

APPENDIX – ‘WPI’

STREAM QUALITY & WETLANDS ASSESSMENT REPORT

BY

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**Foundation Mine
Proposed Refuse Area Site Selection Study**

Foundation Mine

**STREAM QUALITY AND WETLANDS
ASSESSMENT REPORT**

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**January 2008
Revised August 2009**

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1.0 INTRODUCTION

1.1 BACKGROUND

Foundation Coal is in the preliminary stages of developing plans for the construction of a coal refuse disposal site, herein referred to as a Refuse Area, for the proposed Foundation Mine coal preparation plant located in Greene County, Pennsylvania. Original site alternatives were selected from “potential” sites within a designated 25 mi² search area of the proposed Foundation mine coal preparation plant and associated facilities (Figure 1, Appendix A). Twenty-one (21) watersheds (i.e. alternatives/sites) were advanced to the detailed site assessment phase to determine the presence/absence of wetland resources and the status of stream ecology, based on macroinvertebrate sampling and other quantitative measurements. These twenty-one (21) sites are located within the South Fork of Ten Mile Creek watershed, a High-Quality (HQ) watershed according to Chapter 93 of the PA Code. As of June 22, 2009, five (5) of these sites have been re-designated as Exceptional Value (EV) watersheds. Four (4) alternative potential refuse areas, located in non-HQ watersheds and outside of the original 25 mi² search area, were evaluated as alternatives to the HQ and/or EV watersheds (Figures 1 and 5, Appendix E). All sites, twenty-five (25) total, are located in Jackson and Center Townships, Greene County, Pennsylvania (Figure 1, Appendix A and Figure 1, Appendix E).

The results of the field investigations in these twenty-five (25) potential sites are summarized in this report. A qualitative comparison of the twenty-one (21) original HQ watersheds (Refuse Sites R1-R21) and the four (4) alternative non-HQ watersheds (Refuse Areas #1, #2, #3, and #5) is presented as well.

1.2 PURPOSE AND OBJECTIVES

The purpose of these site assessments is to conduct baseline biological and chemical monitoring of benthic macroinvertebrate communities, stream habitat, water chemistry, and wetland resources in the twenty-five (25) sites selected for detailed site assessments. The biological and chemical monitoring data will be used to assess the pre-disturbance conditions in each of the selected watersheds and as a baseline to compare existing conditions with post-disturbance conditions in the preferred sites, upon completion of construction activities.

2.0 STUDY AREAS

2.1 ORIGINAL POTENTIAL REFUSE SITES, HIGH QUALITY AND EXCEPTIONAL VALUE WATERSHEDS

Refuse Site 1 (R1)

Refuse Site 1 is located to the north of the intersection of Macedonia Road and Bristoria Road in Center Township, Greene County, Pennsylvania. One (1) tributary flowing from north to south lies within the potential refuse site boundary. This stream, which originates from several small springs at or near its headwaters, flows under Macedonia Road into an unnamed tributary (UNT) to House Run. On June 22, 2009; this tributary was reclassified as an EV stream by the PADEP. Elevations within the site range from 1,060 feet near the southern boundary of the refuse area to 1,330 feet along the ridges surrounding the stream. The area of this site is 176.56 acres, and the projected volume is 28,744,502 cubic yards.

The land use of Refuse Site 1 is mostly forested with small portions of select cut logging and new construction. Most residences consist of single family dwellings, with associated agricultural structures common. The forested areas within the sub-watershed consist of red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), red oak (*Quercus rubra*), white oak (*Quercus alba*), hickory (*Carya spp.*) and American beech (*Fagus grandifolia*).

Refuse Site 2 (R2)

Refuse Site 2 is located to the north of Hampton Road in Center Township, Greene County, Pennsylvania. One (1) small tributary flowing from north to south lies within the potential refuse site boundary. This tributary flows under Hampton Road into a UNT to House Run. The origins of this stream are several small springs at or near its headwaters. On June 22, 2009; this tributary was reclassified as an EV stream by the PADEP. Elevations within the site range from 1,120 feet near the southern boundary of the refuse area to 1,340 feet along the ridges surrounding the stream. The area of this site is 74.55 acres, and the projected volume is 9,343,182 cubic yards.

The land use of Refuse Site 2 is mostly forested and old-field pasture habitat. The heavily forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech. Typical old-field pasture species include multi-flora rose (*Rosa multiflora*), thistle (*Asteraceae*), goldenrod (*Solidago spp.*), and various upland grasses.

Refuse Site 3 (R3)

Refuse Site 3 is located surrounding the headwaters of Hoges Run in Center Township, Greene County, Pennsylvania. Hoges Run flows from northwest to southeast along Hoges Run Road. The stream eventually flows under Golden Oaks Road and into McCourtney Run. The origins of Hoges Run are several small springs at or near the headwaters of the stream. Elevations within the site range from 1,100 feet near the southern boundary to 1,340 feet along the ridges surrounding the stream. The area of this site is 189.3 acres, and the volume is 30,271,243 cubic yards.

The land use of Refuse Site 3 is dominated by agricultural activities. Cattle have unlimited access to the stream channel in most areas. This practice has led to sediment and nutrient loading within the stream. There are several structures located on the site. These structures generally are single family dwellings or structures associated with agriculture. Landowner consent was not granted to access one property within the proposed Refuse Site 3; however, data collection was performed on surrounding

properties. Typical species include multi-flora rose, thistle, goldenrod, and various upland grasses. Small forested areas occurring on hillsides within the watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

Refuse Site 4 (R4)

Refuse Site 4 is located to the southwest of the intersection of Route 21 and Covered Bridge Road in Center Township, Greene County, Pennsylvania. The tributary located within this potential refuse site flows from southwest to northeast along Covered Bridge Road and into South Fork of Ten Mile Creek. The origins of this tributary are several small springs at or near the headwaters of the stream. Elevations within the site range from 1,060 feet near the eastern boundary of the refuse area to 1,300 feet along the ridges surrounding the stream. The area of this site is 195.6 acres, and the projected volume is 25,929,004 cubic yards.

A single landowner owns the majority of the property in R4 and this landowner denied access to the property for detailed data collection. Therefore, the majority of information gathered for Refuse Site 4 is derived from what could be observed from public roads and secondary sources. By remaining within the Right-of-Way (ROW) of Covered Bridge Road, Wallace & Pancher, Inc. (WPI) personnel attempted to obtain a water sample from this UNT northeast of the boundary of R4 on July 10, 2009; however, the stream was dry and a sample could not be collected. Following a rainy period, flow was restored to the UNT and a grab sample was obtained on July 30, 2009. Results from this sample are provided in Appendix D: ILA Data Physiochemical Data (No Permission Sites). As described above, the water sample was taken within the ROW of Covered Bridge Road which lays adjacent to the no permission area. Given that access to the property was not granted, WPI personnel aimed to keep sampling time at this site to a minimum in order to avoid conflict with the landowner. As such no *in situ* water quality, physiochemical, or macroinvertebrate data were collected by WPI personnel at R4.

() The land use of Refuse Site 4 is influenced by agricultural activities. Cattle and horses have unlimited access to the stream channel of this UNT to South Fork of Ten Mile Creek. This practice has likely lead to sediment and nutrient loading within the stream.

There are several structures located on the R4 site. These structures are single family dwellings and structures associated with agriculture. Most of the residential portion of the site is located near the confluence with South Fork of Ten Mile Creek. Overhead utility lines and gas lines pass through the southern headwaters of this tributary. Typical species include multi-flora rose, thistle, goldenrod, and various upland grasses. Small forested areas occurring on the hillsides within the watershed consist of black walnut (*Juglans nigra*), sugar maple, beech (*Fagus spp.*) and black cherry (*Prunus serotina*).

Refuse Site 5 (R5)

Refuse Site 5 is located to the north of Hoges Run Road in Center Township, Greene County, Pennsylvania. The tributary located within this potential refuse site flows from north to south under Hoges Run Road into Hoges Run. The sources of water for this stream are springs within the headwater areas, as well as sheet-flow from surrounding land. On June 22, 2009; this tributary was reclassified as an EV stream by the PADEP. Elevations within the site range from 1,100 feet near the southern boundary of the refuse area to 1,360 feet along the ridges surrounding the stream. The area of this site is 133.5 acres, and the projected volume is 20,448,027 cubic yards.

The land use of Refuse Site 5 is mostly forested. There is one (1) single family dwelling located on the site. The heavily forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

Refuse Site 6 (R6)

Refuse Site 6 is located to the north of the intersection of Golden Oaks Road and Tower Road in Center Township, Greene County, Pennsylvania. The main tributary within this potential refuse site flows from northwest to southeast along Tower Road. The stream

then flows under Golden Oaks Road and into McCourtney Run. The origin of this stream is a mixture of sheet flow from cleared cropland and several springs at or near its headwaters. Elevations within the site range from 1,040 feet near the southern border of the refuse area to 1,300 feet along the ridges surrounding the stream. The area of the site is 185.1 acres, and the projected volume is 26,214,027 cubic yards.

The land use of Refuse Site 6 is mostly forested with small residential areas. There are several structures located on the site, consisting of single family dwellings and structures associated with agriculture. Some structures on this site have been abandoned. There are gas and aboveground power lines intersecting the site in the middle and southern portions. Hay production occurs in close proximity to the headwaters of this area. The forested areas within the proposed refuse site consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

Refuse Site 7 (R7)

Refuse Site 7 is located to the north of the intersection of Golden Oaks Road and Norman Hollow Road in Center Township, Greene County, Pennsylvania. The main tributary within this potential refuse site flows from the northwest to southeast along Norman Hollow Road. The stream then flows under Golden Oaks Road and into McCourtney Run. The origin of this stream is a mixture of sheet flow from cleared cropland and several springs at or near its headwaters. On June 22, 2009; this tributary was reclassified as an EV stream by the PADEP. Elevations within the site range from 1,040 feet near the southern border of the refuse area to 1,300 feet along the ridges surrounding the stream. The area of the site is 146.2 acres, and the projected volume is 22,800,783 cubic yards.

The land use of Refuse Site 7 is mostly forested with small old pasture and residential areas. There is only one (1) single family dwelling located in the northern portion of the refuse area. Small portions of active pasture exist along the southern reaches of the site. There is hay production near the headwaters of this UNT to McCourtney Run. Gas and above-ground power lines are located on the site. The forested areas within the sub-

watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

Refuse Site 8 (R8)

Refuse Site 8 is located to the north of the intersection of Route 21 and McQuay Road in Center Township, Greene County, Pennsylvania. The main tributary within this potential refuse area flows from north to south along McQuay Road. The stream then flows under Route 21 and into South Fork of Ten Mile Creek. The origin of this stream is a mixture of sheet flow from cleared cropland and several springs at or near its headwaters. Elevations within this site range from 1,020 feet near the southern border of the refuse area to 1,305 feet along the ridges surrounding the stream. The area of the site is 161.6 acres, and the projected volume is 26,036,000 cubic yards.

The land use of Refuse Site 8 is mostly active pasture with small forested areas. There are several structures located on the site, consisting of single family dwellings and structures associated with agriculture. Active cattle and sheep pastures cover a large portion of the site. New road construction associated with mining activities exists in the northern regions of the site. The forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

Refuse Site 9 (R9)

Refuse Site 9 is located to the north of the intersection of Route 21 and Rock Hill Road and to the west of Refuse Site 8 in Center Township, Greene County, Pennsylvania. The main tributary located within this potential refuse site flows from the north to south along Rock Hill Road. The stream then flows under Route 21 and into South Fork of Ten Mile Creek. The origin of this stream is a mixture of sheet flow from cleared cropland and several springs at or near the headwaters. Elevations within this site range from 1,080 feet near the southern border of the refuse area to 1,340 feet along the ridges surrounding the stream. The area of the site is 137.6 acres, and the projected volume is 22,570,783 cubic yards.

() The land use of Refuse Site 9 is completely forested. No structures are located within the site. Gas pipelines cross the site in the northern portions and construction associated with future pipelines is located in the southern portions of the site. The forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

Refuse Site 10 (R10)

Refuse Site 10 is located along Tara Hill Road west of the intersection of Muddy Hollow Road and Hampton Road in Center Township, Greene County, Pennsylvania. The main tributary within this potential refuse site flows from northwest to southeast along Tara Hill Road. The origins of this tributary are several small springs at or near the headwaters of the stream while smaller UNTs from the north and south contribute flow as well. On June 22, 2009; this tributary was reclassified as an EV stream by the PADEP. Elevations within this site range from 1,200 feet near the southern border of the refuse site to 1,410 feet along the ridges surrounding the stream. The area of the site is 83.2 acres, and the projected volume is 12,195,528 cubic yards.

The land cover of Refuse Site 10 is mostly old pasture and forest with small portions of active pasture. Several abandoned structures are located on the southern portion of the site. Utility lines cross the site in several areas in the northern portions of the refuse site. The heavily forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech. Typical old pasture species include multi-flora rose, thistle, goldenrod, and various upland grasses over a majority of the site.

Refuse Site 11 (R11)

Refuse Site 11 is located along Macedonia Road between Hampton Road and Bristoria Road on the border of Center and Jackson Townships, Greene County, Pennsylvania. Two (2) small tributaries are located inside this potential refuse site. The larger tributary flows from the northwest to southeast and under Macedonia Road. The smaller tributary flows from west to east and into the larger tributary. The origins of these tributaries are

() several small springs at or near the headwaters of the watershed. Elevations within this site range from 1,080 feet near the eastern border of the refuse area to 1,360 feet along the ridges surrounding the stream. The area of the site is 164.2 acres, and the projected volume is 27,764,971 cubic yards.

The land cover of Refuse Site 11 is mostly active pasture with portions of forested areas located on the hillsides. The forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech. Typical old pasture species include multi-flora rose, thistle, goldenrod, and various upland grasses

Refuse Site 12 (R12)

Refuse Site 12 is located along Bristoria Road adjacent to State Game Lands (SGL) #179 east of the intersection of Bristoria Road and Knight Road in Jackson Township, Greene County, Pennsylvania. The tributary located inside this refuse site flows from north to south under Bristoria Road, and into House Run. The origins of this stream are several small springs at or near the headwaters of the stream. Elevations within this site range from 1,100 feet near the southern border of the refuse area to 1,355 feet along the ridges surrounding the stream. The area of the site is 97.5 acres, and the projected volume is 15,211,012 cubic yards.

The land cover of Refuse Site 12 is completely forested; however, portions of the forested land are fenced and used as pastures. A gas pipeline crosses the southern portion of the site. The forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

Refuse Site 13 (R13)

Refuse Site is located to the south of the intersection of Bristoria Road and Game Road in Jackson Township, Greene County, Pennsylvania. The tributary flows from south to north along Game Road, and into House Run. The origins of this stream are several small springs at or near the headwaters of the stream. Elevations within this site range from 1,080 feet near the northern border of the refuse area to 1,300 feet along the ridges

() surrounding the stream. The area of the site is 69.9 acres, and the projected volume is 8,794,536 cubic yards.

The land cover of Refuse Site 13 is mostly forested with one small active pasture. The forested area located on the site is included in SGL #179. An off-road trail with old field habitat surrounding it runs along the stream. An active beaver dam is located on House Run outside the northern extent of this refuse site. The forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

Refuse Site 14 (R14)

Refuse Site 14 is located to the west of the intersection of Golden Oaks Road and Valley Chapel Road in Jackson Township, Greene County, Pennsylvania. The tributary flows from west to east along Valley Chapel Road. The stream then flows under Golden Oaks Road and into Garner Run. The origins of this stream are several small springs at or near the western headwaters of the watershed. Elevations within this site range from 1,080 feet near the southern border of the refuse area to 1,350 feet along the ridges surrounding the stream. The area of the site is 176.50 acres, and the projected volume is 17,848,950 cubic yards.

The land cover of Refuse Site 14 is forested; with scattered areas of residential and active pasture land use. The residential portions of the site lie along Valley Chapel Road near its intersection with Golden Oaks Road. Several single family dwellings and a church are located in this area. An active cattle pasture is located at the western end of Valley Chapel Road. This property also has one (1) small pond located near the pasture. The remainder of the refuse area west of the end of Valley Chapel Road is forested. A gas pipeline transects the site. The forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

Refuse Site 15 (R15)

Refuse Site 15 is located to the west of Golden Oaks Road between Valley Chapel Road and Grinnage Run Road in Jackson Township, Greene County, Pennsylvania. One (1) small tributary lies within the refuse area boundary and flows from northwest to southeast. The tributary then flows under Golden Oaks Road and into Garner Run. The origins of this stream are several small springs at or near the headwaters of the stream. Elevations within this site range from 1,060 feet near the southern border of the refuse area to 1,300 feet along the ridges surrounding the stream. The area of the site is 52.7 acres, and the projected volume is 6,390,890 cubic yards.

The land cover of Refuse Site 15 is active pasture and old field, with small portions of forested habitat. Cattle have unlimited access to the stream channel in most areas. This practice has led to sediment and nutrient loading within the stream. There are several structures located on the site. These structures are single family dwellings and structures associated with agriculture. Typical old pasture species include multi-flora rose, thistle, goldenrod, and various upland grasses. The forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

Refuse Site 16 (R16)

Refuse Site 16 is located to the west of Golden Oaks Road between Valley Chapel Road and Grinnage Run Road in Jackson Township, Greene County, Pennsylvania. A small tributary flows from northwest to southeast, under Golden Oaks Road, and into Garner Run. The origins of this stream are several small springs at or near the headwaters of the stream. Elevations within this site range from 1,060 feet near the southern border of the refuse area to 1,300 feet along the ridges surrounding the stream. The area of the site is 48.7 acres, and the projected volume is 6,302,691 cubic yards.

The land cover of Refuse Site 16 is active pasture and old field with small portions of forested habitat. Grazing animals have unlimited access to the stream channel in several areas. There are several structures located on the site, consisting of single family dwellings and structures associated with agriculture. Typical old pasture species include multi-flora rose, thistle, goldenrod, and various upland grasses over a majority of the site.

The forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

Refuse Site 17 (R17)

Refuse Site 17 is located to the west of Golden Oaks Road between Valley Chapel Road and Grinnage Run Road in Jackson Township, Greene County, Pennsylvania. One (1) small tributary flows from northwest to southeast, under Golden Oaks Road, and into Garner Run. The origins of this stream are several small springs at or near the headwaters of the stream. Elevations within this site range from 1,060 feet near the southern border of the refuse area to 1,330 feet along the ridges surrounding the stream. The area of the site is 74.4 acres, and the projected volume is 10,306,590 cubic yards. The land cover of Refuse Site 17 is forested with small portions of old field habitat. Typical old field species include multi-flora rose, thistle, goldenrod, and various upland grasses. The forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

Refuse Site 18 (R18)

Refuse Site 18 is located to the west of Golden Oaks Road between Grinnage Run Road and Bristoria Road in Center Township, Greene County, Pennsylvania. One (1) small tributary flows from northwest to southeast, under Golden Oaks Road and into Garner Run. The origins of this stream are several small springs at or near the headwaters of the stream. Elevations within this site range from 1,040 feet near the southern border of the refuse area to 1,300 feet along the ridges surrounding the stream. The area of the site is 48.7 acres, and the projected volume is 6,136,337 cubic yards.

The land cover of Refuse Site 18 is mostly forested habitat with small residential and agricultural areas of land use scattered throughout the site. The forested areas within the site consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

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Refuse Site (R19)

Refuse Site 19 is located along Grinnage Run Road in Center and Jackson Townships, Greene County, Pennsylvania. Grinnage Run flows from south to north along Grinnage Run Road within the site and continues until its confluence with Garner Run. The origins of this stream are several small springs at or near the headwaters of the stream. Elevations within this site range from 1,160 feet near the northern border of the refuse area to 1,310 feet along the ridges surrounding the stream. The area of the site is 191.1 acres and the projected volume is 26,562,164 cubic yards. This is the largest of the original potential refuse sites sampled.

The land cover of Refuse Site 19 is mostly forested habitat with isolated single family residential areas of land use. Select-cut logging has occurred in the southern extent of the site. Access road construction in association with this logging was also observed in this area. The forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

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Refuse Site 20 (R20)

Refuse Site 20 is located along Hargus Creek Road between Cole Hollow Road and Turkey Hollow Road in Center Township, Greene County, Pennsylvania. One (1) small tributary flows from west to east, continues under Cole Hollow Road and into a tributary to Hargus Creek. The origins of this stream are several small springs at or near the headwaters of the stream. Elevations within this site range from 1,080 feet near the eastern border of the refuse area to 1,385 feet along the ridges surrounding the stream. The area of the site is 100.9 acres, and the projected volume is 16,535,621 cubic yards.

The land cover of Refuse Site 20 is densely forested habitat consisting of red maple, sugar maple, red oak, white oak, and American chestnut (*Castanea dentata*). Woody vines and poison ivy (*Toxicodendron radicans*) are present over a large portion of the site.

Refuse Site 21 (R21)

Refuse Site 21 is located along Hargus Creek Road between Cole Hollow Road and Turkey Hollow Road in Center Township, Greene County, Pennsylvania. One (1) small tributary flowing from west to east lies within the refuse area boundary. This stream flows under Hargus Creek Road and into Hargus Creek. The origins of this stream are several small springs at or near the headwaters of the stream. Elevations within this site range from 1,040 feet near the eastern border of the refuse area to 1,375 feet along the ridges surrounding the stream. The area of the site is 156.0 acres, and the projected volume is 30,261,311 cubic yards.

The land cover of Refuse Site 21 is dominated by old pasture and forested habitat. Typical old pasture species include multi-flora rose, thistle, goldenrod, and various upland grasses. The forested areas within the sub-watershed consist of red maple, sugar maple, red oak, white oak, hickory, and American beech.

The majority landowner of the property in R21 denied permission to access the property for detailed data collection. Therefore, the preponderance of information gathered for Refuse Site 21 is derived from what could be observed from public roads and secondary sources. In addition to this information, WPI personnel, by remaining within the Right-of-Way of Willow Road, were able to obtain a water sample from this UNT just southeast of the boundary of R21. Site specific physiochemical data from this grab sample are presented in Appendix D of this report. As described above, the water sample was taken within the ROW of Willow Road which lays adjacent to the no permission area. Given that access to the property was not granted, WPI personnel aimed to keep sampling time at this site to a minimum in order to avoid conflict with the landowner. As such no *in situ* water quality, physiochemical, or macroinvertebrate data were collected by WPI personnel at R21.

2.2 ALTERNATIVE POTENTIAL REFUSE AREAS, NON HIGH-QUALITY WATERSHEDS

The remaining four (4) potential refuse areas (Refuse Area #1, Refuse Area #2, Refuse Area #3, and Refuse Area #5) that will be discussed are considered “alternative refuse areas” as they were sampled subsequent to the initial Foundation Refuse Area sampling event. These four (4) potential refuse areas were sampled in order to provide location alternatives within a non-HQ watershed for the proposed Foundation Refuse Area. These alternative refuse areas are separate from the original twenty-one (21) which were delineated within the Foundation Mine 25 mi² search area.

Refuse Area #1 (Falling Timber Run)

Refuse Area #1 includes Falling Timber Run and flows north along Falling Timber Road in Jackson Township, Greene County, Pennsylvania. Elevation ranges from 1,100 feet along the stream valley to 1,400 feet on the adjacent hillsides. The area of the site is 179.1 acres, and the projected volume is 25,854,116 cubic yards. Hydrology is provided through a combination ephemeral runoff channels, and several small springs located in the upper portion of the watershed. Falling Timber Run flows into Job Creek then continues to flow northwest until its confluence with the North Fork of Dunkard Creek. Falling Timber and its UNTs are designated under the Pennsylvania Department of Environmental Protection (PADEP) Chapter 93 Water Quality Standards as a Trout Stocking Fishery (TSF) due to the classification of the North Fork of Dunkard Creek.

The Falling Timber Run sub-watershed consists predominantly of upland deciduous forest habitat fragmented by small residential and agriculture portions near the confluence with Job Creek. The majority of the residential and agriculture land use occurs near the headwaters of Falling Timber Run. Typical species observed include Christmas fern (*Polystichium acrostichoides*), wingstem (*Verbesina alternifolia*), white oak, tulip poplar (*Liriodendron tulipifera*), red maple, and red oak.

Refuse Area #1 (Falling Timber Run) sampling stations for Appendix A data will be referred to as “FT #” and Appendix B sampling stations will be referred to as “FTR #” as the sampling stations are located within the Falling Timber Run watershed (Figure 2, Appendix E).

Refuse Area #2 (UNT to North Fork Dunkard Fork)

Refuse Area #2 contains a tributary to North Fork Dunkard Fork and flows west along Claylick Road in Jackson Township, Greene County, Pennsylvania. Elevation ranges from 1,034 feet along the stream valley to 1,380 feet on the adjacent hillsides. The area of the site is 208.7 acres, and the projected volume is 29,292,000 cubic yards. Hydrology is provided through a combination of ephemeral runoff channels, and several small springs located in the upper portion of the watershed. The UNT to North Fork Dunkard Fork flows into the North Fork of Dunkard Fork near the intersection of Claylick Road and Bristoria Road. The UNT to North Fork Dunkard Fork and its UNTs are designated under the Pennsylvania Department of Environmental Protection (PADEP) Chapter 93 Water Quality Standards as a TSF due to the classification of the North Fork of Dunkard Creek.

The Refuse Area #2 (UNT to North Fork Dunkard Fork) sub-watershed consists predominantly of upland deciduous forest habitat, which a majority of it is located in headwaters of the watershed, and is fragmented by small residential areas. Typical species observed include false nettle (*Boehemeria cylindrica*), wood nettle (*Laportea Canadensis*), Christmas fern, wingstem, white oak, tulip poplar, red maple, and red oak.

Sampling stations located within the Refuse Area #2 (UNT to North Fork Dunkard Fork) watershed are named “RA 7-site name” (Figure 3, Appendix E).

Refuse Area #3 (UNT to Toms Run)

Refuse Area #3 contains a tributary to Toms Run and flows southwest along Mt. Zion Road in Jackson Township, Greene County, Pennsylvania. Elevation ranges from 1,000 feet along the stream valley to 1,320 feet on the adjacent hillsides. The area of the site is

198.2 acres, and the projected volume is 27,720,000 cubic yards. The UNT to Toms Run flows into Toms Run, near the intersection of Mt. Zion Road and Toms Run Road. The UNT to Toms Run and its UNTs are designated under the Pennsylvania Department of Environmental Protection (PADEP) Chapter 93 Water Quality Standards as a Warm Water Fishery (WWF) due to the classification of Toms Run.

The watershed is dominated by pole and mature forest cover, mostly comprised of maples, oaks, black cherry, and scattered sycamores along the stream corridor. Scattered residences are located throughout the watershed, however many appeared neglected and abandoned or appear to serve as hunting cabins with no permanent residents. Several of the abandoned residences had barns and other outbuildings, suggesting the historic agricultural use of the watershed. No active pasturing or crops were observed within the watershed, however several areas along the stream corridor and on the hillsides at the top of the watershed contained typical old-field species such as goldenrods, various grasses, and pioneer successional species.

A wetland was noted near the bottom of the potential refuse site area, Wetland TOM-1. Details about this wetland were unable to be obtained from the road; therefore, a datasheet was not prepared. The wetland was located along both banks of the UNT to Toms Run in an open area between forest tracts. The wetland appeared to be dominated by Reed Canary Grass (*Phalaris arundinacea*), and may once have been forested, as evidenced by several standing snags. An approximate wetland boundary has been depicted on project mapping (Figure 5, Appendix E) and the approximate wetland area is presented in Section 6.0 Wetland Results.

Several natural gas pipelines traverse the watershed. Two (2) "Frac Tanks" were observed parked along Mt. Zion Road, suggesting that drilling in the Marcellus Shale formation is occurring or is going to occur within the watershed.

Access to potential Refuse Area #3 (RA #3) for detailed data collection was denied by the landowner. Therefore, the majority of information gathered for this area is derived

from what could be observed from public roads and secondary sources. In addition to this information, WPI personnel, by remaining within the Right-of-Way of Toms Run Road (SR 3009), were able to obtain a water sample from this UNT just southwest of the boundary of RA #3 (Figure 5, Appendix E). Site specific physiochemical data from this grab sample are presented in Appendix D of this report. As described above, the water sample was taken within the ROW of Toms Run Road which lays adjacent to the no permission area. Given that access to the property was not granted, WPI personnel aimed to keep sampling time at this site to a minimum in order to avoid conflict with the landowner. As such no *in situ* water quality, physiochemical, or macroinvertebrate data were collected by WPI personnel at RA #3.

Refuse Area #5 (UNT to Job Creek)

Within potential Refuse Area #5, a UNT to Job Creek flows east along Harkins Road in Jackson Township, Greene County, Pennsylvania. Elevation ranges from 1,106 feet along the stream valley to 1,440 feet on the adjacent hillsides. The area of the site is 176.5 acres, and the projected volume is 33,058,022 cubic yards. Ephemeral runoff channels and several small springs located in the upper portion of the watershed provide the hydrology for this UNT to Job Creek. This UNT to Job Creek flows into Job Creek near the intersection of Harkins Road and Delphene Road; Job Creek then continues to flow northwest until its confluence with the North Fork of Dunkard Creek. Refuse Area #5 and its UNTs are designated under the Pennsylvania Department of Environmental Protection (PADEP) Chapter 93 Water Quality Standards as a TSF due to the classification of the North Fork of Dunkard Creek.

The Refuse Area #5 (UNT to Job Creek) sub-watershed consists predominantly of upland deciduous forest habitat fragmented by small residential portions near the confluence with Job Creek. Typical species observed include false nettle, wood nettle, mayapple (*Podophyllum peltatum*), Christmas fern, wingstem, tulip poplar, red maple, and red oak.

Sampling stations located within the Refuse Area #5 (UNT to Job Creek) watershed are named "RA 8-site name" (Figure 3, Appendix E).

3.0 AQUATIC SAMPLING METHODOLOGY

3.1 BENTHIC MACROINVERTEBRATE SAMPLING

Sampling was conducted using the methodologies described in PADEP's Technical Guidance Document (TGD) 563-2000-655 within the potential Foundation Refuse Areas to acquire baseline observations of the area. Although this methodology is specified for use in streams overlying underground mining operations, underground mining activities are proposed for the region where both the original and alternative potential refuse areas are located and the streams in these areas have been sampled several times using the TGD methodology. To provide a valid comparison between watersheds it was decided that the same sampling protocol should be used on both the twenty-one (21) original and four (4) alternative sites. It should be noted that the use of this methodology has provided a higher level of detail than what would normally be available at this stage of the refuse site development process.

The use of TGD 563-2000-655 to classify streams within the candidate watersheds resulted in stream segments classified as Diverse, Variable, or First Use. There is no absolute equivalency between these classifications and Perennial, Intermittent, and Ephemeral classifications, as defined in Chapter 89.5. However, some general equivalencies can be drawn, that for the purposes of comparing proposed refuse areas, are valid.

Generally, Diverse and Variable reaches can be classified as Perennial. These segments must have the regular, sustained flow found in Perennial streams to support the macroinvertebrate communities that define Diverse and Variable segments. This equivalency is not absolute, as some of the variable segments are intermittent in flow.

First Use segments can be considered Intermittent for the purpose of this evaluation. Intermittent streams have a defined bed and banks and show evidence of stream flow over their bed loads. These characteristics are lacking in Ephemeral segments, therefore,

Ephemeral streams lack the habitat to support macroinvertebrate communities, even at the First Use level.

3.1.1 Appendix A Sampling Methodology

Appendix A stream classification within the study area involved collecting representative macroinvertebrate samples from Diverse, Variable, and point of First Use sections of each stream. Representative organisms were collected, identified to family level, and permanently cataloged according to methods prescribed in the October 8, 2005 Pennsylvania Department of Environmental Protection's Surface Water Protection, document number 563-2000-655.

Benthic communities were evaluated by determining the best riffle habitat and taking three (3) qualitative kick samples. A 500 micron D-frame net was placed in the stream with the bottom edge of the net held firmly against the streambed. Immediately upstream of the net, a biologist vigorously kicked a 1x1 foot area to a depth of approximately 3-4 inches. The depth of substrate sampled may vary due to the ease of disturbance.

The net was visually inspected and each organism was identified by a biologist to the most practical level of taxonomy. The number and type of benthic macroinvertebrates found were used to designate the stream use category (Diverse, Variable, or First Use) based on the criteria set in the October 8, 2005, Pennsylvania Department of Environmental Protection- Bureau of Mining and Reclamation's Surface Water Protection Guidance, document number 563-2000-655. Individuals of representative taxa were then placed into a labeled 125 ml Nalgene bottle and preserved with 91% Isopropyl alcohol.

3.1.2 Appendix B Methodology

Upon completion of the Appendix A stream segment classification for the study area and associated UNTs, Appendix B sampling points were established in several of the potential refuse areas. At each of the Appendix B sample locations, a D-frame dip net equipped with a 500 micron mesh was used to collect ten (10) sub-samples best representing the habitats present within each sampling reach, including cobble/gravel substrate, snags, coarse particulate organic matter (CPOM), submerged aquatic vegetation (SAV), and sand/fine sediment. Each habitat sampled consisted of two (2) 30-inch long sweeps or kicks with the D-frame net. If the total number of habitats present was not divisible by the number of habitats present, the remaining jabs were taken among the most extensive habitat types present within the sampling station area.

All rocks and large stones within the D-frame net were gently rubbed to dislodge any organisms or pupal cases that may have been clinging to the surface into the net. The sample net was thoroughly emptied into a 1-liter largemouth plastic Nalgene bottle that was labeled accordingly and preserved in 91% Isopropyl alcohol.

In the laboratory the contents of each sample bottle were decanted of the alcohol and gently rinsed with cold water within a 500 micron sieve. All materials from the sample were placed within an 8" x 14" white pan marked with 2" x 2" grids. A random number generator was used to select four (4) of the grids. The entire contents of the grids were placed into another plastic tray and the number of benthic macroinvertebrates was counted. If the four (4) random grids that were chosen did not produce a sub-sample of 200 (+/-20%), additional grids were randomly chosen until the sub-sample was obtained. If there were less than 160 organisms, another grid was randomly selected from the sample and sub-sampling continued until the standard was met. If there were greater than 240 organisms, a back-count from the sub-sample was completed until the standard was met.

The contents of each sub-sample were examined under a stereoscopic microscope (45x) for identification and enumeration to the genus taxonomic level. Identification was assisted by the following references: Peckarsky (1990), Merrit and Cummins (1996), Stewart and Stark (1993), and Pennak (1989). After identification, the organisms were placed into labeled 125mL Nalgene bottles and filled with 91% Isopropyl alcohol for preservation.

3.2 SAMPLING LOCATIONS

One (1) long term Appendix B stream sample station was placed in each of the smaller potential refuse areas and two (2) sample stations were placed in the larger potential refuse areas. Sample stations were placed on the diverse segments of each mainstem stream and/or large tributary to the mainstem. Locations of the sample stations in each of the study areas (Figure 2, Appendix A and Figures 2-5, Appendix E) were based on the premise that sampling at the lowest point in each of the sub-watersheds would be reflective of the entire watercourse flowing through each valley for the purposes of this investigation. Accessibility of the stream based on topography and landowner permission was also considered in the placement of the sample stations. Several of the potential refuse areas (R1, R2, R3, R10, R11, R13, R19, and Refuse Area #1 (Falling Timber)) contained preexisting samples stations due to sampling conducted previously for the Foundation Mine Underground Permit (currently under review with the PADEP California District Mining Office). These preexisting sample stations were utilized for this investigation, where applicable.

3.3 PHYSIOCHEMICAL MEASUREMENTS

Wallace & Pancher, Inc. (WPI) field personnel conducted detailed surface water investigations on the streams within each study area, in accordance with Pennsylvania Fish and Boat Commission (PFBC) standards. The investigations consisted of chemical sampling on the primary watercourse flowing through each study site at a location

farthest downstream in the sub-watershed. The investigations consisted of *in situ* measurements of temperature, dissolved oxygen, specific conductance, pH, and flow at each sampling station, in conjunction with the benthic macroinvertebrate sampling. All measurements were made using a Sentry III Dissolved Oxygen Meter and an Oakton pH/Conductivity/Temperature meter.

3.4 STREAM HABITAT CHARACTERISTICS

Physical habitat characteristics were recorded for each station. These data were used to evaluate the benthic community structure at each of the sampling stations. The physical habitat descriptors/features observed and recorded during the field assessment included:

- (1) visual appearance of water and sediment quality;
- (2) water depths at each station;
- (3) stream channel width;
- (4) estimated stream velocity;
- (5) substrate composition (the proportion of cobble, gravel, sand and silt substrate)
- (6) degree of canopy cover over the sample area, and;
- (7) description of vegetation.

These data were recorded on physical characterization/water quality field data sheets. Stream habitat was also scored numerically at each station using habitat assessment field data sheets. The United States Environmental Protection Agency (USEPA) classifies habitat and associated numerical scores as follows (1) optimum (100-76%); (2) sub-optimal (75-51%); (3) marginal (50-26%); and (4) poor (25-0%).

3.5 DATA ANALYSIS

Taxonomic composition, number of taxa, individual counts, and other metrics for the benthic macroinvertebrate assessment were derived directly from identification and enumeration of macroinvertebrates collected in the samples from each station. These metrics have been developed and tested by the USEPA and other agencies and researchers to relate benthic macroinvertebrate community structure to the overall quality of the aquatic system and as a means of evaluating the nature and magnitude of disturbances to aquatic systems (USEPA 1990a and 1999). Pollution tolerance values ranging from zero (0) to ten (10) are assigned to each of the macroinvertebrate family taxa present (zero (0) being the most pollution intolerant and ten (10) being the most pollution tolerant). These values were derived from information developed by the USEPA and the PADEP.

The following metrics are recommended by the PADEP and were used to analyze the benthic macroinvertebrate data for this study: (1) richness measures, such as the total number of taxa, number of Trichoptera taxa, (2) composition measures, such as percent (% EPT), (3) tolerance/intolerance measures, including number of intolerant taxa, and (4) feeding measures, such as the number of filterer/collector taxa and the number of predator taxa. The metrics listed above will be described in the following paragraphs.

3.5.1 Richness Measures

The total number of taxa was derived from the total number of genera identified in the samples. Increasing taxa diversity is correlated with increasing health of the benthic community, and suggests that adequate habitat is available to support the survival and the propagation of many species (USEPA 1999).

The Trichoptera measure is the number of distinct taxa within the order of Trichoptera compared to the total number of taxa present. This order of insect is typically comprised

of pollution-sensitive species. The number of Trichoptera taxa increases with improving water quality (USEPA 1990a and 1999).

3.5.2 Composition Measures

The percent EPT provides information on the relative contribution of these pollution-intolerant taxa to the total fauna. Generally, increasing abundance and diversity among the taxa are associated with increasing water quality (USEPA 1990a).

3.5.3 Tolerance/Intolerance Measures

These measures provide information on the benthic communities' relative sensitivity to environmental stress. The number of intolerant taxa was determined using the regional tolerance values obtained from Appendix B of USEPA's Rapid Bioassessment Protocols (USEPA 1999). Preference was given to the selection of regional tolerance values in order of priority from the Midwest and Mid-Atlantic. When these values were not available, tolerance values from other regions were used or were obtained from USEPA's Modified Family Biotic Index (USEPA 1990b).

3.5.4 Feeding Measures

Functional feeding group measures are used to describe the function of the community as opposed to the structure of the community by comparing organisms adapted to consume a specific food resource or to determine which resources are available. Increased numbers of filterer/collector (FC) and predator (PR) feeding types within a community indicate a healthy community.

4.0 WETLAND METHODOLOGY

4.1 INTRODUCTION

WPI conducted wetland delineations for sites being evaluated for use as a refuse area for Foundation Coal. A total of twenty-five (25) sites (Refuse Sites R1-R21 and Refuse Areas #1, #2, #3, and #5) were evaluated for the presence/absence, extent, and size of wetland resources. A precursory evaluation of the potential refuse area was performed mainly by examination from public roads of areas with potential for wetland presence and/or by using secondary source information such as County Soil Surveys, National Wetland Inventory Maps and available aerial and topographic mapping. As the Foundation Refuse Site selection process advances and fewer sites are proposed as potential disposal area, a more detailed survey and delineation of the wetland resources in these remaining sites will be conducted.

The purpose of these investigations was to identify the location and size of wetlands existing within the study sites.

4.2 PRELIMINARY IDENTIFICATION OF WETLANDS

Prior to conducting the field reconnaissance, locations of potential wetlands were determined using USFWS National Wetlands Inventory Maps, USGS 7.5 Minute Quadrangles (Holbrook and Rogersville, PA), and United States Department of Agriculture (USDA) Soil Conservation Service (SCS) Soil Survey of Greene and Washington Counties (USDA SCS, 1983).

4.3 FIELD ASSESSMENT

Wetland areas were categorized according to the USFWS's Classification of Wetlands and Deep Water Habitats in the United States (Cowardin, et al., 1979).

The U.S. Army Corps of Engineers (Federal Register, 1982) and the U.S. Environmental Protection Agency (Federal Register, 1980) jointly define wetlands as: "Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

The unique characteristics of wetlands are the result of the interaction of vegetation, soil, and hydrology. Therefore, positive indicators from these three parameters were the basis for wetland identification and delineation. The U.S. Army Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory, 1987) procedure was used as guidance in defining these parameters. The U. S. Fish and Wildlife Service's National List of Plant Species That Occur in Wetlands: 1988 National Summary (Reed, 1988) was consulted for wetland plant classification. The definition and diagnostic environmental characteristics of each parameter as well as technical guidelines are presented below.

4.4.1 Wetland Hydrology

Wetland hydrology includes all hydrologic characteristics of areas that are periodically inundated or have soils saturated to the surface at some time during the growing season. The range of wetland hydrologic conditions varies from saturation of the soil for only one week during the growing season to continual inundation. Wetland hydrology can incorporate both surface and subsurface water sources. Wetland hydrology is the catalyst for development of hydric soils and creates the conditions necessary to support hydrophytic vegetation. Indicators of wetland hydrology may be obtained from historical data such as stream gauge records, aerial photography, and flood insurance maps. Field

indicators of wetland hydrology include inundation, soil saturation, oxidized rhizospheres, water marks, drift lines, sediment deposits, water stained leaves, surface scoured areas, drainage patterns, and morphological plant adaptations. In disturbed areas and areas where visual field indicators are absent, wetland hydrology is presumed to occur in an area having hydrophytic vegetation and hydric soils.

4.4.2 Hydric Soil

Wetland soils are either hydric soils or soils possessing characteristics which are associated with anaerobic conditions. Hydric soils are soils that are saturated or flooded long enough during the growing season to develop anaerobic conditions in the A-horizon. Soils are separated into two categories, organic and mineral, based on material composition. Most organic soils are characterized as poorly drained and anaerobic. Accumulation of organic matter results from prolonged anaerobic soil conditions associated with long periods of inundation or saturation during the growing season. Hydric organic soils can be recognized as black-colored muck or as black to dark brown-colored peat. In addition, sulfidic odors are characteristic of hydric organic soils.

Mineral soils have little accumulation of organic matter and are composed largely of mineral matter such as clay and sand. Hydric mineral soils are those that are inundated or saturated for significant periods of time during the growing season. The prolonged presence of water creates anaerobic soil conditions that lower the soil redox potential and cause a chemical reduction of some soil components such as iron and manganese oxides. Under reduced conditions, metal compounds, particularly iron, change color from bright orange and brown to various shades of gray. Hydric mineral soil colors are gleyed (bluish to neutral gray), have a low chroma (chroma is defined as the intensity of gray), and low chroma with mottles. If a soil is gleyed, has a matrix Chroma of 1 (very dark gray-black) without mottles, or a matrix Chroma of 2 (gray) with mottles, it is considered a hydric soil. The presence of hydric soil is determined by comparing soil colors of recovered samples to the Munsell Soil Color Charts (1990). The following types of soils are considered hydric:

- Most organic soils such as peats and mucks.
- Soils that are influenced by groundwater are as follows:
 - » Somewhat poorly drained soils where the water table is within 6 inches of the soil surface for more than 7 days during the growing season.
 - » Poorly or very poorly drained soils with high permeability (greater than 6 inches/hour) where the water table is within 12 inches of the soil surface during the growing season.
 - » Poorly or very poorly drained soils with high permeability (greater than 6 inches/hour) where the water table is within 18 inches of the soil surface during the growing season.
- Soils that are exposed to moderate periods of water saturation are predominantly gray with mottles of inclusions of bright orange or brown.
- Soils that are frequently flooded for long durations during the growing season (i.e. more than 7 days).

A prime farmland soil map has been provided for original potential refuse sites (Figure 2, Appendix A) and prime farmland soils are shown for the alternative potential refuse areas on Figures 2-5, Appendix E.

4.4.3 Hydrophytic Vegetation

Wetland vegetation is defined as macrophytic plant life growing in water, soil, or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content (Federal Interagency Committee for Wetland Delineation, 1989). Hydrophytic species generally have the adaptations and the ability to grow, effectively compete, and/or persist in anaerobic soil conditions.

The USFWS in cooperation with other Federal agencies has published the National List of Plant Species that Occur in Wetlands: National Summary. This list separates vascular plants into four basic groups called wetland indicator status, which is based on a plant

species' frequency of occurrence in wetlands. The categories and their definitions are listed in Table 1.

According to the Federal Manual (Environmental Laboratory, 1987), an area has hydrophytic vegetation when the following conditions occur:

- Obligate plant species comprise all dominants in the plant community; or
- Obligate species do not dominate each stratum, but more than 50 percent of the dominants of all strata are obligate, facultative wet, and/or facultative species; or
- A plant community has a visually estimated percent coverage of obligate and facultative wet species that exceed coverage of facultative up and upland species; or
- A plant community has less than or equal to 50 percent of the dominant species from all strata represented by obligate, facultative wet, and/or facultative species and hydric soils and wetland hydrology are present.

During field reconnaissance, each vegetative community is identified and dominant plant species recorded. Each species is assigned a wetland indicator status as listed in Table 1. Based on this vegetative survey, potential wetland areas are identified for further review.

Table 1. Plant Indicator Status Categories.

Indicator Category	Indicator Symbol	Definition
Obligate Wetland Plants	OBL	Plants that occur almost always (99% of the time) in wetlands under natural conditions, but which may also occur rarely (<1%) in non-wetlands
Facultative Wetland Plants	FACW	Plants that occur usually (67-99%) in wetlands, but also occur (1-33%) in non-wetlands
Facultative Plants	FAC	Plants with a similar likelihood (33-67%) of occurring in both wetlands and non-wetlands
Facultative Upland Plants	FACU	Plants that occur sometimes (1-33%) in wetlands, but occur more often (67%-99%) in non-wetlands
Obligate Upland Plants	UPL	Plants that occur rarely (<1%) in wetlands, but occur almost always (>99%) in non-wetlands under natural conditions
Non-Indicator	NI	Species for which insufficient information was available to determine an indicator status.
Undefined Plants	NA	No agreement was made as to the indicator status.

Source: Reed, P.B., 1988. *National List of Plant Species That Occur in Wetlands: National Summary*. U.S. Fish and Wildlife Service Biological Report 1988 (26.1).

Note:

A "+" sign following an indicator status (e.g., FACW+) means that the species generally has a greater estimated probability of occurring in wetlands than species having the general indicator status, but a lesser estimated probability of occurring in wetlands than those having the next highest general indicator.

A "-" sign following an indicator status means that the species generally has a lesser estimated probability of occurring in wetlands than species having the general indicator status, but a greater estimated probability of occurring in wetlands than those having the next lowest general indicator.

4.4.4 Determining Wetland Boundaries

The Routine Wetland Determination Method, requiring on-site inspection, was utilized after reviewing the approximate size and complexity of potential wetlands. In addition, wetland boundaries were also delineated. These tasks were accomplished using procedures described in the Federal Manual entitled, "Corps of Engineers Wetlands Delineation Manual, Technical Report Y-87-1" (Environmental Laboratories, 1987), as required by the U.S. Army Corps of Engineers.

Boundary delineation on those areas, where access was granted, was accomplished by using a soil auger to extract core samples of soil at a depth of approximately 18 inches (according to delineation procedures) at areas along the wetland's edge. Subtle changes in topography and hydrology were used to locate potential sampling areas. The soil, to a depth of approximately 18 inches, was examined for wetland characteristics (mottles and/or low matrix chroma, gleying, iron, and manganese concretions). The soil samples were then compared to the Munsell Soil Color Charts (1990) for categorization. Hydrological indicators were also noted at each sample location. Depending on the results of the soil sample, further samples were taken either closer to the wetland or upland until the boundary was determined.

5.0 AQUATIC SAMPLING RESULTS

5.1 APPENDIX A RESULTS

5.1.1 Stream Habitat Characteristics

Stream habitats at each Appendix A sampling station were scored numerically using a classification developed by The United States Environmental Protection Agency (USEPA). Each individual habitat parameter was broken down into different condition categories: Optimal, Suboptimal, Marginal, and Poor. Each condition category has a numerical rating value range associated with it, the highest numerical value corresponds

to the best score possible for the different habitat parameters, and the lowest numerical value corresponds to the lowest rating or poor conditions.

The United States Environmental Protection Agency (USEPA) classifies the relative value of habitat according to numerical scores as follows (1) optimum (100-76%); (2) sub-optimal (75-51%); (3) marginal (50-26%); and (4) poor (25-0%).

5.1.1.a Original High-Quality Refuse Sites

The habitat scores (Table 2) observed during Appendix A sampling of the original potential locations Foundation Mine Refuse Site ranged from a low of thirty-five percent (35%) at RA 6 T5 DIV to a high of eighty-five percent (85%) at RA 19 DIV. Of the forty-seven (47) diverse Appendix A sites; two (2) merited optimum (>75%), thirty-four (34) earned sub-optimal, and the remaining eleven (11) received marginal habitat classifications. The average habitat score throughout all original potential refuse sites was 58.3. This score falls into the sub-optimal habitat classification.

Table 2. Physiochemical and Stream Habitat Data of diverse sampling points collected during Appendix A sampling for all Foundation Mine proposed Refuse Areas, Center and Jackson Townships, Greene County, Pennsylvania. 11/8/2006 - 1/7/2008.

	RA1 HOU T6 DIV	RA 2 HOU T8 DIV	RA 3 HOU T8 DIV	RA 6 DIV	RA 6 T2 DIV	RA 6 T2D DIV	RA 6 T4 DIV	RA 6 T4B DIV	RA6 T6 DIV	RA6 T8 DIV	RA6 T9 DIV
pH (Standard Units)	7.88	Water level too low to collect readings	7.32	7.2	7.49	7.48	7.47	7.82	7.54	7.5	7.54
Temperature (Degree Celsius)	10.7		7.2	9.5	10.2	10	11	11	12.2	11.3	11.4
Dissolved Oxygen (Parts Per Million)	11.8		10.69	3.54	7.81	8.2	5.87	6.6	7.01	9.07	7.19
Conductance (Micro Siemens)	155		149.7	338	268	233	362	370	181.6	325	308
Habitat Score	61% (122/200)	81% (122/200)	54% (108/200)	51% (102/200)	48% (98/200)	48% (92/200)	42% (84/200)	48% (98/200)	35% (70/200)	59% (118/200)	43% (86/200)

	RA 7 DIV	RA 7 T6 DIV	RA 7 T7 DIV	RA 7 T9 DIV	RA 8 DIV	RA 8 T3D DIV	RA 8 T8 DIV	RA 8 T7 DIV	RA 8 T10 DIV	RA 9 DIV	RA 9 T2 DIV	
pH (Standard Units)	7.48	Water level too low to collect readings	Water level too low to collect readings	7.58	7.55	7.13	7.21	7.76	7.55	7.98	6.71	
Temperature (Degree Celsius)	11.5			10.8	9.9	9.3	9.8	9.7	9.7	9.7	3.9	7.3
Dissolved Oxygen (Parts Per Million)	8.83			7.33	12.9	12	9.74	9.7	10.88	13.56	10.85	
Conductance (Micro Siemens)	227			304	219	217	N/A	365	325	188	213	
Habitat Score	50% (99/200)	56% (111/200)	51% (101/200)	48% (96/200)	72% (143/200)	50% (99/200)	71% (142/200)	63% (126/200)	62% (124/200)	58% (115/200)	51% (101/200)	

	RA 9 T4 DIV	RA 9 T15 DIV	RA 9 T15C DIV	RA 10 HOU T2 DIV	RA 10 HOU T3 DIV	RA 11 HOU T2A DIV	RA 11 HOU T2B DIV	RA 11 HOU T2B11 DIV	RA 13 HOU T16 DIV	RA 13 HOU T16E DIV
pH (Standard Units)	7.16	7.67	7.42	7.47	7.71	7.59	7.69	7.35	7.63	6.72
Temperature (Degree Celsius)	7.8	6.4	6.8	11.5	11.5	6.5	3.3	7.8	3.5	4.9
Dissolved Oxygen (Parts Per Million)	5.7	13.32	11.56	9.37	12.17	10.41	12.72	9.59	13	12
Conductance (Micro Siemens)	219	181	187	135	137	182	188	174	173	111
Habitat Score	52% (104/200)	65% (132/200)	63% (126/200)	65% (129/200)	70% (140/200)	61% (121/200)	68% (136/200)	66% (132/200)	71% (141/200)	67% (134/200)

	RA 13 HOU T16D DIV	RA 13 HOU T16E DIV	RA 13 HOU T16G DIV	RA 13 HOU T16J DIV	RA 14 DIV	RA 14 T9 DIV	RA 19 DIV	RA 19 GRR T2 DIV	RA 19 T13 DIV	RA 19 T13D DIV	RA 19 T16 DIV
pH (Standard Units)	7.67	7.96	6.09	7.32	Water level too low to collect readings	Water level too low to collect readings	7.13	8.14	7.28	7.16	7.63
Temperature (Degree Celsius)	4.8	9	9	7.2			7.8	11.8	8.5	8.7	7.7
Dissolved Oxygen (Parts Per Million)	11.8	10.2	9.1	10.6			12.15	10.43	11.67	12.03	6.8
Conductance (Micro Siemens)	207	163	185	167			0	159	0	149.1	43.8
Habitat Score	61% (122/200)	61% (122/200)	60% (119/200)	70% (139/200)	55% (110/200)	52% (103/200)	85% (170/200)	66% (131/200)	43% (85/200)	44% (87/200)	78% (156/200)

	RA 19 T16E DIV	RA 19 T16F DIV	RA 19 T16F2 DIV
pH (Standard Units)	7.73	7.51	7.76
Temperature (Degree Celsius)	7.8	8.1	9.9
Dissolved Oxygen (Parts Per Million)	12.06	11.33	11.78
Conductance (Micro Siemens)	278	124.8	119
Habitat Score	57% (113/200)	71% (141/200)	57% (113/200)

5.1.1. b. Alternative, Non-High-Quality Refuse Areas

Refuse Area #1 (Falling Timber Run)

The habitat scores observed during Appendix A sampling (Table 2a) for the potential Refuse Area #1 ranged from a low of forty- six percent (46%) at FT T6 DIV to a high of seventy-six percent (76%) at FT T12 DIV. Of the twenty-seven (27) Appendix A sites; one (1) merited optimum (>75%), twenty-five (25) earned sub-optimal, and the

remaining one (1) sampling station received marginal habitat classifications. The average habitat score throughout the potential Refuse Area #1 (Falling Timber Run) was 61%. This score falls into the sub-optimal habitat classification.

Table 2a. Habitat Data for Appendix A Sampling Stations located in Refuse Area #1 (Falling Timber Run) (January 2007).

% Substrate Type	FT VAR	FT F.U.	FT T3 DIV	FT T3 VAR	FT T3 F.U.	FT T3a F.U.	FT T4 F.U.	FT T6 DIV	FT T6 VAR
Bedrock	0%	0%	60%	0%	0%	0%	0%	0%	0%
Boulder (<256 mm)	0%	0%	0%	0%	20%	0%	0%	0%	0%
Cobble (64-256 mm)	10%	25%	0%	40%	40%	40%	15%	0%	30%
Gravel (2-64 mm)	50%	30%	30%	0%	20%	40%	40%	0%	25%
Sand (0.062-2 mm)	30%	45%	5%	40%	10%	10%	30%	10%	40%
Silt (0.004-0.06 mm)	10%	0%	5%	10%	10%	10%	15%	30%	5%
Clay (<0.004 mm)	0%	0%	0%	10%	0%	0%	0%	60%	0%
% Morphology Type									
% Rife	Na	40%	Na	Na	70%	20%	50%	30%	45%
% Pool	Na	5%	Na	Na	10%	60%	0%	10%	20%
% Run	Na	55%	Na	Na	20%	20%	50%	60%	45%
Habitat Score	109/200 (55%) sub-optimal	129/200 (65%) sub-optimal	107/200 (54%) sub-optimal	114/200 (57%) sub-optimal	101/200 (51%) sub-optimal	127/200 (61%) sub-optimal	132/200 (66%) sub-optimal	91/200 (46%) marginal	123/200 (62%) sub-optimal
% Substrate Type	FT T6 F.U.	FT T7 VAR	FT T9 DIV	FT T9 DIV	FT T9 F.U.	FT T10a F.U.	FT T10g DIV	FT T10g F.U.	FT T10h DIV
Bedrock	0%	0%	0%	0%	0%	0%	10%	10%	5%
Boulder (<256 mm)	30%	20%	15%	0%	10%	5%	10%	10%	5%
Cobble (64-256 mm)	25%	35%	20%	5%	45%	10%	20%	20%	10%
Gravel (2-64 mm)	30%	45%	55%	55%	30%	35%	50%	50%	70%
Sand (0.062 mm)	15%	0%	10%	25%	5%	25%	10%	10%	10%
Silt (0.004-0.06 mm)	0%	0%	0%	15%	0%	25%	0%	0%	0%
Clay (<0.004 mm)	0%	0%	0%	0%	0%	0%	0%	0%	0%
% Morphology Type									
% Rife	30%	30%	35%	100%	20%	100%	100%	100%	100%
% Pool	15%	30%	5%	0%	0%	0%	0%	0%	0%
% Run	55%	40%	60%	0%	80%	0%	0%	0%	0%
Habitat Score	111/200 (56%) sub-optimal	117/200 (59%) sub-optimal	136/200 (68%) sub-optimal	127/200 (64%) sub-optimal	119/200 (60%) sub-optimal	133/200 (67%) sub-optimal	123/200 (62%) sub-optimal	123/200 (62%) sub-optimal	131/200 (66%) sub-optimal
% Substrate Type	FT T10 DIV	FT T10 VAR	FT T10 F.U.	FT T12 DIV	FT T12 VAR	FT T12 F.U.	FT T12a VAR	FT T12b VAR	FT T12c DIV
Bedrock	0%	0%	0%	0%	0%	0%	0%	0%	15%
Boulder (<256 mm)	0%	0%	0%	0%	20%	0%	0%	5%	10%
Cobble (64-256 mm)	10%	10%	20%	10%	20%	10%	5%	10%	10%
Gravel (2-64 mm)	20%	20%	20%	60%	10%	60%	80%	40%	50%
Sand (0.062 mm)	35%	35%	30%	20%	25%	20%	10%	30%	10%
Silt (0.004-0.06 mm)	35%	35%	30%	10%	25%	10%	5%	10%	5%
Clay (<0.004 mm)	0%	0%	0%	0%	0%	0%	0%	5%	5%
% Morphology Type									
% Rife	100%	100%	100%	95%	100%	100%	100%	100%	100%
% Pool	0%	0%	0%	0%	0%	0%	0%	0%	0%
% Run	0%	0%	0%	5%	0%	0%	0%	0%	0%
Habitat Score	134/200 (67%) sub-optimal	130/200 (65%) sub-optimal	110/200 (55%) sub-optimal	151/200 (76%) optimal	124/200 (62%) sub-optimal	108/200 (54%) sub-optimal	103/200 (52%) sub-optimal	105/200 (53%) sub-optimal	118/200 (59%) sub-optimal

Refuse Area #2 (UNT to North Fork Dunkard Fork)

The habitat scores observed during Appendix A sampling (Table 2b, Appendix B) for the potential Refuse Area #2 ranged from a low of forty- one percent (41%) at RA 7 T4 F.U. to a high of sixty-nine percent (69%) at RA 7 T2d DIV. Of the twenty-three (23) Appendix A sites; nineteen (19) earned sub-optimal, and the remaining four (4) sampling station received marginal habitat classifications. The average habitat score throughout the potential Refuse Area #2 (UNT to North Fork Dunkard Fork) was 57%. This score falls into the sub-optimal habitat classification.

Table 2b. Habitat Data for Appendix A Sampling Stations Located in Refuse Area #2 (UNT to North Fork Dunkard Fork) (June 2008).

	RA 7 T1 F.U.	RA 7 T1 DIV	RA 7 T1b F.U.	RA 7 T1c F.U.	RA 7 T1c VAR	RA 7 T1d F.U.	RA 7 T1f F.U.	RA 7 T1g DIV	RA 7 T2 DIV	RA 7 T2a DIV	RA 7 T2b DIV	RA 7 T2c F.U.
% Substrate Type												
Bedrock	0%	0%	0%	25%	0%	0%	0%	0%	0%	20%	70%	0%
Boulder (<256 mm)	0%	0%	0%	0%	5%	0%	5%	0%	5%	15%	0%	0%
Cobble (64-256 mm)	30%	5%	0%	15%	25%	5%	15%	15%	10%	15%	0%	0%
Gravel (2-64 mm)	15%	45%	15%	30%	30%	15%	25%	25%	25%	35%	15%	0%
Sand (0.06-2 mm)	15%	40%	15%	15%	20%	40%	40%	45%	40%	10%	10%	20%
Silt (0.004-0.06 mm)	20%	10%	20%	10%	20%	30%	10%	10%	15%	5%	5%	30%
Clay (<0.004 mm)	20%	0%	50%	5%	0%	10%	5%	5%	5%	0%	0%	50%
% Morphology Type												
% Riffle	70%	N/a	N/a	30%	50%	60%	70%	70%	60%	60%	70%	70%
% Pool	15%	N/a	N/a	60%	30%	30%	10%	15%	20%	25%	15%	20%
% Run	15%	N/a	N/a	10%	20%	10%	20%	15%	20%	15%	15%	10%
Habitat Score	125/200 (63%) sub-optimal	123/200 (62%) sub-optimal	94/200 (47%) marginal	104/200 (52%) sub-optimal	110/200 (55%) sub-optimal	120/200 (60%) sub-optimal	129/200 (65%) sub-optimal	129/200 (65%) sub-optimal	128/200 (64%) sub-optimal	111/200 (56%) sub-optimal	112/200 (56%) sub-optimal	114/200 (57%) sub-optimal

% Substrate Type	RA 7 T2c F.U.	RA 7 T2d DIV	RA 7 T2e F.U.	RA 7 T2f DIV	RA 7 T2f F.U.	RA 7 T2f1 F.U.	RA 7 T3a F.U.	RA 7 T3b DIV	RA 7 T3d VAR	RA 7 T4 F.U.	RA 7 T4 DIV
Bedrock	0%	10%	60%	0%	0%	0%	0%	0%	5%	0%	0%
Boulder (<256 mm)	0%	10%	5%	0%	0%	0%	5%	0%	10%	0%	0%
Cobble (64-256 mm)	0%	30%	5%	15%	0%	5%	15%	20%	25%	0%	10%
Gravel (2-64 mm)	0%	40%	5%	15%	0%	15%	30%	50%	30%	0%	30%
Sand (0.06-2 mm)	0%	5%	20%	30%	0%	40%	30%	30%	20%	10%	30%
Silt (0.004-0.06 mm)	50%	5%	5%	20%	50%	40%	20%	0%	10%	20%	30%
Clay (<0.004 mm)	50%	0%	0%	30%	50%	0%	0%	0%	0%	70%	0%
% Morphology Type											
% Riffle	80%	70%	70%	50%	100%	80%	10%	50%	90%	20%	80%
% Pool	10%	30%	15%	50%	0%	20%	90%	40%	10%	0%	10%
% Run	10%	0%	15%	0%	0%	0%	0%	10%	0%	80%	10%
Habitat Score	105/200 (53%) sub-optimal	138/200 (69%) sub-optimal	118/200 (59%) sub-optimal	127/200 (64%) sub-optimal	98/200 (49%) marginal	126/200 (63%) sub-optimal	102/200 (51%) sub-optimal	123/200 (62%) sub-optimal	92/200 (46%) marginal	81/200 (41%) marginal	117/200 (59%) sub-optimal

Refuse Area #3 (UNT to Toms Run)

Due to lack of permission, no stream habitat data were collected during the Appendix A sampling event at potential Refuse Area #3.

Refuse Area #5 (UNT to Job Creek)

The habitat scores observed during Appendix A sampling (Table 2c) for the potential Refuse Area #5 ranged from a low of fifty-one percent (51%) at RA 8 T4 DIV and RA 8 T7 DIV to a high of sixty-eight percent (68%) at RA 8 T11 DIV. All of the eighteen (18) Appendix A sites earned a sub-optimal habitat score. The average habitat score throughout the potential Refuse Area #5 (UNT to Job Creek) was 58%. This score falls into the sub-optimal habitat classification.

Table 2c. Habitat Data for Appendix A Sampling Stations Located in Refuse Area #5 (UNT to Job Creek (June 2008))

	RA 8 VAR	RA 8 DIV	RA 8 T1 VAR	RA 8 T2 FUL	RA 8 T2 VAR	RA 8 T3 DIV	RA 8 T4 DIV	RA 8 T5 DIV	RA 8 T6 DIV
% Substrate Type									
Bedrock	0%	0%	0%	0%	0%	0%	0%	0%	0%
Boulder (<65 mm)	0%	0%	0%	0%	0%	0%	0%	0%	0%
Cobble (64-258 mm)	30%	30%	15%	0%	0%	20%	20%	20%	5%
Gravel (2-64 mm)	20%	30%	10%	5%	10%	30%	80%	10%	45%
Sand (0.06-2 mm)	10%	20%	15%	15%	10%	10%	80%	40%	30%
Silt (0.004-0.06 mm)	10%	20%	30%	20%	40%	10%	0%	30%	20%
Clay (<0.004 mm)	30%	0%	30%	60%	40%	30%	0%	0%	0%
% Morphology Type									
% Riffle	60%	40%	80%	100%	90%	60%	85%	100%	85%
% Pool	30%	30%	20%	0%	10%	20%	15%	0%	10%
% Run	10%	30%	0%	0%	0%	20%	0%	0%	10%
Habitat Score	112/200 (51%) sub-optimal	139/200 (65%) sub-optimal	115/200 (58%) sub-optimal	118/200 (59%) sub-optimal	115/200 (58%) sub-optimal	111/200 (56%) sub-optimal	101/200 (51%) sub-optimal	121/200 (61%) sub-optimal	124/200 (62%) sub-optimal

	RA 8 T7 DIV	RA 8 T8 VAR	RA 8 T9 DIV	RA 8 T10 VAR	RA 8 T15 DIV	RA 8 T16 VAR	RA 8 T19 DIV	RA 8 T11 DIV	RA 8 T12 DIV
% Substrate Type									
Bedrock	0%	0%	0%	0%	0%	0%	0%	0%	0%
Boulder (<65 mm)	0%	0%	5%	0%	0%	5%	0%	10%	15%
Cobble (64-258 mm)	20%	30%	25%	5%	10%	30%	15%	25%	30%
Gravel (2-64 mm)	10%	30%	40%	10%	10%	30%	35%	30%	30%
Sand (0.06-2 mm)	50%	10%	10%	0%	30%	0%	5%	25%	10%
Silt (0.004-0.06 mm)	20%	30%	0%	65%	40%	35%	40%	10%	0%
Clay (<0.004 mm)	0%	0%	20%	20%	10%	0%	5%	0%	15%
% Morphology Type									
% Riffle	85%	0%	60%	90%	100%	100%	85%	90%	80%
% Pool	15%	95%	25%	0%	0%	0%	15%	10%	20%
% Run	0%	5%	15%	10%	0%	0%	0%	0%	0%
Habitat Score	102/200 (51%) sub-optimal	110/200 (55%) sub-optimal	127/200 (64%) sub-optimal	109/200 (55%) sub-optimal	103/200 (52%) sub-optimal	115/200 (58%) sub-optimal	107/200 (54%) sub-optimal	135/200 (68%) sub-optimal	114/200 (57%) sub-optimal

5.1.2 Stream Physiochemical Characteristics

5.1.2. a. Original High-Quality Refuse Sites

There were seven (7) diverse Appendix A sites where sufficient flow was not present to obtain meter readings; the remaining ninety-four (94) sites produced useable physiochemical data (Table 2). The pH values ranged from 6.09 at R13 HOU T15G DIV to a high of 8.14 at R19 GRR T2 DIV, with an average of 7.73. Water temperatures ranged from 3.3 °C at R11 HOU T2B DIV to 12.2 °C at R6 T5 DIV, with an average temperature of 8.69 degrees Celsius. The dissolved oxygen ranged from 3.54 ppm at R6 DIV to 13.56 ppm at R9 DIV, with an average of 10.19 ppm. The conductivity ranged from 43.8 uS at R19 T16 DIV and R19 T13 DIV to 370 uS at R6 T4B DIV, with an average of 214.02 uS. Generally, the refuse site physiochemical observations were within ranges able support aquatic life.

5.1.2. b. Alternative Non-High-Quality Refuse Sites

Refuse Area #1 (Falling Timber Run)

The Refuse Area #1 Appendix A physiochemical data were obtained for all twenty-seven (27) sampling stations and are presented in Table 3. The pH values ranged from 7.2 at FT T3a F.U., FT T12 F.U., and FT T12a VAR to a high of 9.19 at FT VAR, and had an average of 7.69. Water temperatures ranged from 4.7 °C at FT T10 DIV to 11.9 °C at FT T7 VAR, with an average temperature of 8.43 degrees Celsius. The dissolved oxygen ranged from 5.45 ppm at FT T12b VAR to 13.9 ppm at FT T10 DIV, with an average of 10.48 ppm. The conductivity ranged from 133 uS at FT T10 DIV to 2.8 mS at FT T7 VAR, with an average of 261 uS. Generally, the potential refuse area physiochemical observations were within ranges able support aquatic life.

Table 3. Physiochemical Data for Appendix A Sampling Stations Located in Refuse Area #1 (Falling Timber Run) (January 2007).

Metric	FT VAR	FT F.U.	FT T3 DIV	FT T3 VAR	FT T3 F.U.	FT T3a F.U.	FT T4 F.U.	FT T6 DIV	FT T6 VAR
pH	9.19	7.64	8.5	7.81	7.66	7.2	7.76	7.4	7.55
Temperature (°C)	9	11	9	9.2	8.8	9	11.8	10.8	10.5
Dissolved Oxygen (ppm)	11.62	9.85	11.67	10.56	10.88	8.01	7.17	8	6.31
Conductivity (uohms)	197	194	140	144	143	158	177	153	151
Metric	FT T6 F.U.	FT T7 VAR	FT T9 DIV	FT T10 DIV	FT T10 F.U.	FT T10e F.U.	FT T10g DIV	FT T10g F.U.	FT T10h DIV
pH	7.63	7.4	7.71	7.81	7.72	7.63	8.07	7.73	7.71
Temperature (°C)	9.8	11.9	11.4	4.7	9.4	5.6	6.5	9.9	6.3
Dissolved Oxygen (ppm)	10.05	8.35	9.55	13.9	8.54	13.17	11.68	9.93	11.59
Conductivity (uohms)	187	2.8 (mS)	173	133	137	150	191	195	175.1
Metric	FT T10i DIV	FT T10i VAR	FT T10i F.U.	FT T12 DIV	FT T12 VAR	FT T12 F.U.	FT T12a VAR	FT T12b VAR	FT T12c DIV
pH	7.52	7.41	7.74	7.5	7.87	7.2	7.2	7.47	7.66
Temperature (°C)	7.6	6.6	6.7	7.3	7.5	6	6	9	6.4
Dissolved Oxygen (ppm)	11.75	11.03	13.55	11.75	11.43	11.97	11.97	5.45	13.3
Conductivity (uohms)	179.7	158	197.1	174.6	143	173.6	173.6	134	135

Refuse Area #2 (UNT to North Fork Dunkard Fork)

The Refuse Area #2 Appendix A physiochemical data were obtained for twenty-one (21) of the twenty-three (23) sampling stations. Two (2) of the samplings stations were not evaluated as water levels were insufficient for measurements to be acquired (Table 4). The pH values ranged from 6.69 at RA 7 T1g DIV to a high of 8.14 at RA 7 T2b DIV, and had an average of 7.44. Water temperatures ranged from 10.9 °C at RA 7 T1g DIV to 19.6 °C at RA 7 T3d VAR, with an average temperature of 14.4 degrees Celsius. The dissolved oxygen ranged from 1.9 ppm at RA 7 T2c F.U. to 16 ppm at RA 7 T3b DIV, with an average of 10.9 ppm. The conductivity ranged from 126.8 uS at RA 7 T1d F.U. to 688 uS at RA 7 T1c VAR, with an average of 263.9 uS. Generally, the potential refuse area physiochemical observations were within ranges able support aquatic life.

Refuse Area #3 (UNT to Toms Run)

Due to lack of permission, no physiochemical data were collected during the Appendix A sampling event at potential Refuse Area #3.

Table 4. Physiochemical Data for Appendix A Sampling Stations located in Refuse Area #2 (UNT to North Fork Dunkard Fork) (June 2008).

Metric	RA 7 T1 F.U.	RA 7 T1 DIV	RA 7 T1b F.U.	RA 7 T1c F.U.	RA 7 T1c VAR	RA 7 T1d F.U.	RA 7 T1f F.U.	RA 7 T1g DIV	RA 7 T2 DIV
pH	7.06	7.07	7.25	7.73	7.4	6.74	7.84	6.69	7.71
Temperature (°C)	14.7	12.9	18.1	14.4	12.7	15.1	15.3	10.9	11.8
Dissolved Oxygen (ppm)	12	13.3	9.1	11.1	11.2	10.9	12.2	12.8	12.1
Conductivity (µohms)	326	207	270	175	688	126.8	233	197	279
Metric	RA 7 T2a DIV	RA 7 T2b DIV	RA 7 T2c F.U.	RA 7 T2c F.U.	RA 7 T2d DIV	RA 7 T2e F.U.	RA 7 T2f DIV	RA 7 T2f F.U.	RA 7 T2f F.U.
pH	8.07	8.14	7.35	*	6.79	7.17	7.37	*	6.8
Temperature (°C)	13.7	13.3	12.5	*	11.8	14.7	12.7	*	12
Dissolved Oxygen (ppm)	10.5	13.7	1.9	*	10.5	13.6	14	*	13.7
Conductivity (µohms)	327	294	200	*	213	140.9	201	*	192
Metric	RA 7 T3a F.U.	RA 7 T3b DIV	RA 7 T3d VAR	RA 7 T4 F.U.	RA 7 T4 DIV				
pH	7.71	7.94	7.8	7.71	7.91				
Temperature (°C)	18.1	14.7	19.6	16.5	16.1				
Dissolved Oxygen (ppm)	7.9	16	8.5	8.5	6.2				
Conductivity (µohms)	324	271	N/a	399	214				

* Water level too low for meter data collection.

Refuse Area #5 (UNT to Job Creek)

The Refuse Area #5 Appendix A physiochemical data were obtained for thirteen (13) of the eighteen (18) sampling stations. Five (5) of the sampling stations were not able to be evaluated due to the sites being dry or having insufficient water for a measurement to be acquired (Table 5). The pH values ranged from 6.84 at RA 8 VAR to a high of 8.08 at RA 8 T7 DIV, and had an average of 7.45. Water temperatures ranged from 10.9 °C at RA 8 T6 DIV to 17.2 °C at RA 8 DIV, with an average temperature of 14.4 degrees Celsius. The dissolved oxygen ranged from 7.38 ppm at RA 8 T2 VAR to 11.8 ppm at RA 8 T4 DIV, with an average of 9.8 ppm. The conductivity ranged from 136.1 uS at RA 8 T8 VAR to 266 uS at RA 8 T1 VAR, with an average of 204.9 uS. Generally, the refuse area physiochemical observations were within ranges able support aquatic life.

Table 5. Physiochemical Data for Appendix A Sampling Stations Located in Refuse Area #5 (UNT to Job Creek).

Metric	RA 8 VAR	RA 8 DIV	RA 8 T1 VAR	RA 8 T2 F.U.	RA 8 T2 VAR	RA 8 T3 DIV	RA 8 T4 DIV	RA 8 T5 DIV	RA 8 T6 DIV
pH	6.84	7.71	7.01	*	6.92	7.57	7.97	7.8	7.53
Temperature (°C)	12.8	17.2	15.4	*	13.8	16.4	14.8	12.5	10.9
Dissolved Oxygen (ppm)	11.62	9.12	8.85	*	7.38	10.24	11.8	11.02	9.32
Conductivity (µohms)	176.7	194.2	266	*	144.8	259	247	239	214

Metric	RA 8 T7 DIV	RA 8 T8 VAR	RA 8 T8 DIV	RA 8 T8a VAR	RA T8b DIV	RA 8 T8c VAR	RA 8 T9 DIV	RA 8 T11 DIV	RA 8 T12 DIV
pH	8.08	7.01	7.77	*	7.26	*	*	7.37	*
Temperature (°C)	15.3	13.5	15.8	*	14.8	*	*	14.5	*
Dissolved Oxygen (ppm)	10.58	8.49	10.15	*	7.75	*	*	10.68	*
Conductivity (µohms)	198.9	136.1	162.2	*	249	*	*	177.9	*

* Water level too low for meter data collection.

5.1.3 Appendix A Macroinvertebrate Data

5.1.3. a. Original High-Quality Refuse Sites

Results of the Appendix A sampling efforts between November 8, 2006 to January 7, 2008 indicate that most mainstems are Diverse while the UNTs are classified as Variable and/or First Use (Figure 2, Appendix A and Stream Length Table).

Summary of Stream lengths in select Refuse Study Areas - Foundation Mine 8.19.09						
Refuse Area	Diverse	Variable	First Use	Ephemeral	No Permission	TOTAL
R1	2,038.8435	2,594.3099	2,611.6906			7,244.8440
R2	975.6587	2,325.2047	585.0211			3,885.8845
R3	1,413.4048	6,834.6938	1,000.0583			9,248.1569
R4*					5,170.1406	5,170.1406
R5**		1,832.7953				1,832.7953
R6	11,438.2233	2,489.2924	2,679.4785			16,606.9942
R7	6,909.7768	910.6932	1,839.9493			9,660.4193
R8	6,016.9700	1,474.0497	773.5898			8,264.6095
R9	4,998.9962	2,047.2255	987.5618			8,033.7835
R10	1,889.7921	1,651.0024	249.8567			3,790.6512
R11***	6,128.0145	1,003.4773	1,270.5844		2,111.6295^	10,513.7057
R12				3,356.8823		3,356.8823
R13	5,448.6265	547.0286	1,469.5388			7,465.1939
R14		5,316.3674	641.1288			5,957.4962
R15		1,665.8103	346.2206			2,012.0309
R16	375.4855		1,182.3259			1,557.8114
R17		2,403.3923	44.1773			2,447.5696
R18				88.9711		88.9711
R19	7,718.7144	3,817.1242	5,800.2732			17,336.1118
R20	3,094.6729	463.0488	291.9859			3,849.7076
R21*					4,231.3083	4,231.3083
Area 1****	584.2765	5,344.7224	3,867.0724			9,796.0713
Area 2	8,886.0177	514.3598	1,324.2529		2,723.9096*	13,448.5400
Area 3*					4,733.5424	4,733.5424
Area 5	8,682.1085	959.2172				9,641.3257
TOTAL	76,599.5819	44,193.8152	26,964.7663	3,445.8534	18,970.5304	170,174.5472

* Data not collected. Stream length based on 1:2000 Scale U.S.G.S. Quadrangles.

** Classification based upon previous Appendix A sampling event. Length estimated from 1:2000 Scale U.S.G.S. Quadrangles.

*** Indirect impacts 320.4952 Diverse, 740.5072 Variable, 454.0431 First Use

**** Indirect impacts 167.9832 Diverse, 104.5614 Variable, 289.1320 First Use

^ Data not collected. Stream length based on Foundation Planimetric mapping

Refuse Site 1 (R1)

The main tributary in Refuse Site 1 is HOU T5. This refuse site has one (1) diverse point located on the main stem of HOU T5. There are four (4) variable tributaries flowing into HOU T5. A total of 7,244.8440' of stream channel were delineated in R1. Of this length 2,038.8435' were diverse, 2,594.3099' were variable, and 2,611.6906' were first use.

The family most commonly observed at R1 was Perlodidae (Table 1, Appendix B). Perlodidae were present at six (6) of the eleven (11) sites within Refuse Area 1. Perlodidae are a very diverse and widespread member of the order of stoneflies. The PADEP Regional Tolerance Value for Perlodidae is two (2) indicating sensitivity to pollution. The functional feeding designation of these stoneflies is predator.

Refuse Site 2 (R2)

The main tributary in Refuse Site 2 is HOU T8. This refuse site has one (1) diverse point located on the main stem of HOU T8. There are four (4) tributaries flowing into HOU T8. A total of 3,885.8845' of stream channel were delineated in R2. Of this length 975.6587' were diverse, 2,325.2047' were variable, and 585.0211' were first use.

The family most commonly observed at R2 was Perlodidae (Table 2, Appendix B). Refer to Section 5.1.3.a: Refuse Site 1 for Perlodidae description.

Refuse Site 3 (R3)

The main tributary in Refuse Site 3 is Hoges Run. This refuse area has one (1) diverse tributary (HOG T8) flowing into the variable Hoges Run. There are eight (8) tributaries flowing into Hoges Run. A total of 9,248.1569' of stream channel were delineated in R3. Of this length 1,413.4048' were diverse, 6,834.6938' were variable, and 1,000.0583' were first use.

The families most commonly observed at R3 were Gammaridae and Sphaeriidae (Table 3, Appendix B). These two (2) families were present at four (4) of the nine (9) sites within Refuse Site 3. Gammaridae are often referred to as scuds or side swimmers.

Gammaridae belong to the order Amphipoda and are an important component of the diet of many macroinvertebrate predators. The PADEP Regional Tolerance Value for Gammaridae is six (6) indicating tolerance of pollution. The functional feeding group of Gammaridae is gather/collectors.

Sphaeriidae are also known as fingernail clams. Sphaeriidae belong to the order Bivalvia and because of their ability to burrow into the substrate may inhabit intermittent streams and ponds. The PADEP Regional Tolerance Value for Sphaeriidae is (8) indicating tolerance of pollution. The functional feeding group of Sphaeriidae is scraper.

Refuse Site 4 (R4)

Due to lack of permission, no Appendix A samples were collected from potential Refuse Site 4. An approximate stream length value of 5,170.1406' was calculated using U.S.G.S Quadrangles.

Refuse Site 5 (R5)

No samples were collected at R5 during the Appendix A sampling event conducted during the Foundation Refuse Site selection process due to lack of landowner permission. However, previous Appendix A sampling had been conducted on this area for the proposed underground Foundation Mine and during this sampling event the landowner had granted permission to access the site. Using information collected during this sampling event, an estimation was made of the probable classification and approximate length of the Refuse Site 5 streams. Based upon these previously collected data, an approximate variable stream length of 1,832.7953' was calculated in the potential R5 site.

Refuse Site 6 (R6)

The main tributary in Refuse Site 6 is an unnamed tributary to McCourtney Run. There are seven (7) diverse points within R6. A total of 16,606.9942' of stream channel were delineated in R6. Of this length 11,438.2233' were diverse, 2,489.2924' were variable, and 2,679.4785' were first use.

The class most commonly observed at R6 was Oligochaeta (Table 4, Appendix B). Oligochaeta were present at eleven (11) of the forty-two (42) sites within Refuse Site 6. Oligochaeta are aquatic earthworms and members of the phylum Annelida. The PADEP Regional Tolerance Value for Oligochaeta is (10). This is the upper limit for the PADEP Regional Tolerance Scale indicating significant tolerance of pollution. The functional feeding group of Oligochaeta is omnivore.

Refuse Site 7 (R7)

The main tributary in Refuse Site 7 is an unnamed tributary to McCourtney Run. There are four (4) diverse points within R7. A total of 9,660.4193' were delineated in R7. Of this length 6,909.7768' were diverse, 910.6932' were variable, and 1,839.9493' were first use.

The family most commonly observed at R7 was Oligochaeta (Table 5, Appendix B). Refer to Section 5.1.3.a , R6 for Oligochaeta family description.

Refuse Site 8 (R8)

The main tributary in Refuse Site 8 is an unnamed tributary to the South Fork of Ten Mile Creek. There are five (5) diverse points in R8. A total of 8,264.6095' of stream channel were delineated in R8. Of this length 6,016.9700' were diverse, 1,474.0497' were variable, and 773.5898' were first use.

The families most commonly observed at R8 were Perlodidae and Chloroperlidae (Table 6, Appendix B); both families are within the order Plecoptera. These stoneflies were each present at four (4) of the eighteen (18) sites within Refuse Area 8.

Refer to Section 5.1.3.a, R1 for Perlodidae family description.

Chloroperlidae are also a member of the order of stoneflies. The PADEP Regional Tolerance Value for Chloroperlidae is zero (0). This is the lower limit for the PADEP

Regional Tolerance Scale indicating significant sensitivity to pollution. The functional feeding designation of these stoneflies is predator.

Refuse Site 9 (R9)

The main tributary in Refuse Site 9 is an unnamed tributary to the South Fork of Ten Mile Creek. There are five (5) diverse sites in R9. A total of 8,033.7835' of stream channel were delineated in R9. Of this length 4,998.9962' were diverse, 2,047.2255' were variable, and 987.5618' were first use.

The family most commonly observed at R9 was Perlodidae. Perlodidae were present at six (6) of the fifteen (15) sites within Refuse Site 9 (Table 7, Appendix B). Refer to Section 5.1.3.a, R1 for Perlodidae family description.

Refuse Site 10 (R10)

The main tributary in Refuse Site 10 is an unnamed tributary to House Run. There are two (2) diverse sites in R10. A total of 3,790.6512' of stream channel were delineated in R10. Of this length 1,889.7921' were diverse, 1,651.0024' were variable, and 249.8567' were first use.

The family most commonly observed at R10 was Chironomidae (Table 8, Appendix B). Chironomidae were present at three (3) of the six (6) sites within Refuse Site 10. Chironomidae are an immense family within the order Diptera. There are more than one thousand (1,000) species of Chironomidae in North America. The PADEP Regional Tolerance Value for Chironomidae is six (6) indicating tolerance of pollution. The functional feeding designation of these dipterans is gather/collectors.

Refuse Site 11 (R11)

The main tributary in Refuse Site 11 is an unnamed tributary to House Run. There are three (3) diverse points located in Refuse Site 11. A total of 10,513.7057' of stream channel were located in R11. Of this length 6,128.0145' were diverse, 1,003.4773' were variable, 1,270.5844' were first use, and 2,111.6295' were no permission. The headwater

reaches of several streams within R11 fall outside the upper project area boundary. These tributaries could be indirectly impacted if this site is selected as a refuse area. These indirect impacts, which are included in the total lengths discussed above, are 320.4952' diverse, 740.5072' variable, and 454.0431' first use.

The families most commonly observed at R11 were Tipulidae and Perlodidae (Table 9, Appendix B). These two (2) families were present at five (5) of the eight (8) sites within Refuse Site 11.

Tipulidae are also known as crane flies and are a large family within the order Diptera. There are more than five-hundred (500) species of Tipulidae in North America. The PADEP Regional Tolerance Value for Tipulidae is four (4) indicating sensitivity to pollution. The functional feeding designation of these dipterans is shredder.

Refer to Section 5.1.3.a, R1 for Perlodidae family description.

Refuse Site 12 (R12)

The main tributary in Refuse Site 12 is an unnamed tributary to House Run. A total of 3,356.8823' of stream channel were delineated in R12. The entire length was dry during sampling and has been classified as ephemeral.

Refuse Site 13 (R13)

The main tributary in Refuse Site 13 is a UNT to House Run. There are six (6) diverse points in R13. A total of 7,465.1939' of stream channel were delineated in R13. Of this length 5,448.6265' were diverse, 547.0286' were variable, and 1,469.5388' were first use.

The family most commonly observed at R13 was Tipulidae (Table 10, Appendix B). Tipulidae were present at seven (7) of the thirteen (13) sites within Refuse Site 13. Refer to Section 5.1.3.a, R11 for Tipulidae family description.

Refuse Site 14 (R14)

The main tributary in Refuse Site 14 is an unnamed tributary to Garner Run. There are two (2) diverse points in R14. A total of 5,957.4962' of stream channel were delineated in R14. Of this length 5,316.3674' were variable and the remaining 641.1288' were first use.

The family most commonly observed at R14 was Oligochaeta (Table 11, Appendix B). Refer to Section 5.1.3.a, R6 for Oligochaeta family description.

Refuse Site 15 (R15)

The main tributary in Refuse Site 15 is an unnamed tributary to Garner Run. There are no diverse points in R15. A total of 2,012.0309' of stream channel were delineated in R15. Of this length 1,665.8103' were variable and the remaining 346.2206' were first use.

The family most commonly observed at R15 was Perlodidae (Table 12, Appendix B). Perlodidae were present at both of the two (2) sites within Refuse Site 15. Refer to Section 5.1.3.a, R1 for Perlodidae family description.

Refuse Site 16 (R16)

The main tributary in Refuse Site 16 is an unnamed tributary to Garner Run. A total of 1,557.8114' of stream channel were delineated in R16. Of this length 375.4855' were diverse and the remaining 1,182.3259' were first use.

The families most commonly observed at R16 were Tipulidae, Phryganeidae, Oligochaeta, Physidae, and Sphaeriidae (Table 13, Appendix B). Each of these families was present at one (1) of the two sites within Refuse Site 16.

Refer to Section 5.1.3a.a, R11 for Tipulidae family description.

Phryganeidae are also known as giant case maker caddisflies, and are a family within the order Trichoptera. The PADEP Regional Tolerance Value for Phryganeidae is four (4)

indicating sensitivity to pollution. The functional feeding designation of these caddisflies is shredder.

Refer to Section 5.1.3.a, R6 for Oligochaeta family description.

Physidae are snails and are members of the class Gastropoda. The PADEP Regional Tolerance Value for Physidae is eight (8) indicating tolerance of pollution. The functional feeding designation of these snails is scraper.

Refer to Section 5.1.3.a, R3 for Sphaeriidae family description.

Refuse Site 17 (R17)

The main tributary in Refuse Site 17 is an unnamed tributary to Garner Run. There are no diverse points in R17. A total of 2,447.5696' of stream channel were delineated in R17. Of this length 2,403.3923' were variable and the remaining 44.1773' were first use.

The families most commonly observed at R17 were Peltoperlidae, Corydalidae, and Oligochaeta (Table 14, Appendix B). Each of these families was present at one (1) of the two sites within Refuse Site 17.

Peltoperlidae are also known as roach-like stoneflies because of their shield-like thoracic sternal plates and robust appearance. The PADEP Regional Tolerance Value for Peltoperlidae is two (2) indicating sensitivity to pollution. The functional feeding designation of these stoneflies is shredder.

Corydalidae are very large macroinvertebrates also known as hellgrammites. Corydalidae belong to the order Megaloptera. The PADEP Regional Tolerance Value for Corydalidae is two (2) indicating sensitivity to pollution. The functional feeding designation of these stoneflies is predator.

Refer to Section 5.1.3.a, R6 for Oligochaeta family description.

Refuse Site 18 (R18)

Appendix A sampling was unable to be conducted at Refuse Site 18 as the entire 88.9711' of stream was dry. This stream has been classified as ephemeral.

Refuse Site 19 (R19)

The main tributary in Refuse Site 19 is Grinnage Run. A total of 17,336.1118' of stream channel were delineated in R19. Of this length 7,718.7144' were diverse, 3,817.1242' were variable, and 5,800.2732' were first use.

The families most commonly observed at R19 were Perlodidae and Oligochaeta (Table 15, Appendix B). Perlodidae were present at eight (8) of the forty-nine (49) sites within Refuse Site 19. Oligochaeta were present at seven (7).

Refer to Section 5.1.3.a, R1 for Perlodidae family description.

Refer to Section 5.1.3.a, R6 for Oligochaeta family description.

Refuse Site 20 (R20)

The main tributary in Refuse Site 20 is an unnamed tributary to Hargus Creek. There are no diverse points in R20. A total of 3,849.7076' of stream channel were delineated in R20. Of this length 3,094.6729' were diverse, 463.0488' were variable, and the remaining 291.9859' were first use.

The family most commonly observed at R20 was Gammaridae (Table 16, Appendix B). Gammaridae were present at five (5) of the six (6) sites within Refuse Site 20. Refer to Section 5.1.3.a, R3 for Gammaridae family description.

Refuse Site 21 (R21)

Due to lack of permission, no Appendix A samples were collected from potential Refuse Site 21. An approximate stream length value of 4,231.3083' was calculated using U.S.G.S Quadrangles.

5.1.3. b. *Alternative, Non-High-Quality Refuse Areas*

Results of the Appendix A sampling efforts between November 28, 2006 to June 10, 2008 indicate that most mainstems within each of the three (3) alternative refuse areas where permission to sample was granted are diverse; while the UNTs are classified as variable and/or first use (Figures 2-4, Appendix E and Stream Length Table).

Refuse Area #1 (Falling Timber Run) (Figure 2- Appendix E)

Refuse Area #1 has seven (7) diverse points located throughout the Falling Timber watershed. The main stem of Falling Timber Run was classified as variable and has five (5) diverse tributaries flowing into it. A total of 9,796.0713' of stream channel were delineated in RA #1. Of this length 584.2765' were diverse, 5,344.7224' were variable, and 3,867.0724' were first use. The headwater reaches of several streams within Refuse Area #1 fall outside the upper project area boundary. These tributaries could be indirectly impacted if this site is chosen as a refuse area. These indirect impacts, which are included in the total lengths discussed above, are 167.9832' diverse, 104.5614' variable, and 289.1320' first use.

The family most commonly observed at Falling Timber Run (RA #1) was Tipulidae. Tipulidae were present at fourteen (14) of the twenty-seven (27) sites sampled within Falling Timber Run (RA #1) (Table 1, Appendix F). Tipulidae are the most diverse family of true flies in terms of the total number of species within the family. The PADEP Regional Tolerance Value for Tipulidae is four (4) indicating sensitivity to pollution. The functional feeding designation of these true flies is shredder.

Refuse Area #2 (UNT to North Fork Dunkard Fork) (Figure 3-Appendix E)

The main tributary in Refuse Area #2 is a tributary to North Fork Dunkard Fork and splits into two separate diverse tributaries (RA 7 T1 and RA 7 T3). RA 7 T1 splits into another tributary RA 7 T2. RA 7 T3 is diverse and flows southeast parallel to Pettit Road. Access to a large portion of the headwaters of RA 7 T3 was denied by the property owner; therefore, detailed descriptions of that area are not available. This refuse area has

nine (9) diverse points located within the watershed area. A total of 13,448.5400' of stream channel were delineated in RA #2. Of this length 8,886.0177' were diverse, 514.3598' were variable, and 1,324.2529' were first use. In Refuse Area #2 there were also 2,723.9096' of stream located on parcels where permission to access the site was denied and delineations could not be conducted.

The family most commonly observed at RA #2 was Leptophlebiidae. Leptophlebiidae were present at six (6) of the nineteen (19) sites sampled within Refuse Area #2 (Table 2, Appendix F). Leptophlebiidae also known as "Prong-gilled Mayflies" and can be found in small to moderate size streams that contain moderate flow, but may also be present in larger streams. The PADEP Regional Tolerance Value for Leptophlebiidae is four (4) indicating sensitivity to pollution. The functional feeding designation of these mayflies is gather/collector.

Refuse Area #3 (UNT to Toms Run) (Figure 5- Appendix E)

Due to lack of permission, no Appendix A samples were collected from potential Refuse Area #3. An approximate stream length value of 4,733.5424' was calculated using U.S.G.S Quadrangles.

Refuse Area #5 (UNT to Job Creek) (Figure 4-Appendix E)

The main tributary in RA #5 is a UNT to Job Creek. Refuse Area #5 has eleven (11) diverse sampling stations out of the nineteen (19) sampled. A total of 9,641.3257' of stream channel were delineated in RA #5. Of this length 8,682.1085' were diverse and 959.2172' were variable.

The family most commonly observed at RA #5 was Chloroperlidae. This family of stonefly was observed at nine (9) of the nineteen (19) sampling stations located within Refuse Area #5 (Table 3, Appendix F). Chloroperlidae also known as "Green Stoneflies" are most commonly found in spring-fed brooks or small streams that contain fast moving, clean, and cool waters. The PADEP Regional Tolerance Value for Chloroperlidae is zero (0) indicating intolerance of pollution. The functional feeding group of Chloroperlidae is predator.

5.2 APPENDIX B RESULTS

5.2.1 Stream Habitat Characteristics

The United States Environmental Protection Agency (USEPA) classifies the relative value of habitat according to numerical scores as follows (1) optimum (100-76%); (2) sub-optimal (75-51%); (3) marginal (50-26%); and (4) poor (25-0%).

5.2.1. a. Original High-Quality Refuse Sites

The habitat scores observed during Appendix B sampling for the potential Foundation Mine Refuse site ranged from a low of forty-three percent (43%) at R19 B1 to a high of seventy-five percent (75%) at R14 B2 and R2 HOU 8 (Table 5). Of the twenty-three (23) Appendix B sites; nineteen (19) merited sub-optimal, and four (4) earned marginal habitat classifications. The average habitat score throughout all proposed refuse areas Appendix B sites was 59.3. This score falls into the sub-optimal habitat classification.

Table 5. Physiochemical and Stream Habitat Data of Appendix B sampling points located in original potential refuse sites collected during 11/6/2007 - 1/7/2008.

		R1 HOU 6	R2 HOU 8	R3 HOG 3	R6 B1	R6 B2	R6 B3	R7 B1	R7 B2
pH (Standard Units)		7.74	6.71	6.55	7.42	7.5	7.64	7.48	7.75
Temperature (Degree Celsius)		8.4	7.8	7.8	11.1	10.1	9.8	11.5	8.8
Dissolved Oxygen (Parts Per Million)		11.3	17.8	14.02	0.35	1.4	11.24	8.83	16.6
Conductance (Micro Siemens)		252	142.3	192.9	240	221	221	227	336
Habitat Score		59% 117/200	75% 149/200	45% 90/200	52% 103/200	54% 108/200	64% 128/200	50% 99/200	50% 100/200
		R8 B2	R9 B1	R9 B2	R10 HOU 11	R11 HOU 12	R11 HOU 13	R11 HOU 15	R13 HOU 16
pH (Standard Units)		7.55	7.91	7.76	7.39	7.87	7.81	7.76	6.76
Temperature (Degree Celsius)		9.9	10	10.6	7.6	5.4	7.2	5.9	7.2
Dissolved Oxygen (Parts Per Million)		12.9	10.8	11.6	4.3	14.9	13.3	13.2	17.94
Conductance (Micro Siemens)		219	182	198	379	281	228	220	133.6
Habitat Score		73% 145/200	58% 116/200	59% 117/200	53% 105/200	54% 108/200	59% 118/200	66% 131/200	60% 120/200
		R13 HOU 17	R14 B1	R14 B2	R14 B3	R19 GRR1	R19 GRR 2	R19 B1	
pH (Standard Units)		7.45	7.67	7.51	7.6	7.66	7.65	7.13	
Temperature (Degree Celsius)		8	11.3	11	10.5	8.1	7.8	7.8	
Dissolved Oxygen (Parts Per Million)		8.4	11.8	9.9	9.7	10.86	9.45	12.15	
Conductance (Micro Siemens)		211	110	209	213	259	245	0	
Habitat Score		64% 128/200	58% 115/200	75% 150/200	65% 129/200	64% 129/200	64% 108/200	43% 85/200	

5.2.1. b. Alternative Non-High-Quality Refuse Areas

Refuse Area #1 (Falling Timber Run)

The habitat scores observed during Appendix B sampling seasons (Table 6) for the proposed Foundation Mine RA #1 were averaged and the lowest average score was forty-seven percent (47%) at FTR 7 and the highest average habitat score was sixty-eight percent (68%) at FTR 4. Of the seven (7) Appendix B sites; five (5) sampling stations averaged a sub-optimal habitat classification and two (2) averaged marginal habitat classifications over the three (3) sampling events. The average habitat score throughout proposed Refuse Area #1 Appendix B sites was 57%. This score falls into the sub-optimal habitat classification.

Table 6. Habitat Data for Appendix B Sampling Stations located in Refuse Area #1 (Falling Timber Run); (Spring 2007, Rounds 1&2).

Spring 2007, Round 1	FTR 1	FTR 2	FTR 3	FTR 4	FTR 5	FTR 6	FTR 7
% Substrate Type							
Bedrock	5%	5%	0%	0%	0%	0%	0%
Boulder (<256 mm)	5%	5%	0%	0%	0%	0%	0%
Cobble (64-256 mm)	10%	15%	15%	10%	0%	0%	0%
Gravel (2-64 mm)	60%	45%	65%	30%	70%	50%	26%
Sand (0.06-2 mm)	10%	20%	10%	30%	10%	20%	25%
Silt (0.004- 0.06 mm)	10%	10%	10%	15%	10%	30%	26%
Clay (<0.004 mm)	0%	0%	0%	15%	10%	0%	26%
% Morphology Type							
% Riffle	90%	80%	90%	65%	100%	20%	90%
% Pool	5%	0%	10%	15%	0%	30%	0%
% Run	5%	20%	0%	0%	0%	50%	10%
Habitat Score	112/200 (56%) sub-optimal	96/200 (48%) marginal	130/200 (65%) sub-optimal	11/200 (5%) sub-optimal	93/200 (46%) marginal	83/200 (41%) marginal	84/200 (42%) marginal

Spring 2007, Round 2	FTR 1	FTR 2	FTR 3	FTR 4	FTR 5	FTR 6	FTR 7
% Substrate Type							
Bedrock	10%	0%	DRY	DRY	DRY	0%	0%
Boulder (<256 mm)	10%	10%				0%	0%
Cobble (64-256 mm)	20%	20%				5%	0%
Gravel (2-64 mm)	60%	60%				55%	0%
Sand (0.06-2 mm)	0%	10%				10%	0%
Silt (0.004- 0.06 mm)	0%	0%				30%	100%
Clay (<0.004 mm)	0%	0%				0%	0%
% Morphology Type							
% Riffle	50%	80%				50%	0%
% Pool	20%	10%				25%	60%
% Run	30%	10%				25%	40%
Habitat Score	175/200 (76%) optimal	135/200 (68%) sub-optimal				111/200 (56%) sub-optimal	90/200 (45%) marginal

Fall 2007	FTR 1	FTR 2	FTR 3	FTR 4	FTR 5	FTR 6	FTR 7
% Substrate Type							
Bedrock	50%	0%	0%	0%	0%	0%	0%
Boulder (<256 mm)	0%	0%	0%	0%	5%	0%	0%
Cobble (64-256 mm)	5%	15%	5%	5%	0%	0%	0%
Gravel (2-64 mm)	45%	40%	75%	25%	65%	25%	30%
Sand (0.08-2 mm)	0%	25%	10%	20%	5%	40%	0%
Silt (0.004-0.06 mm)	0%	20%	10%	0%	5%	20%	0%
Clay (<0.004 mm)	0%	0%	0%	50%	0%	25%	70%
% Morphology Type							
% Riffle	25%	20%	90%	60%	90%	20%	100%
% Pool	30%	20%	5%	20%	0%	70%	0%
% Run	45%	60%	5%	20%	10%	10%	0%
Habitat Score	122/200 (61%) sub-optimal	93/200 (47%) marginal	141/200 (71%) optimal	158/200 (79%) optimal	135/200 (68%) sub-	98/200 (49%) marginal	107/200 (54%) sub-optimal

Spring 2008	FTR 1	FTR 2	FTR 3	FTR 4	FTR 5	FTR 6	FTR 7
% Substrate Type							
Bedrock	0%	0%	0%	0%	0%	0%	0%
Boulder (<256 mm)	5%	10%	0%	0%	0%	0%	0%
Cobble (64-256 mm)	25%	40%	15%	10%	0%	0%	0%
Gravel (2-64 mm)	60%	40%	35%	30%	40%	20%	30%
Sand (0.06-2 mm)	10%	10%	35%	30%	20%	40%	30%
Silt (0.004-0.06 mm)	0%	0%	15%	20%	0%	40%	20%
Clay (<0.004 mm)	0%	0%	0%	10%	40%	0%	20%
% Morphology Type							
% Riffle	70%	70%	70%	50%	40%	50%	60%
% Pool	10%	10%	15%	25%	10%	30%	0%
% Run	20%	20%	15%	25%	50%	20%	20%

Refuse Area #2 (UNT to North Fork Dunkard Fork)

The habitat scores observed during Appendix B sampling (Table 7) for the proposed Foundation Mine RA #2 ranged from a low of sixty-five percent (65%) at RA 7 T1 and RA 7 T2 to a high of sixty-eight percent (68%) at RA 7 1. All three (3) Appendix B sampling stations in RA #2 merited a sub-optimal habitat classification. The average habitat score throughout the potential Refuse Area #2 was 66%. This score falls into the sub-optimal habitat classification.

Refuse Area #3 (UNT to Toms Run)

Due to lack of permission, no stream habitat data were collected during the Appendix B sampling event at potential Refuse Area #3.

Table 7 Habitat Data for Appendix B Sampling Stations Located in Refuse Area #2 (UNT to Job Creek) (Spring 2008).

	RA 7 1	RA 7 T1	RA 7 T2
% Substrate Type			
Bedrock	35%	0%	0%
Boulder (<256 mm)	0%	0%	0%
Cobble (64-256 mm)	15%	15%	25%
Gravel (2-64 mm)	5%	25%	50%
Sand (0.06-2 mm)	30%	40%	15%
Silt (0.004- 0.06 mm)	15%	15%	10%
Clay (<0.004 mm)	0%	3%	0%
% Morphology Type			
% Riffle	65%	30%	30%
%Pool	15%	40%	0%
% Run	20%	30%	70%
Habitat Score	136/200 (68%) sub-optimal	130/200 (65%) sub-optimal	129/200 (65%) sub-optimal

Refuse Area #5 (UNT to Job Creek)

The habitat scores observed during Appendix B sampling (Table 8) for the proposed Foundation Mine RA #5 ranged from a low of fifty- three percent (53%) at RA 8 B1 and RA 8 B3 to a high of fifty-eight percent (58%) at RA 8 B2. All three (3) Appendix B sampling stations in RA #5 merited a sub-optimal habitat classification. The average habitat score throughout the proposed Refuse Area #5 was 55%. This score falls into the sub-optimal habitat classification.

Table 8. Habitat Data for Appendix B Sampling Stations Located in Refuse Area #5 (UNT to Job Creek)(Spring 2008).

	RA 8 B1	RA 8 B2	RA 8 B3
% Substrate Type			
Bedrock	0%	0%	35%
Boulder (<256 mm)	0%	0%	5%
Cobble (64-256 mm)	5%	15%	30%
Gravel (2-64 mm)	10%	15%	20%
Sand (0.06-2 mm)	25%	20%	10%
Silt (0.004- 0.06 mm)	30%	25%	0%
Clay (<0.004 mm)	30%	25%	0%
% Morphology Type			
% Riffle	45%	40%	80%
%Pool	20%	15%	0%
% Run	35%	45%	20%
Habitat Score	105/200 (53%) sub-optimal	116/200 (58%) sub-optimal	105/200 (53%) sub-optimal

5.2.2 Stream Physiochemical Characteristics

5.2.2.a Original High-Quality Refuse Sites

The pH values ranged from 6.55 at R3 HOG 3 to a high of 7.91 at R9 B1, with an average of 7.49 (Table 5). Water temperatures ranged from 5.4 °C at R11 HOU 12 to 11.5 °C at R7 B1, with an average temperature of 8.85 degrees Celsius (Table 5). The dissolved oxygen ranged from 0.35 ppm at R6 B1 to 17.94 ppm at R13 HOU 16, with an average of 10.99 ppm (Table 5). The conductivity ranged from 110 uS at R14 B1 to 379 uS at R10 HOU 11, with an average of 213.9 uS (Table 5). Generally, all refuse area physiochemical observations were within acceptable ranges to support aquatic life, except R6 sites B1 and B2 for dissolved oxygen.

5.2.2.b *Alternative Non-High-Quality Refuse Areas*

Refuse Area #1 (Falling Timber Run)

The average pH values in Refuse Area #1 from Spring 2007, Fall 2007, and Spring 2008 ranged from 7.09 at FTR 5 to a high of 8.22 at FTR 2, with an average of 7.64. Water temperature averages ranged from 7.6 °C at FTR 4 to 14.4°C at FTR 7, with an average temperature of 11.23°C between the seven (7) sampling stations. The dissolved oxygen ranged from 7.32 ppm at FTR 7 to a high of 13.66 ppm at FTR 6, with an average of 10.54 ppm. The conductivity ranged from 129 uS at FTR 5 to 217 uS at FTR 1, with an average of 174 uS. Generally, all refuse area physiochemical observations were within acceptable ranges to support aquatic life, except FTR 5 for low dissolved oxygen levels (Table 9).

Table 9. Physiochemical Data for Appendix B Sampling Stations Located on Refuse Area #1 (Falling Timber) (Spring 2007, Rounds 1 & 2).

Spring 2007, Round 1	FTR 1	FTR 2	FTR 3	FTR 4	FTR 5	FTR 6	FTR 7
pH	8.01	8.03	7.91	7.88	7.69	8.52	7.97
Temperature (°C)	4.7	5.2	5.8	6.3	6.6	6.9	6.5
Dissolved Oxygen (ppm)	9.89	7.52	5.59	13.46	4.02	14.95	10.59
Conductivity (µohms)	174.4	170.9	171.9	157.1	132.3	184.3	153.8

Spring 2007, Round 2	FTR 1	FTR 2	FTR 3	FTR 4	FTR 5	FTR 6	FTR 7
pH	8.07	8.43	DRY	DRY	DRY	7.63	7.37
Temperature (°C)	22.2	24.7				26.2	29
Dissolved Oxygen (ppm)	8.59	8.57				7.3	2.3
Conductivity (µohms)	193	181				185	178

Fall 2007	FTR 1	FTR 2	FTR 3	FTR 4	FTR 5	FTR 6	FTR 7
pH	7.96	8.03	6.7	6.56	6.23	7.79	6.27
Temperature (°C)	8.6	9.7	7.41	7	7.25	5.8	6.1
Dissolved Oxygen (ppm)	11.06	10.83	6.08	3.53	1.97	12.97	1.33
Conductivity (µohms)	316	250	129.9	126.8	109.9	257	105.4

Spring 2008	FTR 1	FTR 2	FTR 3	FTR 4	FTR 5	FTR 6	FTR 7
pH	8.06	8.4	7.68	7.46	7.34	8.21	8.1
Temperature (°C)	14.4	15.5	14.6	9.5	10.5	12.8	16
Dissolved Oxygen (ppm)	16.4	17	16.5	20.3	19.5	19.4	15.1
Conductivity (µohms)	185.3	180.7	180.8	160.4	143.6	N/a	182.6

Refuse Area #2 (UNT to North Fork Dunkard Fork)

The pH values in Refuse Area #2 ranged from 7.72 at RA 7 T1 to a high of 8.02 at RA 7 1, with an average of 7.85. Water temperatures ranged from 14.7 °C at RA 7 T2 to 16.6 °C at RA 7 T1, with an average temperature of 15.6 °C. At Refuse Area #2 dissolved oxygen ranged from 11.0 ppm at RA 7 T1 to a high of 12.2 ppm at RA 7 T2, with an average of 11.7 ppm. The conductivity ranged from 171 uS at RA 7 T2 to 216 uS at RA 7 1, with an average of 186.7 uS. Generally, all refuse area physiochemical observations were within acceptable ranges to support aquatic life (Table 10).

Table 10. Physiochemical Data for Appendix B Sampling Stations located in Refuse Area #2 (UNT to North Fork Dunkard Fork)(Spring 2008)

Metric	RA 7 1	RA 7 T1	RA 7 T2
pH	8.02	7.72	7.82
Temperature (°C)	15.6	16.6	14.7
Dissolved Oxygen (ppm)	11.9	11	12.2
Conductivity (µohms)	216	173	171

Refuse Area #3 (UNT to Toms Run)

Due to lack of permission, no physiochemical data were collected during the Appendix B sampling event at potential Refuse Area #3.

Refuse Area #5 (UNT to Job Creek)

The pH values in Refuse Area #5 ranged from 7.82 at RA 8 B1 to a high of 7.97 at RA 8 B3, with an average of 7.90. Water temperatures ranged from 15.7 °C at RA 8 B1 to 18.5 °C at RA 8 B3, with an average temperature of 17.0°C. The dissolved oxygen ranged from 9.01 ppm at RA 8 B3 to a high of 11.25 ppm at RA 8 B2, with an average of 10.49 ppm. The conductivity ranged from 186 uS at RA 8 B1 to 196.9 uS at RA 8 B3, with an average of 192.7 uS. Generally, all refuse area physiochemical observations were within acceptable ranges to support aquatic life (Table 11).

Table 11. Physiochemical Data for Appendix B Sampling Stations located in Refuse Area #5 (UNT to Job Creek)(Spring 2008).

Metric	RA 8 B1	RA 8 B2	RA 8 B3
pH	7.82	7.9	7.97
Temperature (°C)	15.7	16.8	18.5
Dissolved Oxygen (ppm)	11.21	11.25	9.01
Conductivity (µohms)	186	195.1	196.9

5.2.3 Appendix B Macroinvertebrate Data

5.2.3.a Original High-Quality Refuse Sites

The diverse stations were located along the mainstems of the potential refuse sites assessed from November 6, 2007 to January 7, 2008 using the methods described in Appendix B of the Technical Guidance Document (TGD). The taxa collected (Table 17, Appendix B) averaged a Pollution Tolerance Value of 3.85. The lowest average pollution tolerance value observed was 3.00 at R9 B1. This indicates a population heavily comprised of pollution intolerant organisms, and therefore favorable water quality. The highest average pollution tolerance value was 6.67 at R2 HOU 8. This indicates a population shifted towards pollution tolerant organisms, and therefore poor water quality in comparison.

A biological score was generated using the method described in Appendix B of the PADEP's Surface Water Protection- Underground Bituminous Coal Mining Operations document for all of the proposed refuse areas (Table 12). The highest average biological score observed within the originally sampled refuse sites was 76.4 at R11. The lowest was at R2 with a score of 15.9.

Table 12. Biological Scores of the Original High-Quality potential Refuse Sites Appendix B Samples Collected 11/2007 - 1/2008

Stream Reach	R1 HOU 6	R2 HOU 8	R3 HOG 3	R6 B1	R6 B2
Metric	Observed Value/Adjusted Value ¹				
Taxa Richness	15.0 / 49.2	3.0 / 9.8	11.0 / 36.1	9.0 / 29.5	10.0 / 32.8
Trichoptera Richness	3.0 / 28.6	1.0 / 9.5	1.0 / 9.5	0 / 0	2.0 / 19.0
% EPT Richness	48.6 / 75.6	33.3 / 54.1	45.4 / 73.7	22.2 / 35	70.0 / 100.0
Intolerant Taxa Richness	9.0 / 56.3	1.0 / 6.3	5.0 / 31.3	2.0 / 12.5	7.0 / 43.8
FC+PR Richness	6.0 / 44.4	0 / 0	5.0 / 37.0	1.0 / 7.4	3.0 / 22.2
Total Biological Score	50.8	15.9	37.5	17.1	43.6

Stream Reach	R6 B3	R7 B1	R7 B2	R8 B2	R9 B1
Metric	Observed Value/Adjusted Value ¹				
Taxa Richness	17.0 / 55.7	16.0 / 52.5	9.0 / 29.5	11.0 / 38.1	16.0 / 62.5
Trichoptera Richness	3.0 / 28.6	5.0 / 47.6	1.0 / 9.5	3.0 / 28.6	4.0 / 38.1
% EPT Richness	64.7 / 100	56.2 / 91.2	44.4 / 72.1	49.0 / 79.5	35.0 / 56.8
Intolerant Taxa Richness	12.0 / 75.0	10.0 / 62.5	4.0 / 25.0	5.0 / 31.3	14.0 / 87.5
FC+PR Richness	5.0 / 37.0	5.0 / 37.0	4.0 / 29.6	3.0 / 22.2	7.0 / 51.9
Total Biological Score	59.3	58.2	33.1	39.5	57.4

Stream Reach	R9 B2	R10 HOU 11	R11 HOU 12	R11 HOU 13	R11 HOU 15
Metric	Observed Value/Adjusted Value ¹				
Taxa Richness	9.0 / 29.5	10.0 / 32.8	14.0 / 45.9	19.0 / 62.3	23.0 / 75.4
Trichoptera Richness	2.0 / 19.0	3.0 / 28.6	2.0 / 19.0	4.0 / 38.1	5.0 / 47.6
% EPT Richness	32.0 / 51.9	30.0 / 48.7	28.5 / 46.3	57.8 / 93.8	60.8 / 99.7
Intolerant Taxa Richness	6.0 / 37.5	2.0 / 12.5	7.0 / 43.8	12.0 / 75.0	15.0 / 93.8
FC+PR Richness	1.0 / 7.4	3.0 / 22.2	4.0 / 29.6	8.0 / 59.3	9.0 / 66.7
Total Biological Score	29.1	29	36.9	65.7	76.4

Stream Reach	R13 HOU 16	R13 HOU 17	R14 B1	R14 B2	R14 B3
Metric	Observed Value/Adjusted Value ¹				
Taxa Richness	5.0 / 16.4	9.0 / 29.5	14.0 / 45.9	16.0 / 52.5	12.0 / 39.3
Trichoptera Richness	0 / 0	1.0 / 9.5	2.0 / 19.0	4.0 / 38.1	1.0 / 9.5
% EPT Richness	40.0 / 64.9	40.0 / 64.9	35.7 / 58.0	75.0 / 100.0	58.3 / 94.6
Intolerant Taxa Richness	4.0 / 25.0	4.0 / 25.0	2.0 / 12.5	13.0 / 81.3	7.0 / 43.8
FC+PR Richness	0 / 0	2.0 / 14.8	3.0 / 22.2	5.0 / 37.0	4.0 / 29.6
Total Biological Score	21.3	28.7	31.5	61.8	43.4

Stream Reach	R19 GRR 1	R19 GRR 2	R19 B1
Metric	Observed Value/Adjusted Value ¹	Observed Value/Adjusted Value ¹	Observed Value/Adjusted Value ¹
Taxa Richness	19.0 / 62.3	16.0 / 52.5	11.0 / 36.1
Trichoptera Richness	4.0 / 38.1	2.0 / 19.0	3.0 / 28.6
% EPT Richness	52.6 / 85.4	43.7 / 70.9	45.4 / 73.7
Intolerant Taxa Richness	12.0 / 75.0	6.0 / 37.5	6.0 / 37.5
FC+PR Richness	8.0 / 59.3	2.0 / 14.8	2.0 / 14.8
Total Biological Score	64	38.9	38.1

5.2.3.b Alternative Non-High Quality Refuse Areas

The diverse stations located along the mainstems and tributaries of the potential refuse areas were assessed from April 5, 2007 to June 11, 2008 using the methods described in Appendix B of the Technical Guidance Document (TGD 563-2000-655). The macroinvertebrate data from these sampling events are located in Tables 4-9 of Appendix B. The biological scores for Falling Timber Run (RA #1) were averaged between the four (4) sampling seasons (Spring 2007 Rd. #1 and #2, Fall 2007, and Spring 2008).

Falling Timber Run (RA #1)

The taxa collected (Tables 4-7, Appendix F) for Falling Timber (RA #1) over the four (4) sampling events averaged a Pollution Tolerance Value of 3.77. The lowest average pollution tolerance value observed was 3.05 at FTR 4. This indicates a population heavily comprised of pollution intolerant organisms, and therefore favorable water quality. The highest average pollution tolerance value was 6.66 at FTR 7. This indicates a population shifted towards pollution tolerant organisms, and therefore poor water quality in comparison.

A biological score was generated using the method described in Appendix B of TGD-563-2000-655 for all of the potential Refuse Area #1 Appendix B sampling sites (Tables 13-16). The highest average biological score observed within the proposed Refuse Area #1 was 60.1 at FTR 1. The lowest was at FTR 7 with a score of 10.4.

Table 13. Biological Scores for Appendix B sampling stations located in Refuse Area #1 (Falling Timber Run)(Spring 2007, Round #1).

Bioregion:	1		
	Stream Reach:	FTR 1	
Biological Metrics	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	32	104.9	100
Trichoptera Richness	5	47.6	47.6
% EPT Richness	68.7	111.5	100
Intolerant Taxa Richness	19	118.8	100
FC + PR Taxa Richness	13	96.3	96.3
Total Biological Score (Mean of adjusted values)			88.8

Bioregion:	1		
	Stream Reach:	FTR 2	
Biological Metrics	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	23	75.4	75.4
Trichoptera Richness	6	57.1	57.1
% EPT Richness	69.5	112.8	100
Intolerant Taxa Richness	15	93.8	93.8
FC + PR Taxa Richness	10	74.1	74.1
Total Biological Score (Mean of adjusted values)			80.1

Bioregion:	1		
	Stream Reach:	FTR 3	
Biological Metrics	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	33	108.2	100
Trichoptera Richness	8	76.2	76.2
% EPT Richness	78.8	127.9	100
Intolerant Taxa Richness	24	150.0	100
FC + PR Taxa Richness	15	111.1	100
Total Biological Score (Mean of adjusted values)			95.2

Bioregion:	1		
	Stream Reach:	FTR 4	
Biological Metrics	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	22	72.1	72.1
Trichoptera Richness	7	66.7	66.7
% EPT Richness	90.9	147.6	100
Intolerant Taxa Richness	16	100.0	100
FC + PR Taxa Richness	6	44.4	44.4
Total Biological Score (Mean of adjusted values)			76.6

Bioregion:	1		
	Stream Reach:	FTR 5	
Biological Metrics	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	15	49.2	49.2
Trichoptera Richness	4	38.1	38.1
% EPT Richness	53.3	86.5	86.5
Intolerant Taxa Richness	10	62.5	62.5
FC + PR Taxa Richness	4	29.6	29.6
Total Biological Score (Mean of adjusted values)			53.2

Bioregion:	1		
	Stream Reach:	FTR 6	
Biological Metrics	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	12	39.3	39.3
Trichoptera Richness	1	9.5	9.5
% EPT Richness	8.3	13.5	13.5
Intolerant Taxa Richness	2	12.5	12.5
FC + PR Taxa Richness	3	22.2	22.2
Total Biological Score (Mean of adjusted values)			19.4

Bioregion:	1		
	Stream Reach:	FTR 7	
Biological Metrics	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	7	23.0	23
Trichoptera Richness	0	0.0	0
% EPT Richness	14.2	23.1	23.1
Intolerant Taxa Richness	1	6.3	6.3
FC + PR Taxa Richness	1	7.4	7.4
Total Biological Score (Mean of adjusted values)			12.0

Table 14. Biological Scores for Appendix B sampling stations located in Refuse Area #1 (Falling Timber Run); (Spring 2007, Round #2).

Bioregion:		1		
		Stream Reach:	FTR 1	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	16	52.5	52.5	
Trichoptera Richness	1	9.5	9.5	
% EPT Richness	50	81.2	81.2	
Intolerant Taxa Richness	11	68.8	68.8	
FC + PR Taxa Richness	7	51.9	51.9	
Total Biological Score (Mean of adjusted values)			52.8	

Bioregion:		1		
		Stream Reach:	FTR 2	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	25	82.0	82	
Trichoptera Richness	2	19.0	19	
% EPT Richness	48	77.9	77.9	
Intolerant Taxa Richness	16	100.0	100	
FC + PR Taxa Richness	10	74.1	74.1	
Total Biological Score (Mean of adjusted values)			70.6	

Bioregion:		1		
		Stream Reach:	FTR 3	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness			DRY	
Trichoptera Richness				
% EPT Richness				
Intolerant Taxa Richness				
FC + PR Taxa Richness				
Total Biological Score (Mean of adjusted values)				

Bioregion:		1		
		Stream Reach:	FTR 4	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness			DRY	
Trichoptera Richness				
% EPT Richness				
Intolerant Taxa Richness				
FC + PR Taxa Richness				
Total Biological Score (Mean of adjusted values)				

Bioregion:	1		
	Stream Reach:	FTR 5	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	DRY		
Trichoptera Richness			
% EPT Richness			
Intolerant Taxa Richness			
FC + PR Taxa Richness			
Total Biological Score (Mean of adjusted values)			

Bioregion:	1		
	Stream Reach:	FTR 6	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	13	42.6	42.6
Trichoptera Richness	0	0.0	0
% EPT Richness	15.4	25.0	25
Intolerant Taxa Richness	2	12.5	12.5
FC + PR Taxa Richness	4	29.6	29.6
Total Biological Score (Mean of adjusted values)			21.9

Bioregion:	1		
	Stream Reach:	FTR 7	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	6	19.7	19.7
Trichoptera Richness	0	0.0	0
% EPT Richness	0	0.0	0
Intolerant Taxa Richness	0	0.0	0
FC + PR Taxa Richness	0	0.0	0
Total Biological Score (Mean of adjusted values)			3.9

Table 15. Biological Scores for Appendix B sampling stations located in Refuse Area #1 (Fall Timber Run) (Fall 2007).

Bioregion:	1		
	Stream Reach:	FTR 1	
Biological Metrics	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	16	52.5	52.5
Trichoptera Richness	3	28.6	28.6
% EPT Richness	43.8	71.1	71.1
Intolerant Taxa Richness	8	50.0	50
FC + PR Taxa Richness	6	44.4	44.4
Total Biological Score (Mean of adjusted values)			49.3

Bioregion:	1		
	Stream Reach:	FTR 2	
Biological Metrics	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	7	23.0	23
Trichoptera Richness	2	19.0	19
% EPT Richness	28.6	46.4	46.4
Intolerant Taxa Richness	3	18.8	18.8
FC + PR Taxa Richness	3	22.2	22.2
Total Biological Score (Mean of adjusted values)			25.9

Bioregion:	1		
	Stream Reach:	FTR 3	
Biological Metrics	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	4	13.1	13.1
Trichoptera Richness	1	9.5	9.5
% EPT Richness	25	40.6	40.6
Intolerant Taxa Richness	2	12.5	12.5
FC + PR Taxa Richness	0	0.0	0
Total Biological Score (Mean of adjusted values)			15.1

Bioregion:	1		
	Stream Reach:	FTR 4	
Biological Metrics	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	3	9.8	9.8
Trichoptera Richness	1	9.5	9.5
% EPT Richness	33.3	54.1	54.1
Intolerant Taxa Richness	2	12.5	12.5
FC + PR Taxa Richness	1	7.4	7.4
Total Biological Score (Mean of adjusted values)			18.7

	Stream Reach:	FTR 5	
Biological Metrics	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	3	9.8	9.8
Trichoptera Richness	0	0.0	0
% EPT Richness	0	0.0	0
Intolerant Taxa Richness	1	6.3	6.3
FC + PR Taxa Richness	1	7.4	7.4
Total Biological Score (Mean of adjusted values)			4.7

Bioregion:	1		
	Stream Reach:	FTR 6	
Biological Metrics	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	5	16.4	16.4
Trichoptera Richness	1	9.5	9.5
% EPT Richness	20	32.5	32.5
Intolerant Taxa Richness	1	6.3	6.3
FC + PR Taxa Richness	1	7.4	7.4
Total Biological Score (Mean of adjusted values)			14.4

Bioregion:	1		
	Stream Reach:	FTR 7	
Biological Metrics	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value
Taxa Richness	4	13.1	13.1
Trichoptera Richness	0	0.0	0
% EPT Richness	0	0.0	0
Intolerant Taxa Richness	0	0.0	0
FC + PR Taxa Richness	1	7.4	7.4
Total Biological Score (Mean of adjusted values)			4.1

Table 16. Biological Scores for Appendix B sampling stations located in Refuse Area #1 (Falling Timber Run) (Spring 2008)

Bioregion:		1		
		Stream Reach:	FTR 1	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	14	45.9	45.9	
Trichoptera Richness	1	9.5	9.5	
% EPT Richness	57.1	92.7	92.7	
Intolerant Taxa Richness	10	62.5	62.5	
FC + PR Taxa Richness	5	37.0	37	
Total Biological Score (Mean of adjusted values)			49.6	

Bioregion:		1		
		Stream Reach:	FTR 2	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	11	36.1	36.1	
Trichoptera Richness	3	28.6	28.6	
% EPT Richness	72.7	118.0	100	
Intolerant Taxa Richness	7	43.8	43.8	
FC + PR Taxa Richness	4	29.6	29.6	
Total Biological Score (Mean of adjusted values)			47.6	

Bioregion:		1		
		Stream Reach:	FTR 3	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	16	52.5	52.5	
Trichoptera Richness	2	19.0	19	
% EPT Richness	75	121.8	100	
Intolerant Taxa Richness	14	87.5	87.5	
FC + PR Taxa Richness	7	51.9	51.9	
Total Biological Score (Mean of adjusted values)			62.2	

Bioregion:		1		
		Stream Reach:	FTR 4	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	12	39.3	39.3	
Trichoptera Richness	2	19.0	19	
% EPT Richness	91.7	148.9	100	
Intolerant Taxa Richness	11	68.8	68.8	
FC + PR Taxa Richness	2	14.8	14.8	
Total Biological Score (Mean of adjusted values)			48.4	

Bioregion:		1		
		Stream Reach:	FTR 5	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	7	23.0	23	
Trichoptera Richness	3	28.6	28.6	
% EPT Richness	85.7	139.1	100	
Intolerant Taxa Richness	6	37.5	37.5	
FC + PR Taxa Richness	0	0.0	0	
Total Biological Score (Mean of adjusted values)			37.8	

Bioregion:		1		
		Stream Reach:	FTR 6	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	8	26.2	26.2	
Trichoptera Richness	2	19.0	19	
% EPT Richness	62.5	101.5	100	
Intolerant Taxa Richness	3	18.8	18.8	
FC + PR Taxa Richness	4	29.6	29.6	
Total Biological Score (Mean of adjusted values)			38.7	

Bioregion:		1		
		Stream Reach:	FTR 7	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	6	19.7	19.7	
Trichoptera Richness	0	0.0	0	
% EPT Richness	33.3	54.1	54.1	
Intolerant Taxa Richness	3	18.8	18.8	
FC + PR Taxa Richness	2	14.8	14.8	
Total Biological Score (Mean of adjusted values)			21.5	

Refuse Area #2 (UNT to North Fork Dunkard Fork)

The taxa collected (Table 8, Appendix F) for Refuse Area #2 averaged a Pollution Tolerance Value of 2.31. The lowest average pollution tolerance value observed was 2.47 at RA 7 T2. This indicates a population heavily comprised of pollution intolerant organisms, and therefore favorable water quality. The highest average pollution tolerance value was 2.67 at RA 7 1, which also indicates a population comprised of intolerant organisms, and therefore favorable water quality.

A biological score was generated using the method described in Appendix B of TGD 563-200-655 for all Refuse Area #2 Appendix B sampling sites (Table 17). The highest average biological score observed within the potential Refuse Area #2 was 61.8 at RA 7 T2. The lowest was at RA T7 T1 with a score of 26.4.

Table 17. Biological Score Data for Appendix B Sampling Stations located in Refuse Area #2 (UNT to North Fork Dunkard Fork (Spring 2008).

Bioregion:		1		
		Stream Reach: RA 7 1		
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	15	49.2	49.2	
Trichoptera Richness	1	9.5	9.5	
% EPT Richness	73.3	119.0	100	
Intolerant Taxa Richness	12	75.0	75	
FC + PR Taxa Richness	1	7.4	7.4	
Total Biological Score (Mean of adjusted values)			48.2	

Bioregion:		1		
		Stream Reach: RA 7 T1		
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	4	13.1	13.1	
Trichoptera Richness	0	0.0	0	
% EPT Richness	75	121.8	100	
Intolerant Taxa Richness	3	18.8	18.8	
FC + PR Taxa Richness	0	0.0	0	
Total Biological Score (Mean of adjusted values)			26.4	

Bioregion:		1		
		Stream Reach: RA 7 T2		
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	19	62.3	62.3	
Trichoptera Richness	1	9.5	9.5	
% EPT Richness	78.9	128.1	100	
Intolerant Taxa Richness	16	100.0	100	
FC + PR Taxa Richness	5	37.0	37	
Total Biological Score (Mean of adjusted values)			61.8	

Refuse Area #5 (UNT to Job Creek)

The taxa collected (Table 9, Appendix F) for Refuse Area #5 averaged a Pollution Tolerance Value of 3.33. The lowest average pollution tolerance value observed was 3.16 at RA 8 B2. This indicates a population heavily comprised of pollution intolerant

organisms, and therefore favorable water quality. The highest average pollution tolerance value was 3.90 at RA 8 B1, which also indicates a population comprised of intolerant organisms, and therefore favorable water quality.

A biological score was generated using the method described in Appendix B of TGD 563-200-655 for all Refuse Area #5 Appendix B Sampling (Table 18). The highest average biological score observed within the potential Refuse Area #5 was 61.2 at RA 8 B2. The lowest was at RA 8 B1 with a score of 36.6.

Table 18. Biological Score Data for Appendix B Sampling Stations Located in Refuse Area #5 (UNT to Job Creek)(Spring 2008)

Bioregion:		1		
		Stream Reach:	RA 8 B1	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	10	32.8	32.8	
Trichoptera Richness	1	9.5	9.5	
% EPT Richness	50	81.2	81.2	
Intolerant Taxa Richness	6	37.5	37.5	
FC + PR Taxa Richness	3	22.2	22.2	
Total Biological Score (Mean of adjusted values)			36.6	

Bioregion:		1		
		Stream Reach:	RA 8 B2	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	19	62.3	62.3	
Trichoptera Richness	2	19.0	19	
% EPT Richness	63.1	102.4	100	
Intolerant Taxa Richness	14	87.5	87.5	
FC + PR Taxa Richness	5	37.0	37	
Total Biological Score (Mean of adjusted values)			61.2	

Bioregion:		1		
		Stream Reach:	RA 8 B3	
Biological Metric	Observed Value	Normalized Score (Observed value/95th Percentile value)*100	Adjusted Value	
Taxa Richness	14	45.9	45.9	
Trichoptera Richness	0	0.0	0	
% EPT Richness	64.3	104.4	100	
Intolerant Taxa Richness	9	56.3	56.3	
FC + PR Taxa Richness	2	14.8	14.8	
Total Biological Score (Mean of adjusted values)			43.4	

6.0 WETLAND RESULTS

Based on the preliminary field reconnaissance and secondary source information regarding wetlands in the potential original and alternative refuse areas, it has been determined that two (2) wetlands are present. Wetland HOG 3 (0.17 acres), is located in Refuse Site #3 (Figure 2, Appendix A) and Wetland TOM 1 (0.10 acres) is located in Refuse Area #3 (Figure 5, Appendix E). Several additional wetlands were identified within the project area (Figure 2, Appendix A) that do not lie within either the original or the alternative potential refuse areas.

The absence of an abundance of wetlands within the proposed areas could be contributed to the topography of the project area which is comprised of steep, narrow valleys, with streams typically flowing along the flat valley bottoms. Additional streams flow off the steep hillsides to the valley bottoms. The historical use of these narrow valleys for agricultural use has altered the flow patterns of many of the streams, as they have been relocated to either side of the valley to accommodate roads and other human land use. Therefore, the streams tend to flow relatively straight, and are slightly incised, removing a major source of hydrology for wetlands from the surrounding ground. Additionally, since there are few flat areas within the project area, there is little opportunity for water to collect for sufficient duration to form hydric soils or support hydrophytic vegetation.

7.0 SUMMARY OF RESULTS

7.0.1 Original High-Quality Refuse Sites

A biological score was generated using the method described in Appendix B of the PADEP's Surface Water Protection- Underground Bituminous Coal Mining Operations document. The highest average bio score observed within the originally sampled potential Foundation Refuse Area Site was 59.7 at R11. The lowest was at R2 with a score of 15.9. (Table 19)

Table 19 . Summary of Biological Data collected during Appendix B sampling for original potential refuse sites, Center and Jackson Townships, Greene County, Pennsylvania. 11/6/2007 - 1/7/2008.

Potential Refuse Area	Average Biological Score	Average Pollution Tolerance Value
R 1	50.8	4.13
R 2	15.9	6.67
R 3	37.5	4.82
R 6	40.0	4.31
R 7	45.7	4.21
R 8	39.5	5.18
R 9	43.3	3.33
R 10	29.0	6.60
R 11	59.7	4.27
R 13	25.0	5.35
R 14	52.6	5.00
R19	38.5	3.81

The habitat scores observed during Appendix B sampling of the originally sampled twenty-one (21) potential refuse sites ranged from a low of forty-three percent (43%) at R19 B1 to a high of seventy-five percent (75%) at R14 B2 and R2 HOU 8 (Table 5). Of the twenty-three (23) Appendix B sites; nineteen (19) merited sub-optimal, and four (4) earned marginal habitat classifications. The average habitat score throughout all proposed refuse areas Appendix B sites was 59.3. This score indicates a sub-optimal habitat classification.

7.0.2 Alternative Non-High-Quality Refuse Areas

The lowest average pollution tolerance value was observed at UNT North Fork Dunkard Fork (RA #2) indicating that a majority of the macroinvertebrate community within the refuse area consisted mostly of organisms that are intolerant to pollution.

The highest average pollution tolerance value was observed in to Falling Timber Run (RA #1) (4.41), which indicated that a majority of the community consisted of organisms with a moderate or intolerant value to pollution. The habitat scores observed during Appendix B sampling ranged from a low of fifty-five percent (55%) at RA #5 to a high of

sixty-six percent (66%) at RA #2 (Table 20). The average habitat score throughout all alternative refuse area Appendix B sites was 59. This score indicates a sub-optimal habitat classification.

Table 20 . Summary of Biological Data collected during Appendix B sampling for Foundation Mine proposed alternative Refuse Areas #1, #2, and #5 January 2007 - June 2008.

Potential Refuse Area	Average Biological Score	Average Pollution Tolerance	Average Habitat Score
Falling Timber Run (RA #1)	41.0	4.41	57
UNT to North Fork Dunkard Fork (RA #2)	45.5	2.31	66
UNT to Job Creek (RA #5)	47.1	3.33	55

8.0 QUALITATIVE HABITAT SUMMARY

8.0.1 Original High-Quality Refuse Sites

Based upon field observations and aerial photographs, the land use for each of the proposed refuse areas can be categorized as one of the following: predominantly forest, a combination of forest and agriculture, or predominantly agriculture.

The following potential refuse sites were categorized as predominantly forested: R1, R5, R6, R9, R12, R13, R18, R19, and R20. These sites consisted of one or more of the following: all dense forest, all sparse forest, or mostly forest with small areas of agriculture or residential land use. Red maple, sugar maple, red oak, white oak, hickory, American beech, black cherry, and black walnut were the dominant species present in the forested areas. These species of trees provide resting, nesting, and feeding sites for non-migratory birds and resting and feeding sites for neo-tropical migrant birds. The trees also provide habitat and a food source for small mammals such as squirrels, chipmunks,

foxes, and raccoons. Larger mammals such as white-tailed deer utilize these forested areas as well.

While conducting field investigations, several observations of habitat usage were noted. In all of the forested refuse areas, evidence of white-tailed deer was present. Deer trails through the forest were observed as well as countless territorial markings left by male white-tailed deer. Several white-tailed deer were observed in R9 and red-tailed hawks were spotted within the boundaries of R9.

Significant disturbance to the habitat was observed in two (2) of the forested refuse areas. Select-cut logging activity was observed in R1 and R19. R1 also contained new construction activity. These activities disrupt the natural habitat and displace native species.

The following potential refuse sites were determined to contain a combination of forest and agricultural land uses: R2, R7, R10, R14, R17, and R21. These sites contained relatively similar proportions of forest and agricultural land uses. The forested portions of these areas were similar to the forested refuse areas with red maple, sugar maple, red oak, white oak, hickory, American beech, black cherry, and black walnut as the dominant species. These species of trees provide resting, nesting, and feeding sites for non-migratory birds and resting and feeding sites for neo-tropical migrant birds. The trees also provide habitat and a food source for small mammals such as squirrels, chipmunks, foxes, and raccoons. Larger mammals such as white-tailed deer utilize these forested areas as well.

While conducting field investigations, several observations of habitat usage were noted. In all of the forested areas of the proposed refuse areas, evidence of white-tailed deer was present. Deer trails through the forest were observed as well as countless territorial

() markings left by male white-tailed deer. White-tailed deer and red-tailed hawks within the forested boundaries of R7 were observed.

The agricultural portions of the mixed refuse areas contain old field, active pasture, or crop fields. The old field and transition zones contained multiflora rose, thistle, golden rod, and upland grasses as the dominant vegetation. The old-field areas located adjacent to forested areas provide suitable hunting areas for raptors. Active pasture and crop fields are poor habitat areas due to the amount of disturbance associated with the activities.

The following potential refuse sites were categorized as predominantly agriculture: R3, R4, R8, R11, R15, and R16. These areas may contain very small portions of intact forest. The agricultural portions contain old field, active pasture, or crop fields. The old field contained multiflora rose, thistle, golden rod, and upland grasses as the dominant vegetation.

The agricultural portions of the mixed refuse areas contain old field, active pasture, or crop fields. The old field and transition zones contained multiflora rose, thistle, golden rod, and upland grasses as the dominant vegetation. The old field areas located adjacent to forested areas provide suitable hunting areas for raptors. White-tailed deer were observed within the boundaries of R4 and red-tailed hawks within the boundaries of R8.

In summary, none of the original potential refuse sites documented in this report contained unique or rare habitat. The steep side slopes and narrow stream valleys of each of the proposed refuse areas limit usage by wildlife species. ATV usage was noted in several of the sites, although no established trail network was noted. Agricultural land use (both present and historic) has altered the landscape, particularly in the valley bottoms. While residential areas tend to be sparse throughout the project area, the distance between them is not so great that wildlife have undisturbed corridors for

movement or areas for resting, cover, or feeding. The dominant plant species identified within each proposed refuse area are generally not mast producing trees that would provide significant food resources for other than a limited number of wildlife species. The site setting (topography, vegetative cover) and present and historic land uses have all contributed to a lack of prime wildlife habitat in all of the originally sampled potential refuse sites.

8.0.2 Alternative Non-High-Quality Refuse Areas

Based upon field observations and aerial photographs, the land use for each of the proposed refuse areas can be categorized as predominantly forested with a combination of residential and agricultural land use minimally dispersed throughout the area. Generally, most riparian buffers are intact. Red maple, sugar maple, red oak, white oak, hickory, American beech, black cherry, and black walnut were the dominant species present in the forested areas. The trees present in this area can benefit different wildlife located in the area by providing food and shelter. They can provide food for mammals such as white-tailed deer, eastern gray squirrel, fox squirrels, and eastern chipmunks. Birds were also observed, such as the red-tailed hawk, crow, northern cardinal, and blue-jay.

While conducting field investigations, several observations of habitat usage were noted. In all of the forested refuse areas, evidence of white-tailed deer was present. Deer trails through the forest were observed as well as countless territorial markings left by male white-tailed deer.

Agricultural uses in these areas consisted mainly of old field or pastures with some livestock present. Residential areas provided structures such as houses and garages with mowed yards present with some bordering the stream banks. These areas fragment the forested areas sporadically, but there are corridors where forest cover is intact allowing wildlife to travel from one section of forest to the other.

9.0 COMPARISON OF POTENTIAL REFUSE AREAS

In comparison with the originally sampled potential refuse sites located within the HQ watershed, the Falling Timber Run (RA #1), UNT to North Fork Dunkard Fork (RA #2), and UNT to Job Creek (RA #5) have a higher macroinvertebrate Biological Score (44.5) compared to the original refuse sites (39.8) located in an HQ-designated watershed. Though not a significantly large difference, this difference potentially indicates a healthier macroinvertebrate community at these Non-HQ designated alternative areas. Falling Timber Run (RA #1), UNT to North Fork of Dunkard Fork (RA #2), and UNT to Job Creek (RA #5) have a lower average pollution tolerance value (3.35) than the original refuse areas (4.81) located within the HQ watershed. A value of 3.35 indicates no apparent organic pollution present. The original refuse sites' average pollution tolerance value (4.81) shows that there is some organic pollution present within the waters. This is to be expected because of the increased use of many of the originally evaluated watersheds for agricultural use.

The total average habitat scores for the original refuse sites and the alternative refuse areas are identical with an average habitat score of fifty-nine (59%). This score falls within the sub-optimal habitat classification range. Individually, the habitat score for the alternative refuse areas (Falling Timber Run (RA #1), UNT to North Fork Dunkard Fork (RA #2), and UNT to Job Creek (RA #5) are higher than some of the original refuse areas specifically R6, R7, R9, and R10. These areas share common characteristics including predominantly forested land use or forested habitat fragmented to varying degrees by agricultural and residential activities. The alternative refuse areas (Falling Timber Run (RA #1), UNT to North Fork Dunkard Fork (RA #2), and UNT to Job Creek (RA #5) contain more forested area than the originally evaluated refuse areas and provide more intact wildlife corridors and habitat. Since the potential refuse areas from the original and alternative sampling areas have similar habitats, a comparison can be made between their potential as suitable refuse disposal areas. The original refuse sites are located within a High-Quality watershed and the alternative refuse areas are within non-HQ watersheds (TSF and WWF). Based on the observations made, the non-HQ areas are of

equal or in some cases healthier condition, including having higher habitat or biological scores, than some of the original refuse areas within the HQ watershed. It can also be said the water quality of the alternative areas are of equal, if not better condition, by the observations made.

In summary, these factors and characteristics of the original refuse sites (R1-R21) and the alternative refuse areas (Falling Timber Run (RA #1), UNT to North Fork Dunkard Fork (RA #2), and UNT to Job Creek (RA #5) are of comparable overall quality. This was determined based on the observations of the Macroinvertebrate Biological Scores, habitat scores, and wildlife observations.

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