



**US Army Corps
of Engineers**
Pittsburgh District

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*East Branch Dam
Elk County, Pennsylvania
Interim Risk Reduction Measures
And Permanent Repairs*

APPENDIX B

Pennsylvania Department of Environmental
Protection, Model Study – Effect of Various
Operating Pools on NPDES Permit Holders
along the Clarion River

Environmental Assessment

Discussion of Modified Operation of East Branch Clarion River Dam on NPDES permits

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NPDES Background

National Pollutant Discharge Elimination System Permits, or more commonly known through the acronym “NPDES”, are federal permits issued under the Authority of the federal Clean Water Act for a fixed term of 5 years. They specify the acceptable quality of wastewater discharges to surface waters via effluent limits, and also contain other legally binding conditions. Many states, including Pennsylvania, have been delegated the authority from the federal government to issue NPDES permits to wastewater discharges within their state. Generally speaking, the most common types of discharges covered by NPDES Permits are from sewage treatment plants, or industrial waste treatment facilities.

In Pennsylvania, the Department of Environmental Protection (DEP) has been delegated the authority from the federal government to issue NPDES permits.

As a key element in Pennsylvania’s Water Quality Management program each NPDES permit which is issued to a point source discharger to surface waters serves several important purposes:

- It authorizes the permittee to discharge to waters of the Commonwealth after appropriate treatment and best management and pollution prevention practices.
- It requires the permittee to achieve an acceptable quality of effluent prior to discharge, and contains additional conditions for authorization.
- It specifies the type and frequency of self-monitoring and reporting which the permittee must perform in order to demonstrate to the Department that compliance with discharge limitations is being achieved.
- Where applicable, it establishes a schedule for achieving compliance with discharge limitations and other requirements.
- It serves as the basic legal reference document when it becomes necessary to take enforcement actions against the permittee.

Types of Effluent Limitations in NPDES Permits

In Pennsylvania, the development and specification of effluent limitations in NPDES permits must be done in a manner consistent with the Department’s Rules and Regulations, EPA’s NPDES Program Regulations 40 CFR 122-125, EPA’s Effluent Limitation Guidelines 40 CFR 400-473, and applicable State and EPA policies and guidance. NPDES permit requirements must also conform to applicable regulatory standards of river basin commissions such as the Delaware River Basin Commission (DRBC), the Susquehanna River Basin Commission (SRBC), and the Ohio River Valley Sanitation Commission (ORSANCO).

Under the above mentioned regulatory framework, there are several different types of effluent limitations which may be specified in NPDES permits:

1. **Technology-based limitations** represent the basic minimum degree of treatment which must be achieved by all dischargers on a nationwide basis as defined in Section 301 of the Clean Water Act.
2. **Water quality-based limitations** are those which are necessary to meet state water quality standards. They are developed on a case-by-case basis, depending on the location and type of discharge and receiving stream characteristics. Water quality-based limitations may be more or less stringent than technology-based limitations.
3. **Effluent Standards** represent uniform effluent quality requirements for certain types of discharge situations. Effluent standards are generally popular with agencies such as DRBC and ORSANCO as one method of specifying minimum degrees of treatment required as part of their respective basin management plans
4. **Best Management Practices** as effluent limitations.

In summary, effluent limitations in NPDES permits must reflect the more stringent of the above requirements, as applicable (i.e. technology-based, water quality-based, or effluent standard-based), for each pollutant of concern.

Basic Water Quality Modeling Principles

Various types of water quality models are used by DEP to determine water quality based effluent limitations. A water quality model mathematically simulates the fate and transport of a nonconservative pollutant once it enters a receiving body of water. The selection of an appropriate water quality model depends upon the nature of the pollutant of concern. DEP has several different computer based models in routine use.

For modeling purposes, DEP uses as the stream flow that is available for dilution, the minimum seven-consecutive-day average flow which occurs at a statistical frequency of once in ten years, (otherwise shortened as “Q7-10”), unless otherwise specified in applicable regulations and policies.

The use of Q7-10 provides a desirable level of protection for the beneficial uses identified for surface waters. The most sensitive water uses, including water supply, aquatic life, and water contact sports, would be adversely impacted if water quality violated the established criteria during periods of low stream flow. Natural stream flows will normally exceed Q7-10 approximately 99% of the time. In other words, in-stream water quality will be better than the adopted criteria most of the time, if waste discharges are in compliance.

NPDES discharges to the East Branch and mainstem Clarion River of concern

The Army Corps of Engineers (“ACOE”) requested the PaDEP evaluate the impacts of various lower pool levels and potentially decreased streamflows on NPDES discharges to the Clarion River below the East Branch Dam. There are several sewage treatment plant

discharges, and one major industrial waste discharge, that DEP evaluated in this regard. They are as follows:

Name of NPDES discharger:	Discharges to:
Domtar Paper Mill - IW	Mainstem Clarion River
Johnsonburg Boro – STP	Mainstem Clarion River
Ridgway Boro - STP	Mainstem Clarion River
Pa American Water Company – IW	Mainstem Clarion River
Clarion Boro – STP	Mainstem Clarion River
STP = Sewage Treatment Plant	
IW = Industrial Waste Treatment Plant	

All of the above discharges basically rely on a certain level of dilution in the Clarion River. Based on how the ACOE released water from the East Branch Clarion River dam in the past, DEP has traditionally used a value of 80 cubic feet per second (cfs) at Johnsonburg as the minimum streamflow to calculate NPDES effluent limits. The 80 cfs is therefore considered the Q7-10 streamflow value as described above. As one progresses downstream of the East Branch dam, and drainage area into the River increases, a certain amount of additional streamflow becomes available. Essentially this means DEP uses 80 cfs as a minimum streamflow available for dilution at Johnsonburg, and higher values for downstream discharges as drainage area increases.

Impacts to NPDES Permits at reduced pool levels and reduced streamflows

The ACOE has indicated to PaDEP that it may become necessary to reduce the operating pool levels of the East Branch Dam lake even further during the interim control strategy. This could mean a reduction in the dam release flows, and lower streamflows than 80 cfs occurring in the Clarion River at Johnsonburg, especially during extended drought periods.

As stated earlier, DEP has traditionally used a minimum streamflow of 80 cfs at Johnsonburg to calculate effluent limits that should be protective of the Clarion River. However, the ACOE has asked the DEP to evaluate how the NPDES permit effluent limits for the above facilities might change at lower streamflows, and if it would cause these entities to fall into non compliance with their NPDES permits. The ACOE is also inquiring whether lower streamflows could cause adverse water quality impacts if these entities continued to discharge wastewater at existing flowrates and quality.

Impacts from releases of 30-60 cfs from East Branch Dam

Looking at the expected reservoir releases provided by the ACOE during “average year” conditions for the various pool levels, DEP expects the effluent limits for all the above discharges except Domtar Paper would be such that the facilities could still comply with them. For example, at a minimum streamflow of 30 cfs in the Clarion River at Johnsonburg, both the Johnsonburg STP and the Ridgway STP would receive effluent

limits they most likely could still achieve. The Clarion STP and Pa American Water NPDES limits would likely be unaffected. For Domtar paper, however, any River flows less than 80 cfs would mean Domtar would need to re-evaluate, at a minimum, the possible thermal impacts from its' 14+ million gallons per day discharge. The Paper mill in the past, completed several very expensive aquatic studies that concluded the main discharge was not having an adverse impacts on the aquatic life in the River. If the ACOE were to change reservoir release rates and the flow dynamics in the River to the point that the expected minimum river flows at Johnsonburg were less than 80 cfs, Domtar paper would likely need to re-visit and re-do their thermal studies. In that case, there is no guarantee the new thermal studies would show no adverse impacts at much lower River flows.

Impacts from zero outflow releases from East Branch Dam

The ACOE has predicted that during East Branch lake pool levels of 1610', and an extended drought condition, there could be as much as 3 months of zero outflow from the dam. DEP interprets this to mean that flows in the Clarion River would be at an absolute minimum, consisting of only natural drainage into the watershed, with no flow augmentation from the dam releases. DEP estimates the low flow in the mainstem Clarion would be around 20 cfs. DEP re-calculated the effluent limits necessary to protect the Clarion at this streamflow for the above listed dischargers.

For the Domtar paper mill, it is safe to say that these "new" effluent limits would be completely unachievable considering the paper mill's existing wastewater treatment facilities. Taking it a step further, if the paper mill continued to discharge its' effluent at existing flowrates (around 14 million gallons per day) and quality, DEP predicts the River would be severely impacted, as the streamflow just would not be there to properly dilute and assimilate the wastewater. As the paper mill's discharge contains oxygen demanding substances, heat, organic compounds, etc., there are many different pollutants that could harm the River's aquatic and human health uses if the Clarion streamflow were to reach 20 cfs.

The Domtar paper mill has many effluent limits that are considered water-quality based (see above definition). This means in simplest terms, the more dilution a discharge has, the higher (and more lenient) the NPDES limits will be. The more the flow in the Clarion River decreases, the more stringent the Domtar NPDES limits will become.

The Johnsonburg and Ridgway sewage treatment plants ("STPs") would also receive effluent limits far more stringent than those in their existing NPDES permits, if the streamflow were reduced to 20 cfs. However, the existing treatment technologies at those STPs could possibly still allow them to remain in compliance.

The Pa American Water Company industrial waste discharge NPDES limits (from the water treatment facility) would likely be unaffected at a streamflow of 20 cfs at Johnsonburg, as their discharge is near the City of Clarion many miles downstream. The streamflow accrued between Johnsonburg and Clarion would offer enough dilution to

keep their NPDES limits the same. This company also withdraws water from the Clarion to make potable water; the reduced flows may impact their ability to withdraw enough water to satisfy community needs (that issue is being addressed separately).

The Clarion STP effluent discharge is to an impounded area of the River (due to Piney Dam). As long as an impounded area exists, the NPDES effluent limits for the STP would remain unchanged if the streamflows were reduced. Similar to Pa American, there is enough natural flow accrued between Johnsonburg and Clarion that it is likely the STP discharge would still be to an impounded area.