vs. replacement wetland acreage. In the case of mitigation, a comparison of the known wetlands functions and values and degree of impact to each must be compared to the functions and values of the proposed mitigation site when completed. This comparison of "currently existing" to "probable replacement" allows for a basis of the 1:1 replacement ratio.

The mitigation plan for the Bailey Area No. 3 & No. 4 project has been submitted to the Department under separate cover. Refer to the following document:

Civil & Environmental Consultants, Inc. Wetland Mitigation Plan for Bailey Mine Coal Refuse Disposal Areas No. 3 and no. 4. April 28, 2003.

Refer to Attachment 15.1 and Attachment 15.5 for descriptions of affected wetlands, including a description of functions and values. Affected wetlands also are shown on Exhibit 9.1 and 18.1. The wetland (S-20 Figure A of Attachment 15.1) in the Fletcher Run Watershed will impact 0.013 acres, increasing the total impacted wetland acreage to 1.38 acres which is less than the acreage proposed for mitigation.

NOTES: At a minimum, wetland replacement must be at a 1:1 ratio (replacement acres: affected acres), although the Department may require the ratio to exceed 1:1 based on the functions and values of the wetlands to be affected.

Wetland replacement sites will generally not be approved unless the site is located within the same general area as the existing wetland to be replaced.

To determine if we have met our one plant per square yard target with warm season grass plantings, we will sample five of the warm season grass plantings during the fall sampling period. Twenty-five, random 0.25-meter square plots will be monitored to assess the cover density of seeded plants.

6. Statistical analyses will include a comparison of before and after treatment effects and a comparison among treatment and reference sites using a nested ANOVA design (standard parametric procedures). In addition, regression analyses may be used to explore the relationships between the various water chemistry parameters and the biological parameters (e.g., macroinvertebrates and fish) collected.

7. We expect to document a minimum of a 20% improvement in the biological and physical parameters monitored. The program will be considered successful if levels of fecal coliforms and nitrogen and phosphorus compounds, and plant, fish, and invertebrate variables improve 20% over pre-restoration values or restored/protected sites show a 20% improvement over unrestored/protected sites. We expect to document functional shifts in macroinvertebrate populations from tolerant to intolerant individuals and from autochthonous to allochthonous feeders. With respect to fishes, we anticipate an increase in biomass and abundance because fish will have better spawning habitat and more stable habitat conditions. Lastly, we anticipate a large shift in the plant community because cattle will no longer have grazing access. Over the course of the biomonitoring work we expect to see an increase in diversity, density, and height of herbaceous plants with recruitment of woody plants.

Part III – Schedule*

August 2002 – March 2003

Site surveys and landowner contact and sign-up in designated area(s) – See Attachment for Sub-Contract detailing activities and services to be provided

March 2003 – October 2003

Initiate pre-restoration biomonitoring activities.

September 2003 – November 2003

Streambank fencing restoration
November 2003 – April 2004

Border edge cuts completed

April 2004 – September 2004

Streambank fencing restoration

10) Areas where prime farmland will be reconstructed.

Prime farmland reconstruction is not proposed. A negative determination is being requested for prime farmland soils located within the permit boundary.

11) Erosion and sedimentation controls that will be used during reclamation and any which will remain as part of the postmining land use.

Refer to Exhibit 21.1, Construction Drawings. The proposed sedimentation pond will control sedimentation from areas of final cover placement. This pond will remain as part of the postmining land use until the site has been fully vegetated and discharges meet effluent criteria. The pond shall be removed in accordance with the Sediment Pond Abandonment Plan (Sheet 30A) when approval is granted from the Mine Conservation Inspector. Runoff from stockpile areas also will be controlled with sediment traps. The traps will be removed at the end of final reclamation, when the sites have been fully vegetated. Lined channels and culverts will remain after closure to safely convey runoff off of the site.

12) Existing land uses (by area).

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module.

13) Proposed postmining land uses (by area).

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module.

14) Dams or impoundments which will remain as part of the postmining land use.

The proposed sedimentation pond and dam will remain as part of the postmining land use until the site has been fully vegetated and discharges meet effluent criteria. Once this occurs, the sedimentation pond will be removed and a channel will be restored in the area. The five dams constructed to form the Area No. 3 slurry impoundment also will remain as part of the postmining land use, but they will not function as dams. The slurry impoundment (Coal Refuse Disposal Area No. 3) will be dewatered and covered as part of site reclamation. Refer to Sheet 11 of Exhibit 21.1.

15) Areas which will not be restored to approximate original contour.

Only the soil stockpile areas are expected to be restored to approximate original contour. Other areas within the proposed permit boundary will be graded to the contours shown on Sheets 11 and 12 of Exhibit 21.1.

16) Areas in which final slopes will exceed 20 degrees.

Sedimentation pond, slurry impoundment, and coarse coal refuse area outslopes between benches will exceed 20 degrees.

17) Drainage pattern.

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module.

18) Vegetative cover types to be established (key to seed mixture number, woody plant mixture number and cropping group number in 18.5)

Refer to the Land Use/Reclamation Map, Exhibit 18.1, at the end of this module. Also refer to Item 18.5 of this module.

19) Excess spoil disposal areas.

Refer to Sheets 11 and 12 of Exhibit 21.1, Construction Drawings for the final limit of coal refuse in Coal Refuse Disposal Areas No. 3 and No. 4.

20) Facilities for protection or enhancement of fish and wildlife.

Erosion and sedimentation control will enhance and protect fish and wildlife during the operation. Upon reclamation of the site the proposed planting plan will enhance the area for wildlife.

After the disposal facility is closed, the permit area will be returned to unmanaged natural habitat by covering the coal refuse and establishing vegetation. The reclaimed refuse area can then be accessed by wildlife. The areas outside the footprint of Areas 3 and 4 that were forestland will be returned to forestland and all other areas to unmanaged natural habitat. The proposed seed mixture is presented in the revegetation section below. Refer to Exhibit 18.1, Land Use/Reclamation Maps.

b) For each premining land use area in 18.3, discuss the manner in which other potential uses under 18.3(b) were considered in determining the selected postmining land use. Include consideration given to surface owner plans, and applicable state and local land use plans and programs.

Because the area is rural, there is no unfulfilled demand for land that is suitable for building development. Therefore, that future land use was not considered. With the proposed land use, crest areas of the reclaimed coal refuse disposal facility could again be used for grazing cattle or lands occasionally cut for hay if CPCC desires to re-establish such leasing practices.

c) Describe the measures which will be taken during the reclamation and postmining phase of operation to develop aquatic and terrestrial habitat. If enhancement measures are not proposed explain why enhancement is not practical.

The stream/wetland mitigation plan proposed under Module 15 provides for implementation of measures that will develop and enhance aquatic and terrestrial habitat at the proposed mitigation sites. In addition, the vegetation plan proposed for the disposal area includes plants desirable for wildlife habitat. During reclamation, measures will be implemented to reduce erosion and sedimentation of the unnamed tributary and Enlow Fork as discussed in Module 11 of this application. Following reclamation, haul roads not reclaimed will be inspected and maintained in accordance with the attached Postmining Road Maintenance Plan.

d) Identify each building, road, impoundment or other structure which will be developed, improved, or used under this permit and which will remain following reclamation. Also describe its role in the postmining land use.

- For each impoundment that will remain, provide information to demonstrate that: the quality of impounded water will be suitable for the intended use; the level of water and size of impoundment will be sufficient to support the intended use; the impounded water will be safely accessible; adjacent water supplies will not be adversely impacted; and the impoundment will be compatible with the postmining land use.

No buildings or structures will remain other than the sedimentation pond. The pond will remain as part of the postmining land use until such time that the rock drains discharging to it meet effluent limitations and when the refuse sites have been fully vegetated. The pond shall not be removed until approval is granted from the Mine Conservation Inspector. The pond will remain for treatment of seepage that is expected to continue for a period after disposal facility closure. When the seepage can be discharged without treatment, the pond will be eliminated. Refer to Module 13 for sedimentation pond design information. The pond will be operated during the post closure period in the same manner as during the active phase of disposal facility operation. No treatment other than sedimentation is expected to be required based on performance of the existing Bailey sedimentation ponds. Discharge from the pond will be conducted in accordance with discharge limitations. All roadways will be reclaimed prior to final abandonment excluding those used for permanent access and maintenance. Roads to remain for permanent access will be inspected and maintained in accordance with the Postmining Road Maintenance Plan presented as Attachment 18.4.d.

e) Indicate whether or not the proposed land use is compatible with local zoning and land use restrictions.

No laws or ordinances regarding land use classifications or restrictions exist in Richhill and Gray Township. At the county level (Greene County), no laws or ordinances exist classifying land use, however, a countywide plan exists classifying the area as agriculture. The proposed land use of grassland accessible to area wildlife is compatible with the surrounding land use. Since CPCC is returning the site to its premining land use, no violation with local zoning and land use restriction is expected.

f) Provide the comments concerning proposed land uses from the legal or equitable owner of the land surface.

The legal owner of land within the proposed permit boundary (CPCC) has no comment concerning the proposed postmining land use.

b. Name of plant nutrients.
c. Guaranteed nutrient percentages.

Fertilizer rates will be formulated from soil test results or shall be the application rate established as acceptable during soil stockpile seeding..

Lime to be used will be pulverized agricultural limestone conforming with Section 804.2(a)1 of PADOT Specifications. The lime rate will be formulated from soil test results or, in the absence of soil testing, a rate of 2 tons/acre will serve as a preferred minimum.

b) Temporary Cover. Provide the following information for each seed mixture to be used for temporary cover: (Note: Key to 18.1)

1)

Seed Mixture No.	Seed Mixture (Species)	Rate of Appl. (lbs./acre)	Seed Quality (Min. % Germ.)	Seed Quality (Min. % Purity)
A	*Perennial Ryegrass*	*40*	*98*	*98*
B	*Winter Wheat*	*180*	*85*	*98*
C	*Winter Rye (Aroostook Rye)*	168	85	98

2) Use.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

3) Method(s) of seeding.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

4) How seedbed will be prepared for planting.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

5) Type(s) of mulch to be used and rate(s) of application.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

c) Permanent Cover. Provide the following information for each seed mixture to be used for permanent cover: (Note: Key to Exhibit 18.1)

1)

Seed Mixture No.	Seed Mixture (Species)	Rate of Appl. (lbs./acre)	Seed Quality (Min. % Germ.)	Seed Quality (Min. % Purity)
Level to Nearly Level Areas				
A	*Annual Ryegrass*	*20*	*90*	*Pure Live Seed*
B	*Chewings (red) Fescue*	*10*	*85*	*Pure Live Seed*
C	*Birdsfoot Trefoil (inoculated)*	*6*	*80*	*Pure Live Seed*
D	*Timothy*	*5*	*85*	*Pure Live Seed*
E	*Indian Grass (Rumsey)*	*3*	*80*	*Pure Live Seed*
F	*Shelter Switchgrass (purple top)*	*6*	*80*	*Pure Live Seed*
G	*Little Bluestem (Aldous or Camper)*	*4*	*80*	*Pure Live Seed*
H	*Side Oats Grama (El-Reno)*	*2*	*80*	*Pure Live Seed*
I	*Forb-mix*	*2*	*80*	*Pure Live Seed*

Slopes				
A	*Perennial Ryegrass*	*25*	*90*	*98*
B	*Tall Fescue (Fawn or Barce)*	*60*	*85*	*98*
C	*Switchgrass*	*15*	*60*	*Pure Live Seed*

2) Use.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

3) Method of seeding.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

4) How seedbed will be prepared for planting.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

5) Type(s) of mulch to be used and rate(s) of application.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

d) Woody Plants. For areas that will also be planted with woody plants, provide the following: (Note: Key to Exhibit 18.1)

1)

Woody Plant Mixture No.	Woody Plant Species	No./ac.
A	*Deertongue*	*25 lb/ac*
	Birdsfoot trefoil	*15 lb/ac*
B	*Weeping lovegrass*	*5 lb/ac*
	Birdsfoot trefoil	*10 lb/ac*
	Sericea Lespedeza	*25 lb/ac*
C	*Weeping lovegrass*	*5 lb/ac*
	Switchgrass	*5 lb/ac*
	Birdsfoot trefoil or	*10 lb/ac*
	Sericea Lespedeza	*20 lb/ac*

The woody species to be used with these seeding mixtures shall be:

Black Locust	*Austrian Pine*	*Silver Maple*
Black Cherry	*Norway Spruce*	

A single woody species may not comprise more than 50% of the total number of seedlings planted.

2) Method of planting.

Planting of woody species may be done either manually using planting bars (dibbles) or mattocks, or mechanically with commercial tree planting equipment. The standard for successful revegetation shall be determined by percent ground cover. A minimum of 70% ground cover of permanent plant species with not more than 1.0% of the area having less than 30% ground cover with no single or contiguous area having less than 30% ground cover exceeding 3000 square feet. Woody plants shall be 400 per acre except on slopes greater than 20 degrees where the minimum number of woody plants shall be 600 per acre.

For purposes of measuring the stocking standards for woody species, the following apply:

1. *Root crown or root sprouts over 1 foot in height shall count as one toward meeting the stocking requirements. When multiple stems occur, only the tallest stem will be counted.*

2. *A tree or shrub shall count as one toward meeting the stocking requirements if the tree or shrub has been in place at least 2 growing seasons and is alive and healthy with at least 1/3 of its length in live crown.*

The percent ground cover of the reclaimed area must exist a minimum of the last 2 consecutive years of the 5 year period after the last year of augmented seeding and fertilizing.

3) If the area is to be planted for wildlife habitat, identify the grouping and distribution of the plants and the type of wildlife habitat to be created.

Not applicable. The area is to be planted for unmanaged natural habitat.

e) Cropland. For areas that will be planted to crops (agronomic or horticultural), identify the crops to be grown and the management plans to achieve the crop yield standards. (Note: Key to Exhibit 18.1)

Not applicable. Crop planting is not proposed within this permit area.

f) Measurement Techniques. Specify the technique to be used to evaluate the success of revegetation. If cropland is the proposed postmining land use, specify the technique for determining crop yields. Describe the remedial measures to be employed should the minimum standards of success for reclamation not be initially met.

See Section 16.0 of the Technical Specifications appended to the Design Report (Module 21).

18.6 Fish and Wildlife (Protection/Enhancement Plan)

a) State whether or not any threatened or endangered species and/or critical habitats of these species (include species listed or proposed and habitats listed by the U.S. Department of the Interior under the Endangered Species Act of 1973) have been identified within or adjacent (within 1000 feet) to the proposed surface activity site. If it has, identify the species and habitat area and include within your response to (c) and (d) information specific to the species and habitats identified.

There are no known threatened or endangered species within or adjacent to (within 1000 feet of) the limits of the proposed permit area. Refer to the PNDI search form and the responses from the Pennsylvania Fish and Boat Commission and the Pennsylvania Game Commission presented as Attachment 18.6.

b) State whether or not any habitats of unusually high value (e.g., wild trout streams, wetlands, riparian areas, cliff/caves supporting raptors, areas offering special shelter or protection) have been identified within or adjacent (within 1000 feet) to the proposed surface mining activity site. If it has, identify the habitat area and include within your response to (c) and (d) information specific to the habitat identified.

There are no habitats of unusually high value identified within or adjacent to (within 1000 feet of) the limits of the proposed permit area. Refer to the PNDI search form and the responses from the Pennsylvania Fish and Boat Commission and the Pennsylvania Game Commission as Attachment 18.6.

c) Describe the measures which will be taken to avoid or minimize adverse impacts to fish and wildlife resources.

The site was designed to minimize the acreage necessary to construct the proposed facilities, and the design incorporates erosion and sedimentation controls to minimize adverse impacts on streams and associated aquatic life. Erosion and sedimentation controls will be implemented before and during operations and during reclamation activities. The site will be well vegetated after the life of the disposal facility has expired.

d) Describe the measures which will be taken to enhance fish and wildlife resources.

The wetland/stream mitigation plan proposed in Module 15 provides for enhancement of area aquatic and wildlife habitat. Also, the vegetation plan proposed for the disposal facility final cover includes plants desirable for wildlife habitat as an enhancement measure.

e) If no enhancement measures are identified in (d) above, explain why enhancement is not practicable.

See item d above.

ATTACHMENT 18.4.d
POSTMINING ROAD MAINTENANCE PLAN

POSTMINING ROAD MAINTENANCE PLAN

Permanent site access roads and associated drainage facilities will be maintained in good working condition to ensure that they continue to function as designed. Through periodic inspection and maintenance of these facilities, associated flooding and erosion related damage to adjacent property, will be avoided. Erosion and subsequent sediment formation will be controlled which will minimize adverse impacts to air, water, or fish, wildlife and their habitat. This plan presents inspection and maintenance practices that will be followed for retaining permanent site access roads in good condition.

INSPECTION

The condition of haul roads and appurtenant structures will be inspected annually and after major storm events. Presented below is the inspection checklist that will be followed.

INSPECTION CHECKLIST

Item	Condition to be Noted
Road Surfacing	• Absence of aggregate surfacing • Presence of erosion gullies or rills
Roadside Ditches	• Degradation/deterioration of lining • Presence of erosion gullies or rills • Sliding or slumping of the side slopes • Presence of excess sediment, debris, or other obstruction to flow • Presence of low spots
Culverts	• Presence of excess sediment or debris • Evidence of deterioration • Excess erosion at the ends • Scouring or deterioration of any outlet protection
Roadside Embankment and Cut Slopes	• Sliding or slumping • Areas of exposed soil (absence of vegetation) • Presence of erosion gullies or rills

MAINTENANCE

Maintenance of permanent haul roads and associated drainage facilities will be performed on an as needed basis as soon as practical following the periodic inspections described above. Any problems that may be noted during an inspection will be remedied as follows.

MAINTENANCE CHECKLIST

Problem	Proposed Remedy
Roadway - Absence of aggregate surfacing	Repair/replace aggregate surfacing. Re-establish roadway crown as needed.
Roadway, Ditches, & Slopes - Presence of erosion gullies or rills	Fill rills and regrade gullied slopes.
Ditches - Degradation/deterioration of lining	Replace deteriorated sections of channel lining.
Ditches - Presence of low spots	Buildup low points to establish positive drainage and replace lining.
Ditches & Roadway - Sliding or slumping of slopes	Repair slide areas. Repair any breaches in ditch side slopes.
Ditches & Culverts - Presence of excess sediment, debris, or other obstruction to flow	Remove obstructions.
Culverts & Outlet Protection - Evidence of deterioration	Repair or replace deteriorated structures. Replace eroded outlet protection with a more resistant material (e.g., larger rock riprap).
Culvert - Excess erosion at the ends	Repair eroded area of channel and install more resistant channel lining adjacent to the culvert.
Ditches and Slopes - Areas of exposed soil (absence of vegetation)	Reseed, fertilize, and mulch bare areas.

Module 19: Reclamation Schedule and Cost Information

9.1 Structure Demolition

Complete Form 19.1 to identify and describe: each structure which will be constructed or used under this permit; its intended fate upon completion of operations; and the demolition costs. Demolition costs may be taken from Table 19A or based on actual contractor's demolition cost estimates for the structure in question. If contractor's estimates are used, at least 2 estimates (signed by the contractor on company letterhead) must be obtained and included with this module.

(Note that Form 19.1 is intended to show a running tally of all structures which are or ever were included under the permit. New structures proposed under permit revisions should be added to the list. Demolished structures should be retained on the list along with their actual dates of demolition.)

Refer to Form 19.1 included at the end of this module for all structures associated with this coal refuse disposal facility permit application.

19.2 Site Reclamation

Complete Form 19.2 to identify each surface activity site which will be developed or used under this permit, its anticipated date of reclamation, and the estimated cost to reclaim it to the proposed postmining land use. Use Table 19C to calculate surface reclamation costs.

Form 19.2 presents the maximum cost that would be incurred to reclaim the Area No. 3/4 facility during its first five years of development. A cost breakdown is presented as Attachment 19.2

The maximum reclamation cost for the first five year period coincides with Stage 6 of the construction sequencing drawings (Drawing No. 46) presented in Exhibit 21.1. Costs to reclaim the facility after development to this level were calculated in accordance with TGD 563-2504-001. Included in Attachment 19.1 is a plan showing the Stage 6 facility after reclamation.

19.3 Sealing Mine Openings and Ventilation Holes

Complete Form 19.3 to identify each mine opening and ventilation hole which will be developed or used under this permit, the type of seal to be used, the anticipated date of sealing and the estimated cost of sealing. Sealing costs may be taken from Table 19B or based on actual contractor's cost estimates for sealing the opening or ventilation hole in question. If contractor's estimates are used, at least 2 estimates (signed by the contractor on company letterhead) must be obtained and included with this module.

(Note that Form 19.3 is intended to show a running tally of all openings and ventilation holes which are or ever were included under the permit. New openings and ventilation holes proposed under permit revisions should be added to the list. Sealed openings and ventilation holes should be retained on the list along with their actual dates of sealing.)

No mine openings or ventilation holes are proposed with this permit application.

19.4 Mine Drainage Treatment

Provide the following information for the mine drainage treatment facilities which presently serve or are proposed to serve this operation.

a) The design capacity of the treatment facilities.

b) The current costs of operation and maintenance on an annual basis.

c) The date of construction or last major renovation.

d) The capital cost of the facility in current dollars.

(Note that these figures will not be factored into the required bond amount unless the Department determines that there is a potential for a postmining discharge which must be treated or managed. The regulations require that mine designs be planned to prevent such discharges from occurring.)

No mine drainage treatment facilities are proposed with this permit application.

Table 19A
Default Values For Calculating Structure Demolition Costs

Wooden structures	$.35 per ft^3 of useable volume*
Building with minimal internal supports and no fixed machinery	$.35 per ft^3 of useable volume*
All other buildings and tipple structures	$.70 per ft^3 of useable volume*
Belts and conveyors	$1.00 per lineal ft.

*Useable volume = floor area x ceiling (or rafter) height

Table 19B
Default Values for Calculating Sealing Costs

Opening	Type of Seal		Reclamation Cost
Boreholes	Solid Concrete	I.D. 12" or less I.D. more than 12"	$1,500 $2,000
Shaft (not intended to be sealed water-tight)	50' of inert fill random fill to surface, mounded	d* is 100' or less d* is 100' to 200' d* is 200' to 300' d* exceeds 300'	$9,000 $14,000 $19,000 $24,000
Shaft (intended to be sealed water-tight)	Concrete bulk-head/plug and backfilled material	d* is 100' or less d* is 100' to 200' d* is 200' to 300' d* exceeds 300'	$16,000 $21,000 $27,000 $35,000
Drift or slope	Single bulkhead, water-tight, no hydraulic heal		$5,000
	Solid concrete plug, water-tight, hydraulic head on seal		$9,000
	Remotely placed water-tight seal		$10,000
	Air seal, permits discharge of mine water		$5,000

d* means the total depth of the shaft.

Table 19C
Reclamation Costs

Permit Application Type	Reclamation Cost/Ac.
Coal Refuse Disposal	$1000
Coal Preparation Plant	$3000
Bituminous Underground Mine	$3000

FORM 19.1 Structure Demolition

Structure	Construction Material	Dimensions (l-w-h) (ft.)	Volume (ft3)	Construction Date*	Demolition Date*	Postmining Use (if Applicable)	Demolition Cost
Coal Refuse Bin #1	steel	30x30x60	54,000	2005 (P)	2020 (P)	N/A	$37,800
Coal Refuse Bin #2	steel	30x30x60	54,000	2005 (P)	2020 (P)	N/A	$37,800
Coal Refuse Bin #3	steel	30x30x60	54,000	2005 (P)	2020 (P)	N/A	$37,800
Belt conveyor	steel	11,700 linear feet	N/A	2005 (P)	2020 (P)	N/A	$67,392**
Slurry pipeline	HDPE	6,000 linear feet	N/A	2005 (P)	2020 (P)	N/A	$6,000
Maintenance Building	Steel/concrete	40x80x30	96,000	2005 (P)	2020 (P)	N/A	$73,422*** (Breakdown below)
	Structure	*@ $0.35/C.F*					*$33,600*
	Floor	*@ $5.80/S.F.*					*$18,560*
	Footings	*@ 23.28/L.F.*					*$ 5,587*
	Disposal	*@$10.45/cy. (1500cy.)*					*$15,675*

***Indicate (P) for proposed, (A) for actual.**
****Conveyor Abandonment: $5.76/L.F. based on CPCC experience (5 times the value listed in Table 19A).**
*****R.S. Means, Site Work and Landscape Cost Data, 22nd Edition, 2003 with cost breakdown shown.**

FORM 19.2 Surface Area Reclamation

Site	Acreage	Date Opened*	Date Reclaimed*	Estimated Cost of Reclamation
Bailey Mine Complex proposed Coal Refuse Site	556.6	3rd quarter 2005 (P)	2020 (P)	$4,173,300 (1st Five Years)

*** Indicate (P) for proposed, (A) for actual.**

ATTACHMENT 19.2
COST BREAKDOWN
SURFACE AREA RECLAMATION

Consol Pennsylvania Coal Company - Bailey Central Mine Complex
Coal Refuse Disposal Areas No. 3 and No. 4
Attachment 19.2 - Surface Area Reclamation Cost Estimate (5-Year Closure)

Item	Units	Quantity	Unit Cost	Total	Unit Cost Source [1,2]
Mobilization/Demobilization	LS	1	$40,000	$40,000	Reference 1
Area No. 3					
C. Refuse Backfill (From Dam & Area 4)	CY	1,274,600	$1.75	$2,230,550	Contractor price for loading, hauling, placing, compacting coarse refuse at Bailey Central Mine Complex
Low Permeability Soil Material					
Placement	CY	96,500	$1.55	$149,575	Contractor current price for loading, hauling, & placing soil anywhere within Bailey (up to 5000' haul)
Compaction	CY	96,500	$0.80	$77,200	Means 02315-300-5620
QC Testing	Ac	60	$939.00	$56,340	2x(Means 01450-500-4400, 4510, 4900) + (Means 01450-500-4735, 4750, 4800)
Soil Cover Placement	CY	96,500	$1.55	$149,575	Contractor current price for loading, hauling, & placing soil anywhere within Bailey (up to 5000' haul)
Collection Channels					Based on 100-year storm, 4' bottom, 3:1 ch. slopes, 3' depth, rock lined groin ditches already in place.
Excavation (1.9 CY/LF)	LF	9,400	$8.55	$80,370	Reference 1 @ $4.50/CY
High Velocity Erosion Mat (3 SY/LF)	LF	9,400	$7.20	$67,680	Reference 1 @ $2.40/SY
Seed and Mulch	Ac	60	$1,500	$90,000	Reference 1
Area No. 4					
Low Permeability Soil Material					
Placement	CY	88,100	$1.55	$136,555	Contractor current price for loading, hauling, & placing soil anywhere within Bailey (up to 5000' haul)
Compaction	CY	88,100	$0.80	$70,480	Means 02315-300-5620
QC Testing	Ac	55	$939.00	$51,645	2x(Means 01450-500-4400, 4510, 4900) + (Means 01450-500-4735, 4750, 4800)
Soil Cover Placement	CY	88,100	$1.55	$136,555	Contractor current price for loading, hauling, & placing soil anywhere within Bailey (up to 5000' haul)
Collection Channels					Based on 100-year storm, 4' bottom, 3:1 ch. slopes, 3' depth, rock lined groin ditches already in place.
Excavation (1.9 CY/LF)	LF	4,300	$8.55	$36,765	$4.50/CY (Reference 1)
High Velocity Erosion Mat (3 SY/LF)	LF	4,300	$7.20	$30,960	$2.40/SY (Reference 1)
Seed and Mulch	Ac	55	$1,500	$82,500	Reference 1
Sedimentation Pond Abandonment					
Transfer Sediment from Pond to Area 3	LS	1	$80,000	$80,000	Actual cost to clean out existing Bailey Sediment Pond
Channels 1 and 2					
Excavation (1.9 CY/LF)	LF	1050	$8.55	$8,978	$4.50/CY (Reference 1)
R-4 Rock Lining (2.6 SY/LF)	LF	1050	$53.30	$55,965	$20.50/SY (Reference 1)
Geotextile (2.6 SY/LF)	LF	1050	$3.90	$4,095	$1.50/SY (Reference 1)
Rock Drain Outlet Pipe Extension	LF				
12" PVC Pipe	LF	105	$16.50	$1,733	Vendor Quote (Lee Supply)
Excavation (0.2 CY/LF)	LF	105	$0.90	$95	$4.50/CY (Reference 1)
Bedding (0.12 CY/LF)	LF	105	$3.96	$416	$33.00/CY (PADOT Bulletin 50, Construction Cost Catalog, January 2001; 0601-5403)
Backfill (0.05 CY/LF)	LF	105	$0.20	$21	$3.74/CY (Means 02315-120-2020 & 02315-300-7000)
Grading	CY	45,000	$2.35	$105,750	Unit price for loading, hauling & placing soil at Bailey plus compaction (Means 02315-300-5620)
Seed and Mulch	Ac	14	$1,500	$21,000	Reference 1
Spillway Removal	LF	645	$29.00	$18,705	Means 02220-875-3000 w/additional 35% for oversize pipe & 02225-720-0300
E&S for Sed Pond Abandonment	LS	1	$14,800	$14,800	5% of Total Sed Pond Abandonment Cost (Reference 1)
Haul Road Abandonment					
Regrade Haul Roads to AOG	CY	300,000	$1.60	$480,000	Means 02315-120-5420 & 02315-300-5680
Seed and Mulch Disturbed Area	Ac	24	$1,500	$36,000	Reference 1
Structure Abandonment					
Regrading to Bury Exposed Decant	CY	6,100	$1.60	$9,760	Means 02315-120-5420 & 02315-300-5680
Grout Decant Through Dam	CY	310	$92	$28,520	Means 03310-220-0150 + 2003 Means 03310-700-4050
TOTAL				**$4,352,586**	

[1] "Means" refers to 2003 Site Work & Landscape Cost Data by R S Means.
[2] Reference 1 = PADEP Mining Bond Rate Guidelines for 2003, Table 1

Revise il 2003

Consol Penn nia Coal Company
Bailey Ce Mine Complex
Coal Refuse Disposal Areas No. 3 and No. 4
Surface Area Reclamation Cost Estimate (5-Year Closure)

Item	Units	Quantity	Unit Cost	Total	
Mobilization/Demobilization	LS	1	$40,000	$40,000	From Ref. 1
Area No. 3					
Coarse Backfill (From Area 3 Dam)	CY	681,200	$1.75	$1,192,100	Based on current price for refuse disposal operations at Bailey
Coarse Backfill (From Area 4)	CY	593,400	$2.00	$1,186,800	Based on current price for refuse disposal operations at Bailey
Low Permeability Soil Material	CY	96,500	$2.50	$241,250	Current refuse disposal price, plus $0.50 for longer haul
Soil Cover	CY	96,500	$2.50	$241,250	Current refuse disposal price, plus $0.50 for longer haul
Collection Channels	LF	9,400	$3.00	$28,200	Unit prices for channel excavation & high velocity erosion mats from Ref. 1. Rock lined groin ditches are already in place.
Seed and Mulch	AC	60	$1,500	$90,000	From Ref. 1 (seed bed prep, revegetation, mulch, fertilizer)
Area No. 4					
Low Permeability Soil Material	CY	88,100	$2.50	$220,250	Current refuse disposal price, plus $0.50 for longer haul
Soil Cover	CY	88,100	$2.50	$220,250	Current refuse disposal price, plus $0.50 for longer haul
Collection Channels	LF	4,300	$3.00	$12,900	Unit prices for channel excavation & high velocity erosion mats from Ref. 1. Rock lined groin ditches are already in place.
Seed and Mulch	AC	55	$1,500	$82,500	From Ref. 1 (seed bed prep, revegetation, mulch, fertilizer)
Sedimentation Pond Abandonment					
Transfer Sediment from Pond to Area 3	LS	1	$80,000	$80,000	Actual cost to clean out existing Bailey Sediment Pond
Channels 1 and 2	LS	1050	$60	$63,000	Unit prices for channel excavation, R4 rock lining, and geotextile from Ref. 1.
Grading	CY	45,000	$1	$45,000	Grading <500 foot push from Ref. 1 - Multiply x 2 to be conservative
Seed and Mulch	AC	14	$1,500	$21,000	From Ref. 1 (seed bed prep, revegetation, mulch, fertilizer)
Spillway Removal	LS	1	$20,000	$20,000	Engineer's Estimate
E&S for Sed Pond Abandonment	LS	1	$11,500	$11,500	5% of Total Sed Pond Abandonment Cost, as per Ref. 1
Haul Road Abandonment					
Regrade Haul Roads to AOG	CY	300,000	$1	$300,000	Grading <500 foot push from Ref. 1 - Multiply x 2 to be conservative
Seed and Mulch Disturbed Area	AC	24	$1,500	$36,000	From Ref. 1 (seed bed prep, revegetation, mulch, fertilizer)
Structure Abandonment					
Regrading to Bury Exposed Decant	CY	6,100	$2.50	$15,250	Same as soil cover price
Grout Decant Through Dam	CY	310	$84	$26,040	Means 03310-220-4100 + Means 03310-700-4050
TOTAL				**$4,173,290**	

Reference 1 = PADEP Mining Bond Rate Guidelines for 2002, Table 1
Current cost for coal refuse disposal includes loading, transport, placement, and compaction of material.

Baker

Michael Baker Jr., Inc.

REPLACEMENT PAGES

Module 21

Additional unstable areas were located in Coal Refuse Disposal Area No. 4. Again the location and orientation of these unstable areas are such that they will not affect long term stability of the pile.

More detailed discussions of dam foundation conditions and slope stability analyses are presented in the Design Report attached to Module 21.

b) If there are any saturated zones or layers subject to artesian pressures beneath the proposed structure explain what measures will be taken to remove or drain these areas.

A rock drain will be installed beneath Coal Refuse Disposal Areas No. 3 and No. 4 at the location shown on Sheets 3 through 9 in the Exhibit 21 Construction Drawings. This drain will carry stream base flow under the facility. Springs that may be encountered at the subgrade of the downstream sections of impounding structures will be intercepted as needed with a spring drain constructed in accordance with Section 4.0 of the Technical Specifications presented in the Design Report (Module 21). Spring drains will discharge into the rock drain.

c) Define the effect of subsidence from deep mining on the stability of the proposed structure. Describe what measures will be taken to minimize subsidence beneath the proposed area in order to ensure stability of the area.

The extent of existing underground mine workings at the site is presented on the Module 6.2 Environmental Resource Map. Effects on dam stability are discussed in Section 4.9.6 of the Design Report.

d) Define the effect of blasting within the proposed area or adjacent areas on the stability of the proposed structure.

No blasting effects are expected since blasting either will not be permitted or will be carefully controlled by CPCC. Blasting will not be necessary after placement of the dam embankment materials has begun, but may be applicable during site preparation. Because the site is underlain by workings of the the Bailey Mine, CPCC intends to avoid blasting during site preparation. Section 5.0 of the Technical Specifications prohibits blasting unless approved by the Owner and such approval will be based on expected impacts to the dam foundation and underlying mine. If blasting is permitted, the Contractor will be responsible for obtaining all necessary permits and for complying with all regulatory requirements. Stability analyses were performed for seismic conditions that are similar to that which might result from blasting in areas adjacent to the proposed facility. Adequate factors of safety were found for these analyses. Stability analyses are presented in Module 21.

e) Provide calculations showing the lowest <u>static</u> and <u>seismic</u> safety factors <u>within</u> and <u>beneath</u> the structure. Identify the method and any computer software which were used. Explain all assumptions which were made. Provide all supporting data and tests results used in the calculations.

The dams have been analyzed under conditions of steady state seepage with and without seismic loading. Embankment as well as foundation failures were analyzed. The lowest factor of safety resulting from these analyses were 1.5 for static cases and 1.25 for seismic cases. Results of comprehensive slope stability analyses for all critical slopes of the design indicate that minimum required safety factors of 1.5 for static condition and 1.20 for seismic condition are maintained. Consequently, cut and fill slope designs proposed for the sedimentation pond, coarse coal refuse embankments, and earthen saddle dams are stable against deep-seated circular or sliding block failures under the conditions considered.

The stability analyses performed for this facility involves numerous different cases and cannot be adequately represented by providing a single lowest factor of safety. Results of the analyses are tabulated and discussed in Section 4.9.4 of the Design Report presented in Module 21. Supporting calculations are provided in the Design Report as Appendix G.

f) Describe the effects of the liner on the structure's stability.

1.0 OVERVIEW OF FACILITY DESIGN

Consol Pennsylvania Coal Company (CPCC) plans to develop a new coal refuse disposal facility within the watershed of an unnamed tributary located east of the existing Bailey Central Mine Complex (Bailey) slurry impoundment. The new disposal facility will consist of a slurry impoundment referred to as Coal Refuse Disposal Area No. 3 and a coarse coal refuse disposal area referred to as Coal Refuse Disposal Area No. 4. The slurry impoundment will be constructed within the valley of the site's main unnamed tributary. Coarse coal refuse will be used for dam construction. Excess coarse coal refuse will be placed in the valley of a secondary, contributing, tributary. Both disposal areas will receive coal refuse generated by the Bailey Central Mine Complex.

Surface water will be managed by a system of channels and sedimentation control structures. Prior to capping, stormwater runoff above the coarse refuse dam will be directed to the disposal impoundment. Other stormwater runoff will be collected by channels and conveyed through a sedimentation control structure prior to being discharged off-site. Runoff from the downstream face of the main dam, a section of the final cap, and all runoff from Disposal Area No. 4 will be directed to the site sedimentation pond. Runoff from temporary stockpile areas surrounding the site will pass through sediment traps before being discharged. The existing slurry impoundment (Coal Refuse Disposal Area No. 1) will be left open and will serve as a sedimentation pond for portions of Disposal Area No. 3. Runoff from Saddle Dam A and a section of the final cap will be directed to the existing Bailey slurry impoundment.

A network of drains will be constructed to carry base stream and spring flow under both disposal areas. These underdrain systems will discharge into the sedimentation pond. Springs intercepted at the facility subgrade will be drained to a rock drain constructed along the center of the major valleys. A soil liner will be constructed over the rock/spring drainage system to reduce infiltration to the drains from above. Both disposal areas will be provided with a two-foot thick soil liner having a 6-inch protective cover. Internal drains will be installed above the soil liner in both disposal areas. The discharge from these drains, which are separate from the rock and spring drains, will also discharge into the sedimentation pond.

The expected service life of the proposed coal refuse disposal facility is estimated to be approximately 15 years based on current coal refuse generation rates. Both disposal areas will be developed in stages as shown on the Construction Sequence Drawings. Fine coal refuse slurry placement will begin after the Stage 1 dams are complete. Coarse coal refuse placement within embankment areas of the slurry impoundment is expected to take approximately 5.0 years to complete. During that time, the coarse coal refuse disposal area will be activated as needed during severe weather conditions not suitable for adequate compaction. Fine coal refuse slurry placement will begin after the Stage 1 dams are complete Refer to Sheet 15 of the Construction Drawings for a staging diagram showing an estimated schedule for the slurry impoundment.

1.1 Coal Refuse Disposal Area No. 3 (Slurry Impoundment)

Coarse coal refuse will be used to construct embankments within the main stream valley at the downstream and upstream ends (eastern and western ends) of the proposed slurry impoundment site to form the reservoir area. Three additional small earthen saddle dams will be constructed to raise other low areas in the ridgeline to El.1495 feet. Fine coal refuse will be placed within the impoundment area by water slurry techniques. Slurry will be discharged along the upstream face of the eastern dam (main dam). Water levels within the impoundment will be controlled by a decant pipe that will discharge into the sedimentation pond in conjunction with a pumping system which will recycle pond supernatant to the preparation plant on an as-needed basis. The impoundment has been designed to safely store the entire runoff from the design storm conditions, therefore, an emergency spillway has not been provided.

The earth saddle dams, Dams B, C, and D, will be provided with an upstream geomembrane liner to prevent seepage. A contingency internal drain will be installed in each dam for safety purposes. Seepage through the Main Dam and Saddle Dam A will be intercepted and controlled by internal blanket drain systems. The main dam internal drain will outlet to the sedimentation pond; the Saddle Dam A internal drain will outlet to the existing Bailey slurry impoundment (Coal Refuse Disposal Area No. 1).

The Main Dam and Saddle Dam A will be comprised of coarse coal refuse and will be constructed in stages as indicated on the Construction Sequence Drawings. Expansion of the main dam from the initial stage will be accomplished following downstream construction practices (i.e., expanding the dam footprint in a direction away from the pool).

When the fine coal refuse disposal capacity has been exhausted, the impoundment area will be capped with coarse coal refuse. Coarse coal refuse surfaces will be covered with a two-foot thick soil cover and vegetated. The lower foot of soil cover material will exhibit a permeability of 5×10^{-5} cm/sec after compaction.

Development of the slurry impoundment will require maintaining operation of the dewatering borehole located within the main dam area. Manhole sections will be installed as needed to provide access to the borehole and pump.

1.2 Coal Refuse Disposal Area No. 4 (Coarse Coal Refuse Disposal Area)

A coarse coal refuse valley fill will be developed adjacent to and southeast of the slurry impoundment. This area, referred to as Coal Refuse Disposal Area No. 4, will accept coarse coal refuse generated during weather conditions unsuitable for placement in the slurry impoundment embankment and after the slurry impoundment embankments are fully developed. The area will receive coarse coal refuse until it is needed for the final slurry impoundment capping phase. When conditions are unsuitable for adequate compaction, typically two months per year, coarse coal refuse will not be placed within 250 feet of the intermediate and final embankment outslopes. The site selected for disposal of unsuitable material will depend on which stage of the facility is being developed.

Coal Refuse Disposal Area No. 4 will be provided with an internal drain that will intercept and convey infiltration. This drain will be constructed above the soil liner and will outlet to the sedimentation pond.

1.3 Sedimentation Pond

The sedimentation pond will be constructed at the beginning of Coal Refuse Disposal facility site development and will be used throughout the life of the disposal facility. It will receive runoff from both disposal areas (i.e., slurry pond and coarse coal refuse disposal area), as well as, discharge from the disposal facility decant pipe, underdrain system and internal drains. CPCC plans to recycle slurry pond supernatant to the preparation plant; therefore, little flow is expected to be discharged through the decant pipe. The maximum contributory drainage area for the sedimentation pond, 455 acres, will occur during initial site preparation. When the proposed disposal facility is completely developed and capped, runoff from a 116-acre section of the slurry pond cap will drain to the existing Bailey slurry impoundment.

The sedimentation pond embankment, decant system, and emergency spillway will be constructed to the heights and grades shown on the disposal facility Construction Drawings, and in accordance with the facility Technical Specifications. Erosion and sedimentation controls will be installed prior to construction in accordance with Section 4.8 of the disposal facility Design Report.

The pond will be split into two chambers by an interior earthen dike. An upstream chamber will provide initial sedimentation and will require more frequent clean-out than the larger downstream chamber. A pipe culvert will hydraulically connect the two chambers. Pond levels will be controlled by the principal and emergency spillways. Under normal conditions, the lower pool level will be at El. 1141.5 feet. When the water level rises above normal pool, water will be discharged automatically through the principal spillway. During extreme rainfall periods, when the lower pool level rises above El. 1157.5 feet, water will be discharged automatically through the emergency spillway.

2.0 OPERATIONS

2.1 Site Preparation

Initial site preparation will consist of sedimentation pond construction. The sequence of sedimentation pond construction is provided on Sheets 29 and 29A. Initial site preparation activities for Coal Refuse Disposal Area No. 4 will include the following:

- construct a small portion of the Area No. 3 main dam internal drain and cutoff trench,
- excavate and stockpile soil needed for construction of future stages of liner and final cover,
- install rock and spring drains (underdrain systems),
- install sections of liner,
- install haul roads,
- install collection channels,
- construct conveyor,
- construct maintenance facility, and
- construct stormwater collection sump.

Refer to the detailed construction sequence drawings for the entire life of the facility provided on Sheets 41 through 55 of the Construction Drawings.

2.2 Fine Coal Refuse Placement

Fine coal refuse will be placed within the impoundment area of Coal Refuse Disposal Area No. 3 by water slurry techniques. Slurry will be discharged along the upstream face of the Main Dam.

Water that accumulates in the impoundment typically will be pumped to the existing Bailey slurry impoundment. The pipe decant system will drain storm water that may accumulate above the normal operating pool level and is not needed for plant operations to the sedimentation pond.

Presented on Sheet 33 of the facility design drawings are details of the decant system, including inlet construction details and details for sealing the inlets before they are covered with fine coal refuse. Each inlet will be equipped with a cover which will be replaced with a trash rack and anti-vortex device before it is activated. This device will be removed when the inlet is sealed. The cover installed over the highest inlet at elevation 1464 feet will be vented to maintain atmospheric pressure within the pipe. The decant system will be completely installed during initial site preparation.

As the slurry level rises, inlets which are no longer needed to maintain the operating pool level will be taken out of service. The trash rack and anti-vortex device will be removed and a 1.5-inch thick by 36 inch square steel plate will be bolted to the flange. Silicon coating will be applied to the inlet and all exposed metal surfaces to provide a watertight seal and protect the surface from corrosion. The inlet then will be buried with a minimum of three feet of compacted clay as indicated on Sheet 33 of the facility design drawings.

2.3 Coarse Coal Refuse Handling and Placement

Placement of coarse coal refuse and breaker rock will be conducted in accordance with applicable State and Federal regulations pertinent to coal refuse disposal facilities. Breaker rock will be handled and placed in the same general manner as coarse coal refuse except that its placement will be limited to non-structural embankment areas.

Coarse coal refuse will be transported to the disposal facility by belt conveyor. The conveyor will discharge into one of three proposed bins. Coal refuse will be hauled from the bins to the disposal facility by either a scraper or off-highway truck. Appended to this report are schematic plans showing haul roads that will be used for developing each stage of the three sites of coarse coal refuse placement (Main Dam and Saddle Dam A of Coal Refuse Disposal Area No. 3, and Coal Refuse Disposal Area No. 4). Roads available at the start of each stage are shown. Each plan depicts haul road sections to be covered with coal refuse during development of the stage represented.

After placement at the working face, coarse coal refuse will be spread and compacted using the haulage equipment, a self-propelled sheepsfoot roller, and/or a smooth-wheel vibratory roller. The coarse coal refuse in impounding structures, the final cap of Area 3 above elevation 1495, and in structural areas of Area No. 4 will be spread into lifts not more than one (1) foot in thickness before being compacted to at least ninety-five (95) percent of the maximum dry density

determined by the Standard Proctor method (ASTM D698). Coarse coal refuse placed in non-structural areas of Area 4 (as shown on the Drawings) and the final cap of Area 3 below elevation 1495 will be spread into lifts not more than two (2) feet in thickness before being compacted to at least ninety (90) percent of the maximum dry density determined by the Standard Proctor method (ASTM D698). Special requirements for placement of the initial lift in the final cap are contained in Technical Specification Section 7 presented in Appendix B.

Unsuitable coarse coal refuse is coarse coal refuse material produced during periods of inclement weather when acceptable placement and compaction will not be possible. Unsuitable coarse coal refuse and breaker rock will be placed in the area designated for their disposal.

Suitable coarse coal refuse will be placed at a moisture content that will permit adequate compaction to be attained. The moisture content shall be uniform throughout the layer, and no compaction will be permitted when moisture conditions are such that the required density cannot be obtained.

For each stage of facility development, coarse coal refuse placement will advance vertically in nearly horizontal layers. The disposal area will be graded toward the abutments and a channel will be maintained at the embankment/abutment interface. Flow from haul road channels draining to the work area will be diverted to the embankment/abutment interface channels with berms. To reduce infiltration, the surface of the refuse will be sloped and backbladed as it is spread. Surface material too wet to support construction equipment shall be removed to expose drier material prior to placement of the next refuse layer. After drying, these wet materials can be reused in the embankment. As the final contours of the embankment are achieved, it should be graded smoothly to reasonably conform with the configuration indicated on the facility design drawings.

2.4 Final Cover and Revegetation

The downstream slope of the Main Dam of Coal Refuse Disposal Area No. 3, the upstream slope of the Area No. 3 Saddle Dam A, Coal Refuse Disposal Area No. 4, and the completed surface of the slurry impoundment (Area No. 3) coarse coal refuse cap will be covered with 12 inches of soil cover overlying 12 inches of liner soil and vegetated as early as practical. Revegetation shall be in accordance with Module 18 of the Coal Refuse Disposal Permit Application. Sections of the disposal facility reaching the final configuration and elevation will be covered with soil within a 60-day period after the final grade is achieved.

2.5 Erosion and Sedimentation Control

Site erosion and sedimentation (E&S) will be controlled during each phase of facility development using a system of ditches and sedimentation control structures/devices consisting of a pond, runoff collection sump, sediment traps, and straw bale/silt fence barriers.

One sedimentation pond is proposed. It will be constructed during initial site preparation and will remain in service throughout the life of the facility.

During facility operation, erosion will be controlled by collecting facility runoff in ditches when appropriate, by providing ditches with suitable channel lining, and by vegetating disturbed areas as soon as practical. Runoff from disturbed areas will be passed through the slurry impoundment, sedimentation pond, or a sediment trap before being discharged. Sediment traps will be used to control sediment in runoff from cover soil stockpile areas. Runoff from the main soil stockpile area to be developed in the southwest corner of the existing Bailey slurry impoundment will be passed through the existing Bailey sedimentation pond.

All runoff that contacts coal refuse, except contact water from the conveyor that will cross the Fletcher Run watershed, will pass through the existing Bailey slurry impoundment (Coal Refuse Disposal Area No. 1) or the proposed sedimentation pond. Runoff from the upstream face of Saddle Dam A and a section of the slurry impoundment cap will be directed to the existing Bailey slurry impoundment. Runoff from the Fletcher Run watershed conveyor crossing will be collected and conveyed to the runoff collection sump. This sump will have no discharge. The small amount of runoff that will accumulate in this sump will be automatically pumped to the slurry impoundment. Sediment will be removed and disposed in the coarse coal refuse disposal area. Sump clean-out will occur when the sediment level reaches one foot above the sump bottom.

2.6 Sedimentation Pond Operation

Operation of the sedimentation pond will be controlled by the decant system and emergency spillway. Under normal conditions, the normal pool level will be at El. 1141.5 feet. When the water level rises above normal pool, water will be discharged automatically through the principal spillway. During extreme rainfall periods, when the reservoir level rises above El. 1157.5 feet, water will be discharged automatically through the emergency spillway.

3.0 MONITORING AND REPORTING - COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4

3.1 Piezometers and Pond Levels

Piezometers will be installed through the Main Dam and Saddle Dam A of Coal Refuse Disposal Area No. 3 at locations shown on Sheets 16 and 22 of the facility design drawings to monitor the actual positions and shape of the phreatic surface within the embankment. The approximate time of installation of each piezometer and its tip elevation are tabulated on the drawings. Use of remote reading piezometers will allow readings to be taken from a central terminal and will allow embankment construction to proceed unimpeded. Additional piezometers will be field located in the saturated fine coal refuse during construction of the initial lift of coarse coal refuse in the final cap

Piezometers and slurry pond levels will be monitored at least every week during the active life of the disposal facility. The piezometers placed in the saturate fine slurry during the initial lift of the final cap will be monitored daily and compared to the requirements of Technical Specification Section 7. All data will be plotted and reviewed relative to the piezometer table presented on Sheet 32 of the facility design drawings. Additional monitoring will be performed during periods of heavy rain or when the level of water in the pond changes significantly. Should the piezometers become damaged or otherwise inoperable during disposal facility development, they will be repaired or replaced.

3.2 Embankment Compaction

Complete control of coarse coal refuse embankment compaction operations will be exercised by developing moisture density diagrams for the coarse coal refuse. Suitable criteria for judging the adequacy of compaction attained will be developed by making an adequate number of field density determinations (ASTM D2922), and by making check compaction tests on the refuse.

Coarse coal refuse placement and compaction will be performed in accordance with this manual and Section 7 of the Technical Specifications presented in Appendix B of the facility design report.

3.3 Survey Monitoring

Bailey Central Mine Complex personnel will conduct annual surveys of coarse coal refuse embankment elevations in both disposal areas and slurry levels for inventory purposes and for monitoring proper construction control. The surveys will be conducted using aerial photographic methods, which is the method CPCC is currently using for survey monitoring of Disposal Areas No. 1 and No. 2.

3.4 Refuse Quantities

Survey monitoring data along with production data, will be used to assess the quantity of coal refuse disposed in both areas. Records of the refuse quantity assessments will be maintained.

6.3 Permanent Channels

S.O. No.: 24379-000-0000-ENG03

Subject: Consol Bailey Mine Coal Refuse Disposal Areas 3 and 4
Permanent Drainage Channel Calculations

Sheet No. __ of __

Computed By: JMB **Date:** 1/24/08 **Checked By:**_____ **Date:**_____

These calculations present the design of the permanent drainage channels at the Bailey Central Mine Complex for the New Coal Refuse Disposal Areas No. 3 and No. 4. Sheets 1 and 2 show the channel locations and drainage areas for each.

The time of concentration and peak flows were calculated for each subarea using methods presented in the Soil Conservation Service TR-55, "Urban Hydrology for Small Watersheds," June 1986.

The permanent channels were designed using the Manning's equation for open channel flow. Design calculations for the permanent channels are presented in this section.

Design Criteria are provided below:

- All channels are design for the 100-year, 24-hour storm event. (In accordance with the Pennsylvania Code, Chapter 90, Section 122, "Performance Standard for Coal Refuse Disposal."). The peak flow during temporary conditions (i.e., with bare soil) was also calculated using the 2-year storm. The channels were designed for the condition that produced the highest flow.

- 100-year, 24-hour rainfall = 5.2 inches (Ref. Commonwealth of Pennsylvania Department of Environmental Protection Office of Water Management, "Erosion and Sediment Pollution Control Program Manual," March 2000.)

- 2-year, 24-hour rainfall = 2.6 inches (Ref. Commonwealth of Pennsylvania Department of Environmental Protection Office of Water Management, "Erosion and Sediment Pollution Control Program Manual," March 2000.)

- SCS Curve Number for bare soil in the watershed is 91. (Ref. "Urban Hydrology for Small Watersheds", Technical Release Number 55 (TR-55), U.S. Department of Agriculture, Soil Conservation Service, June 1986. Table 2-2c – Bare soil.)

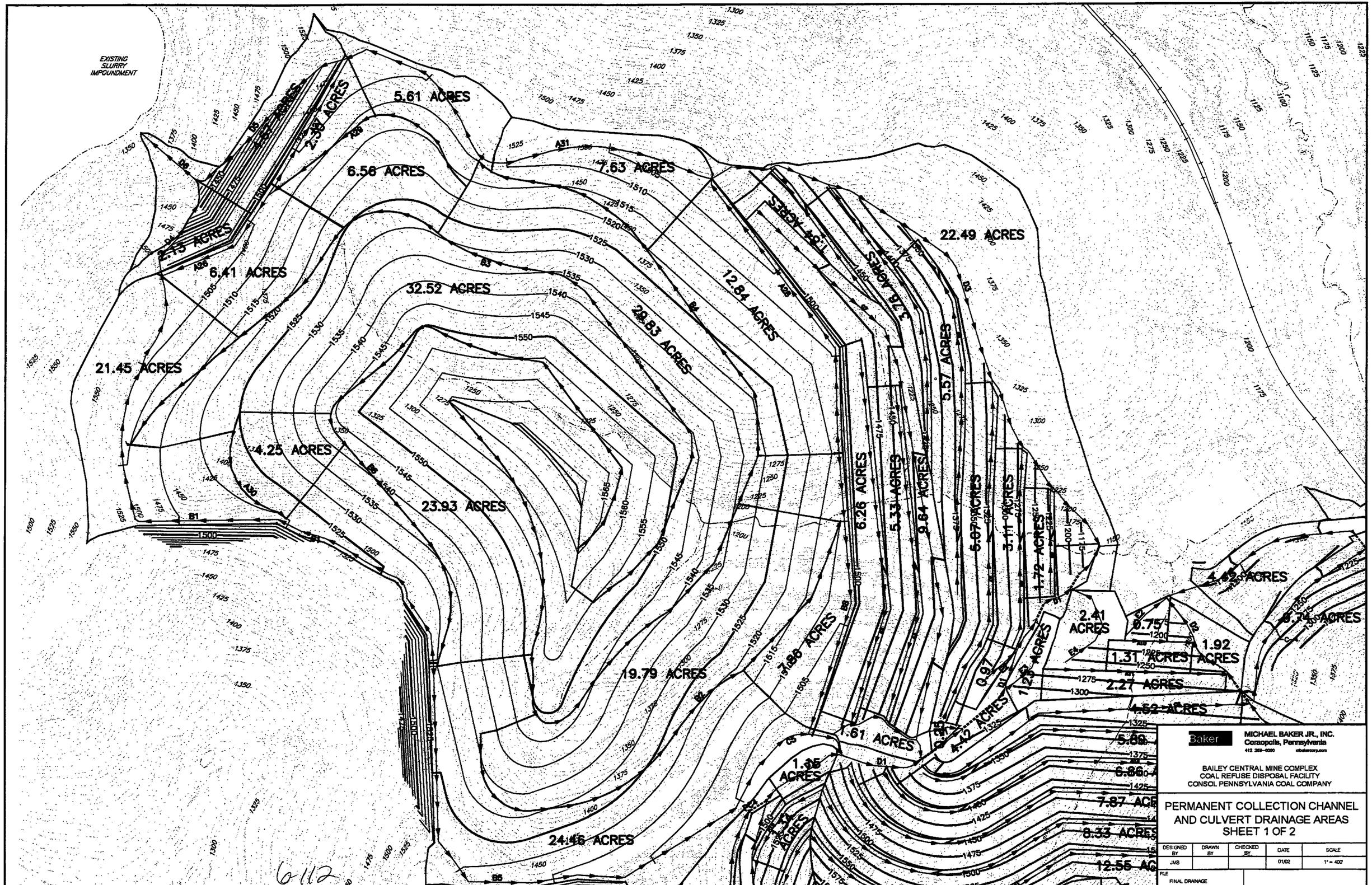
- SCS Curve Number for grass covered areas in the watershed is 70. (Ref. "Urban Hydrology for Small Watersheds", Technical Release Number 55 (TR-55), U.S. Department of Agriculture, Soil Conservation Service, June 1986. Table 2-2c – Meadow-continuous grass, protected from grazing and generally mowed for hay.)

- Manning Roughness Coefficient ("n") value of 0.24 for sheet flow on grass. (Ref. TR-55. Table 3-1 – Dense grasses).

- Manning Roughness Coefficient ("n") value of 0.011 for sheet flow on bare soil. (Ref. TR-55. Table 3-1 – Smooth surfaces (concrete, asphalt, gravel, or bare soil).

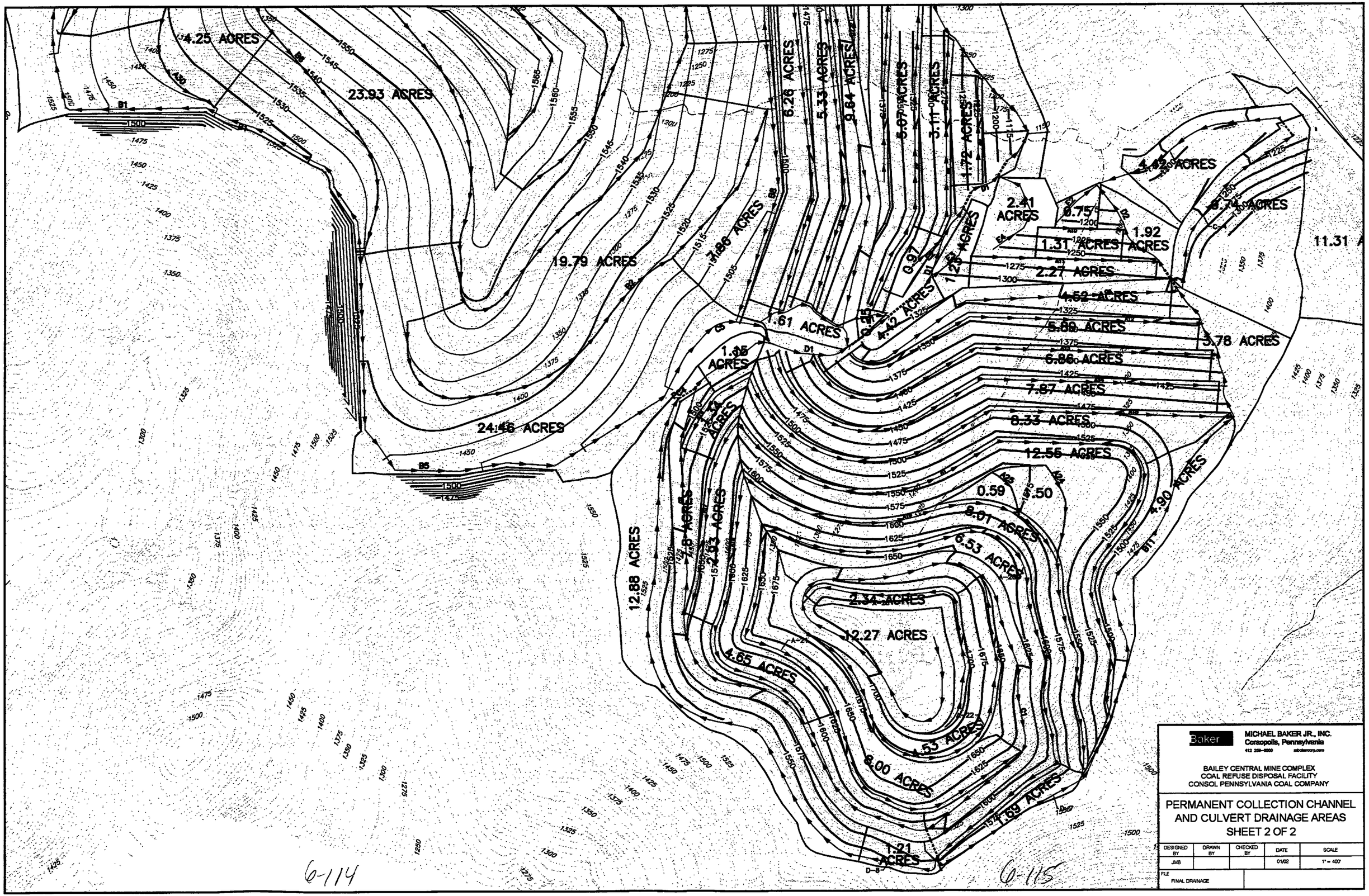
- Manning Roughness Coefficient ("n") value of 0.06 for flow within the grass lined channels. (Estimated assuming good stand of grass with vegetation maintained at 4-9 inches).

- Manning Roughness Coefficient ("n") value of 0.03 for flow within the fabricform lined channels. (Ref. Value given for filter point mat from Nicolon Armorform Design Manual)


EXISTING SLURRY IMPOUNDMENT
5.61 ACRES
2.38 ACRES
6.56 ACRES
7.63 ACRES
2.15 ACRES
6.41 ACRES
32.52 ACRES
21.45 ACRES
4.25 ACRES
23.93 ACRES
19.79 ACRES
24.46 ACRES
29.83 ACRES
12.84 ACRES
3.78 ACRES
22.49 ACRES
5.57 ACRES
6.26 ACRES
5.33 ACRES
9.64 ACRES
5.07 ACRES
3.11 ACRES
1.72 ACRES
4.42 ACRES
2.41 ACRES
0.75
1.92 ACRES
1.31 ACRES
2.27 ACRES
4.52 ACRES
1.61 ACRES
1.35 ACRES
1.14 ACRES
4.42 ACRES
0.97
1.25 ACRES
5.80
6.86
7.87 ACRES
8.33 ACRES
12.55 AC
Baker
MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000
mbakercorp.com
BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY
CONSOL PENNSYLVANIA COAL COMPANY
PERMANENT COLLECTION CHANNEL
AND CULVERT DRAINAGE AREAS
SHEET 1 OF 2
DESIGNED BY
DRAWN BY
CHECKED BY
DATE
SCALE
JMB
01/02
1" = 400'
FILE
FINAL DRAINAGE

6-12

6-13



Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY
CONSOL PENNSYLVANIA COAL COMPANY

PERMANENT COLLECTION CHANNEL
AND CULVERT DRAINAGE AREAS
SHEET 2 OF 2

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB			01/02	1" = 400'

FILE
FINAL DRAINAGE

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number
Coal Disposal Areas No. 3 and No. 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By: JMB	Telephone Number:	Date. January 2002	Sheet 1of 5
Channel Cross-section Type: Type A Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Top Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq ft)	(ft)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
A-1	12.55	100	4.70	70	24	2.0	0.5	Veg./Syn.	0.06	0	3/3	8.09	1.64	9.85	2.97	40.58	2.5	15	73.58
	12.55	2	4.70	91	27	2.0	0.5	Veg./Syn.	0.06	0	3/3	8.84	1.72	10.30	3.05	40.58	2.5	15	73.58
A-2	6.26					2.0		Veg./Syn.											
A-3	5.33					2.0		Veg./Syn.											
A-4	1.84					2.0		Veg./Syn.											
A-5	3.76					2.0		Veg./Syn.											
A-6	5.57					2.0		Veg./Syn.											
A-7	5.07					2.0		Veg./Syn.											
A-8	3.11					2.0		Veg./Syn.											
A-9	1.72					2.0		Veg./Syn.											
A-10	1.31					2.0		Veg./Syn.											
A-11	2.27					2.0		Veg./Syn.											
A-12	5.89					2.0		Veg./Syn.											
A-13	6.86					2.0		Veg./Syn.											
A-14	7.87					2.0		Veg./Syn.											
A-15	8.33					2.0		Veg./Syn.											
A-16	1.34					2.0		Veg./Syn.											
A-17	2.93					2.0		Veg./Syn.											
A-18	4.65					2.0		Veg./Syn.											
A-19	8.01					2.0		Veg./Syn.											
A-20	6.53					2.0		Veg./Syn.											
A-21	8.00					2.0		Veg./Syn.											
A-22	4.53					2.0		Veg./Syn.											
A-23	2.34					2.0		Veg./Syn.											
A-24	1.50					2.0		Veg./Syn.											
A-25	0.59					2.0		Veg./Syn.											
A-26	12.97	100	1.86	70	25.0	1.0	0.50	Veg./Syn.	0.06	0	3/3	10.82	1.90	11.40	2.31	28.69	2.5	15	52.03
	12.97	2	1.86	91	20.0	1.0	0.50	Veg./Syn.	0.06	0	3/3	9.15	1.75	10.48	2.18	28.69	2.5	15	52.03
A-27	2.30					1.0		Veg./Syn.											
A-28	12.84					1.0		Veg./Syn.											
A-29	6.56					1.0		Veg./Syn.											
A-30	4.25					1.0		Veg./Syn.											
A-31	7.63					1.0		Veg./Syn.											

6-116

Quick TR-55 Ver.5.46 S/N:
Executed: 12:15:20 01-22-2002 C:\projects\consol\hydro\A-1 100.TCT

Bailey Central Mine Complex
New Coal Disposal Area
Collection Channel A-1 (100-Year Time of Concentration Calcs.)
December 2001

Tc COMPUTATIONS FOR:

SHEET FLOW (Applicable to Tc only)

Segment ID			
Surface description	Grass		
Manning's roughness coeff., n		0.2400	
Flow length, L (total < or = 300)	ft	100.0	
Two-yr 24-hr rainfall, P2	in	2.600	
Land slope, s	ft/ft	0.0275	
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.23	= 0.23

SHALLOW CONCENTRATED FLOW

Segment ID			
Surface (paved or unpaved)?		Unpaved	
Flow length, L	ft	365.0	
Watercourse slope, s	ft/ft	0.1792	
$Avg.V = Csf * (s)^{0.5}$	ft/s	6.8301	
where: Unpaved Csf = 16.1345 Paved Csf = 20.3282			
T = L / (3600*V)	hrs	0.01	= 0.01

CHANNEL FLOW

Segment ID			
Cross Sectional Flow Area, a	sq.ft	7.32	
Wetted perimeter, Pw	ft	9.88	
Hydraulic radius, r = a/Pw	ft	0.741	
Channel slope, s	ft/ft	0.0200	
Manning's roughness coeff., n		0.0600	
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	2.8755	
Flow length, L	ft	1085	
T = L / (3600*V)	hrs	0.10	= 0.10

::

TOTAL TIME (hrs) 0.35

6-117

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-22-2002 12:26:04
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\A-1 100 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\A-1 100.HYD

Bailey Mine Complex
New Coal Disposal Area
Collection Channel A-1 (100-Year Peak Flow Calcs.)
December 2001

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	12.55	70.0	0.40	0.00	5.20	2.19	I.16 .16

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 12.55 acres or 0.01961 sq.mi
Peak discharge = 24 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.35	0.00	0.40	0.00	Yes	--

* Travel time from subarea outfall to composite watershed outfall point.

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: A-1 100 Q Depth

Comment: Collection Channel A-1 100 Peak Flow Depth

Solve For Depth

Given Input Data:

Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.060
Channel Slope....	0.0200 ft/ft
Discharge.....	24.00 cfs

Computed Results:

Depth.....	1.64 ft
Velocity.....	2.97 fps < 4.5 FPS - O.K. (GRASS)
Flow Area.....	8.09 sf
Flow Top Width...	9.85 ft
Wetted Perimeter.	10.39 ft
Critical Depth...	1.32 ft
Critical Slope...	0.0647 ft/ft
Froude Number....	0.58 (flow is Subcritical)

MIN. FREE BOARD = 0.5 FT (STABLE FLOW)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: A-1 100 Q W/FB

Comment: Collection Channel A-1 100 Full Flow

Solve For Discharge

Given Input Data:

Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.060
Channel Slope....	0.0200 ft/ft
Depth.....	2.50 ft

Computed Results:

Discharge.....	73.58 cfs
Velocity.....	3.92 fps
Flow Area.....	18.75 sf
Flow Top Width...	15.00 ft
Wetted Perimeter.	15.81 ft
Critical Depth...	2.06 ft
Critical Slope...	0.0557 ft/ft
Froude Number....	0.62 (flow is Subcritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

```
Quick TR-55 Ver.5.46   S/N:
Executed: 12:18:58   01-22-2002    C:\projects\consol\hydro\A-1 2.TCT

                         Bailey Central Mine Complex
                            New Coal Disposal Area
        Collection Channel A-1 (2-Year Time of Concentration Calcs.)
                               December 2001

                         Tc COMPUTATIONS FOR:

 SHEET FLOW (Applicable to Tc only)
     Segment ID
     Surface description                      Bare Soil
     Manning's roughness coeff., n                 0.0150
     Flow length, L (total < or = 300)    ft      200.0
     Two-yr 24-hr rainfall, P2            in      2.600
     Land slope, s                      ft/ft    0.0275
                             0.8
          .007 * (n*L)
     T = --------------                   hrs      0.04            =  0.04
             0.5    0.4
           P2    *  s

 SHALLOW CONCENTRATED FLOW
     Segment ID
     Surface (paved or unpaved)?                Unpaved
     Flow length, L                        ft     265.0
     Watercourse slope, s                ft/ft   0.1792

                               0.5
     Avg.V =  Csf *   (s)                ft/s    6.8301
     where:   Unpaved Csf = 16.1345
              Paved   Csf = 20.3282

     T = L / (3600*V)                     hrs      0.01            =  0.01


 CHANNEL FLOW
     Segment ID
     Cross Sectional Flow Area, a       sq.ft      8.84
     Wetted perimeter, Pw                  ft     10.86
     Hydraulic radius, r = a/Pw            ft     0.814
     Channel slope, s                    ft/ft   0.0200
     Manning's roughness coeff., n               0.0600

                          2/3    1/2
          1.49   *   r    *   s
     V = --------------------            ft/s    3.0617
                      n

     Flow length, L                        ft      1085

     T = L / (3600*V)                     hrs      0.10            =  0.10

  ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                           TOTAL TIME (hrs)         0.15
```

Return Frequency: 2 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-22-2002 12:18:41
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\A-1 2 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\A-1 2.HYD

Bailey Mine Complex
New Coal Disposal Area
Collection Channel A-1 2-Yr Peak Flow (Bare Soil)
December 2001

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
	12.55	91.0	0.20	0.00	2.60	1.70	I.08	.10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 12.55 acres or 0.01961 sq.mi
Peak discharge = 27 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.15	0.00	0.20	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

6-122

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: A-1 2 Peak

Comment: Collection Channel A-2 Peak Flow (Bare Soil)

Solve For Depth

Given Input Data:

Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.060
Channel Slope....	0.0200 ft/ft
Discharge.....	27.00 cfs

Computed Results:

Depth.....	1.72 ft
Velocity.....	3.05 fps
Flow Area.....	8.84 sf
Flow Top Width...	10.30 ft
Wetted Perimeter.	10.86 ft
Critical Depth...	1.38 ft
Critical Slope...	0.0637 ft/ft
Froude Number....	0.58 (flow is Subcritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

```
Quick TR-55 Ver.5.46   S/N:
Executed: 12:36:00   01-22-2002    C:\projects\consol\hydro\A-26 100.TCT

                    Bailey Central Mine Complex
                       New Coal Disposal Area
    Collection Channel A-26 (100-Year Time of Concentration Calcs.)
                           December 2001

                    Tc COMPUTATIONS FOR:

 SHEET FLOW (Applicable to Tc only)
    Segment ID
    Surface description                        Grass
    Manning's roughness coeff., n                   0.2400
    Flow length, L (total < or = 300)     ft       100.0
    Two-yr 24-hr rainfall, P2             in       2.600
    Land slope, s                        ft/ft     0.0575
                              0.8
         .007 * (n*L)
    T =  --------------                   hrs       0.17              =  0.17
              0.5     0.4
          P2    *   s

 SHALLOW CONCENTRATED FLOW
    Segment ID
    Surface (paved or unpaved)?                   Unpaved
    Flow length, L                         ft       154.6
    Watercourse slope, s                 ft/ft     0.0592

                               0.5
    Avg.V =  Csf *   (s)                 ft/s      3.9257
    where:   Unpaved Csf = 16.1345
             Paved   Csf = 20.3282

    T = L / (3600*V)                      hrs       0.01              =  0.01


 CHANNEL FLOW
    Segment ID
    Cross Sectional Flow Area, a         sq.ft     10.82
    Wetted perimeter, Pw                   ft      12.01
    Hydraulic radius, r = a/Pw             ft      0.901
    Channel slope, s                     ft/ft     0.0100
    Manning's roughness coeff., n                   0.0600

                         2/3     1/2
          1.49   *   r    *   s
    V =   --------------------          ft/s      2.3166
                     n

    Flow length, L                         ft       1858

    T = L / (3600*V)                      hrs       0.22              =  0.22

    ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                              TOTAL TIME (hrs)        0.41
```

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-22-2002 12:36:22
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\A-26 100.MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\A-26 100.HYD

Bailey Mine Complex
New Coal Disposal Area
Collection Channel A-26 (100-Year Peak Flow Calcs.)
December 2001

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	12.97	70.0	0.40	0.00	5.20	2.19	I.16 .16

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 12.97 acres or 0.02027 sq.mi
Peak discharge = 25 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.41	0.00	0.40	0.00	Yes	--

* Travel time from subarea outfall to composite watershed outfall point.

6-125

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: A-26 100 Q Depth

Comment: Collection Channel A-26 100 Peak Flow Depth

Solve For Depth

Given Input Data:

Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.060
Channel Slope....	0.0100 ft/ft
Discharge.....	25.00 cfs

Computed Results:

Depth.....	1.90 ft
Velocity.....	2.31 fps < 4.5 FPS - O.K. (GRASS)
Flow Area.....	10.82 sf
Flow Top Width...	11.40 ft
Wetted Perimeter.	12.01 ft
Critical Depth...	1.34 ft
Critical Slope...	0.0644 ft/ft
Froude Number....	0.42 (flow is Subcritical)

MIN. FREEBOARD = 0.5' (STABE FLOW)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: A-26 100 Q W/FB

Comment: Collection Channel A-26 100 Full Flow

Solve For Discharge

Given Input Data:

Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.060
Channel Slope....	0.0100 ft/ft
Depth.....	2.50 ft

Computed Results:

Discharge.....	52.03 cfs
Velocity.....	2.77 fps
Flow Area.....	18.75 sf
Flow Top Width...	15.00 ft
Wetted Perimeter.	15.81 ft
Critical Depth...	1.80 ft
Critical Slope...	0.0584 ft/ft
Froude Number....	0.44 (flow is Subcritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

```
Quick TR-55 Ver.5.46   S/N:
Executed: 12:40:48   01-22-2002    C:\projects\consol\hydro\A-26 2.TCT

                    Bailey Central Mine Complex
                      New Coal Disposal Area
           Collection Channel A-26 2-Yr Tc Calcs. (Bare Soil)
                          December 2001

                   Tc COMPUTATIONS FOR:

 SHEET FLOW (Applicable to Tc only)
     Segment ID
     Surface description                        Bare Soil
     Manning's roughness coeff., n                  0.0110
     Flow length, L (total < or = 300)    ft       200.0
     Two-yr 24-hr rainfall, P2            in       2.600
     Land slope, s                      ft/ft     0.0500
                          0.8
          .007 * (n*L)
     T =  --------------                  hrs       0.03                =  0.03
             0.5    0.4
           P2    *  s

 SHALLOW CONCENTRATED FLOW
     Segment ID
     Surface (paved or unpaved)?                  Unpaved
     Flow length, L                        ft        54.6
     Watercourse slope, s                ft/ft     0.0500

                            0.5
     Avg.V =  Csf *  (s)                 ft/s     3.6078
     where:   Unpaved Csf = 16.1345
              Paved   Csf = 20.3282

     T = L / (3600*V)                     hrs       0.00                =  0.00


 CHANNEL FLOW
     Segment ID
     Cross Sectional Flow Area, a       sq.ft        2.42
     Wetted perimeter, Pw                  ft        5.69
     Hydraulic radius, r = a/Pw            ft       0.425
     Channel slope, s                    ft/ft     0.0100
     Manning's roughness coeff., n                 0.0600

                       2/3    1/2
          1.49   *   r    *  s
     V =  --------------------            ft/s     1.4044
                     n

     Flow length, L                        ft        1858

     T = L / (3600*V)                     hrs       0.37                =  0.37

   ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                                 TOTAL TIME (hrs)        0.40
```

6-129

Return Frequency: 2 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-22-2002 12:41:01
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\A-26 2 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\A-26 2.HYD

Bailey Mine Complex
New Coal Disposal Area
Collection Channel A-26 2-Yr Peak Flow Calcs. (Bare Soil)
December 2001

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	12.97	91.0	0.40	0.00	2.60	1.70	I.08 .10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 12.97 acres or 0.02027 sq.mi
Peak discharge = 20 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.40	0.00	**	**	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: A-26 2 Peak Flow

Comment: Collection Channel A-26 2 Peak (Bare Soil)

Solve For Depth

Given Input Data:

Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.060
Channel Slope....	0.0100 ft/ft
Discharge.....	20.00 cfs

Computed Results:

Depth.....	1.75 ft
Velocity.....	2.18 fps
Flow Area.....	9.15 sf
Flow Top Width...	10.48 ft
Wetted Perimeter.	11.05 ft
Critical Depth...	1.23 ft
Critical Slope...	0.0663 ft/ft
Froude Number....	0.41 (flow is Subcritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company	Permit Number:
Coal Disposal Areas No. 3 and No. 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By: JMB	Telephone Number:	Date: January 2002	Sheet 2 of 5
Channel Cross-section Type: Type B Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Top Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
B-1	58.22	100	1.20	70	79	1.0	0.5	Veg./Syn.	0.06	4	3/3	25.82	2.34	18.05	3.06	91.27	3	22	137.45
	58.22	2	1.20	91	82	1.0	0.5	Veg./Syn.	0.06	4	3/3	26.55	2.38	18.29	3.09	91.27	3	22	137.45
B-2	19.79					1.0		Veg./Syn.											
B-3	32.52					1.0		Veg./Syn.											
B-4	29.83					1.0		Veg./Syn.											
B-5	47.79					1.0		Veg./Syn.											
B-6	23.93					1.0		Veg./Syn.											
B-7	35.24					1.0		Veg./Syn.											
B-8	27.65					1.0		Veg./Syn.											
B-9	38.49					1.0		Veg./Syn.											
B-10	20.62					1.0		Veg./Syn.											
B-11	56.38					1.0		Veg./Syn.											

6-132

Quick TR-55 Ver.5.46 S/N:
Executed: 12:52:50 01-22-2002 C:\projects\consol\hydro\B-1 100.TCT

Bailey Mine Complex
New Coal Disposal Area
Colection Channel B-1 (100-Year Time of Concentration Calcs.)
December 2001

Tc COMPUTATIONS FOR:

```
SHEET FLOW (Applicable to Tc only)
    Segment ID
    Surface description                          Grass
    Manning's roughness coeff., n                      0.2400
    Flow length, L (total < or = 300)      ft         100.0
    Two-yr 24-hr rainfall, P2              in         2.600
    Land slope, s                          ft/ft      0.0500
                         0.8
          .007 * (n*L)
    T =   --------------                   hrs        0.18              =   0.18
             0.5     0.4
          P2    *   s

SHALLOW CONCENTRATED FLOW
    Segment ID
    Surface (paved or unpaved)?                       Unpaved
    Flow length, L                         ft         146.5
    Watercourse slope, s                   ft/ft      0.0500

                            0.5
    Avg.V =  Csf *  (s)                    ft/s       3.6078
    where:   Unpaved Csf = 16.1345
             Paved   Csf = 20.3282

    T = L / (3600*V)                       hrs        0.01              =   0.01


CHANNEL FLOW
    Segment ID
    Cross Sectional Flow Area, a           sq.ft      25.82
    Wetted perimeter, Pw                   ft         18.81
    Hydraulic radius, r = a/Pw             ft         1.373
    Channel slope, s                       ft/ft      0.0100
    Manning's roughness coeff., n                     0.0600

                     2/3     1/2
        1.49  *  r    *   s
    V = --------------------               ft/s       3.0672
                   n

    Flow length, L                         ft         5181

    T = L / (3600*V)                       hrs        0.47              =   0.47

    ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                                    TOTAL TIME (hrs)       0.66
```

6-133

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-22-2002 12:45:17
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\B-1 100 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\B-1 100.HYD

Bailey Mine Complex
New Coal Disposal Area
Collection Channel B-1 (100-Year Peak Flow Calcs.)
December 2001

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	58.22	70.0	0.75	0.00	5.20	2.19	I.16 .16

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 58.22 acres or 0.09097 sq.mi
Peak discharge = 79 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.66	0.00	0.75	0.00	Yes	--

* Travel time from subarea outfall to composite watershed outfall point.

6-134

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: B-1 100 Q Depth

Comment: Collection Channel B-1 100 Peak Flow Depth

Solve For Depth

Given Input Data:

Bottom Width.....	4.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.060
Channel Slope....	0.0100 ft/ft
Discharge.....	79.00 cfs

Computed Results:

Depth.....	2.34 ft
Velocity.....	3.06 fps < 4.5 FPS - O.K. (GRASS)
Flow Area.....	25.82 sf
Flow Top Width...	18.05 ft
Wetted Perimeter.	18.81 ft
Critical Depth...	1.58 ft
Critical Slope...	0.0548 ft/ft
Froude Number....	0.45 (flow is Subcritical)

MIN. FREEBOARD = 0.5 FT (STABLE FLOW)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: B-1 100 Q W/FB

Comment: Collection Channel B-1 100 Full Depth

Solve For Discharge

Given Input Data:

Bottom Width.....	4.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.060
Channel Slope....	0.0100 ft/ft
Depth.....	3.00 ft

Computed Results:

Discharge.....	137.45 cfs
Velocity.....	3.52 fps
Flow Area.....	39.00 sf
Flow Top Width...	22.00 ft
Wetted Perimeter.	22.97 ft
Critical Depth...	2.08 ft
Critical Slope...	0.0508 ft/ft
Froude Number....	0.47 (flow is Subcritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

```
Quick TR-55 Ver.5.46   S/N:
Executed: 12:57:44   01-22-2002    C:\projects\consol\hydro\B-1 2.TCT

                         Bailey Mine Complex
                        New Coal Disposal Area
              Collection Channel B-1 2-Yr Tc Calcs. (Bare Soil)
                           December 2001

                      Tc COMPUTATIONS FOR:

 SHEET FLOW (Applicable to Tc only)
     Segment ID
     Surface description                         Bare Soil
     Manning's roughness coeff., n                  0.0150
     Flow length, L (total < or = 300)    ft     100.0
     Two-yr 24-hr rainfall, P2             in     2.600
     Land slope, s                       ft/ft    0.0500
                          0.8
          .007 * (n*L)
     T =  --------------                  hrs      0.02                 =  0.02
             0.5    0.4
           P2    *   s

 SHALLOW CONCENTRATED FLOW
     Segment ID
     Surface (paved or unpaved)?                   Unpaved
     Flow length, L                        ft     146.5
     Watercourse slope, s                ft/ft    0.0500

                             0.5
     Avg.V =   Csf *   (s)               ft/s    3.6078
     where:    Unpaved Csf = 16.1345
               Paved   Csf = 20.3282

     T = L / (3600*V)                     hrs      0.01                 =  0.01


 CHANNEL FLOW
     Segment ID
     Cross Sectional Flow Area, a       sq.ft     13.89
     Wetted perimeter, Pw                  ft     14.03
     Hydraulic radius, r = a/Pw            ft     0.990
     Channel slope, s                    ft/ft    0.0100
     Manning's roughness coeff., n                0.0600

                        2/3     1/2
          1.49  *   r    *   s
     V =  --------------------           ft/s    2.4668
                        n

     Flow length, L                        ft      5181

     T = L / (3600*V)                     hrs      0.58                 =  0.58

   ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                             TOTAL TIME (hrs)          0.61
```

Return Frequency: 2 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-22-2002 12:57:22
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\B-1 2 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\B-1 2.HYD

Bailey Mine Complex
New Coal Disposal Area
Collection Channel B-1 2-Yr Peak Flow Calcs. (Bare Soil)
December 2001

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
	58.22	91.0	0.50	0.00	2.60	1.70	I.08	.10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 58.22 acres or 0.09097 sq.mi
Peak discharge = 82 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.61	0.00	0.50	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

6-138

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: B-1 2 Peak Flow

Comment: Collection Channel B-1 2-Yr (Bare Soil)

Solve For Depth

Given Input Data:

Bottom Width.....	4.00 ft
Left Side Slope..	3.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.060
Channel Slope....	0.0100 ft/ft
Discharge.....	82.00 cfs

Computed Results:

Depth.....	2.38 ft
Velocity.....	3.09 fps
Flow Area.....	26.55 sf
Flow Top Width...	18.29 ft
Wetted Perimeter.	19.07 ft
Critical Depth...	1.61 ft
Critical Slope...	0.0545 ft/ft
Froude Number....	0.45 (flow is Subcritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number:
Coal Disposal Areas No. 3 and No. 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By: JMB	Telephone Number:	Date: January 2002	Sheet 3 of 5
Channel Cross-section Type: Type C Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Top Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
C-1	27.14	100	3.73	70	52	5.0	0.5	Filter Pnt.	0.03	0	2/2	5.67	1.68	6.74	9.17	82.26	2.5	10	149.14
	27.14	2	3.73	91	73	5.0	0.5	Filter Pnt.	0.03	0	2/2	7.31	1.91	7.65	9.98	82.26	2.5	10	149.14
C-2	7.8					5.0		Filter Pnt.											
C-3	14.16					5.77		Filter Pnt.											
C-4	9.74					7.35		Filter Pnt.											
C-5	22.84					9.18-39.5		Filter Pnt.											
C-6	4.52					5.0		Filter Pnt.											
C-7	9.64					5.0		Filter Pnt.											
C-8	11.31					9.0-38.0		Filter Pnt.											

6-140

Quick TR-55 Ver.5.46   S/N:
Executed: 12:58:33   01-22-2002   C:\projects\consol\hydro\C-1 100.TCT

Bailey Central Mine Complex
New Coal Disposal Area
Collection Channel C-1 100 (Time of Concentration Calcs.)
December 2001

Tc COMPUTATIONS FOR:

```
SHEET FLOW (Applicable to Tc only)
    Segment ID
    Surface description                          grass
    Manning's roughness coeff., n                      0.2400
    Flow length, L (total < or = 300)        ft       100.0
    Two-yr 24-hr rainfall, P2                in       2.600
    Land slope, s                          ft/ft      0.0200
                      0.8
           .007 * (n*L)
    T =  ---------------                   hrs         0.26                 =   0.26
             0.5     0.4
           P2    *   s

SHALLOW CONCENTRATED FLOW
    Segment ID
    Surface (paved or unpaved)?                     Unpaved
    Flow length, L                           ft       368.7
    Watercourse slope, s                   ft/ft      0.0759

                        0.5
    Avg.V =  Csf *   (s)                    ft/s      4.4450
    where:   Unpaved Csf = 16.1345
             Paved   Csf = 20.3282

    T = L / (3600*V)                        hrs        0.02                 =   0.02


CHANNEL FLOW
    Segment ID
    Cross Sectional Flow Area, a           sq.ft       5.67
    Wetted perimeter, Pw                     ft        7.53
    Hydraulic radius, r = a/Pw               ft       0.753
    Channel slope, s                       ft/ft      0.0500
    Manning's roughness coeff., n                     0.0300

                     2/3     1/2
          1.49  *  r    *  s
    V =  --------------------               ft/s      9.1920
                   n

    Flow length, L                           ft        2689

    T = L / (3600*V)                        hrs        0.08                 =   0.08

    :::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                                 TOTAL TIME (hrs)               0.37
```

6-141

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-22-2002 12:58:48
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\C-1 100 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\C-1 100.HYD

Bailey Central Mine Complex
New Coal Disposal Area
Collection Channel C-1 100 (Peak Flow Calcs.)
December 2001

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	27.14	70.0	0.40	0.00	5.20	2.19	I.16 .16

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 27.14 acres or 0.04241 sq.mi
Peak discharge = 52 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.37	0.00	0.40	0.00	Yes	--

* Travel time from subarea outfall to composite watershed outfall point.

6-142

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: C-1 100 Peak Flow

Comment: Collection Channel C-1 100 Peak Flow

Solve For Depth

Given Input Data:

Left Side Slope..	2.00:1 (H:V)
Right Side Slope.	2.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0500 ft/ft
Discharge.....	52.00 cfs

Computed Results:

Depth.....	1.68 ft
Velocity.....	9.17 fps
Flow Area.....	5.67 sf
Flow Top Width...	6.74 ft
Wetted Perimeter.	7.53 ft
Critical Depth...	2.11 ft
Critical Slope...	0.0150 ft/ft
Froude Number....	1.76 (flow is Supercritical)

MIN. FREEBOARD = 0.5' (STABLE FLOW)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: c-1 full flow

Comment: Collection Channel C-1 Full Flow

Solve For Discharge

Given Input Data:

Left Side Slope..	2.00:1 (H:V)
Right Side Slope.	2.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0500 ft/ft
Depth.....	2.50 ft

Computed Results:

Discharge.....	149.14 cfs
Velocity.....	11.93 fps
Flow Area.....	12.50 sf
Flow Top Width...	10.00 ft
Wetted Perimeter.	11.18 ft
Critical Depth...	3.22 ft
Critical Slope...	0.0130 ft/ft
Froude Number....	1.88 (flow is Supercritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

```
Quick TR-55 Ver.5.46   S/N:
Executed: 13:04:38   01-22-2002    C:\projects\consol\hydro\C-1 2.TCT

                  Bailey Central Mine Complex
                    New Coal Disposal Area
         Collection Channel C-1 2-Yr Tc Calcs. (Bare Soil)
                        December 2001

                    Tc COMPUTATIONS FOR:

 SHEET FLOW (Applicable to Tc only)
     Segment ID
     Surface description
     Manning's roughness coeff., n                 0.0110
     Flow length, L (total < or = 300)    ft      100.0
     Two-yr 24-hr rainfall, P2            in      2.600
     Land slope, s                       ft/ft    0.0200
                         0.8
          .007 * (n*L)
     T =  --------------                  hrs      0.02              =  0.02
             0.5    0.4
           P2    *   s

 SHALLOW CONCENTRATED FLOW
     Segment ID
     Surface (paved or unpaved)?                 Unpaved
     Flow length, L                       ft      368.7
     Watercourse slope, s                ft/ft    0.0759

                          0.5
     Avg.V =  Csf *  (s)                 ft/s    4.4450
     where:   Unpaved Csf = 16.1345
              Paved   Csf = 20.3282

     T = L / (3600*V)                     hrs      0.02              =  0.02


 CHANNEL FLOW
     Segment ID
     Cross Sectional Flow Area, a       sq.ft      7.31
     Wetted perimeter, Pw                 ft       8.55
     Hydraulic radius, r = a/Pw           ft      0.855
     Channel slope, s                    ft/ft    0.0500
     Manning's roughness coeff., n                0.0300

                        2/3     1/2
          1.49   *   r    *    s
     V =  --------------------           ft/s    %10.0042
                     n

     Flow length, L                       ft       2689

     T = L / (3600*V)                     hrs      0.07              =  0.07

     ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                          TOTAL TIME (hrs)              0.12
```

Return Frequency: 2 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-22-2002 13:04:50
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\C-1 2 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\C-1 2.HYD

Bailey Central Mine Complex
New Coal Disposal Area
Collection Channel C-1 2 Peak Flow Calcs. (Bare Soil)
December 2001

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	27.14	91.0	0.10	0.00	2.60	1.70	I.08 .10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 27.14 acres or 0.04241 sq.mi
Peak discharge = 73 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.12	0.00	0.10	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

6-146

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: C-1 2 Peak Flow

Comment: Collection Channel C-1 2-Yr Peak Flow

Solve For Depth

Given Input Data:

Left Side Slope..	2.00:1 (H:V)
Right Side Slope.	2.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0500 ft/ft
Discharge.....	73.00 cfs

Computed Results:

Depth.....	1.91 ft
Velocity.....	9.98 fps
Flow Area.....	7.31 sf
Flow Top Width...	7.65 ft
Wetted Perimeter.	8.55 ft
Critical Depth...	2.42 ft
Critical Slope...	0.0143 ft/ft
Froude Number....	1.80 (flow is Supercritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title: Coal Disposal Areas No. 3 and No. 4 Collection Channels	Site: Bailey Central Mine Complex, Greene County	Company: CONSOL	Permit Number:
Prepared By: JMB	Telephone Number:	Date: January 2002	Sheet 4 of 5
Channel Cross-section Type: Type D Channel (See Sheet 35)			

Channel I.D	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Top Channel Width	Q Available
	acres	(yrs.)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
D-1	146.2	100	4.97	70	197	11.0-39.0	1.0	Filter Pnt.	0.03	3	2.5/2.5	11.99	1.67	11.36	26.19	290.51	3	18	720.97
	146.2	2	4.97	91	263	11.0-39.0	1.0	Filter Pnt.	0.03	3	2.5/2.5	14.86	1.91	12.55	28.27	290.51	3	18	720.97
D-2	99.13					8.38-36.0		Filter Pnt.											
D-3	64.03					3.62-29.9		Filter Pnt.											
D-4	74.12					8.65 - 21.1		Filter Pnt.											
D-5	42.21					5.39 - 34.2		Filter Pnt.											
D-6	116.33					23.1		Filter Pnt.											
D-7	51.48					11.6		Filter Pnt.											
D-8	1.21					11.6		Filter Pnt.											

G-148

Quick TR-55 Ver.5.46 S/N:
Executed: 13:05:35 01-22-2002 C:\projects\consol\hydro\D-1 100.TCT

Bailey Mine Complex
New Coal Disposal Area
Collection Channel D-1 (100-Year Peak Flow Calcs.)
December 2001

Tc COMPUTATIONS FOR:

SHEET FLOW (Applicable to Tc only)

Segment ID				
Surface description		Grass		
Manning's roughness coeff., n		0.2400		
Flow length, L (total < or = 300)	ft	100.0		
Two-yr 24-hr rainfall, P2	in	2.600		
Land slope, s	ft/ft	0.0500		
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.18		= 0.18

SHALLOW CONCENTRATED FLOW

Segment ID				
Surface (paved or unpaved)?		Unpaved		
Flow length, L	ft	123.1		
Watercourse slope, s	ft/ft	0.0500		
$Avg.V = Csf * (s)^{0.5}$	ft/s	3.6078		
where: Unpaved Csf = 16.1345; Paved Csf = 20.3282				
T = L / (3600*V)	hrs	0.01		= 0.01

CHANNEL FLOW

Segment ID				
Cross Sectional Flow Area, a	sq.ft	25.82	11.99	
Wetted perimeter, Pw	ft	18.81	12.00	
Hydraulic radius, r = a/Pw	ft	1.373	0.999	
Channel slope, s	ft/ft	0.0100	0.1920	
Manning's roughness coeff., n		0.0600	0.0300	
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	3.0672	%21.7508	
Flow length, L	ft	6244	1756	
T = L / (3600*V)	hrs	0.57	+ 0.02	= 0.59

::

TOTAL TIME (hrs) 0.78

D-149

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-22-2002 13:05:49
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\D-1 100 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\D-1 100.HYD

Bailey Mine Complex
New Disposal Area
Collection Channel D-1 (100-Year Peak Flow Calcs.)
December 2001

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	146.20	70.0	0.75	0.00	5.20	2.19	I.16 .16

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 146.20 acres or 0.2284 sq.mi
Peak discharge = 197 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.78	0.00	0.75	0.00	Yes	--

* Travel time from subarea outfall to composite watershed outfall point.

6-150

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: D-1 100 Peak Flow mn

Comment: Collection Channel D-1 100 Peak Q Min. Slope

Solve For Depth

Given Input Data:

Bottom Width.....	3.00 ft
Left Side Slope..	2.50:1 (H:V)
Right Side Slope.	2.50:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.1100 ft/ft
Discharge.....	197.00 cfs

Computed Results:

Depth.....	1.67 ft
Velocity.....	16.42 fps
Flow Area.....	11.99 sf
Flow Top Width...	11.36 ft
Wetted Perimeter.	12.00 ft
Critical Depth...	2.76 ft
Critical Slope...	0.0121 ft/ft
Froude Number....	2.82 (flow is Supercritical)

MIN. FREEBOARD = 0.5 FT (STABLE FLOW)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: D-1 100 Peak Flow mx

Comment: Collection Channel D-1 100 Peak Q Max. Slope

Solve For Depth

Given Input Data:

Bottom Width.....	3.00 ft
Left Side Slope..	2.50:1 (H:V)
Right Side Slope.	2.50:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.3900 ft/ft
Discharge.....	197.00 cfs

Computed Results:

Depth.....	1.24 ft
Velocity.....	26.19 fps
Flow Area.....	7.52 sf
Flow Top Width...	9.18 ft
Wetted Perimeter.	9.65 ft
Critical Depth...	2.76 ft
Critical Slope...	0.0121 ft/ft
Froude Number....	5.10 (flow is Supercritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: D-1 100 Full Depth

Comment: Collection Channel D-1 100 Full Depth

Solve For Discharge

Given Input Data:

Bottom Width.....	3.00 ft
Left Side Slope..	2.50:1 (H:V)
Right Side Slope.	2.50:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.1100 ft/ft
Depth.....	3.00 ft

Computed Results:

Discharge.....	720.97 cfs
Velocity.....	22.89 fps
Flow Area.....	31.50 sf
Flow Top Width...	18.00 ft
Wetted Perimeter.	19.16 ft
Critical Depth...	4.97 ft
Critical Slope...	0.0102 ft/ft
Froude Number....	3.05 (flow is Supercritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

```
Quick TR-55 Ver.5.46   S/N:
Executed: 13:07:03   01-22-2002    C:\projects\consol\hydro\D-1 2.TCT

                        Bailey Mine Complex
                      New Coal Disposal Area
        Collection Channel D-1 2-Yr. Peak Flow Calcs. (Bare Soil)
                          December 2001

                      Tc COMPUTATIONS FOR:

 SHEET FLOW (Applicable to Tc only)
     Segment ID
     Surface description                      Bare Soil
     Manning's roughness coeff., n                0.0110
     Flow length, L (total < or = 300)    ft      100.0
     Two-yr 24-hr rainfall, P2            in      2.600
     Land slope, s                        ft/ft   0.0500
                          0.8
        .007 * (n*L)
     T = --------------                   hrs      0.02                 =  0.02
            0.5    0.4
          P2   *  s

 SHALLOW CONCENTRATED FLOW
     Segment ID
     Surface (paved or unpaved)?                Unpaved
     Flow length, L                       ft      123.1
     Watercourse slope, s                 ft/ft   0.0500

                            0.5
     Avg.V =  Csf *   (s)                 ft/s    3.6078
     where:   Unpaved Csf = 16.1345
              Paved   Csf = 20.3282

     T = L / (3600*V)                     hrs      0.01                 =  0.01


 CHANNEL FLOW
     Segment ID
     Cross Sectional Flow Area, a        sq.ft    16.67     14.86
     Wetted perimeter, Pw                  ft     15.28     13.29
     Hydraulic radius, r = a/Pw            ft     1.091     1.118
     Channel slope, s                    ft/ft    0.0100    0.1920
     Manning's roughness coeff., n                0.0250    0.0300

                      2/3    1/2
         1.49   *  r    *  s
     V = --------------------            ft/s     6.3162    %23.4447
                   n

     Flow length, L                        ft      6244      1757

     T = L / (3600*V)                     hrs      0.27  +   0.02   =  0.30

   ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                                 TOTAL TIME (hrs)      0.32
```

6-184

Return Frequency: 2 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-22-2002 13:07:11
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\D-1 2 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\D-1 2.HYD

Bailey Mine Complex
New Disposal Area
Collection Channel D-1 2-Yr. Peak Flow Calcs. (Bare Soil)
December 2001

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
	146.20	91.0	0.30	0.00	2.60	1.70	I.08	.10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 146.20 acres or 0.2284 sq.mi
Peak discharge = 263 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.32	0.00	0.30	0.00	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.

6-155

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: D-1 2

Comment: Collection Channel D-1 2 Min. Slope

Solve For Depth

Given Input Data:

Bottom Width.....	3.00 ft
Left Side Slope..	2.50:1 (H:V)
Right Side Slope.	2.50:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.1100 ft/ft
Discharge.....	263.00 cfs

Computed Results:

Depth.....	1.91 ft
Velocity.....	17.70 fps
Flow Area.....	14.86 sf
Flow Top Width...	12.55 ft
Wetted Perimeter.	13.29 ft
Critical Depth...	3.15 ft
Critical Slope...	0.0117 ft/ft
Froude Number....	2.87 (flow is Supercritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: D-1 2 Max Slope

Comment: Collection Channel D-1 2 Max. Slope

Solve For Depth

Given Input Data:

Bottom Width.....	3.00 ft
Left Side Slope..	2.50:1 (H:V)
Right Side Slope.	2.50:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.3900 ft/ft
Discharge.....	263.00 cfs

Computed Results:

Depth.....	1.42 ft
Velocity.....	28.27 fps
Flow Area.....	9.30 sf
Flow Top Width...	10.10 ft
Wetted Perimeter.	10.65 ft
Critical Depth...	3.15 ft
Critical Slope...	0.0117 ft/ft
Froude Number....	5.19 (flow is Supercritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

5600-PM-MR0324 Rev. 4/2001

FORM 11.1A
DIVERSION/COLLECTION DITCH DATA SHEET

Title:	Site:	Company:	Permit Number:
Coal Disposal Areas No. 3 and No. 4 Collection Channels	Bailey Central Mine Complex, Greene County	CONSOL	
Prepared By: JMB	Telephone Number:	Date: January 2002	Sheet 5 of 5
Channel Cross-section Type: Type E Channel (See Sheet 35)			

Channel I.D.	Drainage Area	Design Storm	Average Watershed Slope	Curve Number	Peak Discharge Q	Channel Bed Slope	Freeboard	Channel Lining (specify average rock size)	Manning's Coefficient	Channel Bottom Width	Channel Side Slopes	Flow Area	Flow Depth	Top Flow Width	Flow Velocity	Q Available	With Freeboard		
																	Channel Depth	Top Channel Width	Q Available
	acres	(yrs)	(%)		cfs	(%)	(ft.)		(n)	(ft)	L/R	(sq. ft.)	(ft.)	(ft)	(ft./sec.)	cfs	(ft.)	(ft.)	cfs
E1	0.18					2.1-40.0		Filter Pnt.											
E2	0.97					2.0-15.0		Filter Pnt.											
E3	1.23					5.0-28.3		Filter Pnt.											
E4	2.41	100	10.9	70	8.0	2.0-31.9	0.5	Filter Pnt.	0.03	0	2/2	1.96	0.99	3.96	11.50	8.19	1.5	6.0	24.16
	2.41	2	10.9	91	6.0	2.0-31.9	0.5	Filter Pnt.	0.03	0	2/2	1.58	0.89	3.56	10.71	8.19	1.5	6.0	24.16
E5	0.75					2.0-35.0		Filter Pnt.											

6-152

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-22-2002 14:51:10
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\E-4 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\E-4 100.HYD

Bailey Central Mine Complex
New Coal Disposal Area
Collection Channel E-4
January 2002

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used	
1	2.41	70.0	0.10	0.00	5.20	2.19	I.16	.16

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 2.41 acres or 0.00377 sq.mi
Peak discharge = 8 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
1	0.10	0.00	**	**	Yes	--

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

6-159

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: E-4 100 Peak Flow mn

Comment: Collection Channel E-4 100-Yr Peak Flow mn S

Solve For Depth

Given Input Data:

Left Side Slope..	2.00:1 (H:V)
Right Side Slope.	2.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0200 ft/ft
Discharge.....	8.00 cfs

Computed Results:

Depth.....	0.99 ft
Velocity.....	4.07 fps
Flow Area.....	1.96 sf
Flow Top Width...	3.96 ft
Wetted Perimeter.	4.43 ft
Critical Depth...	1.00 ft
Critical Slope...	0.0192 ft/ft
Froude Number....	1.02 (flow is Supercritical)

$0.075\,(vd) = 0.075(4.07)(.99) = 0.30' < 0.5'$

$\therefore$ 0.5' FREEBOARD

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: E-4 100 Peak Flow mn

Comment: Collection Channel E-4 100-Yr Peak Flow mx S

Solve For Depth

Given Input Data:

Left Side Slope..	2.00:1 (H:V)
Right Side Slope.	2.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.3190 ft/ft
Discharge.....	8.00 cfs

Computed Results:

Depth.....	0.59 ft
Velocity.....	11.50 fps
Flow Area.....	0.70 sf
Flow Top Width...	2.36 ft
Wetted Perimeter.	2.64 ft
Critical Depth...	1.00 ft
Critical Slope...	0.0192 ft/ft
Froude Number....	3.73 (flow is Supercritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: E-4 100 Full Flow

Comment: Collection Channel E-4 100-Yr Full Flow

Solve For Discharge

Given Input Data:

Left Side Slope..	2.00:1 (H:V)
Right Side Slope.	2.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0200 ft/ft
Depth.....	1.50 ft

Computed Results:

Discharge.....	24.16 cfs
Velocity.....	5.37 fps
Flow Area.....	4.50 sf
Flow Top Width...	6.00 ft
Wetted Perimeter.	6.71 ft
Critical Depth...	1.55 ft
Critical Slope...	0.0166 ft/ft
Froude Number....	1.09 (flow is Supercritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Return Frequency: 2 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-22-2002 14:54:05
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\E-4-2 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\E-4 2.HYD

Bailey Central Mine Complex
New Coal Disposal Area
Collection Channel E-4 (2 Year - Bare Soil)
January 2002

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
1	2.41	91.0	0.10	0.00	2.60	1.70	I.08 .10

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 2.41 acres or 0.00377 sq.mi
Peak discharge = 6 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	* Tt (hr)	Rounded Values Tc (hr)	* Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
1	0.10	0.00	**	**	No	Computed Ia/p < .1

* Travel time from subarea outfall to composite watershed outfall point.
** Tc & Tt are available in the hydrograph tables.

6-163

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: E-4 2 Peak Flow mn

Comment: Collection Channel E-4 2-Yr Peak Flow mn S

Solve For Depth

Given Input Data:

Left Side Slope..	2.00:1 (H:V)
Right Side Slope.	2.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.0200 ft/ft
Discharge.....	6.00 cfs

Computed Results:

Depth.....	0.89 ft
Velocity.....	3.79 fps
Flow Area.....	1.58 sf
Flow Top Width...	3.56 ft
Wetted Perimeter.	3.98 ft
Critical Depth...	0.89 ft
Critical Slope...	0.0199 ft/ft
Froude Number....	1.00 (flow is Critical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: E-4 2 Peak Flow mx

Comment: Collection Channel E-4 2-Yr Peak Flow mx S

Solve For Depth

Given Input Data:

Left Side Slope..	2.00:1 (H:V)
Right Side Slope.	2.00:1 (H:V)
Manning's n.....	0.030
Channel Slope....	0.3190 ft/ft
Discharge.....	6.00 cfs

Computed Results:

Depth.....	0.53 ft
Velocity.....	10.71 fps
Flow Area.....	0.56 sf
Flow Top Width...	2.12 ft
Wetted Perimeter.	2.37 ft
Critical Depth...	0.89 ft
Critical Slope...	0.0199 ft/ft
Froude Number....	3.67 (flow is Supercritical)

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

6.4 Permanent Culverts

S.O. No.: 24379-000-0000-ENG03
Subject: Consol Bailey Mine New Coal Refuse Disposal Area
Permanent Culvert Calculations
Computed By: JMB **Date:** 1/24/02

Baker

Sheet No. __ **of** __
Checked By:_____ **Date:**_____

These calculations present the design of the permanent drainage culverts at the Bailey Central Mine Complex for the New Coal Refuse Disposal Areas No. 3 and No. 4. Sheets 1 and 2 show the culvert locations and drainage areas for each.

The time of concentration and peak flows were calculated for each subarea using methods presented in the Soil Conservation Service TR-55, "Urban Hydrology for Small Watersheds," June 1986.

Permanent culverts were design using U.S. Department of Transportation, Federal Highway Administration, Hydraulic Design Series No. 5, "Hydraulic Design of Highway Culverts." Design calculations for the permanent culverts are presented in this section. Inlet control was assumed for all culverts.

Design Criteria are provided below:

- All channels are design for the 100-year, 24-hour storm event. (In accordance with the Pennsylvania Code, Chapter 90, Section 122, "Performance Standard for Coal Refuse Disposal.")

- 100-year, 24-hour rainfall = 5.2 inches (Ref. Commonwealth of Pennsylvania Department of Environmental Protection Office of Water Management, "Erosion and Sediment Pollution Control Program Manual," March 2000.)

- 2-year, 24-hour rainfall = 2.6 inches (Ref. Commonwealth of Pennsylvania Department of Environmental Protection Office of Water Management, "Erosion and Sediment Pollution Control Program Manual," March 2000.)

- SCS Curve Number for grass covered areas in the watershed is 70. (Ref. "Urban Hydrology for Small Watersheds", Technical Release Number 55 (TR-55), U.S. Department of Agriculture, Soil Conservation Service, June 1986. Table 2-2c – Meadow-continuous grass, protected from grazing and generally mowed for hay.)

- Manning Roughness Coefficient ("n") value of 0.24 for sheet flow on grass. (Ref. TR-55. Table 3-1 – Dense grasses).

- Manning Roughness Coefficient ("n") value of 0.06 for flow within the grass lined channels. (Estimated assuming good stand of grass with vegetation maintained at 4-9 inches).

- Manning Roughness Coefficient ("n") value of 0.03 for flow within the fabricform lined channels. (Ref. Value given for filter point mat from Nicolon Armorform Design Manual)

```
Quick TR-55 Ver.5.46   S/N:
Executed: 16:23:24   01-02-2002    C:\projects\consol\hydro\SP CUL.TCT

                     Bailey Central Mine Complex
            Coal Refuse Disposal Area's No. 3 and No. 4
                CONSOL Pennsylvania Coal Company
                     Permanent Culvert 1

                     Tc COMPUTATIONS FOR:

 SHEET FLOW (Applicable to Tc only)
     Segment ID
     Surface description                    Grass
     Manning's roughness coeff., n                  0.2400
     Flow length, L (total < or = 300)     ft      100.0
     Two-yr 24-hr rainfall, P2              in      2.600
     Land slope, s                        ft/ft    0.1700
                             0.8
           .007 * (n*L)
     T =  --------------                 hrs       0.11               =  0.11
              0.5    0.4
            P2    *   s

 SHALLOW CONCENTRATED FLOW
     Segment ID
     Surface (paved or unpaved)?                  Unpaved
     Flow length, L                         ft      555.0
     Watercourse slope, s                 ft/ft    0.3300

                               0.5
     Avg.V =  Csf *   (s)                 ft/s     9.2686
     where:   Unpaved Csf = 16.1345
              Paved   Csf = 20.3282

     T = L / (3600*V)                     hrs       0.02               =  0.02


 CHANNEL FLOW
     Segment ID
     Cross Sectional Flow Area, a        sq.ft     17.00
     Wetted perimeter, Pw                   ft     15.00
     Hydraulic radius, r = a/Pw             ft     1.133
     Channel slope, s                     ft/ft    0.0143
     Manning's roughness coeff., n                 0.0600

                          2/3    1/2
          1.49   *   r    *   s
     V =  --------------------            ft/s     3.2281
                         n

     Flow length, L                         ft      1192

     T = L / (3600*V)                     hrs       0.10               =  0.10

    :::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                                    TOTAL TIME (hrs)      0.23
```

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-02-2002 16:28:02
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\PC-1 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\PC-1.HYD

Bailey Central Mine Complex
Coal Refuse Disposal Area's No. 3 and No. 4
CONSOL Pennsylvania Coal Company
Permanent Culvert 1

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	20.15	70.0	0.20	0.00	5.20	2.19	I.16 .16

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

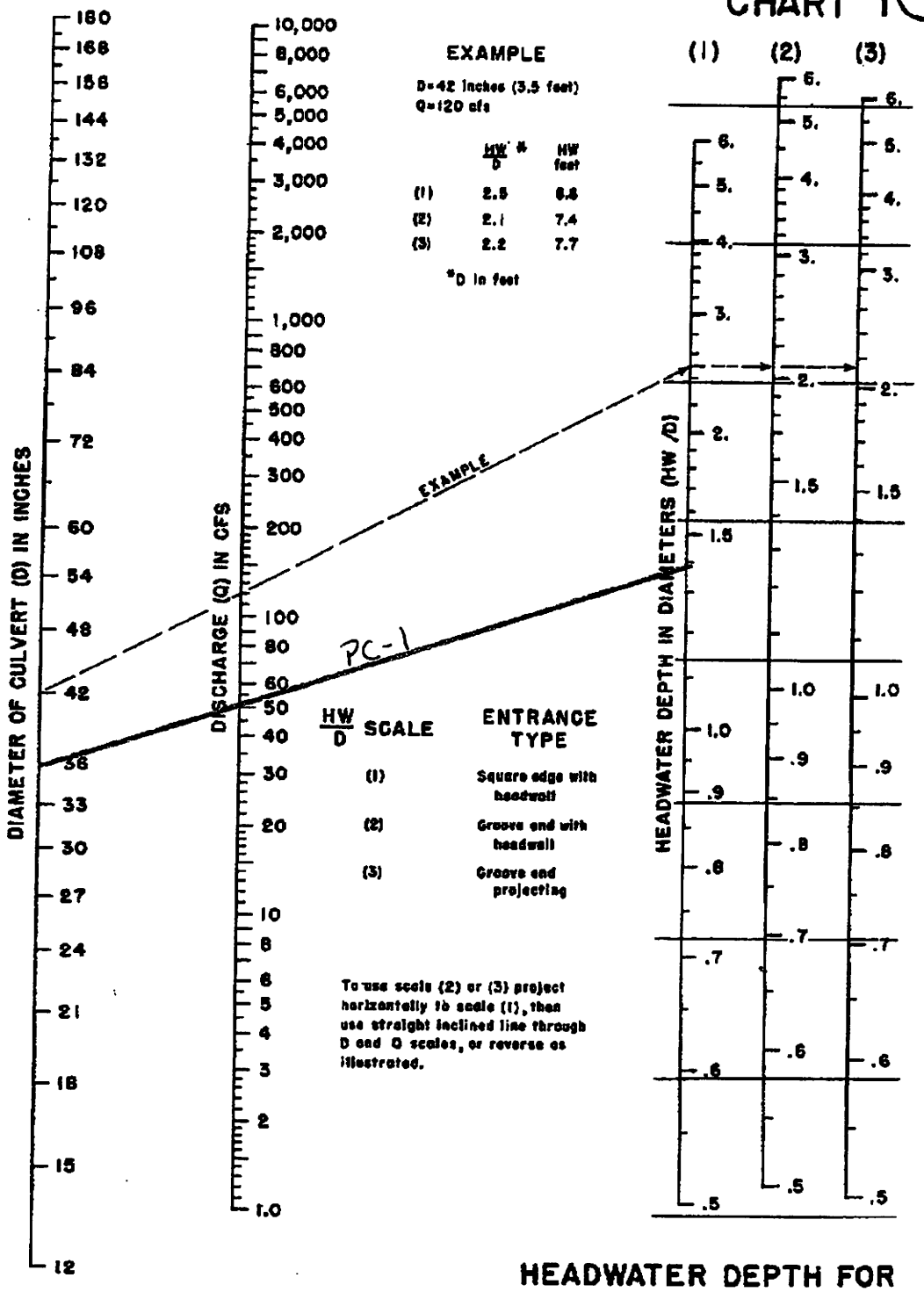
Total area = 20.15 acres or 0.03148 sq.mi
Peak discharge = 53 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.23	0.00	0.20	0.00	Yes	--

* Travel time from subarea outfall to composite watershed outfall point.

CHART 1



HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

6-171

Quick TR-55 Ver.5.46 S/N:
Executed: 17:18:05 01-02-2002 C:\projects\consol\hydro\PC-2.TCT

Bailey Central Mine Complex
Coal Refuse Disposal Area's No. 3 and No. 4
CONSOL Pennsylvania Coal Company
Permanent Channel 2

Tc COMPUTATIONS FOR:

SHEET FLOW (Applicable to Tc only)

Segment ID				
Surface description	grass			
Manning's roughness coeff., n		0.2400		
Flow length, L (total < or = 300)	ft	100.0		
Two-yr 24-hr rainfall, P2	in	2.600		
Land slope, s	ft/ft	0.0200		
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.26		= 0.26

SHALLOW CONCENTRATED FLOW

Segment ID				
Surface (paved or unpaved)?		Unpaved		
Flow length, L	ft	368.7		
Watercourse slope, s	ft/ft	0.0759		
$Avg.V = Csf * (s)^{0.5}$	ft/s	4.4450		
where: Unpaved Csf = 16.1345				
Paved Csf = 20.3282				
T = L / (3600*V)	hrs	0.02		= 0.02

CHANNEL FLOW

Segment ID				
Cross Sectional Flow Area, a	sq.ft	5.67	15.00	
Wetted perimeter, Pw	ft	7.53	12.00	
Hydraulic radius, r = a/Pw	ft	0.753	1.250	
Channel slope, s	ft/ft	0.0500	0.0100	
Manning's roughness coeff., n		0.0300	0.0600	
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	9.1920	2.8817	
Flow length, L	ft	2689	3575	
T = L / (3600*V)	hrs	0.08	+ 0.34	= 0.43

::

TOTAL TIME (hrs) 0.71

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-02-2002 17:10:57
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\PC-2 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\PC-2.HYD

Bailey Central Mine Complex
Coal Refuse Disposal Area's No. 3 adn No. 4
CONSOL Pennsylvania Coal Company
Permanent Culvert 2

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	93.63	70.0	0.75	0.00	5.20	2.19	I.16 .16

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

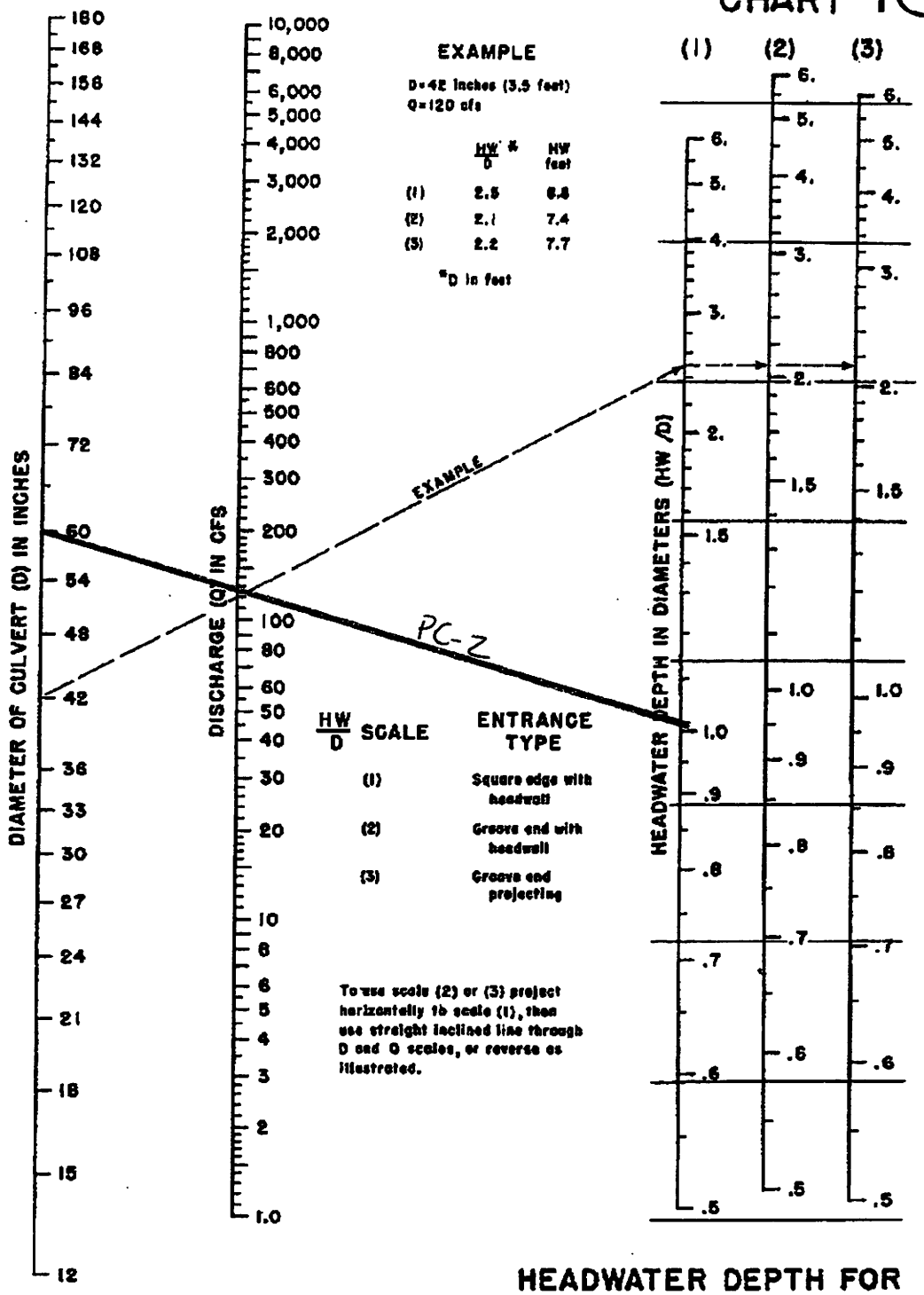
Total area = 93.63 acres or 0.14630 sq.mi
Peak discharge = 126 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.71	0.00	0.75	0.00	Yes	--

* Travel time from subarea outfall to composite watershed outfall point.

CHART 1



HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

6-174

```
Quick TR-55 Ver.5.46   S/N:
Executed: 16:56:47   01-02-2002    C:\projects\consol\hydro\PC-3.TCT

                    Bailey Central Mine Complex
          Coal Refuse Disposal Area's No. 3 and No. 4
              CONSOL Pennsylvania COal Company
                    Permanent Culvert 3

                    Tc COMPUTATIONS FOR:

 SHEET FLOW (Applicable to Tc only)
     Segment ID
     Surface description                     grass
     Manning's roughness coeff., n                 0.2400
     Flow length, L (total < or = 300)      ft     100.0
     Two-yr 24-hr rainfall, P2              in     2.600
     Land slope, s                        ft/ft    0.0200
                              0.8
          .007 * (n*L)
     T =  --------------                   hrs      0.26             =   0.26
             0.5    0.4
           P2    *   s

 SHALLOW CONCENTRATED FLOW
     Segment ID
     Surface (paved or unpaved)?                  Unpaved
     Flow length, L                         ft     368.7
     Watercourse slope, s                 ft/ft    0.0759

                                0.5
     Avg.V =  Csf *  (s)                   ft/s    4.4450
     where:   Unpaved Csf = 16.1345
              Paved   Csf = 20.3282

     T = L / (3600*V)                       hrs      0.02             =   0.02


 CHANNEL FLOW
     Segment ID
     Cross Sectional Flow Area, a        sq.ft     5.67
     Wetted perimeter, Pw                   ft     7.53
     Hydraulic radius, r = a/Pw             ft    0.753
     Channel slope, s                     ft/ft   0.0500
     Manning's roughness coeff., n                0.0300

                           2/3    1/2
          1.49   *   r    *   s
     V =  --------------------             ft/s    9.1920
                     n

     Flow length, L                         ft      2689

     T = L / (3600*V)                       hrs      0.08             =   0.08

    ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                                TOTAL TIME (hrs)       0.37
```

6-175

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-02-2002 16:56:56
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\PC-3 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\PC-3.HYD

Bailey Central Mine Complex
Coal Refuse Disposal Area's No. 3 and No. 4
CONSOL Pennsylvania Coal Company
Permanent Culvert 3

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	27.14	70.0	0.40	0.00	5.20	2.19	I.16 .16

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

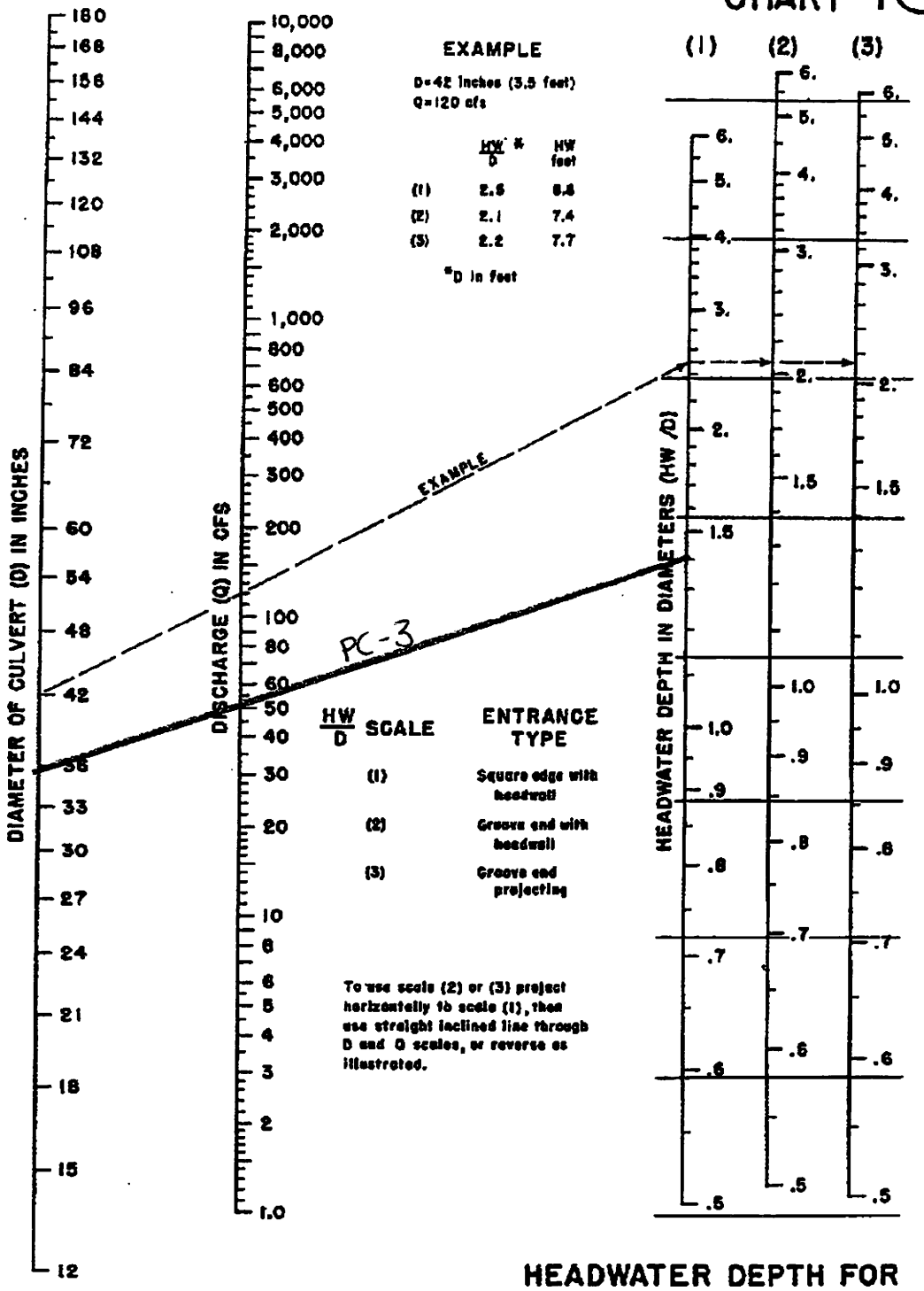
Total area = 27.14 acres or 0.04241 sq.mi
Peak discharge = 52 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.37	0.00	0.40	0.00	Yes	--

* Travel time from subarea outfall to composite watershed outfall point.

CHART 1



HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

6-177

Quick TR-55 Ver.5.46 S/N:
Executed: 16:47:31 01-02-2002 C:\projects\consol\hydro\PC-4.TCT

Bailey Central Mine Complex
Coal Refuse Disposal Area's No. 3 and No. 4
CONSOL Pennsylvania Coal Company
Permanent Culvert 4

Tc COMPUTATIONS FOR:

SHEET FLOW (Applicable to Tc only)

Segment ID				
Surface description		Grass		
Manning's roughness coeff., n		0.0240		
Flow length, L (total < or = 300)	ft	100.0		
Two-yr 24-hr rainfall, P2	in	2.600		
Land slope, s	ft/ft	0.0200		
$T = \frac{.007 * (n*L)^{0.8}}{P2^{0.5} * s^{0.4}}$	hrs	0.04		= 0.04

SHALLOW CONCENTRATED FLOW

Segment ID				
Surface (paved or unpaved)?		Unpaved		
Flow length, L	ft	88.0		
Watercourse slope, s	ft/ft	0.3280		
$Avg.V = Csf * (s)^{0.5}$	ft/s	9.2404		
where: Unpaved Csf = 16.1345; Paved Csf = 20.3282				
T = L / (3600*V)	hrs	0.00		= 0.00

CHANNEL FLOW

Segment ID		A-20	B-9	
Cross Sectional Flow Area, a	sq.ft	8.09	12.00	
Wetted perimeter, Pw	ft	10.39	13.12	
Hydraulic radius, r = a/Pw	ft	0.779	0.915	
Channel slope, s	ft/ft	0.0200	0.0100	
Manning's roughness coeff., n		0.0600	0.0600	
$V = \frac{1.49 * r^{2/3} * s^{1/2}}{n}$	ft/s	2.9724	2.3399	
Flow length, L	ft	2811	3542	
T = L / (3600*V)	hrs	0.26 +	0.42	= 0.68

::

TOTAL TIME (hrs) 0.73

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-02-2002 16:47:12
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\PC-4 .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\PC-4.HYD

Bailey Central Mine Complex
Coal Refuse Disposal Area's No. 3 and No. 4
CONSOL Pennsylvania Coal Company
Permanent Culvert 4

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	20.62	70.0	0.75	0.00	5.20	2.19	I.16 .16

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

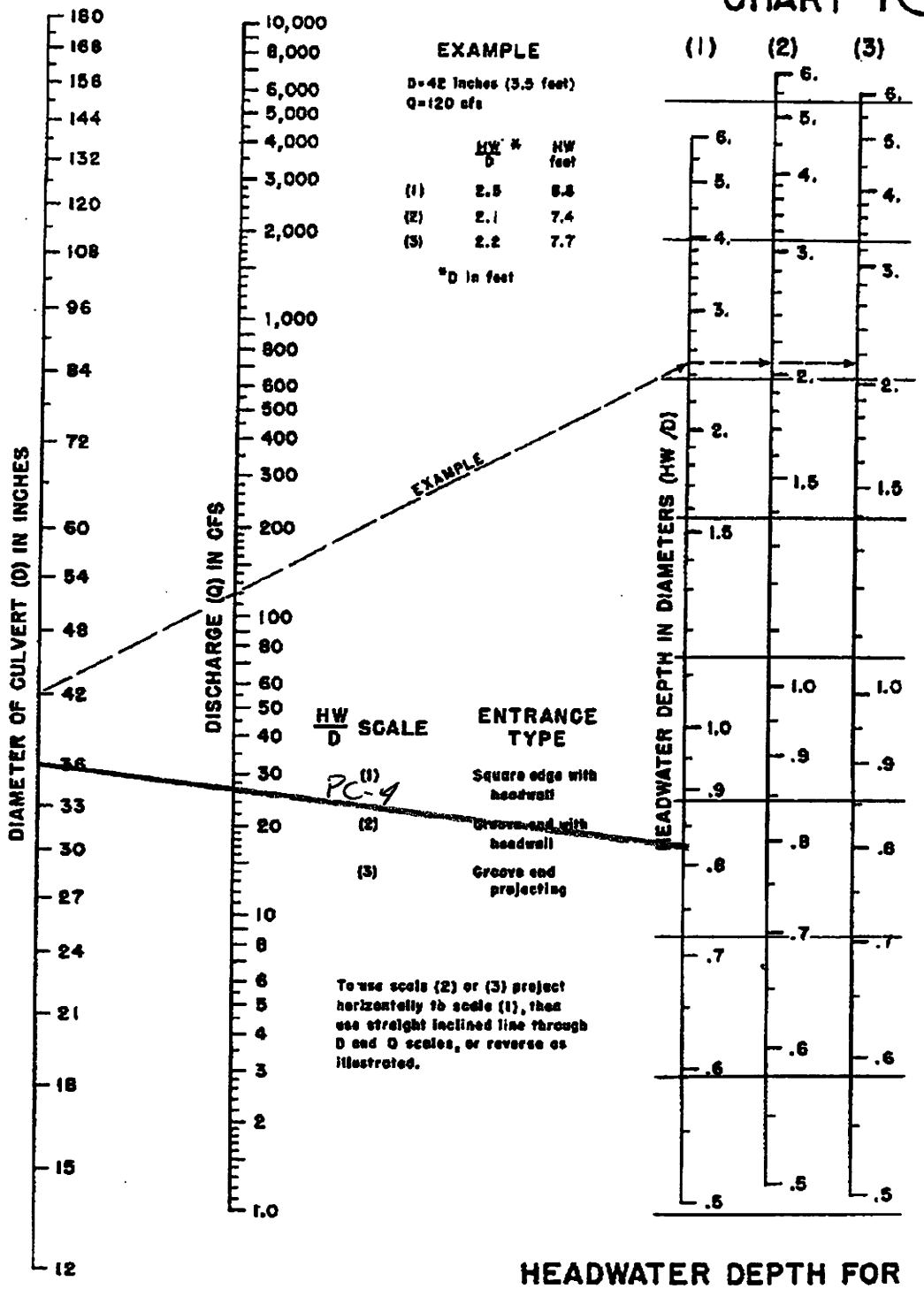
Total area = 20.62 acres or 0.03222 sq.mi
Peak discharge = 28 cfs

>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.73	0.00	0.75	0.00	Yes	--

* Travel time from subarea outfall to composite watershed outfall point.

CHART 1



HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

6-180

```
Quick TR-55 Ver.5.46   S/N:
Executed: 10:10:44   01-03-2002    C:\projects\consol\hydro\G CUL.TCT

                    Bailey Mine Complex
          Coal Refuse Disposal Area's No. 3 and No. 4
               CONSOL Pennsylvania Coal Company
               Permanent Culverts 5, 6, 7, and 8

               Tc COMPUTATIONS FOR:

 SHEET FLOW (Applicable to Tc only)
    Segment ID
    Surface description                  Grass
    Manning's roughness coeff., n             0.2400
    Flow length, L (total < or = 300)     ft    100.0
    Two-yr 24-hr rainfall, P2             in    2.600
    Land slope, s                       ft/ft   0.0500
                          0.8
       .007 * (n*L)
    T = --------------                  hrs      0.18                 =  0.18
          0.5     0.4
        P2    *   s

 SHALLOW CONCENTRATED FLOW
    Segment ID
    Surface (paved or unpaved)?                Unpaved
    Flow length, L                        ft     123.1
    Watercourse slope, s                ft/ft   0.0500

                           0.5
    Avg.V =  Csf *   (s)                 ft/s   3.6078
    where:   Unpaved Csf = 16.1345
             Paved   Csf = 20.3282

    T = L / (3600*V)                     hrs      0.01                 =  0.01


 CHANNEL FLOW
    Segment ID
    Cross Sectional Flow Area, a       sq.ft    25.82      11.99
    Wetted perimeter, Pw                  ft    18.81      12.00
    Hydraulic radius, r = a/Pw            ft    1.373      0.999
    Channel slope, s                    ft/ft   0.0100     0.1920
    Manning's roughness coeff., n               0.0600     0.0300

                      2/3    1/2
        1.49   *  r    *  s
    V = --------------------             ft/s   3.0672    %21.7508
                    n

    Flow length, L                        ft     6244       1756

    T = L / (3600*V)                     hrs     0.57   +   0.02    =  0.59

   ::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::::
                                            TOTAL TIME (hrs)        0.78
```

6-181

Return Frequency: 100 years

TR-55 TABULAR HYDROGRAPH METHOD
Type II. Distribution
(24 hr. Duration Storm)

Executed: 01-03-2002 10:11:56
Watershed file: --> C:\PROJECTS\CONSOL\HYDRO\G CUL .MOP
Hydrograph file: --> C:\PROJECTS\CONSOL\HYDRO\G CUL.HYD

Bailey Mine Complex
Coal Refuse Disposal Area's No. 3 and No. 4
CONSOL Pennsylvania Coal Company
Permanent Culverts No. 5, 6, 7, and 8

>>>> Input Parameters Used to Compute Hydrograph <<<<

Subarea Description	AREA (acres)	CN	Tc (hrs)	* Tt (hrs)	Precip. (in)	Runoff (in)	Ia/p input/used
	146.20	70.0	0.75	0.00	5.20	2.19	I.16 .16

* Travel time from subarea outfall to composite watershed outfall point.
I -- Subarea where user specified interpolation between Ia/p tables.

Total area = 146.20 acres or 0.2284 sq.mi
Peak discharge = 197 cfs

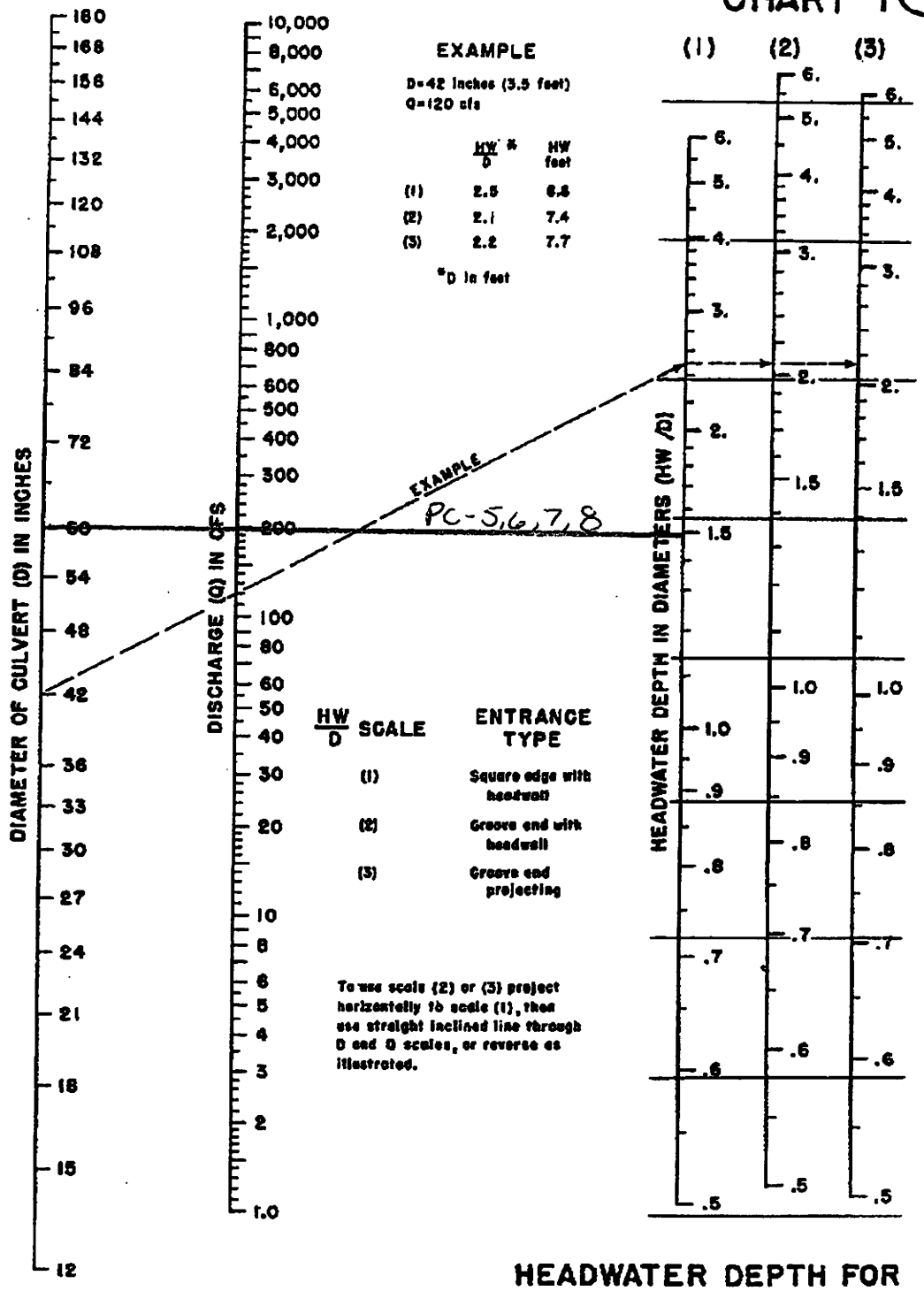
>>>> Computer Modifications of Input Parameters <<<<<

Subarea Description	Input Values Tc (hr)	Input Values * Tt (hr)	Rounded Values Tc (hr)	Rounded Values * Tt (hr)	Ia/p Interpolated (Yes/No)	Ia/p Messages
	0.78	0.00	0.75	0.00	Yes	--

* Travel time from subarea outfall to composite watershed outfall point.

6-182

CHART 1



HEADWATER SCALES 2&3
REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

HEADWATER DEPTH FOR CONCRETE PIPE CULVERTS WITH INLET CONTROL

6-183

S.O. No. 24379-000-0000

Subject: BAILEY COAL REFUSE DISPOSAL AREAS NO. 3 AND NO. 4

CULVERT DESIGN

Sheet No. 1 of 2

Drawing No.

Computed by JMB Checked By Date 1-3-01

Baker

PC-1

FLOW = 53 CFS

SIZE = 36 IN

$\frac{H_w}{D} = 1.4$

$\frac{H_w}{36"/12"/'} = 1.4$

$H_w = 4.2'$ ∴ USE: 36" PENNDOT TYPE D-W ENDWALL (ENTRANCE)
36" PENNDOT CONCRETE END SECTION (OUTLET)

PC-2

FLOW = 126 CFS

SIZE = 60 IN

$\frac{H_w}{D} = 1.01$

$\frac{H_w}{60"/12"/'} = 1.01$

$H_w = 5.05'$ ∴ USE: 72" PENNDOT TYPE D-W ENDWALL (ENTRANCE)
PROJECTING OUTLET

PC-3

FLOW = 52 CFS

SIZE = 36 IN

$\frac{H_w}{D} = 1.4$

$\frac{H_w}{36"/12"/'} = 1.4$

$H_w = 4.2"$ ∴ USE: 36" PENNDOT TYPE D-W ENDWALL (ENTRANCE)
36" PENNDOT TYPE E-S ENDWALL (OUTLET)

S.O. No. 24379-000-0000

Subject: BAILEY COAL REFUSE DISPOSAL AREA No. 3 AND No. 4

CULVERT DESIGN

Sheet No. 2 of 2

Drawing No.

Computed by JMB Checked By Date 1-3-01

Baker

PC-4

FLOW = 28 CFS

SIZE = 36"

$\frac{H_w}{D} = 0.82$

$\frac{H_w}{36"/12"/'} = 0.82$

$H_w = 2.46'$ ∴ USE: 36" PENNDOT TYPE D-W ENDWALL (ENTRANCE)

36" PENNDOT CONCRETE END SECTION (OUTLET)

PC-5, 6, 7, 8

FLOW = 197 CFS

SIZE = 60 IN

$\frac{H_w}{D} = 1.50$

$\frac{H_w}{60"/12"/'} = 1.50$

$H_w = 7.5'$ ∴ USE: 72" PENNDOT TYPE D-W ENDWALL (ENTRANCE)

PROJECTING OUTLET

6.5 Sedimentation Traps

STANDARD WORKSHEET #L
Sediment Trap Data

PROJECT NAME: CONSOL BAILEY COAL REFUSE DISPOSAL AREAS No. 3 AND No. 4
LOCATION: GREENE COUNTY
PREPARED BY: JMB DATE: 1/23/02
CHECKED BY: _____ DATE: _____

TRAP NUMBER	1	2	3		
DRAINAGE AREA (5 ACRES MAX) AC	2.5	2.9	4.5		
REQUIRED CAPACITY (2000 CF/AC) CF	5000	5800	9000		
* AVERAGE BOTTOM LENGTH (FT)	50	54	68		
* AVERAGE BOTTOM WIDTH (FT)	25	27	34		
BOTTOM ELEVATION (FT)	1403.9	1487.7	1330.0		
TOP OF EMBANKMENT ELEVATION	1408.9	1492.7	1335.0		
CREST OF SPILLWAY ELEVATION	1407.9	1491.7	1334.0		
CLEAN-OUT ELEVATION (@ 700CF/AC)	1405.7	1489.9	1331.7		
FLOW LENGTH/WIDTH RATIO (2:1 MIN)	2:1	2:1	2:1		

EMBANKMENT SPILLWAYS

OUTLET WIDTH (FT) (GREATER OF 2 x # AC OR 2 x h)	8.0	8.0	9.0		
OUTLET SIDE SLOPES (2:1 MIN.)	2:1	2:1	2:1		

RISER PIPE SPILLWAYS

Dr (RISER DIAMETER, 8" MIN.)					
Db (BARREL DIAMETER, 6" MIN.)					
BARREL OUTLET ELEVATION (FT)					
MAX WATER SURFACE ELEVATION (@ 1.5 CFS/AC. DISCHARGE)					

OUTLET BASIN

LENGTH (6 Db)	Ft.					
WIDTH (3 Db)	Ft.					
RIPRAP PROTECTION (Size)						

* For Irregular shaped traps, provide stage storage data.

NOTE: Add data from this worksheet to worksheet #9 or #10 and show information on plan drawings.

STANDARD WORKSHEET
Sediment Trap Data

PROJECT NAME: CONSOL BAILEY COAL REFUSE DISPOSAL AREAS NO 3 AND NO 4
LOCATION: GREENE COUNTY
PREPARED BY: JMB DATE: 1/17/01
CHECKED BY: DATE:

TRAP NUMBER	SP1	SP2	SP3	SP4	SP5
DRAINAGE AREA (5 ACRES MAX) AC	5.0	2.7	2.8	3.9	4.0
REQUIRED CAPACITY (2000 CF/AC) CF	10000	5400	5600	7800	8000
* AVERAGE BOTTOM LENGTH (FT)	72	52	54	64	64
* AVERAGE BOTTOM WIDTH (FT)	35	26	27	32	32
BOTTOM ELEVATION (FT)	1134.3	1140.3	1145.0	1157.5	1159.8
TOP OF EMBANKMENT ELEVATION	1139.3	1145.3	1150.0	1162.5	1165.8
CREST OF SPILLWAY ELEVATION	1138.3	1144.3	1149.0	1161.5	1164.8
CLEAN-OUT ELEVATION (@ 700CF/AC)	1136.0	1142.1	1146.8	1159.2	1161.5
FLOW LENGTH/WIDTH RATIO (2:1 MIN)	2.06	2.0	2.0	2.0	2.0

EMBANKMENT SPILLWAYS

OUTLET WIDTH (FT) (GREATER OF 2 x # AC OR 2 x h)				8.0	8.0
OUTLET SIDE SLOPES (2:1 MIN.)				2:1	2:1

RISER PIPE SPILLWAYS

Dr (RISER DIAMETER, 8" MIN.)	27"	15"	15"		
Db (BARREL DIAMETER, 6" MIN.)	21"	18"	18"		
BARREL OUTLET ELEVATION (FT)	1134	1140	1144.90		
MAX WATER SURFACE ELEVATION (@ 1.5 CFS/AC. DISCHARGE)	0.5	0.5	0.5		

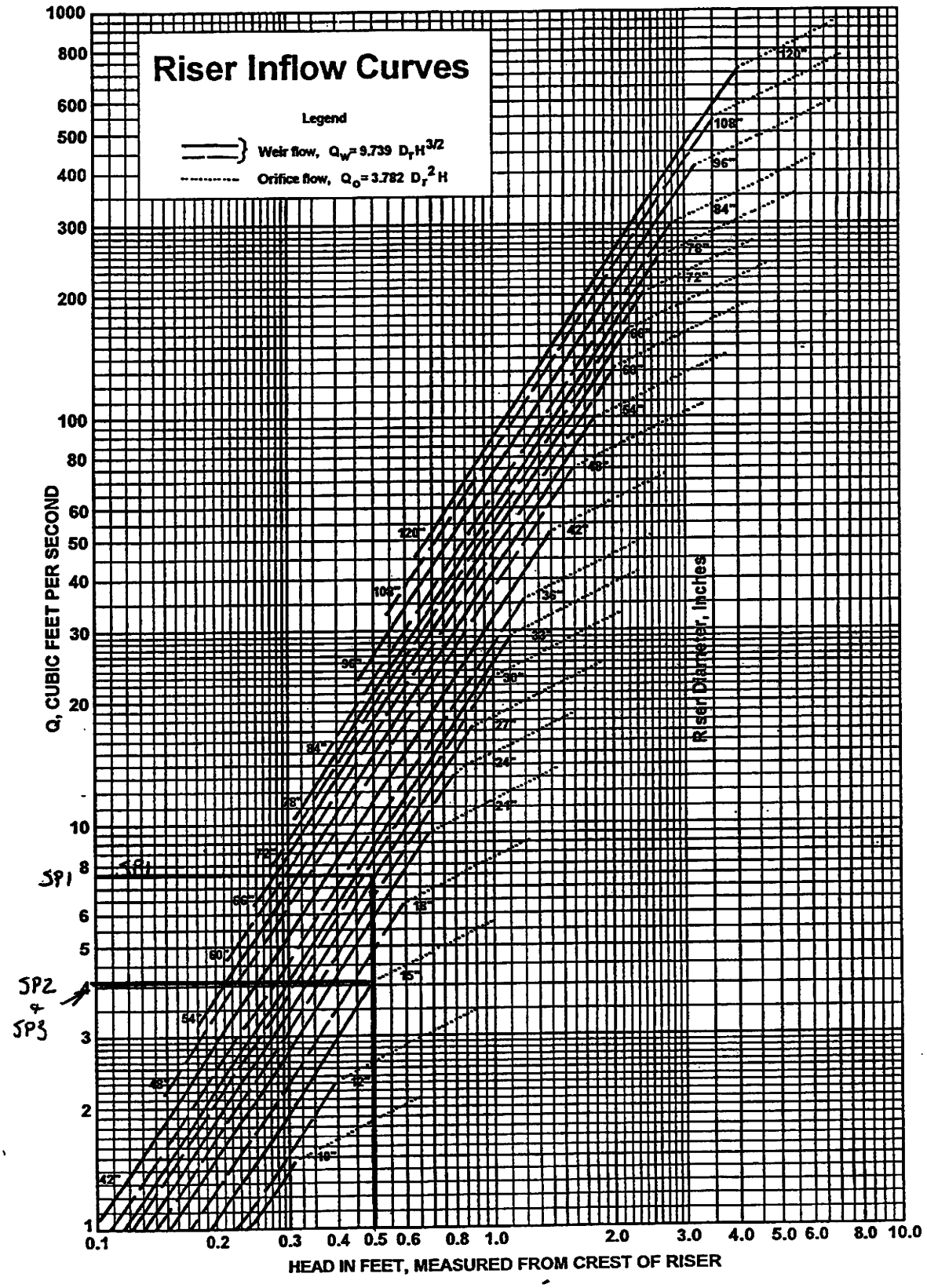
OUTLET BASIN

LENGTH (6 Db)	Ft.					
WIDTH (3 Db)	Ft.					
RIPRAP PROTECTION (Size)						

* For Irregular shaped traps, provide stage storage data.

NOTE: Add data from this worksheet to worksheet #9 or #10 and show information on plan drawings.

FIGURE 8
Riser In flow Curves



The principal spillway riser should have a trash rack and an anti-vortex device.

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: SP1

Comment: SP1 Barrel Sizing

Solve For Full Flow Diameter

Given Input Data:

Slope.....	0.0100 ft/ft
Manning's n.....	0.024
Discharge.....	7.50 cfs

Computed Results:

Full Flow Diameter.....	1.66 ft ∴ USE 21"
Full Flow Depth.....	1.66 ft
Velocity.....	3.45 fps
Flow Area.....	2.17 sf
Critical Depth....	1.03 ft
Critical Slope....	0.0201 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	7.50 cfs
QMAX @.94D.....	8.07 cfs
Froude Number.....	FULL

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: SP1

Comment: SP2 Barrel Sizing

Solve For Full Flow Diameter

Given Input Data:

Slope.....	0.0100 ft/ft
Manning's n.....	0.024
Discharge.....	4.05 cfs

Computed Results:

Full Flow Diameter.....	1.32 ft ∴ USE 18"
Full Flow Depth.....	1.32 ft
Velocity.....	2.96 fps
Flow Area.....	1.37 sf
Critical Depth....	0.80 ft
Critical Slope....	0.0214 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	4.05 cfs
QMAX @.94D.....	4.36 cfs
Froude Number.....	FULL

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: SP1

Comment: SP3 Barrel Sizing

Solve For Full Flow Diameter

Given Input Data:

Slope.....	0.0100 ft/ft
Manning's n.....	0.024
Discharge.....	4.20 cfs

Computed Results:

Full Flow Diameter.....	1.34 ft ∴ USE 18"
Full Flow Depth.....	1.34 ft
Velocity.....	2.98 fps
Flow Area.....	1.41 sf
Critical Depth....	0.81 ft
Critical Slope....	0.0213 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	4.20 cfs
QMAX @.94D.....	4.52 cfs
Froude Number.....	FULL

Open Channel Flow Module, Version 3.11 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakercorp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY
CONSOL PENNSYLVANIA COAL COMPANY

SEDIMENT TRAP DESIGN

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB			01/02	1"=300'

FILE:

Baker

MICHAEL BAKER JR., INC.
Coraopolis, Pennsylvania
412 269-6000 mbakerworp.com

BAILEY CENTRAL MINE COMPLEX
COAL REFUSE DISPOSAL FACILITY
CONSOL PENNSYLVANIA COAL COMPANY

SEDIMENT TRAP DESIGN

DESIGNED BY	DRAWN BY	CHECKED BY	DATE	SCALE
JMB	JMB	•	01/02	1" = 200'

FILE. CONSOL SED POND PLAN 100