



October 15, 2018

Tennessee Valley Authority
1101 Market Street
Chattanooga, Tennessee 37402

**Engineer's Certification of Wetlands Location Demonstration
Gypsum Disposal Area, Gypsum Disposal Area Stilling Pond, and Gypsum Disposal Area Stilling
Pond 2
EPA Final CCR Rule
TVA Paradise Fossil Plant
Drakesboro, Kentucky**

1.0 PURPOSE

The purpose of this document is to certify that the Wetlands Location Restriction Demonstration for the TVA Paradise Fossil Plant Gypsum Disposal Area, Gypsum Disposal Area Stilling Pond 1, and Gypsum Disposal Area Stilling Pond 2 are in compliance with the Wetlands location requirements specified in the EPA Final CCR Rule at 40 CFR §257.61.

2.0 BACKGROUND

As required by 40 CFR §257.61 of the EPA Final CCR Rule, the owner or operator of an existing surface impoundment must demonstrate that the unit must not be located in wetlands, as defined in 40 CFR §232.2, unless the owner or operator demonstrates that the CCR unit meets the requirements of paragraphs 40 CFR §257.61(a)(1) through (a)(5). Pursuant to § 257.61(c)(1), the owner or operator of an existing CCR surface impoundment must complete the demonstration no later than October 17, 2018.

3.0 SUMMARY OF FINDINGS

In accordance with §257.61(a), the Gypsum Disposal Area, Gypsum Disposal Area Stilling Pond, and Gypsum Disposal Area Stilling Pond 2 comply with specified state and federal programs, including the Clean Water Act (CWA) and Kentucky Pollutant Discharge Elimination System (KPDES). In addition, based on field delineations and desktop reviews performed by AECOM, no known threatened and endangered (T&E) species have been noted within the site. Gypsum Disposal Area, Gypsum Disposal Area Stilling Pond 1 and Gypsum Disposal Area Stilling Pond 2 meet the requirements of 40 CFR §257.61(a).

According to Paradise CCR Management Operations Environmental Assessment (TVA), there are no known aquatic and/or marine mammals present within Muhlenberg County that are listed in the Marine Mammal Protection Act. The attached Wetland Study (AECOM 2017) determined the wetland soils do not pose erosion stability or migration concern, and closure construction is not expected to result in any substantial impacts to populations of wildlife species. The existing surface impoundments are not anticipated to have significant effects on the surrounding environment from a catastrophic release, based on the calculated factors of safety performed by GEI in 2016.

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4.0 Qualified Professional Engineer Certification

I, Nicholas Golden, being a Professional Engineer in good standing in the State of Kentucky, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this certification has been prepared in accordance with generally accepted engineering practices; that the information contained herein is accurate as of the date of my signature below; and that Gypsum Disposal Area, Gypsum Disposal Area Stilling Pond 1 and Gypsum Disposal Area Stilling Pond 2 meet the requirements of 40 CFR §257.61(a).

SIGNATURE  _____

DATE 10/15/18

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ATTACHMENTS: Engineer's Certification of Wetlands Location Demonstration (40 CFR §257.61) for Coal Combustion Residuals (CCR) Existing Surface Impoundments - Gypsum Disposal Area, Gypsum Disposal Area Stilling Pond 1 and Gypsum Disposal Area Stilling Pond 2



COAL COMBUSTION PRODUCT DISPOSAL PROGRAM

TENNESSEE VALLEY AUTHORITY – PARADISE FOSSIL PLANT
GYPSUM DISPOSAL AREA, GYPSUM DISPOSAL AREA STILLING POND 1 AND
GYPSUM DISPOSAL AREA STILLING POND 2
DRAKESBORO, KENTUCKY

ENGINEER'S CERTIFICATE OF WETLANDS LOCATION DEMONSTRATION (40 CFR §257.61) FOR COAL COMBUSTION RESIDUALS (CCR) EXISTING SURFACE IMPOUNDMENTS

Prepared for



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1101 Market Street
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October 15, 2018 – Rev 0

Prepared by
AECOM





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1.0 INTRODUCTION

1.0 OBJECTIVE

The purpose of this demonstration is to evaluate compliance with 40 Code of Federal Regulations (CFR) §257.61 of the Environmental Protection Agency Final Coal Combustion Residual Rule (EPA Final CCR Rule). This Wetland Location Restriction Demonstration is based on existing documentation such as construction drawings, record drawings, and any other pertinent data and/or investigations to support historic conditions and operations at Gypsum Disposal Area, Gypsum Disposal Area Stilling Pond 1 and Gypsum Disposal Area Stilling Pond 2 at the Tennessee Valley Authority (TVA) Paradise Fossil Plant (PAF). Supporting documentation for this demonstration is located in the attached appendices.

1.2 RULE REQUIREMENTS

40 CFR § 257.61(a) *New CCR Landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetland, as defined in 232.2 of this chapter, unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that the CCR unit meets the requirements of paragraphs (a)(1) through (a)(5) of this section*

40 CFR § 257.61(a)(1) *Where applicable under section 404 of the Clean Water Act or applicable state wetland laws, a clear and objective rebuttal of the presumption that an alternative to the CCR unit is reasonably available that does not involve the wetlands.*

40 CFR § 257.61(a)(2) *The construction and operation of the CCR unit will not cause or contribute to any of the following:*

- (i) A violation of any applicable state or federal water quality standard;*
- (ii) A violation of any applicable toxic effluent standard or prohibition under section 307 of the Clean Water Act;*
- (iii) Jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of a critical habitat*
- (iv) A violation of any requirement under the Marine Protection, Research, and Sanctuaries Act of 1972 of the protection of a marine sanctuary.*

40 CFR § 257.61(a)(3) *The CCR unit will not cause or contribute to significant degradation of wetlands by addressing all of the following factors:*

- (v) Erosion, stability, and migration potential of native wetland soils, muds, and deposits used to support the CCR unit;*
- (vi) Erosion, stability, and migration potential of dredged and fill materials used to support the CCR unit;*
- (vii) The volume and chemical nature of the CCR;*
- (viii) Impacts on fish, wildlife, and other aquatic resources and their habitat from release of CCR;*
- (ix) The potential effects of catastrophic release of CCR to the wetland and the*



- resulting impacts on the environment; and*
- (x) *Any additional factors, as necessary, to demonstrate that ecological resources in the wetland are sufficiently protected.*

40 CFR § 257.61(a)(4) *To the extent required under section 404 of the Clean Water Act or applicable wetlands laws, steps have been taken to attempt to achieve no net loss of wetlands laws, steps have been taken to attempt to achieve no net loss of wetlands (as defined by acreage and function) by first avoiding impacts to wetlands to the maximum extent reasonable as required by paragraphs (a)(1) through (3) of this section, then minimizing unavoidable impacts to the maximum extent reasonable and finally offsetting remaining unavoidable impacts to the maximum extent reasonable, and finally offsetting remaining unavoidable wetland impacts through all appropriate and reasonable compensatory mitigation actions (e.g., restoration of existing degraded wetlands or creation of man-made wetlands).*

40 CFR § 257.61(a)(5) *Sufficient information is available to make a reasoned determination with respect to the demonstration in paragraphs (a)(1) through (4) of this section. For an existing surface impoundment, the owner or operator must complete the demonstration no later than October 17, 2018.*

40 CFR § 257.61(b) *The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the demonstration meets the requirements of paragraph (a) of this section.*

40 CFR § 257.61(c) *The owner or operator of the CCR unit must complete the demonstrations required by paragraph (a) of this section by the date specified in (c)(1) or (c)(2) of this section,*

40 CFR § 257.61(c)(1) *For an existing CCR surface impoundment, the owner or operator must complete the demonstration no later than October 17, 2018.*

40 CFR § 257.61(c)(2) *For a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit, the owner or operator must complete the demonstration no later than the date of initial receipt of CCR in the CCR unit.*

40 CFR § 257.61(c)(3) *The owner or operator has completed the demonstration required by paragraph (a) of this section when the demonstration is placed in the facility's operating record as required by §257.105(e).*

40 CFR § 257.61(c)(4) *An owner or operator of an existing CCR surface impoundment who fails to demonstrate compliance with the requirements of paragraph(a) of this section by the date specified in paragraph (c)(1) of this section is subject to the requirements of §257.101(b)(1).*

40 CFR § 257.61(d) *The owner or operator must comply with the recordkeeping requirements*

specified in 40 CFR § 257.105(e), the notification requirements specified in 40 CFR § 257.106(e), and the internet requirements specified in 40 CFR § 257.107(e).

Hereafter, *italicized text* is copied verbatim from the EPA Final CCR Rule 40 CFR § 257.62 for clarity of discussion, each response in regard to the regulation in the following sections is provided in non-italicized text.

1.1 SITE DESCRIPTION

PAF is located in Drakesboro, Kentucky along the west bank of the Green River and State Route 176. The plant sits inside the eastern border of Muhlenberg County as depicted below in **Figure 1**. The plant features three units, completed between 1963 and 1970, and three large natural-draft cooling towers. Units 1 and 2 at PAF were retired in 2017.

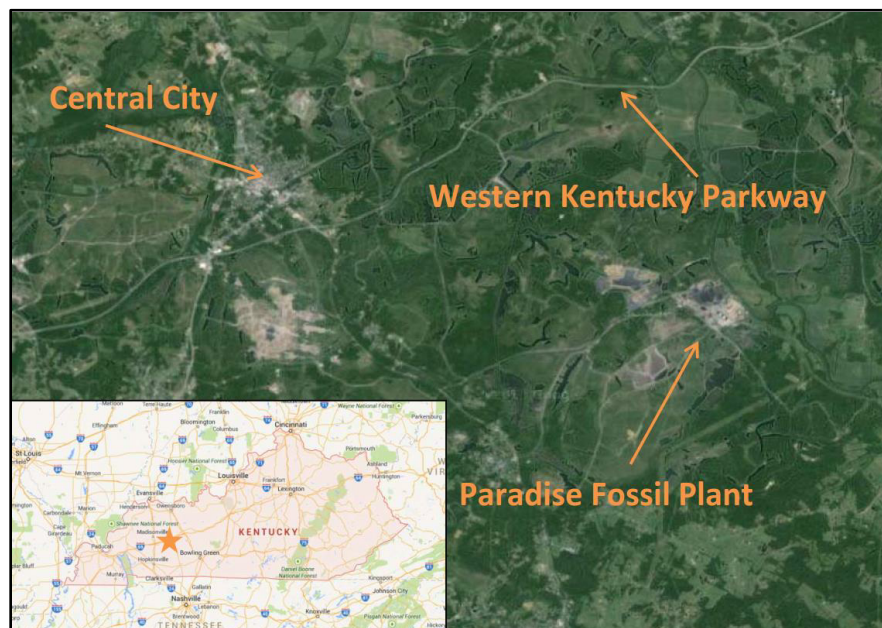


Figure 1: TVA PAF Site Location

The collective Gypsum Disposal Area is approximately 225 acres in area and partially enclosed by a 1.4 mile long dike with a maximum height of approximately 62 feet. The Gypsum Disposal Area currently serves as a disposal facility for gypsum and fly ash. Stilling Ponds 1 & 2 receive process water and stormwater drainage from the Gypsum Disposal Area and the surrounding Drainage Area. Figure 2 shows a current aerial of the collective Gypsum Disposal Area and the Peabody Ash Pond where the collective area eventually drains.



Figure 2: Site Overview

2.0 ASSESSMENT OF SITE WETLANDS

2.1 LOCATION AND CONDITION OF WETLANDS

According to 40 CFR §257.61(a) of the EPA Final CCR Rule, any existing CCR surface impoundments must not be located in wetlands, as defined in 40 CFR § 232.2. By definition of 40 CFR § 232.2, the term wetlands means 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. Wetlands generally include swamps, marshes, bogs, and similar areas. AECOM performed a wetlands delineation examining areas within the parameters of the word wetlands as defined in 40 CFR § 232.2 and those adjacent.

AECOM wetlands delineation was performed in accordance with the procedures outlined in the Corps of Engineers Wetland Delineation Manual (1987) as well as the regional supplement for the eastern mountains and Piedmont Region (2008) report in Appendix A. Site modifications have resulted in the water features (ponds) including wetlands and streams. Open water wetlands and a stream were preliminarily identified by the NWI map. The entire site was then walked to determine if wetlands were present, particularly within the breach zone and downgradient of the ponds. The breach zone occupies approximately 175 to 200 acres of the 350 acres wetland study area.



3.0 IMPACTS

The 2017 Wetland Determination performed by AECOM assessed the potential impacts of a breach within the 350 acre wetland study area. A review of literature and maps of the site show seven potential wetlands, four ponds, one stream and four ephemerals potentially present in the breach zone (see Figure 4). A modeled breach analysis indicates the following impacts may be anticipated:

- Pond Surface – 0.2 ac
- Wetland Area – 8.41 ac
- Linear Wetland – 0
- Stream – 1,000 feet

The wetland delineation further identified all linear features (linear wetlands and streams) are jurisdictional.

3.1 40 CFR §257.61(A)(1) – LOCATION ALTERNATIVES

40 CFR §257.61(a)(1), Where applicable under section 404 of the Clean Water Act or applicable state wetland laws, a clear and objective rebuttal of the presumption that an alternative to the CCR unit is reasonably available that does not involve the wetlands must be made.

TVA Paradise Fossil Plant began operating in 1963. TVA issued the drawings for Gypsum Stack Ash Pond (renamed Gypsum Disposal Area) original embankments for construction in 1985. Prior to the construction of the CCR impoundment, the land was previously used for strip mining activities. The surface impoundment is not considered a wetland as the area the Gypsum Disposal Area is built on is located over previous strip mining activities. The area itself is not a wetland, furthermore, by definition surface impoundments are waste treatment systems.

3.2 40 CFR §257.61(A)(2)(I&II) APPLICABLE WATER QUALITY STANDARDS

(2) The construction and operation of the CCR unit will not cause or contribute to any of the following: (i) A violation of any applicable state or federal water quality standard; (ii) A violation of any applicable toxic effluent standard or prohibition under section 307 of the Clean Water Act;

In accordance with the EPA Final CCR Rule all applicable impoundments that have the potential to impact wetlands, must comply with the regulatory standards set forth in all applicable governing documents. In examination of the Final CCR Rule, the Gypsum Disposal Area complies with required state and federal programs, including the Clean Water Act (CWA) and Kentucky Pollutant Discharge Elimination System (KPDES).



3.2.1 KENTUCKY ADMINISTRATIVE REGULATIONS (KAR)

Surface water quality in the State of Kentucky is regulated, in part, by 401 KAR 10:031. These standards set the surface water quality criteria and list the maximum allowable concentrations for specific pollutants. These regulations will supersede the federal standards where more stringent. Kentucky also has an antidegradation policy (401 KAR 10.030) for surface waters of notable quality (i.e., categorized as an outstanding national resource water (ONRW), exceptional water). State regulations are incorporated as conditions on the issued NPDES/KPDES permit for the facility.

Historically, the issued Kentucky Division of Waste Management permit for special waste sites or facilities, requires groundwater monitoring in accordance with 401 KAR 45:160 with site specific monitoring limits set for pollutants of concern as part of the issued permit. In addition, the CCR Rule requires stringent monitoring of groundwater to determine if wells around the CCR Unit have significantly elevated concentrations of several metals, as compared with background concentrations.

3.2.2 40 CFR §257.61(A)(2)(ii) APPLICABLE EFFLUENT LIMITATIONS

40 CFR §257.61(a)(2)(ii) A violation of any applicable toxic effluent standard or prohibition under section 307 of the Clean Water Act;

TVA is required under KPDES Permit No. KY0004201 to meet pH, total suspended solids, oil and grease, and chronic whole effluent toxicity limits prior to discharge (KPDES Permit). The Gypsum Disposal Area, outlets to the Peabody Ash Pond before discharging via Outfall 001. The KPDES permit also requires monitoring for a series of total recoverable metals including antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc (KPDES 2004). **Table 1** below displays the effluent limitations set forth in KPDES Permit No. KY0004201 for the Gypsum Disposal Area via Outfall 001.

The Peabody Ash Impoundment provides settling of suspended solids, ammonia removal, and limited metals precipitation from the Gypsum Disposal Area, before treated water flows to a stilling impoundment for further settling. Effluent (about 33 MGD) from the stilling impoundment is discharged into Jacobs Creek through KPDES Outfall 001 (see attached Figure in **Appendix A**). Normal operating conditions can result in lower discharge flows in the range of 17 to 20 MGD. The pH of effluent discharged from the Gypsum Disposal Area generally ranges from 6.0 to 9.0; however a CO₂ system is in place to provide pH control when needed to meet discharge limits.



Table 1. KPDES Permit No. KY0004201 Effluent Limitations – Outfall 001

Effluent Characteristic	Reported Monthly Average	Discharge Daily Maximum	Proposed Monthly Average	Proposed Daily Maximum	Applicable Water Quality Criteria and/or Effluent Guidelines
Flow (MGD)	29	59	Report	Report	401 KAR 5:065, Section 2(8)
Total Suspended Solids (mg/l)	6.72	190	30	74	401 KAR 5:065, Sections 4 and 5
Oil & Grease (mg/l)	5.01	8.0	11	13	401 KAR 5:065, Sections 4 and 5
Hardness (as mg/l CaCO ₃)	496	693	Report	Report	401 KAR 5:065, Section 2(8)
Total Recoverable Metals (mg/l)	0.122	0.255	Report	Report	401 KAR 5:065, Section 2(8)
Chronic Toxicity (TU _c)	N/A	<3.40	N/A	1.00	401 KAR 5:029, Section 4
pH (standard units)	7.0	8.9	6.0	9.0	401 KAR 5:031, Section 2

Effluent limitations established in KPDES Permit KY0004201 are managed through existing facilities, Best Management Practices (BMPs), and inspections. TVA has established an Inspection Program that includes weekly, informal, intermediate, and formal inspections. Weekly inspections, as required by the Final CCR Rule are conducted for all CCR surface impoundments, landfills, and lateral expansions. In addition, informal inspections may be performed by operations and maintenance personnel. Intermediate inspections are performed annually by a registered professional engineer. Formal inspections are required to verify the integrity of all dams and structures at an interval not to exceed 5 years. TVA has consistently met the effluent discharge limits set in KPDES Permit KY0004201, no NPDES exceedances have been documented.

3.3 40 CFR §257.61(A)(2)(III) ENDANGERED AND THREATENED SPECIES

(2) The construction and operation of the CCR unit will not cause or contribute to any of the following: (iii) Jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of a critical habitat, protected under the Endangered Species Act of 1973

In Accordance with 40 CFR § 257.61(a)(2)(iii) the owner or operator must ensure that the impoundment does not jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of a critical habitat, protected under the Endangered Species Act of 1973. Much of the area of PAF has been impacted and altered as a result of construction and operation of the existing impoundment. Plant communities within the project area have been heavily disturbed.

The primary aquatic environments related to the PAF CCR actions include Jacobs Creek and the Green River. The Green River adjacent to PAF is characterized as having steep banks with limited suitable spawning habitat for fishes. TVA collected fish from the PAF intake structure as part of the CWA Section 316(b). TVA sampled fish upstream and downstream of PAF. The most



abundant species downstream of PAF were emerald shiner (20 percent), bullhead minnow (18 percent), spotfin shiner (15 percent), and bluegill (15 percent). Upstream of PAF, 887 fish (37 species) were collected. The most abundant species upstream of PAF were Mississippi silvery minnow (32 percent), emerald shiner (17 percent), and gizzard shad (11 percent) (TVA 2012a).

Each of the seven state and/or federally listed freshwater mussel species is known to occur within Muhlenberg County and has been recorded within a 5-mile radius of PAF. The mussel species require perennial freshwater riverine and/or reservoir systems. As none of the CCR management project areas contain a riverine system, none of the listed mussel species are expected to occur within the project areas. The pocketbook, although a generalist species, is unlikely to inhabit any of the ash impoundments at PAF due to the poor water quality and frequent disturbance.

As ash impoundments are considered treatment systems and not aquatic habitat, direct impacts to aquatic habitat would primarily be avoided with closure activities. There are no aquatic habitats within the proposed borrow areas, thus direct impacts to aquatic biota from the removal of material from these areas are not anticipated. Should minor alterations of surface waters be required to support construction activities (e.g., culverted crossing of drainage that leads to Jacobs Creek for construction access), any activities within areas containing aquatic resources would be appropriately permitted and would utilize approved BMPs.

Indirect impacts to aquatic resources of adjacent water bodies (i.e., Jacobs Creek and the Green River) may be associated with storm water runoff due to temporary construction activities associated with site preparation and closure activities and dewatering of the ash impoundments. Ash impoundment dewatering activities would temporarily increase flow to Jacobs Creek and the Green River. Aquatic biota would be displaced temporarily due to increased flows, but would quickly re-establish following dewatering activities. Any construction activities would adhere to permit limit requirements and would utilize BMPs to minimize indirect effects on aquatic resources during the construction phase. Following the construction phase, care and maintenance of the approved closure system and site-wide management of storm water using appropriate BMPs would minimize indirect impacts to the aquatic community in the receiving waters.

Based on the use of an approved outfall structure in accordance with the KPDES permit for wastewater discharge and the use of appropriate BMPs to control storm water runoff, impacts to aquatic resources as a result of the ash impoundment closure are expected to be minor.

The ash impoundment offers a suitable habitat and foraging opportunities for water birds, amphibians, and mammals. Despite the continual disturbance of the ponds, wildlife using them include black ducks, mallards, great blue herons, Canada geese, and beavers (TVA 2003 and 2004a). Several migratory bird species of concern are listed in the region surrounding PAF. These include bald eagle, Bell's vireo, blue-winged warbler, cerulean warbler, chuck-will's-widow, dickcissel, fox sparrow, Kentucky warbler, least bittern, loggerhead shrike, prairie warbler, prothonotary warbler, red-headed woodpecker, rusty blackbird, short-eared owl, willow



flycatcher, wood thrush, and worm eating warbler (USFWS 2016b). The heavy industrialized and disturbed land uses in the immediate project vicinity likely limit the use of these areas by these species. The following species are identified by USFWS as threatened or endangered and have potential to occur in Muhlenberg County, Kentucky.

- Eastern Hellbender (*Cryptobranchus Alleganienis*) – Endangered
- Broad-winged Skipper (*Poanes Viator*) – Threatened
- Elusive Clubtail (*Stylurus Notatus*) – Endangered
- Great Egret (*Ardea Alba*) – Threatened
- Short-eared Owl (*Asio Flammeus*) – Endangered
- Long-eared Owl (*Asio Otus*) – Endangered
- Lark Sparrow (*Grammacus*) – Threatened
- Northern Harrier (*Circus Cyaneus*) – Threatened
- Common Gallinule (*Gallinula Galeata*) – Threatened
- Bald Eagle (*Haliaeetus leucocephalus*) – while not currently listed as threatened or endangered, the Bald Eagle is protected under the Bald and Golden Eagle Protection Act. No designated critical habitat is located in the vicinity of the CCR unit.
- Least Bittern (*Lxobrychus Exilis*) – Threatened
- Hooded Merganser (*Lophodytes Cucullatus*) – Threatened
- Indiana Bat (*Myotis Sodalis*) – Endangered
- Northern Long-eared Bat (*Myotis Septentrionalis*) – Endangered
- Southeastern Bat (*Myotis Austroriparius*) – Endangered
- Gray Bat (*Myotis Griseszens*) – Threatened

Multiple threatened and endangered species have been spotted within 5 miles of the TVA PAF Plant. No eminent threat to these species are expected as no nesting or dwellings have been identified within proximity of the impoundment/facility. As such the facility was built prior to the establishment of the Endangered Species Act and any continued modifications to the facility have been constructed in accordance with the Corps of Engineers and EPA.

3.4 40 CFR §257.61(A)(2)(IV) MARINE PROTECTION ACT

(2) The construction and operation of the CCR unit will not cause or contribute to any of the following: (iv) A violation of any requirement under the Marine Protection, Research, and Sanctuaries Act of 1972 for the protection of a marine sanctuary

The 1972, Marine Mammal Protection Act was enacted to protect all marine mammals, including cetaceans (whales, dolphins, and porpoises), pinnipeds (seals and sea lions), sirenians (manatees and dugongs), sea otters, and polar bears within the waters of the United States. The act establishes an ending on the taking and importation of marine mammals and marine mammal by products. According to Table 2, Endangered, Threatened, Proposed & Candidate Species in Muhlenberg County, Kentucky, there are no known aquatic and/or marine mammals present within Muhlenberg County that are found in the Marine Mammal Protection Act.

3.5 §257.61(A)(3)(I&II) EROSION, STABILITY, AND MIGRATION POTENTIAL

3) The CCR unit will not cause or contribute to significant degradation of wetlands by addressing all of the following factors: (i) Erosion, stability, and migration potential of native wetland soils, muds and deposits used to support the CCR unit; (ii) Erosion, stability, and migration potential of dredged and fill materials used to support the CCR unit;

TVA monitors for potential erosion and stability issues, pursuant to 40 CFR § 257.83, and addresses them when/if identified. Inspection requirements of 40 CFR § 257.83 are as follows:

- Weekly visual inspections must be performed to identify any potential structural issues that could negatively affect the function or safety of the CCR Unit.
- Weekly inspections of all hydraulic discharges are also required weekly, observing for any indication of abnormal coloration of discharge, as well as any debris or sediment in discharge.
- Monthly inspections are required of all CCR Unit instrumentation

The wetland study determined the wetland soils within the 350 acres do not pose an erosion stability or migration concern.

Based on the Initial Structural Stability Assessment performed by AECOM in 2016 and the Safety Factor Assessment performed by GEI Consultants in 2016 show no erosion or migration potential. The Safety Factor Assessment results are greater than or equal to the required safety factors specified in 40 CFR § 257.73. The Structural Stability Assessment reiterates the results of the Safety Factor Assessment noting the structures within the impoundment meet the requirements of 40 CFR § 257.73.



3.6 40 CFR §257.61(A)(3)(III) CCR VOLUME AND CHEMICAL NATURE

(3) The CCR unit will not cause or contribute to significant degradation of wetlands by addressing all of the following factors: (iii) The volume and chemical nature of the CCR

The Gypsum Disposal Area was designed to accommodate about 13.7 million cubic yards of CCR (fly ash, bottom ash, and gypsum). Previous chemical testing of this CCR material has been conducted. The impoundment does not include a liner. The Gypsum Disposal Area has been used for gypsum disposal since 1986. The facility was initially operated as a gypsum pond until 1996 when the complex was converted to a wet stacking facility.

3.7 §257.61(A)(3)(V) FISH AND WILDLIFE IMPACTS

(3) The CCR unit will not cause or contribute to significant degradation of wetlands by addressing all of the following factors: (iv) Impacts on fish, wildlife, and other aquatic resources and their habitat from release of CCR

According to the KSNPC, 45 species of conservation concern occur in Muhlenberg County (Table 2 attached) (KSNPC 2015). A review of the TVA Regional Natural Heritage database in November 2016 indicated that of those species listed by USFWS and KYNPC, 21 species are currently known or have been known to occur within a 5-mile radius of PAF (as indicated by asterisks in Table 2 attached). The wildlife communities associated with these habitats are common and do not support unique or rare wildlife species. Wildlife species present in the more developed portions of the site include those often associated with human presence such as the European starling, house sparrow, killdeer, and rock dove. The more heavily vegetated areas support a more diverse community of wildlife adapted to early successional habitats. Wildlife species present in the successional habitats likely include American crow, eastern mole, red fox, raccoon, Virginia opossum, eastern box turtle and northern ringneck snake. Of the 45 species listed in Table 2, the 30 listed as threatened and endangered species were discussed in section 2.2.3.

Based on the use of an approved outfall structure in accordance with the KPDES permit for wastewater discharge and the use of appropriate BMPs to control storm water runoff, impacts to aquatic resources and wildlife as a result of the ash impoundment closure are expected to be minor.

The modeled breach analysis (see attached) was performed to further assess the potential impact a breach event would have on the environment within the designated 350 acre wetland study area. The breach analysis determined 8.41 acres of wetlands, 1,000 feet of streams and 0.2 acres of ponds have the potential to be affected. As noted in the Initial Structural Stability Assessment (AECOM 2016) no impact is expected as the impoundment meets or exceeds the specified factors of safety, indicating no release is anticipated. The area of potential impact is constantly monitored and any potential impact would be mitigated immediately.



3.8 §257.61(A)(3)(V) POTENTIAL EFFECTS FROM A CATASTROPHIC RELEASE (ENVIRONMENTAL IMPACTS)

(3) The CCR unit will not cause or contribute to significant degradation of wetlands by addressing all of the following factors: (v) The potential effects of catastrophic release of CCR to the wetland and the resulting impacts on the environment

The EPA Final CCR Rule requires that the Gypsum Disposal Area will not cause or contribute to significant degradation of wetlands and the environment due to the potential effects from a catastrophic release of CCR. A breach analysis (Appendix A) to determine the extent of a catastrophic release was conducted. The breach analysis determined 8.41 acres of wetlands have the potential to be affected. In the unlikely but hypothetical event of a failure, the potential inundation area identified in the breach analysis and wetlands therein could be flooded in water and CCR material. Additionally, CCR material could be carried downstream in Jacobs Creek. Trees and other vegetation as well as any existing wildlife in the area inundated by the breach would be impacted. However, while there are potential wetlands within the footprint of the breach extents that would likely be affected by a catastrophic release, the likelihood of a release is minimal for the following reasons.

Gypsum Disposal Area is subject to TVA's CCP Storage Facilities Inspection Program. The inspection program includes scheduled formal, intermediate, and informal inspections as well as unscheduled special (emergency) inspections. Additionally, TVA plant personnel make daily observations and perform weekly reviews of the disposal areas. Maintenance is performed on an as-needed basis, and TVA all documents repair and maintenance activities.

TVA has an Emergency Action Plan (EAP) in the unlikely event of a catastrophic failure of the CCR unit. As per the EAP, the Plant Shift Operations Supervisor (SOS) will coordinate with the Civil Construction Field Supervisor/ Construction Manager in the event of a safety emergency to (among other duties) "Assess the possible hazards to human health and the environment due to the release."

As the Gypsum Disposal Area meets or exceeds structural design thresholds, there is little to no risk of a catastrophic failure. Thus, the threat to wetlands from such a release is minimal.

3.9 40 CFR §257.61(A)(4) - WETLAND MITIGATION

40 CFR § 257.61(a)(4) To the extent required under section 404 of the Clean Water Act or applicable wetlands laws, steps have been taken to attempt to achieve no net loss of wetlands laws, steps have been taken to attempt to achieve no net loss of wetlands (as defined by acreage and function) by first avoiding impacts to wetlands to the maximum extent reasonable as required by paragraphs (a)(1) through (3) of this section, then minimizing unavoidable impacts to the maximum extent reasonable and finally offsetting remaining unavoidable impacts to the maximum extent reasonable, and finally offsetting remaining unavoidable wetland impacts



through all appropriate and reasonable compensatory mitigation actions (e.g., restoration of existing degraded wetlands or creation of man-made wetlands).

No mitigation is expected during the closure/post closure of the collective Gypsum Disposal Area. If required, credit from mitigation banks could be obtained.

4. CONCLUSIONS

Based on this assessment, the Gypsum Disposal Area, the Gypsum Disposal Area Stilling Pond 1, and Gypsum Disposal Area Stilling Pond 2 located at PAF meet the requirements for the wetlands location restriction as required by 40 CFR § 257.61 of the EPA Final CCR Rule.

5. REFERENCES

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- 2016b. Kingston Fossil Plant Bottom Ash Dewatering Facility, Revised Draft Environmental Assessment. January 2016.
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FIGURES

C:\Users\jimundm\Documents\field work_data\Jim_Orn\PAF\Deliverables\PAF_NWI_Map_2017.mxd



Legend

- PAF Facilities
- Breach Zone

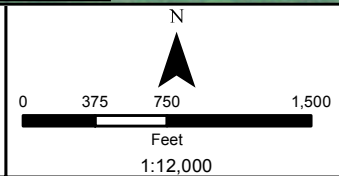
Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

Notes

MAP FORMATTED FOR 'A' (8.5" X 11")
 SIZE SHEET. SCALE NOT VALID FOR
 DIFFERENT PAGE SIZE

Service Layer and Inset Layer Credits:
 TVA Aerial Imagery 2016



FILE NUMBER
DESIGNED BY
DCW
DRAWN BY
MBE
CHECKED BY

AECOM

1000 Corporate Centre Dr
 Suite 250
 Franklin, TN 37067

**TVA Paradise Wetland Delineation
 USFWS NWI Map, Gypsum Stack**

2017 Wetland Delineations
 TVA Paradise Fossil Plant
 Drakesboro, KY, 42337

PROJECT NUMBER
60478473
DATE
November, 2017
FIGURE NUMBER
3

TABLES

Table 2. Species of Conservation Concern within Muhlenberg County and Within 5 Miles of PAF

Common Name	Scientific Name	Status		Suitable Habitat Present ⁴
		Federal ¹	State ² (Rank ³)	
Aquatic Snails				
Rugged Hornsnail*	<i>Pleurocera alveare</i>	SOMC	S(S3S4)	N
Mollusks				
Fanshell*	<i>Cyprogenia stegaria</i>	LE	E(S1)	N
Catspaw*	<i>Epioblasma obliquata</i>	LE	E(S1)	N
Pocketbook*	<i>Lampsilis ovata</i>	--	E(S1)	N
Rough Pigtoe*	<i>Pleurobema plenum</i>	LE	E(S1)	N
Pyramid Pigtoe*	<i>Pleurobema rubrum</i>	SOMC	E(S1)	N
Purple Lilliput*	<i>Toxolasma lividus</i>	SOMC	E(S1)	N
Little Spectaclecase*	<i>Villosa lienosa</i>	--	S(S3S4)	N
Crustaceans				
Mud River Crayfish	<i>Orconectes ronaldi</i>	--	T(S2S3)	N
Fish				
Lake Chubsucker	<i>Erimyzon sucetta</i>	--	T(S2)	N
Chestnut Lamprey*	<i>Ichthyomyzon castaneus</i>	--	S(S2)	N
Redspotted Sunfish	<i>Lepomis miniatus</i>	--	T(S2)	N
Longhead Darter	<i>Percina macrocephala</i>	--	E(S1)	N
Amphibians				
Eastern Hellbender	<i>Cryptobranchus alleganiensis</i>	SOMC	E(S1)	N
Bird-voiced Treefrog*	<i>Hyla avivoca</i>	--	S(S3)	N
Reptiles				
Eastern Ribbon Snake	<i>Thamnophis sauritus</i>	--	S(S3)	P
Insects				
Broad-winged Skipper	<i>Poanes viator</i>	--	T(S1)	P
Elusive Clubtail	<i>Stylurus notatus</i>	SOMC	E(S1)	N
Birds				
Henslow's Sparrow	<i>Ammodramus henslowii</i>	SOMC	S(S3B)	P
Great Egret*	<i>Ardea alba</i>	--	T(S2B)	P
Short-eared Owl*	<i>Asio flammeus</i>	--	E(S1B,S2N)	N
Long-eared Owl*	<i>Asio otus</i>	--	E(S1B,S1S2N)	N
American Bittern	<i>Botaurus lentiginosus</i>	--	H(SHB)	N
Lark Sparrow	<i>grammacus</i>	--	T(S2S3B)	P
Northern Harrier*	<i>Circus cyaneus</i>	--	T(S1S2B,S4N)	P
Sedge Wren*	<i>Cistothorus platensis</i>	--	S(S3B)	N
Common Gallinule*	<i>Gallinula galeata</i>	--	T(S1S2B)	N
Bald Eagle*	<i>leucocephalus</i>	DM	T(S2B,S2S3N)	N
Least Bittern*	<i>Ixobrychus exilis</i>	--	T(S1S2B)	N
		--	T(S1S2B,S3S4)	
Hodded Merganser*	<i>Lophodytes cucullatus</i>		N	P (foraging only)
Osprey*	<i>Pandion haliaetus</i>	--	S(S2S3B)	Y

Table 2. Species of Conservation Concern within Muhlenberg County and Within 5 Miles of PAF

Common Name	Scientific Name	Status		Suitable Habitat Present ⁴
		Federal ¹	State ² (Rank ³)	
Bank Swallow*	Riparia	--	S(S3B)	N
Bell's Vireo*	Vireo bellii	SOMC	S(S2S3B)	Y, P (past record within the South Spoil Area)
Barn Owl	Tyto alba	--	S(S3)	N
Mammals				
Indiana Bat*	Myotis sodalis	LE	E(S1S2)	P (foraging only)
Northern long-eared Bat	Myotis septentrionalis	LT	E(S3)	P (foraging only)
Evening Bat*	Nycticeius humeralis	--	S(S3)	P (foraging only)
Southeastern Bat	Myotis austroriparius	SOMC	E(S1S2)	P (foraging only)
Gray Bat	Myotis grisescens	LE	T(S2)	P (foraging only)
Plants				
Water Hickory	Carya aquatica	--	T(S2S3)	N
Rose Turtlehead	speciosa	--	S(S3)	N
Water-purslane	Didiplis diandra	--	E(S1S2)	N
Frech's Shooting Star	Dodecatheon frenchii	--	S(S3)	N
Hair Grass	glabrifloris	--	S(S2S3)	N
Trepocarpus	Trepocarpus aethusae	--	S(S3)	N
Buffalo Clover	Trifolium reflexum	--	E(S1S2)	N
Southern Wild Rice	Zizaniopsis miliacea	--	T(S1S2)	N

Sources: KSNPC 2015 and USFWS IPaC 2016b

1 Federal Status Codes:

DM = Delisted, Recovered, and Being Monitored LE = Listed Endangered

LT = Listed Threatened; -- = Not Listed by USFWS

SOMC = Species of Management Concern

2 State Status Codes:

E = listed endangered S = species of special concern

T = listed threatened

3 State Rank:

S1 = critically imperiled S2 = imperiled

S3 = vulnerable S4 = apparently secure

S#S# = Denotes a range of ranks because the exact rarity of the element is uncertain (e.g., S1S2)

Migratory Species may have separate ranks for different population segments (e.g., S1B, S2N, S4M);

S#B = rank of breeding population S#N = rank of non-breeding population

4 Habitat Codes:

Y = Yes, species has been documented in existing habitats in study area and suitable habitat is present

N = No, no records of species within study area and no suitable habitat is present

P = Potentially suitable habitat is present, but no records of species in study area

* Species documented within 5 miles of PAF by the TVA Natural Heritage Database.

APPENDIX A

DRAFT REPORT

**GYP STACK POTENTIAL BREACH
AREA - WETLAND SURVEY
PARADISE FOSSIL PLANT (PAF)
MULHENBURG COUNTY KY**



October 2017



1000 Corporate Centre Drive
Suite 250
Franklin, Tennessee 37067
(615) 771-2480

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Figure 2 USFWS NWI Map
Figure 3 NRCS Soils Map
Figure 4 Site Location and Survey Points

ATTACHMENTS:

Attachment 1 Field Data Forms
Attachment 2 Photolog

Introduction

AECOM was contracted by TVA to conduct a wetlands survey of land located in the potential breach zone of the Gyp Stack located on the northwest side of the PAF facility, Figure 1. The PAF Gyp Stack (gypsum storage unit) is currently active. This coal combustion residuals (CCR) unit is considered an Existing (Active) CCR Surface Impoundment under the Final CCR Rule. The purpose of the survey was to identify the wetlands and water bodies that might be impacted by a breach in a berm as required by the CCR Rule. The concerns would be 1) a slope failure of the Gypsum Stack, 2) a failure of the Stilling Pond 1 (aka Upper Stilling Pond) or 3) a failure of Stilling Pond 2 (aka Lower Stilling Pond) (see Figure 4). The survey was conducted on previously disturbed land (mined) that includes land owned by TVA. The eastern portion of this land is designated for potential borrow area, while the western portion is designated a wildlife management area (WMA). The breach zone occupies approximately 175 to 200 acres. The wetland study area was expanded to approximately 350 acres due to the connected waterbodies in the zone.

The property is bordered in the south, east and west by prior mined land. The Gyp stack is located north of the breach zone. Surface runoff from the Gyp stack flows primarily to the south and east. This is the modeling flow direction of a potential breach. Several ponds are located south of the Gyp stack which were originally formed during the mining activity. These ponds are bordered by wetland fringe, primarily vegetated with Phragmites. Over flow from these ponds travels to the Peabody Ash Pond which discharges to Jacobs Creek a perennial second order stream then the Green River. The 100-year flood elevation is 402 feet above mean sea level (ft msl). None of the breach zone is within this elevation, with the surface elevation of Ponds 5 and 7 at 440 msl.

Topographic mapping, aerial survey, soils, geology, and other information were reviewed to determine the potential for the area to be associated with jurisdictional waters of the United States (i.e., "jurisdictional wetlands or streams"). Following review of the available literature, a wetlands delineation and stream characterization was performed in accordance with the procedures outlined in the US Army Corps of Engineers (USACE) Wetlands Delineation Manual, 1987 and the 2008 Eastern Mountains and Piedmont Regional Supplement. The delineation included visual observation of the site and characterization of the vegetation, soils and hydrology to determine if various wetland criteria (hydic characteristics) were met.

The potential for wetlands on the property was reviewed by viewing the United States Fish and Wildlife Service (USFWS) Wetland Inventory Map (NWI) as shown on Figure 2. The National Resource Conservation Service (NRCS) website was utilized to determine the soil types present on the site as a potential indicator of hydric soils and wetlands, Figure 3. All soils were designated as Udothents (previously disturbed land). This is not a hydric soil.

Following review of these data, a delineation was conducted on September 14-15, 2017 and lead by Mr. James R. Orr biologists and certified wetland delineator with AECOM. Mr. James Orr severed as senior biologist for the delineation and has over 25 years of

experience with wetlands delineation. Mr. Hayden Orr (environmental engineer) assisted with the survey.

The historic use of the property was reviewed to determine the potential for past activities to have influenced site conditions. The property has been in industrial use and mining for decades. These data plus the site inspection were utilized to make the determination of the potential for wetlands on the site and potential jurisdictional status.

Literature Review

Soils

The soils survey for the site was reviewed from the National Resources Conservation Service (NRCS) Web Soil survey. The only soil in the breach zone is Udorthents (disturbed soils) (Figure 2). In addition to this soil types, the ponds of the study area was designated as water. Much of the area designated as water; however, has been filled (former ash ponds or mining ponds) and the land would be designated as Udorthents. These soils have very slow infiltration rates, are clayey, have a highwater table, or are shallow to an impervious layer. They are rated at a low percentage of hydric characteristics (1-32%).

In the field, soils were determined to be either hydric or non-hydric by the methods provided in the 1987 Manual and regional supplement. During the survey, soil cores were collected and compared to the Munsell color chart. In addition, hydric characteristics were documented as listed in the Eastern Mountains and Piedmont Region data sheets, Attachment 1.

Wetlands

A National Wetlands Inventory map (NWI) was downloaded from the US Fish and Wildlife Service NWI website (Figure 3). A number of areas identified as open water wetland areas (palustrine unconsolidated, PUBHx or freshwater pond) and riverine, perennial, unconsolidated bottom (R5UB or stream) were indicated on the property by the NWI. No emergent, shrub/scrub or forested wetlands were identified in the breach zone on the NWI map.

The ponds and streams from those ponds drain to the south to the Peabody Ash Pond which flows to Jacobs Creek, which flows to the Green River. Storm water flows either to these ponds or to the leachate ditch which also flow to the Peabody Ash Pond. Discharge from the ash pond is permitted through the facilities NPDES permit.

Hydrology

Wetland hydrology at the site was determined by the hydrologic characteristics of the site and site mapping (USGS topographic map). Consideration was given to the human impacts such as mining and industrial practices, construction and grading. The major hydrologic features include Jacobs Creek to the south and drainages to it and the Green

River. Within this study area a number of drainages were diked or constricted resulting in ponds that had developed wetland characteristics around the fringe and in their drainage. None of the site is within the 100-year floodplain as the lowest elevation in the study area is 440 msl and the flood elevation is 402 msl.

Methods

The wetlands determination was performed in accordance with the procedures outlined in the Corps of Engineers Wetlands Delineation Manual, (1987) as well as the regional supplement for the Eastern Mountains and Piedmont Region (2008). Data were collected to characterize wetland area in terms of hydrology, soils, dominant plant species, and wetland type on Data Form 1 as provided in the Regional Supplement (Attachment 1). Wetland boundaries were determined and recorded in the field with GIS files generated for each wetland area.

Open water wetlands and a stream were preliminarily identified by the NWI map which appear to be ponds created during the surface mining of the area. The entire site was then walked to determine if wetlands were present, particularly within the breach zone and downgradient of the ponds. The surface water features are connected by streams, linear wetlands or wet weather conveyances. Wetlands and streams were number based on the numbering system used in 2016, to keep of running total of wetlands investigated and avoid confusion. Therefore, the three wetlands were number 26, 27 and 28 which includes ponds 5, 6 and 7 respectively. Wetland 27 drains to wetland 26 via a linear wetland and then a WWC, while stream 2 flows to wetland 28 from a pond west of the Gyp Stack. Both wetland 26 and 28 drain to the south to a tributary of Jacobs Creek that flows into the Peabody ash pond. Wetlands 27 and 28 were located on a public use, wildlife management area and were identified with fishing signs.

Wetlands within the breach zone were also previously identified in 2016 by AECOM as part of the "Wetland Survey, Paradise Fossil Plant PAF, Mulhenburg County, Kentucky", March 2017. During 2016 nine wetlands, one stream and two ponds were identified in the "supplemental investigation area" which is partially impacted by the breach zone. Four of the wetlands and one pond identified in the 2016 survey would potentially be impacted by a breach in the supplemental investigation area.

Wetland determination methods utilizing a shovel were conducted to test soils conditions by comparison of site soils to the Munsell color chart. The soil color and other characteristics such as depleted matrix and gleyed soils, were observed to determine the potential for hydric conditions. Soil cores were taken to a depth of up to 12 inches where needed or refusal. In addition, vegetation type and status was investigated to determine if wetland or upland plant species dominated. The dominant vegetation was documented and percent cover was estimated. The wetland status of the vegetation was then determined from regional literature. The final characteristic that was evaluated was the hydrology. The hydrologic characteristics were evaluated by estimating the frequency and level of saturation of the area and by documenting the primary and secondary hydrological characteristics as indicated on Form 1 data sheets. Wetland boundary

locations were documented on a site map and with GPS and no flagging was left on the site. Photographs were taken of wetland and adjoining non-wetland areas. A USACE Data Form 1 was completed for the wetland and upland areas and the TVA Rapid Assessment Method form was completed for each wetland to indicate wetland quality (Attachment 1). Wetland areas delineated on the site are summarized in Figure 4. A photolog of the wetland locations is provided in Attachment 2.

Field Survey

Based on the results of the literature review, it is unknown if natural wetlands were not historically associated with the site. Site modifications have resulted in water features (ponds) including wetlands and streams. Within the seven days prior to the field survey, approximately 0.15 inches of rainfall had occurred. During the survey, no rain fell. Wetlands were identified in the field by the designation "W-26". Three ponds with wetland fringes were identified. Four wetlands and one pond from the 2016 would be entirely impacted by a breach while only portions of the three wetlands and three ponds and one stream, identified in 2017 would be impacted. The area and description of these water features are summarized in Table 1. The assumed jurisdictional status of these water features is also indicated in Table 1; however, confirmation with the Louisville District Corps of Engineers is advised.

Conclusions

Based on the review of literature and maps of the site, seven wetlands, four ponds, one stream and four WWCs are potentially present in the breach zone. The breach zone was overlaid on the GIS shape files to predict the area impacted by a potential breach. Based on the modeled breach the following impact may be anticipated:

1. Pond surface – 0.2 ac
2. Wetland area – 8.41 ac
3. Linear wetland – 0
4. Stream – 1,000 feet

All of the linear features (linear wetlands and stream) are jurisdictional WOUS as they are connected to other WOUS. Most of the other wetlands are also likely jurisdictional based on the hydrologic connection to other waters, while a number of the small wetlands are isolated and not jurisdictional. Confirmation of the jurisdictional status could be requested by the Louisville District Corps of Engineers.

Table 1. Water Bodies Potentially Impacted by Gyp Stack Pond Breach.

Wetland ID	Wetland Type	Area/Length	Potentially WOUS Impacted	Potential Jurisdictional Status
Pond 3	PUBHx	2.83 acres	None	Not WOUS
Pond 4	PUBHx	2.55 acres	None	Not WOUS
Pond 5	PUBHx	4.67 acres	0.2 ac	WOUS
Pond 6	PUBHx	1.01 acres	None	WOUS
Pond 7	PUBHx	8.94 acres	None	WOUS
W-17	PEM	1.21 acres	1.21 ac	WOUS connected to W-26
W-18	PEM	0.14 acres	None	Isolated not WOUS
W-22	PEM	0.06 acres	None	Isolated not WOUS
W-23	PEM	0.025 acres	None	Isolated not WOUS
W-26	PEM/PSS	14.8 acres	7.0 ac	WOUS
W-27	PEM/PSS	1.92 acres	0	WOUS
W-28	PEM/PSS	19.76 acres	0.2 ac	WOUS
Str-2	R5UB	1,404 feet	1,000 feet	WOUS
LW-1	none	550 feet	0	WOUS connected to W-26
WWC-1	none	103 feet	None	Do not meet Rgl 0505
WWC-2	none	454 feet	None	Do not meet Rgl 0505
WWC-3	none	1221 feet	None	Do not meet Rgl 0505
WWC-4	none	201 feet	None	Do not meet Rgl 0505

PSS – Palustrine shrub scrub

PEM – Palustrine emergent wetland

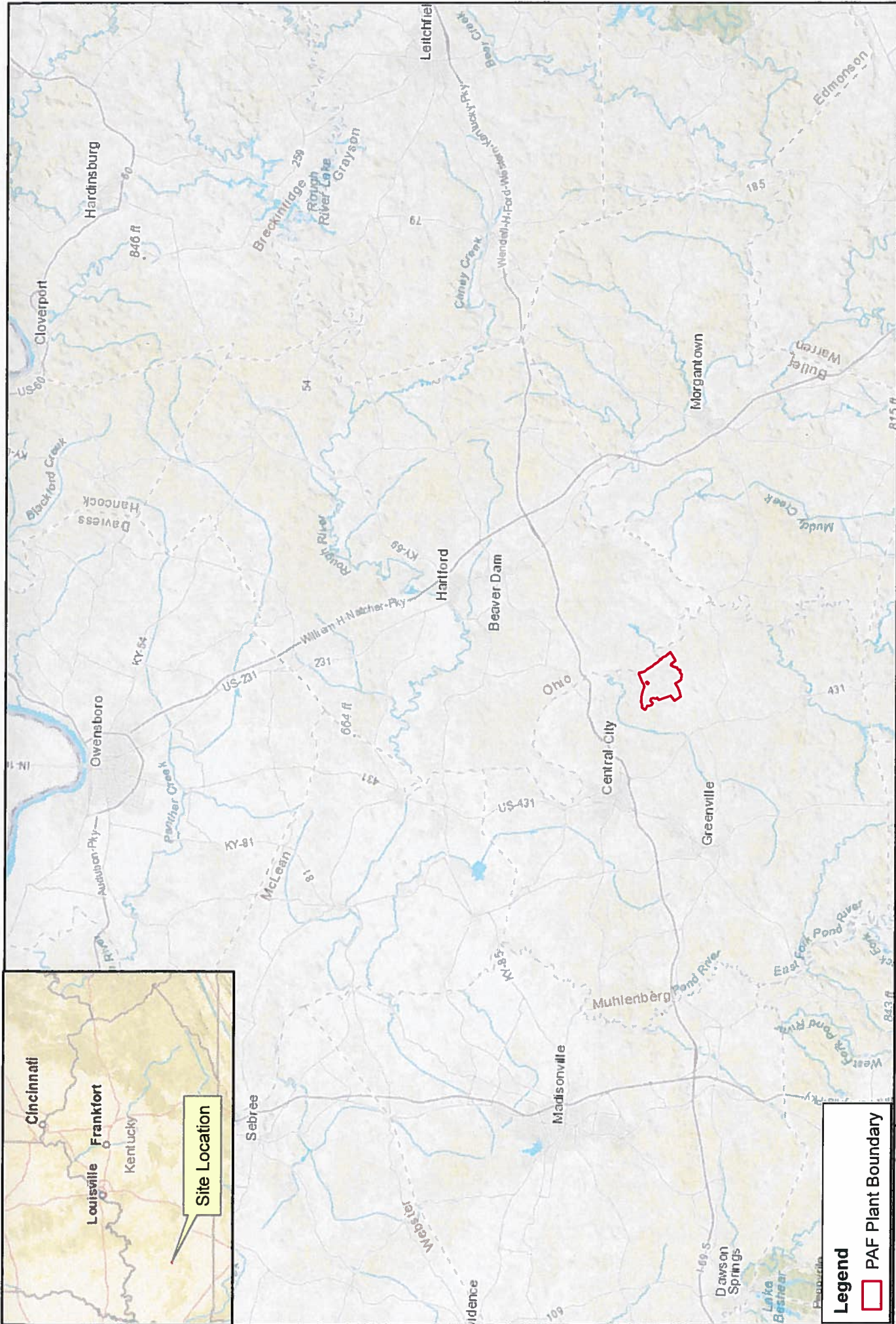
PUBHx – palustrine unconsolidated bottom permanently flooded

RGL 0505– Regulatory Guidance Letter 0505– COE definition of a stream

WOUS – Waters of the United States

Ac - acre

Figures



PROJECT NUMBER	60478473
DATE	October, 2017
FIGURE NUMBER	1

**TVA Paradise Gypsum Stack
Site Location Map**
2017 Wetland Delineations
TVA Paradise Fossil Plant
Drakesboro, KY 42337

AECOM
1000 Corporate Centre Dr
Suite 250
Franklin, TN 37067

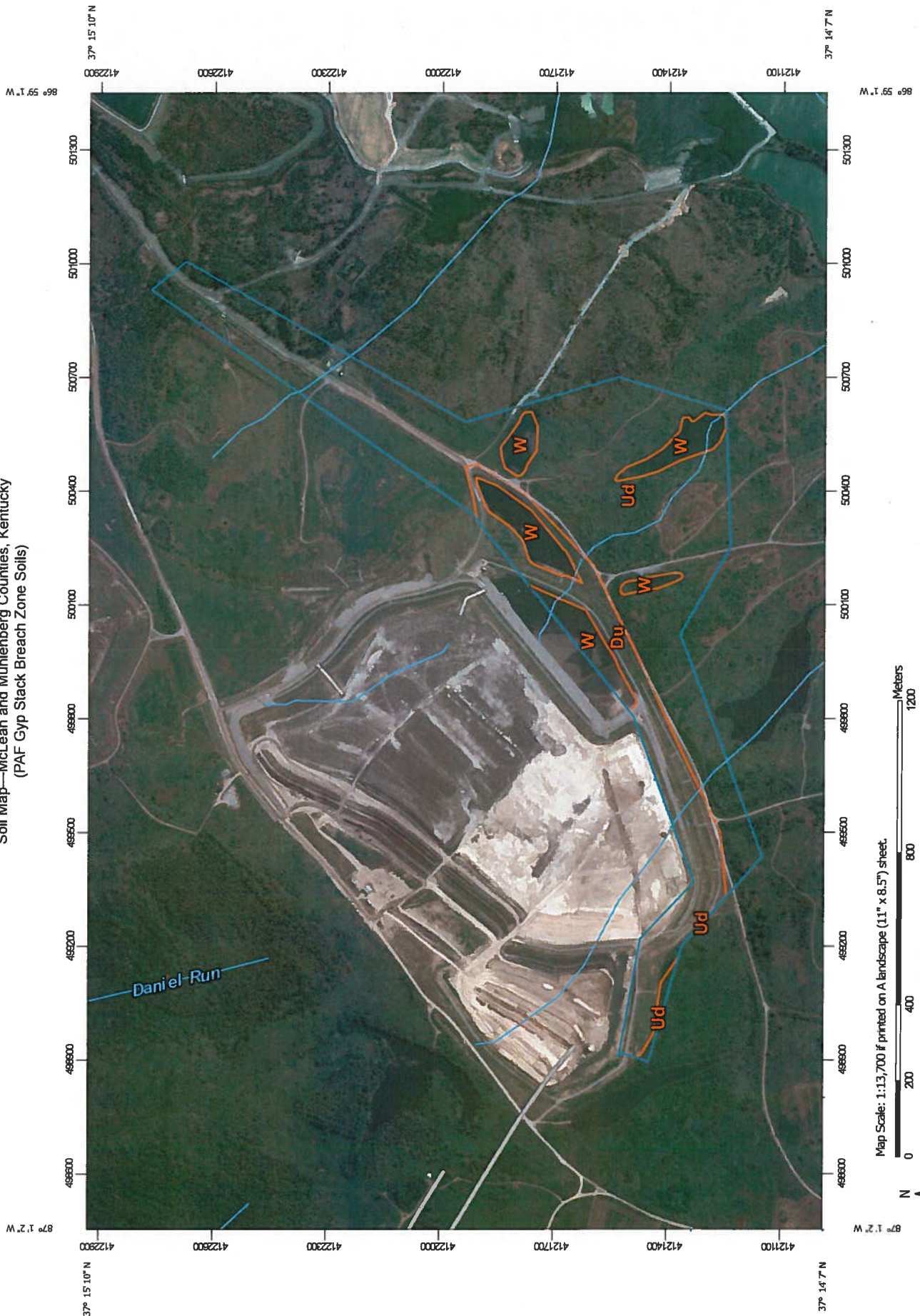
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DRAWN BY	MBE
CHECKED BY	



Legend
 PAF Plant Boundary

Notes
 MAP FORMATTED FOR 'A' (8.5" X 11")
 SIZE SHEET. SCALE NOT VALID FOR
 DIFFERENT PAGE SIZE
 Service Layer and Inset Layer Credits:
 TVA Aerial Imagery 2016










































Soil Map—McLean and Muhlenberg Counties, Kentucky
(PAF Gyp Stack Breach Zone Soils)



Map Scale: 1:13,700 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

 Area of Interest (AOI)	 Spoil Area
 Soils	 Stony Spot
 Soil Map Unit Polygons	 Very Stony Spot
 Soil Map Unit Lines	 Wet Spot
 Soil Map Unit Points	 Other
 Special Point Features	 Special Line Features
 Blowout	 Water Features
 Borrow Pit	 Streams and Canals
 Clay Spot	 Transportation
 Closed Depression	 Rails
 Gravel Pit	 Interstate Highways
 Gravelly Spot	 US Routes
 Landfill	 Major Roads
 Lava Flow	 Local Roads
 Marsh or swamp	 Background
 Mine or Quarry	 Aerial Photography
 Miscellaneous Water	
 Perennial Water	
 Rock Outcrop	
 Saline Spot	
 Sandy Spot	
 Severely Eroded Spot	
 Sinkhole	
 Slide or Slip	
 Sodic Spot	

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: McLean and Muhlenberg Counties, Kentucky
Survey Area Data: Version 14, Sep 16, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 30, 2012—Mar 9, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Du	Dumps	36.3	20.7%
Ud	Udorthents	120.1	68.4%
W	Water	19.2	10.9%
Totals for Area of Interest		175.7	100.0%



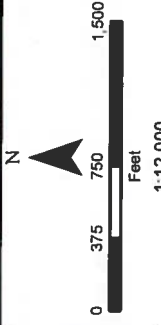
Legend

- Breach Zone

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

Notes
 MAP FORMATTED FOR 'A' (8.5" X 11")
 SIZE SHEET. SCALE NOT VALID FOR
 DIFFERENT PAGE SIZE
 Service Layer and Inset Layer Credits:
 TVA Aerial Imagery 2016



FILE NUMBER	DCW
DESIGNED BY	MBE
DRAWN BY	
CHECKED BY	

AECOM
 1000 Corporate Centre Dr
 Suite 250
 Franklin, TN 37067

TVA Paradise Wetland Delineation
 NWI Map
 2017 Wetland Delineations
 TVA Paradise Fossil Plant
 Drakesboro, KY 42337

PROJECT NUMBER	60478473
DATE	October, 2017
FIGURE NUMBER	3

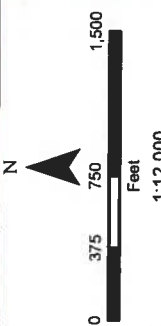


FILE NUMBER	
DESIGNED BY	DCM
DRAWN BY	MBE
CHECKED BY	

PROJECT NUMBER	60478473
DATE	October, 2017
FIGURE NUMBER	4

TVA Paradise Wetland Delineation
 September 14-15, 2017
 2017 Wetland Delineations
 TVA Paradise Fossil Plant
 Drakesboro, KY. 42337

AECOM
 1000 Corporate Centre Dr
 Suite 250
 Franklin, TN 37067



Notes
 MAP FORMATTED FOR 'A' (8.5" X 11")
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Legend	
	Landfill Facilities
	Breach Zone
	Ponds
	Wetlands
	Wetlands 2016
	Leachate Ditch
	Stream
	Linear Wetland
	Wet Weather Conveyance
	Flow Direction

Attachment 1
Field Data Forms

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PAF City/County: Muhlenberg Sampling Date: 9/14/2017
 Applicant/Owner: TVA State: KY Sampling Point: UPL-1
 Investigator(s): JRO,HJO Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): concave Slope (%): 3-5
 Subregion (LRR or MLRA): _____ Lat: _____ Long: _____ Datum: NAD83
 Soil Map Unit Name: Urdothents NWI classification: none
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation Soil or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation Soil or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>			
Remarks: South of Pond 6					

HYDROLOGY

<p>Wetland Hydrology Indicators:</p> <p><u>Primary Indicators (minimum of one is required; check all that apply)</u></p> <input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)		<p><u>Secondary Indicators (minimum of two required)</u></p> <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
<p>Field Observations:</p> Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)		Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: UPL-1

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Celtis occidentalis</u>	<u>15</u>	<u>x</u>	<u>FACU</u>
2. <u>Juniperus virginiana</u>	<u>7</u>	<u>x</u>	<u>FACU</u>
3. <u>Pyrus calleryana</u>	<u>2</u>		<u>FAC</u>
4. _____			
5. _____			
6. _____			

24 = Total Cover

50% of total cover: 12 20% of total cover: 4.8

Sapling Stratum (Plot size: _____)

1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			

_____ = Total Cover

50% of total cover: _____ 20% of total cover: _____

Shrub Stratum (Plot size: _____)

1. _____			
2. _____			
3. _____			
4. _____			
5. _____			
6. _____			

_____ = Total Cover

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: _____)

1. <u>Lespedeza cuneata</u>	<u>65</u>	<u>X</u>	<u>FACU</u>
2. <u>Ambrosia artemisiifolia</u>	<u>25</u>	<u>X</u>	<u>FACU</u>
3. <u>Ambrosia trifida</u>	<u>10</u>		<u>FAC</u>
4. <u>Solidage gigantea</u>	<u>3</u>		<u>FACW</u>
5. <u>Circium vulgare</u>	<u>2</u>		<u>FACU</u>
6. _____			
7. _____			
8. _____			
9. _____			
10. _____			
11. _____			

105 = Total Cover

50% of total cover: 52.5 20% of total cover: 21

Woody Vine Stratum (Plot size: _____)

1. _____			
2. _____			
3. _____			
4. _____			
5. _____			

_____ = Total Cover

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of: _____ Multiply by:

OBL species _____ x 1 = _____

FACW species 3 x 2 = 6

FAC species 12 x 3 = 36

FACU species 114 x 4 = 452

UPL species _____ x 5 = _____

Column Totals: 129 (A) 494 (B)

Prevalence Index = B/A = 3.8

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is >50%
- 3 - Prevalence Index is ≤3.0¹
- 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present?

Yes No

Remarks: (Include photo numbers here or on a separate sheet.)

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PAF City/County: Muhlenberg Sampling Date: 9/14/2017
 Applicant/Owner: TVA State: KY Sampling Point: W-26
 Investigator(s): JRO,HJO Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Pond and wetland edge Local relief (concave, convex, none): concave Slope (%): 0
 Subregion (LRR or MLRA): _____ Lat: 37.240 Long: -86.995 Datum: NAD 83
 Soil Map Unit Name: Urdothents NWI classification: PUBHx
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation Soil or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation Soil or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input type="checkbox"/>
Remarks: Pond south of road	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input checked="" type="checkbox"/> Surface Water (A1) <input checked="" type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input checked="" type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
--	--

Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>0-48</u> Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
--	--

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: W-26

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Salix nigra</u>	<u>5</u>	<u>x</u>	<u>OBL</u>
2. <u>Populus deltoides</u>	<u>5</u>	<u>x</u>	<u>FAC</u>
3. <u>Platanus occidentalis</u>	<u>10</u>	<u>X</u>	<u>FACW</u>
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

20 = Total Cover

50% of total cover: 10 20% of total cover: 4

Sapling Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Salix nigra</u>	<u>10</u>	<u>X</u>	<u>OBL</u>
2. <u>Platanus occidentalis</u>	<u>5</u>	<u>X</u>	<u>FACW</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

15 = Total Cover

50% of total cover: 7.5 20% of total cover: 3

Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Cornus amomum</u>	<u>5</u>	<u>X</u>	<u>FACW</u>
2. <u>Elaeagnus umbellata</u>	<u>20</u>	<u>X</u>	<u>FAC</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

25 = Total Cover

50% of total cover: 12.5 20% of total cover: 5

Herb Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Phragmites australis</u>	<u>95</u>	<u>X</u>	<u>FACW</u>
2. <u>Cyperus esculentus</u>	<u>5</u>	_____	<u>FACW</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____

100 = Total Cover

50% of total cover: 50 20% of total cover: _____

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____

_____ = Total Cover

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:	
Number of Dominant Species That Are OBL, FACW, or FAC:	<u>8</u> (A)
Total Number of Dominant Species Across All Strata:	<u>8</u> (B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	<u>100</u> (A/B)

Prevalence Index worksheet:	
Total % Cover of:	Multiply by:
OBL species <u>10</u>	x 1 = <u>10</u>
FACW species <u>120</u>	x 2 = <u>240</u>
FAC species <u>25</u>	x 3 = <u>75</u>
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: <u>155</u> (A)	<u>325</u> (B)

Prevalence Index = B/A = 2.1

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - 3 - Prevalence Index is ≤3.0¹
 - 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - Problematic Hydrophytic Vegetation¹ (Explain)

¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: W-26

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	2.5Y 3/1	100						loamy clay
2-5	2.5Y4/1	98	2.5Y6/6	2				clay loam
5-12	2.5Y6/1	95	2.5Y6/6	5				clay

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (LRR N)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) (MLRA 147, 148)
- Thin Dark Surface (S9) (MLRA 147, 148)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- Umbric Surface (F13) (MLRA 136, 122)
- Piedmont Floodplain Soils (F19) (MLRA 148)
- Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (MLRA 147)
- Coast Prairie Redox (A16) (MLRA 147, 148)
- Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PAF City/County: Muhlenberg Sampling Date: 9/14/2017
 Applicant/Owner: TVA State: KY Sampling Point: W-27
 Investigator(s): JRO,HJO Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): pond and drainage Local relief (concave, convex, none): concave Slope (%): 1-3
 Subregion (LRR or MLRA): _____ Lat: 37.239 Long: -86.998 Datum: NAD 83
 Soil Map Unit Name: Urdothents NWI classification: PUBHx
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation Soil or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation Soil or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input checked="" type="checkbox"/> Surface Water (A1) <input checked="" type="checkbox"/> True Aquatic Plants (B14) <input checked="" type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input checked="" type="checkbox"/> Thin Muck Surface (C7) <input checked="" type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input checked="" type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input checked="" type="checkbox"/> Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>1-2</u> Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>-2</u> Saturation Present? (includes capillary fringe) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>0</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: W-27

<p><u>Tree Stratum</u> (Plot size: _____)</p> <table style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:40%;"></th> <th style="width:15%; text-align: center;">Absolute % Cover</th> <th style="width:15%; text-align: center;">Dominant Species?</th> <th style="width:10%; text-align: center;">Indicator Status</th> </tr> </thead> <tbody> <tr><td>1. <u>Salix nigra</u></td><td style="text-align: center;">10</td><td></td><td style="text-align: center;">OBL</td></tr> <tr><td>2. <u>Populus deltoides</u></td><td style="text-align: center;">40</td><td style="text-align: center;">X</td><td style="text-align: center;">FACW</td></tr> <tr><td>3. <u>Acer negundo</u></td><td style="text-align: center;">2</td><td></td><td style="text-align: center;">FAC</td></tr> <tr><td>4. <u>Fraxinus pennsylvanica</u></td><td style="text-align: center;">20</td><td style="text-align: center;">X</td><td style="text-align: center;">FACW</td></tr> <tr><td>5. _____</td><td></td><td></td><td></td></tr> <tr><td>6. _____</td><td></td><td></td><td></td></tr> <tr><td colspan="4" style="text-align: right;">72 = Total Cover</td></tr> <tr><td colspan="4" style="text-align: center;">50% of total cover: <u>36</u> 20% of total cover: <u>14.4</u></td></tr> </tbody> </table> <p><u>Sapling Stratum</u> (Plot size: _____)</p> <table style="width:100%; 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(7.6 cm) or larger in diameter at breast height (DBH).</p> <p>Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.</p> <p>Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.</p> <p>Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.</p> <p>Woody vine – All woody vines, regardless of height.</p> <hr/> <p>Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p>	Total % Cover of:	Multiply by:	OBL species <u>20</u>	x 1 = <u>20</u>	FACW species <u>150</u>	x 2 = <u>300</u>	FAC species <u>4</u>	x 3 = <u>12</u>	FACU species <u>7</u>	x 4 = <u>28</u>	UPL species _____	x 5 = _____	Column Totals: <u>181</u> (A)	<u>360</u> (B)
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SOIL

Sampling Point: W-27

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	10YR2/1	60	2.5Y3/1	20			clay loam	
0-12	2.5Y4/1	15	2.5Y6/6	5			clay loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (LRR N)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) (MLRA 147, 148)
- Thin Dark Surface (S9) (MLRA 147, 148)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- Umbric Surface (F13) (MLRA 136, 122)
- Piedmont Floodplain Soils (F19) (MLRA 148)
- Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (MLRA 147)
- Coast Prairie Redox (A16) (MLRA 147, 148)
- Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PAF City/County: Muhlenberg Sampling Date: 9/15/2017
 Applicant/Owner: TVA State: KY Sampling Point: W-28
 Investigator(s): JRO,HJO Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): Pond and wetland edge Local relief (concave, convex, none): concave Slope (%): 0
 Subregion (LRR or MLRA): _____ Lat: 37.237 Long: -87.003 Datum: NAD 83
 Soil Map Unit Name: Urdothents NWI classification: PUBHx
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation Soil or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation Soil or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input type="checkbox"/>
Remarks: Pond and wetland fringe south of road on wildlife management property	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input checked="" type="checkbox"/> Surface Water (A1) <input checked="" type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input checked="" type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Water-Stained Leaves (B9) <input checked="" type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Stunted or Stressed Plants (D1) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
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Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>0-48</u> Water Table Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: W-28

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Salix nigra</u>	<u>25</u>	<u>X</u>	<u>OBL</u>
2. <u>Populus deltoides</u>	<u>5</u>		<u>FAC</u>
3. <u>Platanus occidentalis</u>	<u>10</u>	<u>X</u>	<u>FACW</u>
4. _____			
5. _____			
6. _____			

50 = Total Cover

50% of total cover: 25 20% of total cover: 10

Sapling Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Salix nigra</u>	<u>10</u>	<u>X</u>	<u>OBL</u>
2. <u>Platanus occidentalis</u>	<u>5</u>	<u>X</u>	<u>FACW</u>
3. _____			
4. _____			
5. _____			
6. _____			

15 = Total Cover

50% of total cover: 7.5 20% of total cover: 3

Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Cornus amomum</u>	<u>5</u>	<u>X</u>	<u>FACW</u>
2. <u>Elaeagnus umbellata</u>	<u>20</u>	<u>X</u>	<u>FAC</u>
3. _____			
4. _____			
5. _____			
6. _____			

25 = Total Cover

50% of total cover: 12.5 20% of total cover: 5

Herb Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Phragmites australis</u>	<u>95</u>	<u>X</u>	<u>FACW</u>
2. <u>Cyperus esculentus</u>	<u>5</u>		<u>FACW</u>
3. _____			
4. _____			
5. _____			
6. _____			
7. _____			
8. _____			
9. _____			
10. _____			
11. _____			

100 = Total Cover

50% of total cover: 50 20% of total cover: _____

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____			
2. _____			
3. _____			
4. _____			
5. _____			

_____ = Total Cover

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 7 (A)

Total Number of Dominant Species Across All Strata: 7 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species <u>30</u>	x 1 = <u>30</u>
FACW species <u>120</u>	x 2 = <u>240</u>
FAC species <u>25</u>	x 3 = <u>75</u>
FACU species _____	x 4 = _____
UPL species _____	x 5 = _____
Column Totals: <u>175</u> (A)	<u>345</u> (B)

Prevalence Index = B/A = 1.97

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - 3 - Prevalence Index is ≤3.0¹
 - 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: W-28

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-2	2.5Y 3/1	100						loamy clay
2-5	2.5Y4/1	98	2.5Y6/6	2				clay loam
5-12	2.5Y6/1	95	2.5Y6/6	5				clay

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5)
- 2 cm Muck (A10) (LRR N)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1) (LRR N, MLRA 147, 148)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)

- Dark Surface (S7)
- Polyvalue Below Surface (S8) (MLRA 147, 148)
- Thin Dark Surface (S9) (MLRA 147, 148)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Iron-Manganese Masses (F12) (LRR N, MLRA 136)
- Umbric Surface (F13) (MLRA 136, 122)
- Piedmont Floodplain Soils (F19) (MLRA 148)
- Red Parent Material (F21) (MLRA 127, 147)

Indicators for Problematic Hydric Soils³:

- 2 cm Muck (A10) (MLRA 147)
- Coast Prairie Redox (A16) (MLRA 147, 148)
- Piedmont Floodplain Soils (F19) (MLRA 136, 147)
- Very Shallow Dark Surface (TF12)
- Other (Explain in Remarks)

³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____
Depth (inches): _____

Hydric Soil Present? Yes No

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: PAF City/County: Muhlenberg Sampling Date: 9/14/2017
 Applicant/Owner: TVA State: KY Sampling Point: LW-1
 Investigator(s): JRO,HJO Section, Township, Range: _____
 Landform (hillslope, terrace, etc.): roadside ditch Local relief (concave, convex, none): concave Slope (%): 1-3
 Subregion (LRR or MLRA): _____ Lat: 37.240 Long: -86.998 Datum: NAD 83
 Soil Map Unit Name: Udorthents NWI classification: none
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes No (If no, explain in Remarks.)
 Are Vegetation Soil or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation Soil or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Hydric Soil Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Remarks: Roadside ditch connected to W-27, flows to WWC-2 which flows to W-26	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) <input checked="" type="checkbox"/> Surface Water (A1) <input checked="" type="checkbox"/> True Aquatic Plants (B14) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input checked="" type="checkbox"/> Saturation (A3) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) <input checked="" type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Thin Muck Surface (C7) <input checked="" type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Other (Explain in Remarks) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input checked="" type="checkbox"/> Water-Stained Leaves (B9) <input type="checkbox"/> Aquatic Fauna (B13)	Secondary Indicators (minimum of two required) <input type="checkbox"/> Surface Soil Cracks (B6) <input checked="" type="checkbox"/> Sparsely Vegetated Concave Surface (B8) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Moss Trim Lines (B16) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Crayfish Burrows (C8) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input checked="" type="checkbox"/> Stunted or Stressed Plants (D1) <input checked="" type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> Microtopographic Relief (D4) <input type="checkbox"/> FAC-Neutral Test (D5)
---	---

Field Observations: Surface Water Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u><1-4</u> Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Depth (inches): <u>0</u>	Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
---	--

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants.

Sampling Point: LW-1

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Salix nigra</u>	<u>40</u>	<u>X</u>	<u>OBL</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

40 = Total Cover

50% of total cover: _____ 20% of total cover: _____

Sapling Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Salix nigra</u>	<u>10</u>	<u>X</u>	<u>OBL</u>
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

10 = Total Cover

50% of total cover: _____ 20% of total cover: _____

Shrub Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

_____ = Total Cover

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Phragmites australis</u>	<u>40</u>	<u>X</u>	<u>FACW</u>
2. <u>Ambrosia trifida</u>	<u>20</u>	<u>X</u>	<u>FACU</u>
3. <u>Polygonum pensylvanicum</u>	<u>10</u>	_____	<u>FACW</u>
4. <u>Polygonum cuspidatum</u>	<u>10</u>	_____	<u>FACU</u>
5. <u>Carex vulpinoidea</u>	<u>5</u>	_____	<u>OBL</u>
6. <u>Carex pensylvanica</u>	<u>5</u>	_____	<u>FACW</u>
7. _____	_____	_____	_____
8. _____	_____	_____	_____
9. _____	_____	_____	_____
10. _____	_____	_____	_____
11. _____	_____	_____	_____

90 = Total Cover

50% of total cover: 45 20% of total cover: 18

Woody Vine Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status
1. <u>Toxicodendron radicans</u>	<u>5</u>	<u>X</u>	<u>FAC</u>
2. <u>Lonicera japonica</u>	<u>5</u>	<u>X</u>	<u>FACU</u>
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____

10 = Total Cover

50% of total cover: 5 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species <u>55</u>	x 1 = <u>55</u>
FACW species <u>55</u>	x 2 = <u>110</u>
FAC species <u>5</u>	x 3 = <u>15</u>
FACU species <u>35</u>	x 4 = <u>140</u>
UPL species _____	x 5 = _____
Column Totals: <u>150</u> (A)	<u>320</u> (B)

Prevalence Index = B/A = 2.1

- Hydrophytic Vegetation Indicators:**
- 1 - Rapid Test for Hydrophytic Vegetation
 - 2 - Dominance Test is >50%
 - 3 - Prevalence Index is ≤3.0¹
 - 4 - Morphological Adaptations¹ (Provide supporting data in Remarks or on a separate sheet)
 - Problematic Hydrophytic Vegetation¹ (Explain)
- ¹Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Five Vegetation Strata:

Tree – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and 3 in. (7.6 cm) or larger in diameter at breast height (DBH).

Sapling – Woody plants, excluding woody vines, approximately 20 ft (6 m) or more in height and less than 3 in. (7.6 cm) DBH.

Shrub – Woody plants, excluding woody vines, approximately 3 to 20 ft (1 to 6 m) in height.

Herb – All herbaceous (non-woody) plants, including herbaceous vines, regardless of size, and woody plants, except woody vines, less than approximately 3 ft (1 m) in height.

Woody vine – All woody vines, regardless of height.

Hydrophytic Vegetation Present? Yes No

Remarks: (Include photo numbers here or on a separate sheet.)

Attachment 2
Photolog

Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
1

Date:
9/13/17

Location

South of Gypsum stack
landfill

Description:

Wetland 27



Photo No.
2

Date:
9/13/17

Location:

Gypsum stack landfill

Description:

Upland associated with
wetlands south of W-27.



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
3

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Pond 5 formed by beaver dam in W-26, facing south



Photo No.
4

Date:
9/13/17

Location:

Gypsum stack landfill

Description:



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
5

Date:
9/13/17

Location:

Gypsum stack landfill

Description:

Linear Wetland 1 (LW1)
located in roadside ditch
east of Wetland 27



Photo No.
6

Date:
9/13/17

Location:

Gypsum stack landfill

Description:

Soils in LW-1



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
7

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Upstream portion of LW-1



Photo No.
8

Date:
9/13/17

Location:

Gypsum stack landfill

Description:

Northeast corner of Gyp Stack, Northern extent of survey area facing south.



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
9

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Northern extent of survey
area facing north.



Photo No.
10

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Drainage from the gyp
stack landfill will runoff
into this area from the
north west side of the
landfill. Stream-2 is in the
ditch across the road at
the edge of the trees.



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
11

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Str-2 looking downstream,
(east).



Photo No.
12

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Str-2 looking upstream,
west



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro, Kentucky

Project No.
60532201

Photo No.
13

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Pond 7 on Wildlife Management land. Stream 2 and landfill access road runoff flow to this Pond 7.



Photo No.
14

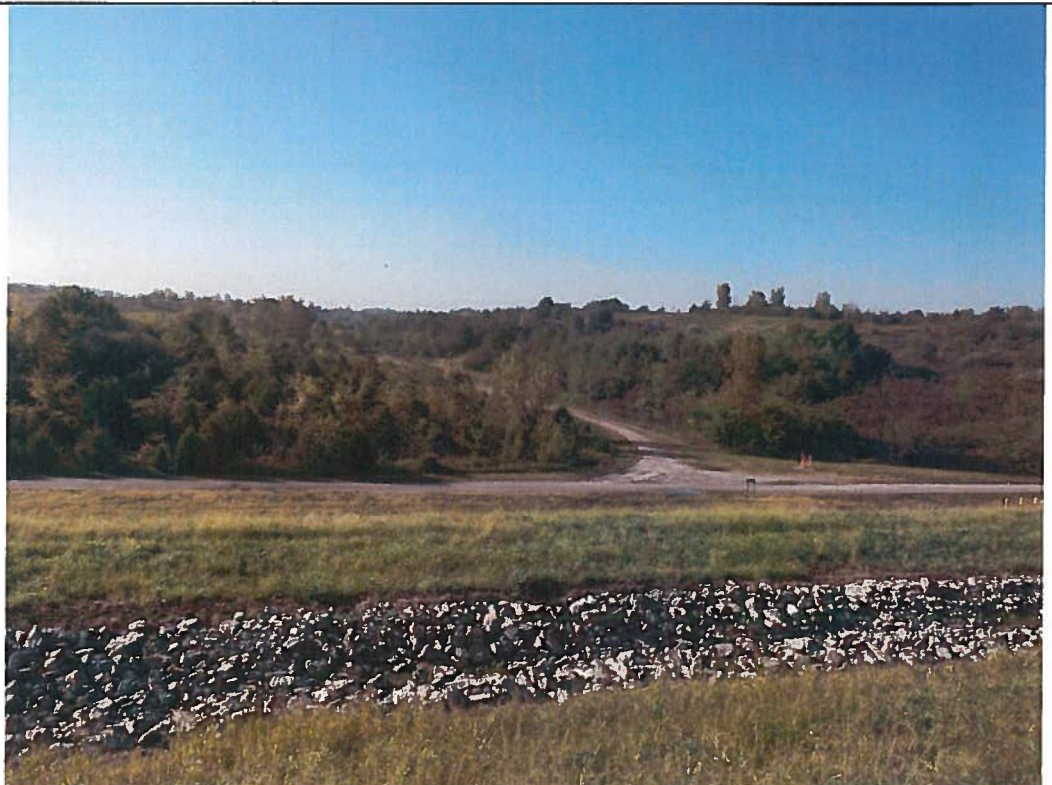
Date:
9/13/17

Location

Gypsum stack landfill

Description:

Access road to wildlife managed land. Culverts transfer Stream 2 drainage below this road from west to east (right to left).



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
15

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Str-2 crosses a road via
culverts and forms a small
area of standing water.



Photo No.
16

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Landfill toe of slope
drainage pathway looking
east



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
17

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Landfill toe of slope
drainage pathway looking
west



Photo No.
18

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Landfill toe of slope
drainage pathway culvert
facing south



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
19

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Str-2 entering W-28 and
Pond 7



Photo No.
20

Date:
9/13/17

Location

Gypsum stack landfill

Description:

From south end of Pond 7
and W-28 looking north at
the Gyp Stack landfill



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
21

Date:
9/13/17

Location

Gypsum stack landfill

Description:

North end of Pond 7
looking south away from
the landfill



Photo No.
22

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Open water area of Pond 7
at boat ramp access on
west side.



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
23

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Gyp stack Stilling Pond 2
facing southeast.



Photo No.
24

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Leachate stream on east
side of Gyp Stack, part of
NPDES system, facing
north.



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
25

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Leachate stream from
Gyp Stack facing east.



Photo No.
26

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Overflow from retention
pond(culvert) joins with the
leachate stream.



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
27

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Leachate stream looking west towards the landfill.



Photo No.
28

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Culvert in leachate stream under haul road, facing northeast.



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
29

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Leachate stream looking east towards the plant.



Photo No.
30

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Leachate stream takes a turn to the south and crosses under that haul road.



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro, Kentucky

Project No.
60532201

Photo No.
31

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Culvert exit on the south side of the haul road. Stream continues out of survey area into the ash pond and NPDES discharge.



Photo No.
32

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Eastern end of the roadside ditch east of Photo 33 that contains the leachate stream. Also the eastern extent of the survey area.



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro, Kentucky

Project No.
60532201

Photo No.
33

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Roadside ditch, south side of road leading to gyp stack landfill opposite photo 32 facing east.



Photo No.
34

Date:
9/13/17

Location

Gypsum stack landfill

Description:

Pond 6 (also designated trout stocking pond with roadside signage) south of landfill facing southwest.



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
35

Date:
9/13/17

Location

Gypsum stack landfill

Description:

WWC-1 looking south,
upstream of PUB-1



Photo No.
36

Date:
9/13/17

Location

Gypsum stack landfill

Description:

LW-1 is a small narrow
ditch containing wetland
plants upstream of Pond
5.



Client Name:
Tennessee Valley Authority

Site Location: Paradise Fossil Plant, Drakesboro,
Kentucky

Project No.
60532201

Photo No.
37

Date:
9/13/17

Location

Gypsum stack landfill

Description:

LW-1, eastern end, facing west.



Photo No.
38

Date:
9/13/17

Location

Gypsum stack landfill

Description:

WWC-3 where it makes
confluence with WWC-2
facing south



APPENDIX B



ERNIE FLETCHER
GOVERNOR

ENVIRONMENTAL AND PUBLIC PROTECTION CABINET

LAJUANA S. WILCHER
SECRETARY

DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER
14 REILLY ROAD
FRANKFORT, KENTUCKY 40601-1190
www.kentucky.gov

APR 27 2004

Mr. Bryan Wells
Tennessee Valley Authority
1101 Market Street, LP 3K
Chattanooga, Tennessee 37402-2801

Re: Tennessee Valley Authority
KPDES No.: KY0004201
Muhlenberg County, Kentucky

Dear Mr. Wells:

Enclosed is the Kentucky Pollutant Discharge Elimination System (KPDES) permit for the above-referenced facility. This action constitutes a final permit issuance under 401 KAR 5:075, pursuant to KRS 224.16-050.

This permit will become effective on the date indicated in the attached permit provided that no request for adjudication is granted. All provisions of the permit will be effective and enforceable in accordance with 401 KAR 5:075, unless stayed by the Hearing Officer under Sections 11 and 13.

Any demand for a hearing on the permit shall be filed in accordance with the procedures specified in KRS 224.10-420, 224.10-440, 224.10-470 and any regulations promulgated thereto. Any person aggrieved by the issuance of a permit final decision may demand a hearing, pursuant to KRS 224.10-420(2), within thirty (30) days from the date of the issuance of this letter. Two (2) copies of request for hearing should be submitted in writing to the Natural Resources and Environmental Protection Cabinet, Office of Administrative Hearings, 35-36 Fountain Place, Frankfort, Kentucky 40601 and the Commonwealth of Kentucky, Natural Resources and Environmental Protection Cabinet, Division of Water, 14 Reilly Road, Frankfort, Kentucky 40601. For your record keeping purposes, it is recommended that these requests be sent by certified mail. The written request must conform to the appropriate statutes referenced above.

If you have any questions regarding the KPDES decision, please contact Courtney Seitz, Inventory and Data Management Section, KPDES Branch, at (502) 564-2225, extension 465.

Further information on procedures and legal matters pertaining to the hearing request may be obtained by contacting the Office of Administrative Hearings at (502) 564-7312.

Sincerely,

Jeffrey W. Pratt, Director
Division of Water

JWP:NG:ng
Enclosure

c: Madisonville Regional Office
Division of Water Files
U.S. EPA Region IV



ERNE FLETCHER
GOVERNOR

ENVIRONMENTAL AND PUBLIC PROTECTION CABINET

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WATER

14 REILLY ROAD

FRANKFORT, KENTUCKY 40601-1190

www.kentucky.gov

LAJUANA S. WILCHER
SECRETARY

FACT SHEET

**KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM
PERMIT TO DISCHARGE TREATED WASTEWATER
INTO WATERS OF THE COMMONWEALTH**

KPDES No.: KY0004201 Permit Writer: Larry Sowder Date: February 9, 2004

1. SYNOPSIS OF APPLICATION

a. Name and Address of Applicant

Tennessee Valley Authority
1101 Market Street, LP 3K
Chattanooga, Tennessee 37402-2801

b. Facility Location

Tennessee Valley Authority
Paradise Fossil Plant
13246 State Route 176
Drakesboro, Muhlenberg County, Kentucky

c. Description of Applicant's Operation

Coal-fired steam electric power generation and transmission facility (SIC Code 4911)

d. Production Capacity of Facility

The Paradise Fossil Plant has three (3) coal fired steam electric generation units with a total generation capacity of 2558 megawatts. Units 1 and 2 are 680 megawatts each and Unit 3 is 1198 megawatts.

e. Description of Existing Pollution Abatement Facilities

Outfall 001 - The fly ash pond provides mixing, neutralization, and sedimentation to the combined wastewaters of the ash slurry sump (2.41 MGD), fly ash sluice water Unit 3 and air preheater hopper wastewater Units 1 and 2 (22.4 MGD), air preheater wastewater sumps Units 1 and 2 (0.033 MGD), storm water runoff (reclaimed strip mine area (9.17 MGD), fly ash pond surface (22.92 MGD), chemical treatment pond (0.62 MGD), east and west dredge ponds (0.67 MGD), FGD slurry settling pond (17.77 MGD), FGD drainage area (13.11 MGD), and dry ash storage areas (6.0 MGD) - all are calculated maximums), and bottom ash pond (138.41 MGD - calculated maximum).

CW



- Outfall 002 - The bottom ash pond provides mixing, neutralization, and sedimentation to the combined wastewaters of the ash pit sumps Units 1 and 2 (2.92 MGD), station sumps Units 1, 2, and 3 (10.55 MGD), bottom ash sluice water Units 1, 2, and 3 (61.46 MGD), unwatering sumps Units 1 and 2 (9.17 MGD), demineralizer sumps Units 1 and 2 (0.002 MGD), water treatment sump (0.85 MGD), Unit 3 extension area sump (0.35 MGD), sewage treatment plant (0.041 MGD), and storm water runoff (wooded area west of Red Water Ditch (RWD) 3 (2.58 MGD), RWD 4 (0.298 MGD), RWD 3 (0.789 MGD), RWD 5 (0.259 MGD), RWD 2 (0.194 MGD), RWD 1 (0.194 MGD), coal wash refuse disposal area (10.42 MGD), rail and truck unloading area (4.19 MGD), area north, west, and southwest of coal wash plant (6.21 MGD), coal storage yard (16.1 MGD), coal yard drainage basins 2 and 3 (0.776 MGD), coal wash plant area (1.07 MGD), limestone handling and cooling tower area (2.40 MGD), miscellaneous plant drainage (4.99 MGD), and bottom ash pond surface (2.63 MGD) - all are calculated maximums. A portion of the discharge from this outfall discharges to the fly ash pond of Outfall 001.
- Outfall 004 - Sanitary wastewater (0.041 MGD) is treated in an extended aeration package treatment plant that discharges to Red Water Ditch 1 which in turn discharges to the bottom ash pond (Outfall 002).
- Outfall 005 - No treatment of condenser cooling water (306.23 MGD).
- Outfall 006 - This outfall has been inactivated and combined with Outfall 007.
- Outfall 007 - The chemical treatment ponds (006 and 007) provide sedimentation to the combined wastewaters of Unit 3 ash slurry sump including Unit 3 powder & air preheater washes (1.162 MGD), Units 1 and 2 air preheater sumps (0.008 MGD), chemical boiler cleaning Units 1, 2, and 3 (0.033 MGD), and storm water runoff including pond 006 (0.621 MGD - calculated maximum). This outfall discharges to the fly ash pond of Outfall 001.
- Outfall 010 - Plant intake.

f. Permitting Action

Reissuance of a KPDES permit for an existing source coal-fired steam electric power generation station.

2. RECEIVING WATERS

a. Receiving Water Name

Outfall 001 is to the Jacobs Creek at mile point 1.4.

Outfalls 002 and 005 are to the Green River at mile points 100.15 and 100.3, respectively.

Outfall 004 is an internal outfall to the bottom ash pond (Outfall 002).

Outfall 006 has been inactivated.

Outfall 007 is an internal outfall to the fly ash pond (Outfall 001).

Outfall 010, the plant intake, is at mile point 100.6 of the Green River.

b. Stream Segment Use Classifications

The Green River and Jacobs Creek are classified as Warmwater Aquatic Habitat and Primary/Secondary Contact Recreation.

c. Stream Low Flow Condition

At the point of discharge, the 7Q10 and the Harmonic Mean for Jacobs Creek are 0.0 cfs and unavailable, respectively.

At the point of discharge, the 7Q10 and the Harmonic Mean for the Green River are 500 and 3,140 cfs, respectively.

At the city of Rockport, which is the nearest downstream public water supply intake, the 7Q10 and the Harmonic Mean for the Green River are 505 and 3,150 cfs, respectively.

d. Water Quality Limited or Effluent Limited

The Green River and Jacobs Creek are designated as Water Quality Limited.

3A. REPORTED DISCHARGE AND PROPOSED LIMITS

Description of Discharge - Outfall 001 - Combined wastewaters of the ash slurry sump (2.41 MGD), fly ash sluice water Unit 3 and air preheater hopper wastewater Units 1 and 2 (22.4 MGD), air preheater wastewater sumps Units 1 and 2 (0.033 MGD), storm water runoff (reclaimed strip mine area (9.17 MGD), fly ash pond surface (22.92 MGD), chemical treatment pond (0.62 MGD), east and west dredge ponds (0.67 MGD), FGD slurry settling pond (17.77 MGD), FGD drainage area (13.11 MGD), and dry ash storage areas (6.0 MGD) - all are calculated maximums), and bottom ash pond (138.41 MGD - calculated maximum).

Effluent Characteristics	Reported Discharge		Proposed Limits		Applicable Water Quality Criteria and/or Effluent Guidelines
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Flow (MGD)	29	59	Report	Report	401 KAR 5:065, Section 2(8)
Total Suspended Solids (mg/l)	6.72	190	30	74	401 KAR 5:065, Sections 4 and 5
Oil & Grease (mg/l)	5.01	8.0	11	13	401 KAR 5:065, Sections 4 and 5
Hardness (as mg/l CaCO ₃)	496	693	Report	Report	401 KAR 5:065, Section 2(8)
Total Recoverable Metals (mg/l)	0.122	0.255	Report	Report	401 KAR 5:065, Section 2(8)
Chronic Toxicity (TU _c)	N/A	<3.40	N/A	1.00	401 KAR 5:029, Section 4
pH (standard units)	7.0 (min)	8.9 (max)	6.0 (min)	9.0 (max)	401 KAR 5:031, Section 2 401 KAR 5:031, Section 4 401 KAR 5:065, Sections 4 and 5

The data contained under the reported discharge columns is not from the renewal application, but rather from the analysis of the DMR data that has been reported during the term of the current permit.

The abbreviation N/A means Not Applicable.

The term Total Recoverable Metals means Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc.

4A. METHODOLOGY USED IN DETERMINING LIMITATIONS

a. Serial Number

Outfall 001 - Combined wastewaters of the ash slurry sump (2.41 MGD), fly ash sluice water Unit 3 and air preheater hopper wastewater Units 1 and 2 (22.4 MGD), air preheater wastewater sumps Units 1 and 2 (0.033 MGD), storm water runoff (reclaimed strip mine area (9.17 MGD), fly ash pond surface (22.92 MGD), chemical treatment pond (0.62 MGD), east and west dredge ponds (0.67 MGD), FGD slurry settling pond (17.77 MGD), FGD drainage area (13.11 MGD), and dry ash storage areas (6.0 MGD) - all are calculated maximums), and bottom ash pond (138.41 MGD - calculated maximum).

b. Effluent Characteristics

Flow	Total Suspended Solids	Oil & Grease
pH	Total Recoverable Metals	Chronic Toxicity
Hardness		

c. Pertinent Factors

All units are existing sources subject to the requirements of 40 CFR Part 423 - Steam Electric Power Generating Point Source Category (1982 version). The specific requirements include the "Best Practicable Technology Currently Available" (BPT - 423.12) and "Best Available Technology Economically Achievable" (BAT - 423.13) requirements.

A summarization of the effluent guidelines, water quality standards, assumptions, and calculations can be found in Attachment A - Fact Sheet Addendum for Steam Electric Power Generating Plants, Attachment B - SSTWAM95, and Attachment C - Reasonable Potential Analysis.

d. Monitoring Requirements

Flow shall be monitored twice per month using a weir.

Monitoring for Hardness, Oil & Grease, pH, and Total Suspended Solids shall be conducted twice per month by grab sample.

Chronic Toxicity shall be monitored quarterly by three (3) composite samples collected every other day.

Total Recoverable Metals shall be monitored quarterly by grab sample. The results of the analyses shall be totaled and reported as a single concentration on the DMR. The laboratory bench sheets showing the results for each metal shall be attached to the DMR.

4A. METHODOLOGY USED IN DETERMINING LIMITATIONS - continued

e. Justification of Limits

The Kentucky Administrative Regulations (KARs) cited below have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes (KRSs).

Concentration Limitations versus Mass Based Limitations

Pursuant to 401 KAR 5:065, Sections 4 and 5, the requirements of 40 CFR Part 423 - Steam Electric Power Generating Point Source Category apply to this discharge. In accordance with Sections 423.12(b)(11) and 423.13(g), the permitting authority may allow the quantity of pollutant discharge to be expressed as a concentration limitation instead of a mass based limitation. The Division of Water has determined to apply the requirements of 40 CFR Part 423 in this manner.

Flow, Hardness, and Total Recoverable Metals

The monitoring requirements for these parameters are consistent with the requirements of 401 KAR 5:065, Section 2(8).

Total Suspended Solids, and Oil & Grease

The limits for these parameters are consistent with the requirements of 401 KAR 5:065, Sections 4 and 5. These limits are representative of the BPT requirements for the discharge of these pollutants in a co-treatment facility that treats wastewaters that include, but are not limited to low volume wastes (423.12(b)(3)), ash transport water (423.12(b)(4)), metal cleaning wastes (423.12(b)(5)), and coal pile runoff (423.12(b)(9)).

pH

The limits for these parameters are consistent with the requirements of 401 KAR 5:031, Section 4 and 401 KAR 5:065, Sections 4 and 5. These limits are representative of the BPT requirements for the discharge of these pollutants in a co-treatment facility that treats wastewaters that include, but are not limited to low volume wastes (423.12(b)(3)), ash transport water (423.12(b)(4)), metal cleaning wastes (423.12(b)(5)), and coal pile runoff (423.12(b)(9)).

Chronic Toxicity

The requirements for this parameter are consistent with the requirements of 401 KAR 5:029, Section 4 and 401 KAR 5:031, Sections 1 and 4.

3B. REPORTED DISCHARGE AND PROPOSED LIMITS

Description of Discharge - Outfall 002 - Combined wastewaters of the ash pit sumps Units 1 and 2 (2.92 MGD), station sumps Units 1, 2, and 3 (10.55 MGD), bottom ash sluice water Units 1, 2, and 3 (61.46 MGD), unwatering sumps Units 1 and 2 (9.17 MGD), demineralizer sumps Units 1 and 2 (0.002 MGD), water treatment sump (0.85 MGD), Unit 3 extension area sump (0.35 MGD), sewage treatment plant (0.041 MGD), and storm water runoff (wooded area west of Red Water Ditch (RWD) 3 (2.58 MGD), RWD 4 (0.298 MGD), RWD 5 (0.259 MGD), RWD 2 (0.194 MGD), RWD 1 (0.194 MGD), coal wash refuse disposal area (10.42 MGD), rail and truck unloading area (4.19 MGD), area north, west, and southwest of coal wash plant (6.21 MGD), coal storage yard (16.1 MGD), coal yard drainage basins 2, and 3 (0.776 MGD), coal wash plant area (1.07 MGD), limestone handling and cooling tower area (2.40 MGD), miscellaneous plant drainage (4.99 MGD), and bottom ash pond surface (2.63 MGD) - all are calculated maximums. A portion of the discharge from this outfall discharges to the fly ash pond of Outfall 001.

Effluent Characteristics	Reported Discharge		Proposed Limits		Applicable Water Quality Criteria and/or Effluent Guidelines
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Flow (MGD)	27	58	Report	Report	401 KAR 5:065, Section 2 (8)
Total Suspended Solids (mg/l)	17.24	74	30	81	401 KAR 5:065, Sections 4 and 5
Oil & Grease (mg/l)	5.0	6.0	13	15	401 KAR 5:080, Section 1(2)(c)2
Hardness (as mg/l) (CaCO ₃)	178	532	Report	Report	401 KAR 5:065, Sections 4 and 5
Total Recoverable Metals (mg/l)	0.06	0.25	Report	Report	401 KAR 5:065, Section 2 (8)
Acute Toxicity (TU _a)	N/A	<1.5	N/A	1.00	401 KAR 5:029, Section 4
pH (standard units)	6.5 (min)	8.5 (max)	6.0 (min)	9.0 (max)	401 KAR 5:031, Section 2
					401 KAR 5:031, Section 4
					401 KAR 5:065, Sections 4 and 5

The data contained under the reported discharge columns is not from the renewal application but rather from the analysis of the DMR data that has been reported during the term of the current permit.

The abbreviation N/A means Not Applicable.

The term Total Recoverable Metals means Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc.

The limits for Total Suspended Solids shall be applied as net limitations when the Total Suspended Solids concentration in the raw water, as measured at Outfall 010 - Plant Intake, exceeds the proposed effluent limitations. The following formula shall be used to determine compliance: $TSS_{(Net)} = TSS_{(002 \text{ discharge})} - TSS_{(010 \text{ intake})}$.

4B. METHODOLOGY USED IN DETERMINING LIMITATIONS

a. Serial Number

Outfall 002 - Combined wastewaters of the ash pit sumps Units 1 and 2 (2.92 MGD), station sumps Units 1, 2, and 3 (10.55 MGD), bottom ash sluice water Units 1, 2, and 3 (61.46 MGD), unwatering sumps Units 1 and 2 (9.17 MGD), demineralizer sumps Units 1 and 2 (0.002 MGD), water treatment sump (0.85 MGD), Unit 3 extension area sump (0.35 MGD), sewage treatment plant (0.041 MGD), and storm water runoff (wooded area west of Red Water Ditch (RWD) 3 (2.58 MGD), RWD 4 (0.298 MGD), RWD 3 (0.789 MGD), RWD 5 (0.259 MGD), RWD 2 (0.194 MGD), RWD 1 (0.194 MGD), coal wash refuse disposal area (10.42 MGD), rail and truck unloading area (4.19 MGD), area north, west, and southwest of coal wash plant (6.21 MGD), coal storage yard (16.1 MGD), coal yard drainage basins 2, and 3 (0.776 MGD), coal wash plant area (1.07 MGD), limestone handling and cooling tower area (2.40 MGD), miscellaneous plant drainage (4.99 MGD), and bottom ash pond surface (2.63 MGD) - all are calculated maximums.

b. Effluent Characteristics

Flow	Total Suspended Solids	Oil & Grease
pH	Total Recoverable Metals	Acute Toxicity
Hardness		

c. Pertinent Factors

A portion of the discharge from this outfall is routed to the fly ash pond (Outfall 001).

Raw water from the Green River is used for once-through cooling then ash sluicing.

All units are existing sources subject to the requirements of 40 CFR Part 423 - Steam Electric Power Generating Point Source Category (1982 version). The specific requirements include the "Best Practicable Technology Currently Available" (BPT - 423.12) and "Best Available Technology Economically Achievable" (BAT - 423.13) requirements.

A summarization of the effluent guidelines, water quality standards, assumptions, and calculations can be found in Attachment A - Fact Sheet Addendum for Steam Electric Power Generating Plants, Attachment B - SSTWAM95, and Attachment C - Reasonable Potential Analysis.

d. Monitoring Requirements

Flow shall be monitored twice per month using a weir.

Monitoring for Hardness, Oil & Grease, pH, and Total Suspended Solids shall be conducted twice per month by grab sample.

Acute Toxicity shall be monitored quarterly by two (2) grab samples collected a minimum of eight (8) hours apart.

Total Recoverable Metals shall be monitored quarterly by grab sample. The results of the analyses shall be totaled and reported as a single concentration on the DMR. The laboratory bench sheets showing the results for each metal shall be attached to the DMR.

4B. METHODOLOGY USED IN DETERMINING LIMITATIONS - continuede. Justification of Limits

The Kentucky Administrative Regulations (KARs) cited below have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes (KRSs).

Concentration Limitations versus Mass Based Limitations

Pursuant to 401 KAR 5:065, Sections 4 and 5, the requirements of 40 CFR Part 423 - Steam Electric Power Generating Point Source Category apply to this discharge. In accordance with Sections 423.12(b)(11) and 423.13(g), the permitting authority may allow the quantity of pollutant discharge to be expressed as a concentration limitation instead of a mass based limitation. The Division of Water has determined to apply the requirements of 40 CFR Part 423 in this manner.

Flow, Hardness, and Total Recoverable Metals

The monitoring requirements for these parameters are consistent with the requirements of 401 KAR 5:065, Section 2(8).

Oil & Grease

The limits for this parameter are consistent with the requirements of 401 KAR 5:065, Sections 4 and 5. These limits are representative of the BPT requirements for the discharge of these pollutants in a co-treatment facility that treats wastewaters that include, but are not limited to low volume wastes (423.12(b)(3)), ash transport water (423.12(b)(4)), metal cleaning wastes (423.12(b)(5)), and coal pile runoff (423.12(b)(9)).

Total Suspended Solids

The limits for this parameter are consistent with the requirements of 401 KAR 5:065, Sections 4 and 5, and 401 KAR 5:080, Section 1(2)(c)2. These limits are representative of the BPT requirements for the discharge of these pollutants in a co-treatment facility that treats wastewaters that include, but are not limited to low volume wastes (423.12(b)(3)), ash transport water (423.12(b)(4)), metal cleaning wastes (423.12(b)(5)), and coal pile runoff (423.12(b)(9)). Due to the configuration of the bottom ash pond and the use of once-through cooling water from the Green River for ash transport, the limitations for this parameter shall be applied as net limitations when the total suspended solids concentration of the Green River, as taken at Outfall 010 - Plant Intake, exceeds the daily maximum effluent limitation.

pH

The limits for this parameter are consistent with the requirements of 401 KAR 5:031, Section 4 and 401 KAR 5:065, Sections 4 and 5. These limits are representative of the BPT requirements for the discharge of these pollutants in a co-treatment facility that treats wastewaters that include, but are not limited to low volume wastes (423.12(b)(3)), ash transport water (423.12(b)(4)), metal cleaning wastes (423.12(b)(5)), and coal pile runoff (423.12(b)(9)).

Acute Toxicity

The requirements for this parameter are consistent with the requirements of 401 KAR 5:029, Section 4 and 401 KAR 5:031, Sections 1 and 4.

3C. REPORTED DISCHARGE AND PROPOSED LIMITS

Description of Discharge - Outfall 004 - Sanitary wastewater (internal outfall of Outfall 002).

Effluent Characteristics	Reported Discharge		Proposed Limits		Applicable Water Quality Criteria and/or Effluent Guidelines
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Flow (MGD)	0.023	0.200	Report	Report	401 KAR 5:065, Section 2(8)
CBOD ₅ (mg/l)	2.64	14	30	45	401 KAR 5:045, Section 3
Fecal Coliform Bacteria (#/100 ml)	6	71	200	400	401 KAR 5:045, Section 4

The data contained under the reported discharge columns is not from the renewal application but rather from the analysis of the DMR data that has been reported during the term of the current permit.

The abbreviation CBOD₅ means Carbonaceous Biochemical Oxygen Demand, 5-day.

4C. METHODOLOGY USED IN DETERMINING LIMITATIONS

a. Serial Number

Outfall 004 - Sanitary wastewater.

b. Effluent Characteristics

Flow	Fecal Coliform Bacteria	CBOD ₅
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c. Pertinent Factors

The sanitary wastewater plant discharges to Red Water Ditch No. 1, which in turn discharges to the bottom ash pond (Outfall 002).

d. Monitoring Requirements

Flow measurements shall be taken instantaneously once per month

CBOD₅ and Fecal Coliform Bacteria shall be sampled once per month by grab sample.

e. Justification of Limits

The Kentucky Administrative Regulations (KARs) cited below have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes (KRSs).

Internal Monitoring Point

Section 3(8) of 401 KAR 5:065 authorizes the establishment of internal monitoring points to ensure compliance with applicable treatment requirements, which when commingling with other wastestreams will prevent measuring compliance. In this case, the sanitary wastewater is commingled with the waters of the ash pond. In order to gauge compliance with the secondary treatment requirements for biodegradable wastewaters, an internal monitoring point is being established prior to the commingling of wastewaters.

Flow

The monitoring requirements for this parameter are consistent with the requirements of 401 KAR 5:065, Section 2(8).

Carbonaceous Biochemical Oxygen Demand, 5-day

The limits for this parameter are consistent with the requirements of 401 KAR 5:045, Section 3. These limits are representative of the secondary treatment requirements biodegradable wastewaters

Fecal Coliform Bacteria

The requirements for this parameter are consistent with the requirements of 401 KAR 5:045, Section 4.

3D. REPORTED DISCHARGE AND PROPOSED LIMITS

Description of Discharge - Outfall 005 - Condenser cooling water (306.23 MGD)

Effluent Characteristics	Reported Discharge		Proposed Limits		Applicable Water Quality Criteria and/or Effluent Guidelines
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Flow (MGD)	299	683	Report	Report	401 KAR 5:065, Section 2(8)
Discharge Temperature (°F)	84	118	Report	Report	401 KAR 5:065, Section 2(8)
Mixed River Temperature (°F)	65	89	Report	89	401 KAR 5:031, Section 4
Instream Temperature Change (°F)	2.6	18	Report	10	401 KAR 5:080, Section 1(2)(c)2
Free Available Chlorine (mg/l)	D/C	D/C	0.2	0.5	401 KAR 5:031, Section 4
Total Residual Chlorine (mg/l)	D/C	D/C	0.012	0.019	401 KAR 5:065, Sections 4 and 5
Total Residual Oxidants (mg/l)	D/C	D/C	Report	0.2	401 KAR 5:065, Sections 4 and 5
Time of Oxidant Addition (Minutes/unit/day)	D/C	D/C	N/A	120	401 KAR 5:080, Section 1(2)(c)2
pH (Standard Units)	6.9 (min)	8.6 (max)	6.0 (min)	9.0 (max)	401 KAR 5:065, Sections 4 and 5

The data contained under the reported discharge columns is not from the renewal application but rather from the analysis of the DMR data that has been reported during the term of the current permit.

The abbreviation N/A means Not Applicable.

The abbreviation D/C means Does Not Chlorinate. The facility does not routinely chlorinate or add oxidants to the cooling water.

4D. METHODOLOGY USED IN DETERMINING LIMITATIONS

a. Serial Number

Outfall 005 - Condenser cooling water (306.23 MGD).

b. Effluent Characteristics

Flow	Discharge Temperature
Mixed River Temperature	Instream Temperature Change
Free Available Chlorine	Total Residual Chlorine
Total Residual Oxidants	Time of Oxidant Addition
pH	

c. Pertinent Factors

Raw water from the Green River is used for once-through cooling water.

The Paradise Fossil Plant combines once-through cooling water from Units 1 and 2, and miscellaneous equipment cooling waters with excess raw service water, and storm water runoff in the condenser cooling water discharge channel. Make up water for the cooling towers is withdrawn from this discharge channel. The waters of the discharge channel and the waters of the Green River commingle within the channel. In 1976, TVA conducted a 316(a) thermal plume study that defined the limits of the mixing zone in the Green River. The study indicated that the Paradise thermal discharges were within the constraints of the NPDES permit.

All units are existing sources subject to the requirements of 40 CFR Part 423 - Steam Electric Power Generating Point Source Category (1982 version). The specific requirements include the "Best Practicable Technology Currently Available" (BPT - 423.12) and "Best Available Technology Economically Achievable" (BAT - 423.13) requirements.

A summarization of the effluent guidelines, water quality standards, assumptions, and calculations can be found in Attachment A - Fact Sheet Addendum for Steam Electric Power Generating Plants.

d. Monitoring Requirements

Flow shall be monitored continuously using logs.

Discharge Temperature shall be monitored once per day by grab sample.

Monitoring for Total Residual Chlorine, Free Available Chlorine, Total Residual Oxidants, and Time of Oxidant Addition shall be conducted during periods of chlorination/oxidation, but no more frequent than once per month. Multiple grabs consisting of grab samples collected at the approximate beginning of FAC/TRO discharge and once every fifteen (15) minutes thereafter until the end of FAC/TRO discharge.

The pH shall be monitored once per month by grab sample.

4D. METHODOLOGY USED IN DETERMINING LIMITATIONS - continued

d. Monitoring Requirements - continued

Mixed River Temperature shall be calculated daily using the following formula:

$$T_m = \frac{(T_i)(Q_u - Q_i) + (T_d)(Q_i - Q_{misc})}{Q_a - Q_{misc}}$$

Where T_m = Mixed River Temperature downstream of Outfall 005
 T_i = Intake Temperature (Outfall 010)
 T_d = Discharge Temperature (Outfall 005)
 Q_u = Upstream Flow of Green River
 Q_i = Intake Flow (Outfall 010)
 Q_{misc} = Cooling water used for ash sluice and tower evaporation flows taken from the intake flow not discharged as cooling water.

Instream Temperature Change shall be calculated daily using the following formula:

$$\Delta T = T_m - T_i$$

Where ΔT = Instream Temperature Change
 T_m = Mixed River Temperature downstream of Outfall 005
 T_i = Intake Temperature (Outfall 010)

e. Justification of Limits

The Kentucky Administrative Regulations (KARs) cited below have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes (KRSs).

Concentration Limitations versus Mass Based Limitations

Pursuant to 401 KAR 5:065, Sections 4 and 5, the requirements of 40 CFR Part 423 - Steam Electric Power Generating Point Source Category apply to this discharge. In accordance with Sections 423.12(b)(11) and 423.13(g), the permitting authority may allow the quantity of pollutant discharge to be expressed as a concentration limitation instead of a mass based limitation. The DOW has determined to apply the requirements of 40 CFR Part 423 in this manner.

Flow, and Discharge Temperature

The monitoring requirements for these parameters are consistent with requirements of 401 KAR 5:065, Section 2(8).

Mixed River Temperature, and Instream Temperature Change

The limits for these parameters are consistent with the requirements of 401 KAR 5:031, Section 4 and 401 KAR 5:080, Section (3)(a). These limitations are representative of the alternate effluent limits for thermal discharges.

4D. METHODOLOGY USED IN DETERMINING LIMITATIONS - continued

e. Justification of Limits (continued)

Free Available Chlorine

The limits for this parameter are consistent with the requirements of 401 KAR 5:065, Sections 4 and 5. These limits are representative of the BPT requirements for the discharge of this pollutant in once through cooling as specified in 40 CFR Parts 423.12(b)(6).

Total Residual Chlorine

The limits for these parameters are consistent with the requirements of 401 KAR 5:031, Section 4, and 401 KAR 5:065, Sections 4 and 5. These limits are representative of the state water quality standards and the BAT requirements for this pollutant associated with once through cooling water as specified in 40 CFR 423.13(b)(1).

Time of Oxidant Addition

The limits for this parameter are consistent with the requirements of 401 KAR 5:065, Sections 4 and 5 and 401 KAR 5:080, Section 1(2)(c)2. These limits are representative of the BPT and BAT requirements for the addition of chlorine in once through cooling water as specified in 40 CFR Parts 423.13(b)(2). It is the Best Professional Judgement (BPJ) of the Division of Water that this requirement is also applicable to the addition of other oxidants.

Total Residual Oxidants

The limits for this parameter are consistent with the requirements of 401 KAR 5:080, Section 1(2)(c)2. These limits are representative of the Division of Water's Best Professional Judgement (BPJ) determination of the BPT and BAT requirements for the discharge of these pollutants in cooling tower blowdown.

pH

The limits for these parameters are consistent with the requirements of 401 KAR 5:031, Section 4.

3E. REPORTED DISCHARGE AND PROPOSED LIMITS

Description of Discharge - Outfall 007 - Combined wastewaters of Unit 3 ash slurry sump including Unit 3 powder & air preheater washes (1.162 MGD), Units 1 and 2 air preheater sumps (0.008 MGD), chemical boiler cleaning Units 1, 2, and 3 (0.033 MGD), and storm water runoff including pond 006 (0.621 MGD - calculated maximum). This outfall discharges to the fly ash pond of Outfall 001.

Effluent Characteristics	Reported Discharge		Proposed Limits		Applicable Water Quality Criteria and/or Effluent Guidelines
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Flow (MGD)	1.0	8.2	Report	Report	401 KAR 5:065, Section 2(8)
Copper, Total (mg/l)	0.01	0.03	1.0	1.0	401 KAR 5:065, Sections 4 and 5
Iron, Total (mg/l)	0.04	0.2	1.0	1.0	401 KAR 5:065, Sections 4 and 5
Total Suspended Solids (mg/l)	D/M	D/M	30	100	401 KAR 5:065, Sections 4 and 5
Oil & Grease (mg/l)	D/M	D/M	20	30	401 KAR 5:065, Sections 4 and 5
pH (standard units)	7.3 (min)	11.4 (max)	6.0 (min)	9.0 (max)	401 KAR 5:065, Sections 4 and 5

The data contained under the reported discharge columns is not from the renewal application but rather from the analysis of the DMR data that has been reported during the term of the current permit.

The application of the effluent requirements for Total Suspended Solids, Oil & Grease, and pH shall be at the Green Ash Pond.

4E. METHODOLOGY USED IN DETERMINING LIMITATIONS

a. Serial Number

Outfall 007 - Combined wastewaters of Unit 3 ash slurry sump including Unit 3 powdex & air preheater washes (1.162 MGD), Units 1 and 2 air preheater sumps (0.008 MGD), chemical boiler cleaning Units 1, 2, and 3 (0.033 MGD), and storm water runoff including pond 006 (0.621 MGD - calculated maximum). This outfall discharges to the fly ash pond of Outfall 001.

b. Effluent Characteristics

Flow	Total Suspended Solids	Oil & Grease
Total Copper	Total Iron	pH

c. Pertinent Factors

Outfall 006 has been combined with this outfall.

Outfall 007 is an internal outfall to the fly ash pond of Outfall 001.

All units are existing sources subject to the requirements of 40 CFR Part 423 - Steam Electric Power Generating Point Source Category (1982 version). The specific requirements include the "Best Practicable Technology Currently Available" (BPT - 423.12) and "Best Available Technology Economically Achievable" (BAT - 423.13) requirements.

A summarization of the effluent guidelines, water quality standards, assumptions, and calculations can be found in Attachment A - Fact Sheet Addendum for Steam Electric Power Generating Plants.

d. Monitoring Requirements

Flow measurements shall be calculated once per metal cleaning operation.

Monitoring for Total Copper, Total Iron, and pH shall be conducted once per metal cleaning operation by grab samples.

e. Justification of Limits

The Kentucky Administrative Regulations (KARs) cited below have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes (KRSs).

Internal Monitoring Requirement

Section 3(8) of 401 KAR 5:065 authorizes the establishment of internal monitoring points to ensure compliance with applicable treatment requirements, which when commingling with other wastestreams will prevent measuring compliance. In this case, the much smaller cooling tower blowdown flow is commingled with the larger discharge flow from the wastewater treatment plant.

4E. METHODOLOGY USED IN DETERMINING LIMITATIONS (continued)

e. Justification of Limits (continued)

Concentration Limitations versus Mass Based Limitations

Pursuant to 401 KAR 5:065, Sections 4 and 5, the requirements of 40 CFR Part 423 - Steam Electric Power Generating Point Source Category apply to this discharge. In accordance with Sections 423.12(b)(11) and 423.13(g), the permitting authority may allow the quantity of pollutant discharge to be expressed as a concentration limitation instead of a mass based limitation. The DOW has determined to apply the requirements of 40 CFR Part 423 in this manner.

Flow and pH

The monitoring requirements for these parameters are consistent with requirements of 401 KAR 5:065, Section 2(8).

Total Copper and Total Iron

The limits for these parameters are consistent with the requirements of 401 KAR 5:065, Sections 4 and 5. These limits are representative of the BPT (423.12(b)(5)) and BAT (423.13(e)) requirements for the discharge of these pollutants in metal cleaning wastes.

Total Suspended Solids and Oil & Grease

The limits for these parameters will be applied after commingling with waters of either Outfall 001. The Division of Water has determined that application of the requirements for these parameters at Outfall 001 will be appropriate due to the same requirements being applied to the other wastestreams of Outfall 001.

3F. REPORTED DISCHARGE AND PROPOSED LIMITS

Description of Discharge - Outfall 010 - Plant Intake.

Effluent Characteristics	Reported Discharge		Proposed Limits		Applicable Water Quality Criteria and/or Effluent Guidelines
	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	
Flow (MGD)	341	709	Report	Report	401 KAR 5:065, Section 2 (8)
Temperature (°F)	38	89	Report	Report	401 KAR 5:065, Section 2 (8)
Total Suspended Solids (mg/l)	50	730	Report	Report	401 KAR 5:065, Section 2 (8)
Hardness (as mg/l CaCO ₃)	150	312	Report	Report	401 KAR 5:065, Section 2 (8)
pH (standard units)	7.1	8.6	Report	Report	401 KAR 5:065, Section 2 (8)
Total Recoverable Metals (mg/l)	N/R	N/R	Report	Report	401 KAR 5:065, Section 2 (8)

The data contained under the reported discharge columns is not from the renewal application, but rather from the analysis of the DMR data that has been reported during the term of the current permit.

The abbreviation N/R means Not Reported.

The term Total Recoverable Metals means Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc.

4F. METHODOLOGY USED IN DETERMINING LIMITATIONS

a. Serial Number

Outfall 010 - Plant Intake.

b. Effluent Characteristics

Flow	Temperature	Total Suspended Solids
pH	Hardness	Total Recoverable Metals

c. Pertinent Factors

The initial Section 316(b) study conducted in 1976 demonstrated a negligible effect on fish impingement from the plant intake. However, the makeup withdrawn from the condenser cooling discharge channel was periodically having a significant impact on the fish populations. As a result of this realization, TVA installed fish screens and skimmers in the channel to prevent fish from invading the discharge channel.

d. Monitoring Requirements

Flow and Temperature shall be monitored continuously by recorder.

Monitoring for Hardness, pH, Total Suspended Solids shall be conducted twice per month operation by grab sample.

Total Recoverable Metals shall be monitored quarterly by grab sample. The results of the analyses shall be totaled and reported as a single concentration on the DMR. The laboratory bench sheets showing the results for each metal shall be attached to the DMR.

e. Justification of Limits

The Kentucky Administrative Regulations (KARs) cited below have been duly promulgated pursuant to the requirements of Chapter 224 of the Kentucky Revised Statutes (KRSs).

Flow, Hardness, pH, Temperature, Total Recoverable Metals, and Total Suspended Solids

The monitoring requirements for these parameters are consistent with requirements of 401 KAR 5:065, Section 2(8).

5. ANTIDegradation

The conditions of 401 KAR 5:029, Section 1(1) have been satisfied by this permit action. A review under Section 1(2), (3), and (4) is not applicable.

6. PROPOSED COMPLIANCE SCHEDULE FOR ATTAINING EFFLUENT LIMITATIONS

Permittee shall comply with the effluent limitations by the effective date of the permit.

7. PROPOSED SPECIAL CONDITIONS WHICH WILL HAVE A SIGNIFICANT IMPACT ON THE DISCHARGE

Best Management Practices (BMP) Plan

Pursuant to 401 KAR 5:065, Section 2(10), a BMP requirement shall be included: to control or abate the discharge of pollutants from ancillary areas containing toxic or hazardous substances or those substances which could result in an environmental emergency, where numeric effluent limitations are infeasible, or to carry out the purposes and intent of KRS 224. The facility has several areas where support activities occur which have a potential of the discharge of such substances through storm water runoff or spillage. Some of these areas will drain to present wastewater treatment plants, others will not.

Polychlorinated Biphenyls

Pursuant to the requirements of 401 KAR 5:065, Section 4(3) (40 CFR Parts 423.12(b)(2) and 423.13(a)), there shall be no discharge from any point source of polychlorinated biphenyl compounds such as those commonly used in transformer fluids. The permittee shall implement this requirement as a specific section of the BMP plan developed for this station.

Cooling Water Additives, FIFRA, and Mollusk Control

The discharge of any product registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) in cooling water that ultimately may be released to the waters of the Commonwealth is prohibited, except Herbicides, unless specifically identified and authorized by the KPDES permit. In the event the permittee needs to use a biocide or chemical not previously reported for mollusk control or other purpose, the permittee shall submit sufficient information, a minimum of thirty (30) days prior to the commencement of use of said biocides or chemicals, to the Division of Water for review and establishment of appropriate control parameters.

Selective Catalytic Reduction Devices or Systems (SCRs) and Nonselective Catalytic Reduction Devices or Systems (NSCRs)

In response to recent Clean Air Act amendments, the installation of these devices for NOx reduction may become necessary. Associated with the installation and operation of these units, an "ammonia slip" may occur resulting in the discharge of ammonia to the ash pond. The impact of such an occurrence on the performance of the ash pond and any eventual impact on the environment are not known. Therefore, should it become necessary to install these devices, the permittee shall develop and implement an Ammonia Monitoring Plan. The plan shall be submitted to the Division of Water within ninety (90) days of the determination that these devices will be installed and shall include a minimum influent and effluent monitoring of each unit on a monthly basis with submission of the data as a quarterly report.

Section 311, Clean Water Act Exclusion

The permittee is relieved of the reporting and liability requirements under Section 311 of the Clean Water Act for the following substances, consistent with Exclusion 2, authorized by Section 311(a)(a)(B) and 40 CFR Part 117.12 for: Ammonium Hydroxide, Sodium Hypochlorite, Ethylene Diaminetetracetic Acid (EDTA), Sodium Hydroxide, Sodium Nitrite, Sodium Phosphate (Dibasic), and Sulfuric Acid.

8. **PERMIT DURATION**

This permit shall become effective November 1, 2004. The effective date of this permit is being delayed to place the facility in the correct 5-year cycle, as per the Kentucky Watershed Management Framework. During the interim period, the current permit will remain effective, in accordance with 401 KAR 5:060, Section 1(5)(c). In this instance, the permit is scheduled for reissuance in November 2009 for the Tradewater/Green Basin Management Unit.

9. **PERMIT INFORMATION**

The application, draft permit, fact sheet, public notice, comments received, and additional information is available from the Division of Water at 14 Reilly Road, Frankfort Office Park, Frankfort, Kentucky 40601.

10. **REFERENCED AND CITED DOCUMENTS**

All material and documents referenced or cited in this fact sheet are parts of the permit information as described above, and are readily available at the Division of Water Central Office. Information regarding these materials may be obtained from the person listed below.

11. **CONTACT**

For further information contact the individual identified on the Public Notice or the Permit Writer - Larry Sowder at (502) 564-2225, extension 472 or e-mail larry.sowder@ky.gov.

12. **PUBLIC NOTICE INFORMATION**

Please refer to the attached Public Notice for details regarding the procedures for a final permit decision, deadline for comments, and other information required by 401 KAR 5:075, Section 4(2)(e).

ATTACHMENT A - FACT SHEET ADDENDUM FOR STEAM ELECTRIC POWER GENERATING PLANTS

PART 423 - STEAM ELECTRIC POWER GENERATING POINT SOURCE CATEGORY

Section 423.11 Specialized definitions.

In addition to the definitions set forth in 40 CFR Part 401, the following definitions apply to this part:

- (a) The term total residual chlorine (or total residual oxidants for intake water with bromides) means the value obtained using the amperometric method for total residual chlorine described in 40 CFR Part 136.
- (b) The term low volume waste sources means, taken collectively as if from one source, wastewater from all sources except those for which specific limitations are otherwise established in this part. Low volume wastes sources include, but are not limited to: wastewaters from wet scrubber air pollution control systems, ion exchange water treatment system, water treatment evaporator blowdown, laboratory and sampling streams, boiler blowdown, floor drains, cooling tower basin cleaning wastes, and recirculating house service water systems. Sanitary and air conditioning wastes are not included.
- (c) The term chemical metal cleaning waste means any wastewater resulting from the cleaning of any metal process equipment with chemical compounds, including, but not limited to, boiler tube cleaning.
- (d) The term metal cleaning waste means any wastewater resulting from cleaning [with or without chemical cleaning compounds] any metal process equipment including, but not limited to, boiler tube cleaning, boiler fireside cleaning, and air preheater cleaning.
- (e) The term fly ash means the ash that is carried out of the furnace by the gas stream and collected by mechanical precipitators, electrostatic precipitators, and/or fabric filters. Economizer ash is included when it is collected with fly ash.
- (f) The term bottom ash means the ash that drops out of the furnace gas stream in the furnace and in the economizer sections. Economizer ash is included when it is collected with bottom ash.
- (g) The term once through cooling water means water passed through the main cooling condensers in one or two passes for the purpose of removing waste heat.
- (h) The term recirculated cooling water means water which is passed through the main condensers for the purpose of removing waste heat, passed through a cooling device for the purpose of removing such heat from the water and then passed again, except for blowdown, through the main condenser.
- (i) The term 10-year, 24-hour rainfall event means a rainfall event with a probable recurrence interval of once in ten years as defined by the National Weather Service in Technical Paper No. 40. Rainfall Frequency Atlas of the United States, May 1961 or equivalent regional rainfall probability information developed therefrom.

ATTACHMENT A - FACT SHEET ADDENDUM FOR STEAM ELECTRIC POWER GENERATING PLANTS

Section 423.11 Specialized definitions - continued.

- (j) The term blowdown means the minimum discharge of recirculating water for the purpose of discharging materials contained in the water, the further buildup of which would cause concentration in amounts exceeding limits established by best engineering practices.
- (k) The term average concentration as it relates to chlorine discharge means the average of analyses made over a single period of chlorine release which does not exceed two hours.
- (l) The term free available chlorine shall mean the value obtained using the amperometric titration method for free available chlorine described in Standard Methods for the Examination of Water and Wastewater, page 112 (13th edition).
- (m) The term coal pile runoff means the rainfall runoff from or through any coal storage pile.

Section 423.12 - Best Practicable Control Technology Currently Available (BPT)

- (b)(1) The pH of all discharges, except once-through cooling water, shall be within the range of 6.0 to 9.0 standard units.
- (b)(2) There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.
- (b)(3) The quantity of pollutants discharged from low volume waste sources shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table.

Low volume wastes sources means, taken collectively as if from one (1) source, wastewater from all sources except those for which specific limitations are otherwise established. Included but not limited to wet scrubber air pollution control systems, ion exchange water treatment system, water treatment evaporator blowdown, laboratory and sampling streams, boiler blowdown, floor drains, cooling tower basin cleaning wastes, and recirculating house service water systems. Sanitary and air conditioning wastes are not included.

Pollutant or Pollutant Characteristic	Maximum for Any 1 Day (mg/l)	Average of Daily Values for 30 Consecutive Days Shall Not Exceed (mg/l)
Total Suspended Solids	100.0	30.0
Oil & Grease	20.0	15.0

- (b)(4) The quantity of pollutants discharged in fly ash and bottom ash transport waters shall not exceed the quantity determined by multiplying the flow of fly ash and bottom ash transport waters times the concentration listed in the following table.

ATTACHMENT A - FACT SHEET ADDENDUM FOR STEAM ELECTRIC POWER GENERATING PLANTS

Section 423.12 - Best Practicable Control Technology Currently Available (BPT) - continued

Pollutant or Pollutant Characteristic	Maximum for Any 1 Day (mg/l)	Average of Daily Values for 30 Consecutive Days Shall Not Exceed (mg/l)
Total Suspended Solids	100.0	30.0
Oil & Grease	20.0	15.0

(b)(5) The quantity of pollutants discharged in metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table.

Pollutant or Pollutant Characteristic	Maximum for Any 1 Day (mg/l)	Average of Daily Values for 30 Consecutive Days Shall Not Exceed (mg/l)
Total Suspended Solids	100.0	30.0
Oil & Grease	20.0	15.0
Copper, Total	1.0	1.0
Iron, Total	1.0	1.0

(b)(6) The quantity of pollutants discharged in once-through cooling water shall not exceed the quantity determined by multiplying the flow of once-through cooling water times the concentration listed in the following table.

Pollutant or Pollutant Characteristic	Maximum Concentration (mg/l)	Average Concentration (mg/l)
Free Available Chlorine	0.5	0.2

(b)(7) The quantity of pollutants discharged in cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown times the concentration listed in the following table.

Pollutant or Pollutant Characteristic	Maximum Concentration (mg/l)	Average Concentration (mg/l)
Free Available Chlorine	0.5	0.2

The term average concentration as it relates to chlorine discharge means the average of analyses made over a single period of chlorine release which does not exceed two (2) hours.

(b)(8) Neither Free Available Chlorine nor Total Residual Chlorine may be discharged from any unit for more than two (2) hours in any one (1) day and not more than one (1) unit in any plant may discharge Free Available Chlorine or Total Residual Chlorine at any one time.

(b)(9) The following effluent limitations shall apply to the point source discharges of coal pile runoff.

Pollutant or Pollutant Characteristic	Maximum Concentration for Any Time (mg/l)
Total Suspended Solids	50

ATTACHMENT A - FACT SHEET ADDENDUM FOR STEAM ELECTRIC POWER GENERATING PLANTS

Section 423.13 - Best Available Technology Economically Achievable (BAT)

(b)(10) Any untreated overflow from facilities designed, constructed, and operated to treat the volume of coal pile runoff which is associated with a 10-year, 24-hour rainfall event shall not be subject to the limitations in paragraph (b)(9) of this section.

(a) There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

(b)(1) For any plant with a total rated electric generating capacity of 25 or more megawatts, the quantity of pollutants discharged in once-through cooling water from each discharge point shall not exceed the quantity determined by multiplying the flow of the once-through cooling water from each discharge point times the concentration listed in the following table.

Pollutant or Pollutant Characteristic	Maximum Concentration for Any Time (mg/l)
Total Residual Chlorine	0.2

(b)(2) Total Residual Chlorine may not be discharged from any single generating unit for more than two (2) hours per day.

(d)(1) The quantity of pollutants discharged in cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown times the concentration listed in the following table.

Pollutant or Pollutant Characteristic	Maximum Concentration (mg/l)	Average Concentration (mg/l)
Free Available Chlorine	0.5	0.2

Pollutant or Pollutant Characteristic	Maximum for Any 1 Day (mg/l)	Average of Daily Values for 30 Consecutive Days Shall Not Exceed (mg/l)
The 126 priority pollutants contained in chemicals added for cooling tower maintenance except:	No detectable amount	No detectable amount
Chromium, Total	0.2	0.2
Zinc, Total	1.0	1.0

(d)(2) Neither Free Available Chlorine nor Total Residual Chlorine may be discharged from any unit for more than two (2) hours in any one (1) day and not more than one (1) unit in any plant may discharge Free Available Chlorine or Total Residual Chlorine at any one time.

(d)(3) At the permitting authority's discretion, instead of the monitoring specified in 40 CFR Part 122.11(b) compliance with the limitations for the 126 priority pollutants in paragraph (d)(1) of this section may be determined by engineering calculations which demonstrate that the regulated pollutants are not detectable in the final discharge by the analytical methods in 40 CFR Part 136.

ATTACHMENT A - FACT SHEET ADDENDUM FOR STEAM ELECTRIC POWER GENERATING PLANTS

Section 423.13 - Best Available Technology Economically Achievable (BAT) - continued

(e) The quantity of pollutants discharged in chemical metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of the chemical metal cleaning wastes times the concentration listed in the following table.

Pollutant or Pollutant Characteristic	Maximum for Any 1 Day (mg/l)	Average of Daily Values for 30 Consecutive Days Shall Not Exceed (mg/l)
Copper, Total	1.0	1.0
Iron, Total	1.0	1.0

Section 423.15 - New Source Performance Standards (NSPS)

(a) The pH of all discharges, except once-through cooling water, shall be within the range of 6.0 to 9.0 standard units.

(b) There shall be no discharge of polychlorinated biphenyl compounds such as those commonly used for transformer fluid.

(c) The quantity of pollutants discharged from low volume waste sources shall not exceed the quantity determined by multiplying the flow of low volume waste sources times the concentration listed in the following table.

Pollutant or Pollutant Characteristic	Maximum for Any 1 Day (mg/l)	Average of Daily Values for 30 Consecutive Days Shall Not Exceed (mg/l)
Total Suspended Solids	100.0	30.0
Oil & Grease	20.0	15.0

(d) The quantity of pollutants discharged in metal cleaning wastes shall not exceed the quantity determined by multiplying the flow of metal cleaning wastes times the concentration listed in the following table.

Pollutant or Pollutant Characteristic	Maximum for Any 1 Day (mg/l)	Average of Daily Values for 30 Consecutive Days Shall Not Exceed (mg/l)
Total Suspended Solids	100.0	30.0
Oil & Grease	20.0	15.0
Copper, Total	1.0	1.0
Iron, Total	1.0	1.0

(f) The quantity of pollutants discharged in bottom ash transport waters shall not exceed the quantity determined by multiplying the flow of bottom ash transport waters times the concentration listed in the following table.

Pollutant or Pollutant Characteristic	Maximum for Any 1 Day (mg/l)	Average of Daily Values for 30 Consecutive Days Shall Not Exceed (mg/l)
Total Suspended Solids	100.0	30.0
Oil & Grease	20.0	15.0

ATTACHMENT A - FACT SHEET ADDENDUM FOR STEAM ELECTRIC POWER GENERATING PLANTS

Section 423.15 - New Source Performance Standards (NSPS) - continued

- (g) There shall be no discharge of wastewater pollutants from fly ash transport water.
- (h)(1) For any plant with a total rated electric generating capacity of 25 or more megawatts, the quantity of pollutants discharged in once-through cooling water from each discharge point shall not exceed the quantity determined by multiplying the flow of the once-through cooling water from each discharge point times the concentration listed in the following table.

Pollutant or Pollutant Characteristic	Maximum Concentration for Any Time (mg/l)
Total Residual Chlorine	0.2

- (h)(2) Total Residual Chlorine may not be discharged from any single generating unit for more than two (2) hours per day unless the discharger demonstrates to the permitting authority that discharge for more than two (2) hours is required for macroinvertebrate control. Simultaneous multi-unit chlorination is permitted.

- (j)(1) The quantity of pollutants discharged in cooling tower blowdown shall not exceed the quantity determined by multiplying the flow of cooling tower blowdown times the concentration listed in the following table.

Pollutant or Pollutant Characteristic	Maximum Concentration (mg/l)	Average Concentration (mg/l)
Free Available Chlorine	0.5	0.2

Pollutant or Pollutant Characteristic	Maximum for Any 1 Day (mg/l)	Average of Daily Values for 30 Consecutive Days Shall Not Exceed (mg/l)
The 126 priority pollutants contained in chemicals added for cooling tower maintenance except:	No detectable amount	No detectable amount
Chromium, Total	0.2	0.2
Zinc, Total	1.0	1.0

- (j)(2) Neither Free Available Chlorine nor Total Residual Chlorine may be discharged from any unit for more than two (2) hours in any one (1) day and not more than one (1) unit in any plant may discharge Free Available Chlorine or Total Residual Chlorine at any one (1) time unless the utility can demonstrate to the permit issuing authority that the units in a particular location cannot operate at or below this level of chlorination.

- (j)(3) At the permitting authority's discretion, instead of the monitoring specified in 40 CFR 122.11(b) compliance with the limitations for the 126 priority pollutants in paragraph (d)(1) of this section may be determined by engineering calculations which demonstrate that the regulated pollutants are not detectable in the final discharge by the analytical methods in 40 CFR Part 136.

ATTACHMENT A - FACT SHEET ADDENDUM FOR STEAM ELECTRIC POWER GENERATING PLANTS

Section 423.15 - New Source Performance Standards (NSPS) - continued

(k) Subject to the provisions of Section 423.15(1), the quantity or quality of pollutants or pollutant parameters discharged in coal pile runoff shall not exceed the limitations specified below.

Pollutant or Pollutant Characteristic	Maximum Concentration for Any Time (mg/l)
Total Suspended Solids	50

(1) Any untreated overflow from facilities, designed, constructed, and operated to treat coal pile runoff which results from a 10-year, 24-hour rainfall event shall not be subject to the limitations of Section 423.15(k).

401 KAR 5:031, SECTION 4(h)5 (TABLE 2) - WARM WATER AQUATIC HABITAT CRITERIA

Pollutant or Pollutant Characteristic	Acute Criteria (mg/l)	Chronic Criteria (mg/l)
Total Residual Chlorine	0.019	0.011

401 KAR 5:080, SECTION 1(2)(c)2 - BEST PROFESSIONAL JUDGEMENT

For Coal Pile Runoff

Pollutant or Pollutant Characteristic	Maximum Concentration (mg/l)	Average Concentration (mg/l)
Total Suspended Solids	N/A	30
Oil & Grease	5.0	5.0

Plant Area Storm Water Runoff

Pollutant or Pollutant Characteristic	Maximum Concentration (mg/l)	Average Concentration (mg/l)
Total Suspended Solids	50	30
Oil & Grease	5.0	5.0

To calculate the flows for precipitation-based discharges, the following formula will be used.

$$Q = CIAF$$

Where Q is flow (in MGD)

C is the coefficient of runoff

I is the rainfall (in inches)

A is the area (in acres)

F is the units conversion factor

1-Day Flow

30-Day Flow

10-year, 24-hour event

Annual Average Rainfall

18.71

1.23

ATTACHMENT A – FACT SHEET ADDENDUM FOR STEAM ELECTRIC POWER GENERATING PLANTS

Due to the treatment plant being a co-treatment system, the development of flow-weighted limitations is required to insure compliance with the effluent guidelines. To calculate the limits for each parameter, the following formulas are used.

$$\text{Monthly Average} = \frac{\sum Q_{30} \times F_{30}}{Q_{30}}$$

$$\text{Daily Maximum} = \frac{\sum Q_1 \times F_1}{Q_1}$$

Where
 Q_{30} is the 30-day or average flow of each component wastestream
 Q_1 is the maximum flow of each component wastestream
 F_{30} is the average factor applied to each component wastestream
 F_1 is the maximum factor applied to each component wastestream

The following tables are the results of the limits calculations discussed in the preceding pages.

Source	Flow Calculations						Average Annual Rainfall (inches)	Maximum Conversion Factor	Average Conversion Factor	Maximum Flow (gpm)	Average Flow (gpm)
	Coefficient of Runoff	Surface Area (acres)	10-yr, 24-hr Rainfall (inches)	Average Annual Rainfall (inches)	Maximum Conversion Factor	Average Conversion Factor					
Outfall 002											
Wood Area West of RMD #3 Drainage	0.70	28.50	4.80	44.50	18.71	1.23	18.71	1.23	1792	1092	
Red Water Ditch # 4	1.00	2.30	4.80	44.50	18.71	1.23	18.71	1.23	207	126	
Red Water Ditch # 3	1.00	6.10	4.80	44.50	18.71	1.23	18.71	1.23	548	334	
Red Water Ditch # 5	1.00	2.00	4.80	44.50	18.71	1.23	18.71	1.23	180	109	
Red Water Ditch # 2	1.00	1.50	4.80	44.50	18.71	1.23	18.71	1.23	135	82	
Red Water Ditch # 1	1.00	1.50	4.80	44.50	18.71	1.23	18.71	1.23	135	82	
Coal Wash Refuse Disposal Area	0.49	164.50	4.80	44.50	18.71	1.23	18.71	1.23	7239	4412	
Rail & Truck Unloading Area Drainage	0.53	61.20	4.80	44.50	18.71	1.23	18.71	1.23	2913	1775	
Area N, W, & SW of Coal Wash Plant	0.49	98.00	4.80	44.50	18.71	1.23	18.71	1.23	4313	2628	
Coal Storage Yard	0.70	177.40	4.80	44.50	18.71	1.23	18.71	1.23	11152	6797	
Coal Yard Drainage Basins 2 & 3	1.00	6.00	4.80	44.50	18.71	1.23	18.71	1.23	539	328	
Coal Wash Plant Area	0.83	10.00	4.80	44.50	18.71	1.23	18.71	1.23	745	454	
Limestone Handling & Cooling Tower Area Drainage	0.43	43.20	4.80	44.50	18.71	1.23	18.71	1.23	1668	1017	
Miscellaneous Plant Drainage	0.79	48.80	4.80	44.50	18.71	1.23	18.71	1.23	3462	2110	
Bottom Ash Pond	1.00	20.30	4.80	44.50	18.71	1.23	18.71	1.23	1823	1111	
Total									36850	22459	

ATTACHMENT A - FACT SHEET ADDENDUM FOR STEAM ELECTRIC POWER GENERATING PLANTS

Flow Calculations								
Source	Coefficient of Runoff	Surface Area (acres)	10-yr, 24-hr Rainfall (inches)	Average Annual Rainfall (inches)	Maximum Conversion Factor	Average Conversion Factor	Maximum Flow (gpm)	Average Flow (gpm)
Outfall 001								
Strip Mine Drainage Area	0.35	202.50	4.80	44.50	18.71	1.23	6365	3879
Fly Ash Pond	1.00	177.20	4.80	44.50	18.71	1.23	15914	9699
Chemical Treatment Pond (007)	1.00	4.80	4.80	44.50	18.71	1.23	431	263
East & West Dredge Ponds	1.00	5.20	4.80	44.50	18.71	1.23	467	285
FGD Slurry Settling Pond	1.00	137.40	4.80	44.50	18.71	1.23	12340	7521
FGD Drainage Area	0.34	298.20	4.80	44.50	18.71	1.23	9105	5549
Dry Ash Storage Areas	0.39	118.90	4.80	44.50	18.71	1.23	4164	2538
Total							48787	29734

Source	Limits Calculations									
	Flow (gpm)			Total Suspended Solids			Oil & Grease			
	Maximum	Average	Factor	Maximum	Average	Contribution	Maximum	Average	Contribution	
Outfall 002										
Wood Area West of RMD #3 Drainage	1792	1092	50.00	30.00	89583	32763	5.00	5.00	8958	5460
Red Water Ditch # 4	207	126	50.00	30.00	10328	3777	5.00	5.00	1033	630
Red Water Ditch # 3	548	334	50.00	30.00	27391	10017	15.00	10.00	8217	3339
Red Water Ditch # 5	180	109	50.00	30.00	8981	3284	15.00	10.00	2694	1095
Red Water Ditch # 2	135	82	50.00	30.00	6736	2463	5.00	5.00	674	411
Red Water Ditch # 1	135	82	50.00	30.00	6736	2463	15.00	10.00	2021	821
Coal Wash Refuse Disposal Area	7239	4412	50.00	30.00	361949	132372	5.00	5.00	36195	22062
Rail & Truck Unloading Area Drainage	2913	1776	50.00	30.00	145651	53267	15.00	10.00	43695	17756
Area N, W, & SW of Coal Wash Plant	4313	2629	50.00	30.00	215629	78860	15.00	10.00	64689	26287
Coal Storage Yard	1152	6798	50.00	30.00	557618	203932	5.00	5.00	55762	33989
Coal Yard Drainage Basins 2 & 3	539	328	50.00	30.00	26942	9853	15.00	10.00	8083	3284
Coal Wash Plant Area	745	454	50.00	30.00	37270	13631	15.00	10.00	11181	4544
Limestone Handling & Cooling Tower Area Drainage	1668	1017	50.00	30.00	83414	30506	5.00	5.00	8341	5084
Miscellaneous Plant Drainage	3462	2110	50.00	30.00	173114	63311	5.00	5.00	17311	10552
Bottom Ash Pond	1823	1111	50.00	30.00	91155	33337	5.00	5.00	9116	5556
Ash Pit Sumps Units 1 & 2	2030	2030	100.00	30.00	203000	60900	20.00	15.00	40600	30450
Station Sumps Units 1, 2, and 3	7327	7327	100.00	30.00	732700	219810	20.00	15.00	146540	109905
Bottom Ash Sluice Water Units 1, 2, & 3	42679	42679	100.00	30.00	4267900	1280370	20.00	15.00	853580	640185
Unwatering Sumps Units 1 & 2	6366	6366	100.00	30.00	636600	190980	20.00	15.00	127320	95490
Units 1 & 2 Demineralizer Sumps	1	1	100.00	30.00	144	43	20.00	15.00	29	22
Water Treatment Sump	592	592	100.00	30.00	59200	17760	20.00	15.00	11840	8880
Unit 3 Extension Area Sump	243	243	100.00	30.00	24300	7290	20.00	15.00	4860	3645
Sewage Treatment Plant	29	29	45.00	30.00	1296	864	15.00	10.00	432	288
Limit	96117	81729			7767636	2451855	81	30	1463170	1029734
							15	13		

ATTACHMENT A – FACT SHEET ADDENDUM FOR STEAM ELECTRIC POWER GENERATING PLANTS

Source	Limits Calculations						Oil & Grease						
	Flow (gpm)			Total Suspended Solids			Factor			Contribution			
	Maximum	Average		Maximum	Average		Maximum	Average		Maximum	Average		
Outfall 001													
Strip Mine Drainage Area	6365	3879		50.00	30.00		318257	116380		5.00	5.00	31826	19397
Fly Ash Pond	15914	9699		50.00	30.00		795699	290971		5.00	5.00	79570	48495
Chemical Treatment Pond (007)	431	263		50.00	30.00		21554	7882		5.00	5.00	2155	1314
East & West Dredge Ponds	467	285		50.00	30.00		23350	8539		15.00	10.00	7005	2846
FGD Slurry Settling Pond	12340	7521		50.00	30.00		616981	225618		5.00	5.00	61698	37603
FGD Drainage Area	9105	5549		50.00	30.00		455273	166484		5.00	5.00	45527	27747
Dry Ash Storage Areas	4164	2538		50.00	30.00		208224	76144		15.00	10.00	62467	25381
Ash Slurry Sump	1673	1673		100.00	30.00		167300	50190		20.00	15.00	33460	25095
Fly Ash Sluice Water Unit 3 & Air Preheater Hopper Wastewater Units 1 & 2	15579	15579		100.00	30.00		1557900	467370		20.00	15.00	311580	233685
Air Preheater Washwater Sumps Unit 1 & 2	23	23		100.00	30.00		2304	691		20.00	15.00	461	346
	162179	128737					11934478	3862124				2098920	1451642
Limit							74	30				13	11

ATTACHMENT A - FACT SHEET ADDENDUM FOR STEAM ELECTRIC POWER GENERATING PLANTS

APPENDIX A TO PART 403-126 PRIORITY POLLUTANTS		
001 Acenaphthene		088 Vinyl chloride (chloroethylene)
002 Acrolein		089 Aldrin
003 Acrylonitrile		090 Dieldrin
004 Benzene		091 Chlordane (technical mixture and metabolites)
005 Benzidine		092 4,4-DDT
006 Carbon tetrachloride (tetrachloromethane)		093 4,4-DDE (p,p-DDX)
007 Chlorobenzene		094 4,4-DDD (p,p-TDE)
008 1,2,4-trichlorobenzene		095 Alpha-endosulfan
009 Hexachlorobenzene		096 Beta-endosulfan
010 1,2-dichloroethane		097 Endosulfan sulfate
011 1,1,1-trichloroethane		098 Endrin
012 Hexachloroethane		099 Endrin aldehyde
013 1,1-dichloroethane		100 Heptachlor
014 1,1,2-trichloroethane		101 Heptachlor epoxide (BHC-hexachlorocyclohexane)
015 1,1,2,2-tetrachloroethane		102 Alpha-BHC
016 Chloroethane		103 Beta-BHC
018 Bis(2-chloroethyl) ether		104 Gamma-BHC (lindane)
019 2-chloroethyl vinyl ether (mixed)		105 Delta-BHC (PCB-polychlorinated biphenyls)
020 2-chloronaphthalene		106 PCB-1242 (Arochlor 1242)
021 2,4,6-trichlorophenol		107 PCB-1254 (Arochlor 1254)
022 Parachlorometa cresol		108 PCB-1221 (Arochlor 1221)
023 Chloroform (trichloromethane)		109 PCB-1232 (Arochlor 1232)
024 2-chlorophenol		110 PCB-1248 (Arochlor 1248)
025 1,2-dichlorobenzene		111 PCB-1260 (Arochlor 1260)
026 1,3-dichlorobenzene		112 PCB-1016 (Arochlor 1016)
028 3,3-dichlorobenzidine		113 Toxaphene
029 1,1-dichloroethylene		114 Antimony
030 1,2-trans-dichloroethylene		115 Arsenic
031 2,4-dichlorophenol		116 Asbestos
032 1,2-dichloropropane		117 Beryllium
033 1,2-dichloropropylene (1,3-dichloropropene)		118 Cadmium
034 2,4-dimethylphenol		119 Chromium
035 2,4-dinitrotoluene		120 Copper
036 2,6-dinitrotoluene		121 Cyanide, Total
037 1,2-diphenylhydrazine		122 Lead
038 Ethylbenzene		123 Mercury
039 Fluoranthene		124 Nickel
040 4-chlorophenyl phenyl ether		125 Selenium
041 4-bromophenyl phenyl ether		126 Silver
042 Bis(2-chloroisopropyl) ether		127 Thallium
043 Bis(2-chloroethoxy) methane		128 Zinc
		129 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD)

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l	Criteria / Standards, ug/l			Aquatic Life			Human Health			Fetal Limits			Reported Discharge Level ug/l
			Acute CIA	Chronic CIC	Fish Only CHL	Fish & H2O CH2	Acute RCP	Chronic Mix Zone	Hardness 400.00	Fish Only Mix Zone	Fish & H2O Complete Mix	Average	Maximum	Average	
1 Acrylonitrile	N	0.000	NA	NA	2700.000	1200.000	NA	NA	2700.000	14240.000	2700.000	NA	NA	NA	0.000
2 Benzothiazole	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
3 Benzothiazole	N	0.000	NA	NA	780.000	320.000	NA	NA	780.000	3797.330	780.000	NA	NA	NA	0.000
4 Benzothiazole	Y	0.000	NA	NA	6.500E-01	5.800E-02	NA	NA	6.500E-01	3.92233	6.500E-01	NA	NA	NA	0.000
5 Benzothiazole	Y	0.000	3.000	NA	1.400E-04	1.300E-04	NA	NA	1.400E-04	8.943E-03	1.400E-04	3.000	ACUTE	NA	0.000
6 Benzothiazole, Total Recoverable	N	0.000	NA	NA	NA	960.000	NA	NA	NA	113920	11000	NA	NA	NA	0.000
7 Benzothiazole	N	0.000	NA	NA	11000	6.000	NA	NA	11000	71.200	71.200	NA	NA	NA	0.000
8 Benzothiazole, Total Recoverable	N	0.000	NA	NA	4300.000	NA	NA	NA	4300.000	NA	50.000	NA	NA	NA	0.000
9 Benzothiazole, Total Recoverable	Y	0.000	340.000	150.000	NA	2000.000	NA	NA	340.000	2373.330	150.000	340.000	ACUTE	NA	0.000
10 Benzothiazole III	N	0.000	NA	NA	NA	1.200	NA	NA	NA	82.600	71.000	NA	NA	NA	0.000
11 Benzothiazole, Total Recoverable	Y	0.000	NA	NA	71.000	1.200	NA	NA	71.000	82.600	71.000	NA	NA	NA	0.000
12 Benzothiazole	Y	0.000	NA	NA	5.400E-04	1.200E-04	NA	NA	5.400E-04	8.260E-03	5.400E-04	NA	NA	NA	0.000
13 Benzothiazole (a) Anthracene	Y	0.000	NA	NA	4.900E-02	4.400E-02	NA	NA	4.900E-02	3.0287E-01	4.900E-02	NA	NA	NA	0.000
14 Benzothiazole (a) Anthracene	Y	0.000	NA	NA	4.900E-02	4.400E-02	NA	NA	4.900E-02	3.0287E-01	4.900E-02	NA	NA	NA	0.000
15 Benzothiazole (a) Anthracene	Y	0.000	NA	NA	4.900E-02	4.400E-02	NA	NA	4.900E-02	3.0287E-01	4.900E-02	NA	NA	NA	0.000
16 Benzothiazole (a) Anthracene	Y	0.000	NA	NA	4.900E-02	4.400E-02	NA	NA	4.900E-02	3.0287E-01	4.900E-02	NA	NA	NA	0.000
17 Benzothiazole (a) Anthracene	Y	0.000	NA	NA	4.900E-02	4.400E-02	NA	NA	4.900E-02	3.0287E-01	4.900E-02	NA	NA	NA	0.000
18 Benzothiazole (a) Anthracene (3,4)	Y	0.000	NA	NA	4.900E-02	4.400E-02	NA	NA	4.900E-02	3.0287E-01	4.900E-02	NA	NA	NA	0.000
19 Benzothiazole, Total Recoverable	N	0.000	NA	NA	4.900E-02	4.400E-02	NA	NA	4.900E-02	3.0287E-01	4.900E-02	NA	NA	NA	0.000
20 Benzothiazole, Total Recoverable	N	0.000	NA	NA	4.900E-02	4.400E-02	NA	NA	4.900E-02	3.0287E-01	4.900E-02	NA	NA	NA	0.000
21 Benzothiazole	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
22 Benzothiazole	Y	0.000	NA	NA	360.000	4.300	NA	NA	360.000	285.983	285.983	NA	NA	NA	0.000
23 Benzothiazole, Benzyl Ether (4)	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
24 Benzothiazole, Benzyl Ether (4)	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
25 Benzothiazole, Benzyl Ether (4)	N	0.000	NA	NA	5200.000	3000.000	NA	NA	5200.000	3500.000	5200.000	NA	NA	NA	0.000
26 Benzothiazole, Benzyl Ether (4)	N	0.000	21.5715	7.31182	NA	5.000	NA	NA	21.5715	7.31182	7.31182	21.5715	CHRONIC	ACUTE	0.000
27 Benzothiazole	Y	0.000	2.400	0.0043	4.400	2.500E-01	NA	NA	2.400	17.203	4.400	NA	NA	NA	0.000
28 Benzothiazole	Y	0.000	120000	60000	2.200E-03	2.100E-03	NA	NA	2.400	1.4457E-01	2.200E-03	2.400	FISH ONLY	ACUTE	0.000
29 Benzothiazole, Total Residual	N	0.000	19.000	11.000	NA	25000	NA	NA	19.000	286667	60000	19.000	CHRONIC	ACUTE	0.000
30 Benzothiazole	N	0.000	NA	NA	21000.000	680.000	NA	NA	21000.000	8069.3340	11.000	NA	NA	NA	0.000
31 Benzothiazole	Y	0.000	NA	NA	34.000	4.100E-01	NA	NA	34.000	28.2217	28.2217	NA	NA	NA	0.000
32 Benzothiazole	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
33 Benzothiazole, Benzyl Ether (Bis-2)	Y	0.000	NA	NA	1.400	3.100E-02	NA	NA	1.400	2.13383	1.400	NA	NA	NA	0.000
34 Benzothiazole, Benzyl Ether (Bis-2)	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
35 Benzothiazole, Benzyl Ether (2)	N	0.000	NA	NA	470.000	5.700	NA	NA	470.000	392.350	392.350	NA	NA	NA	0.000
36 Benzothiazole	Y	0.000	NA	NA	17000	1400.000	NA	NA	17000	16613.330	16613.330	NA	NA	NA	0.000
37 Benzothiazole, Benzyl Ether (Bis-2)	N	0.000	NA	NA	4300.000	1700.000	NA	NA	4300.000	20173.330	4300.000	NA	NA	NA	0.000
38 Benzothiazole, Benzyl Ether (Bis-2)	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
39 Benzothiazole, Benzyl Ether (2)	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l	Acute		Chronic		Fish Only		Fish & H2O		Fish & H2O Complete Mix	Average		Maximum		Justification	Reported Discharge Level ug/l
			CDA	CIA	CC	CC	CH1	CH2	Fish Only Mix Zre	Fish & H20		Average	Maximum	Average	Maximum		
40 Chloroform (2)	N	0.0000	NA	NA	NA	120.0000	400.0000	NA	1424.0000	400.0000	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
41 Chlorobenzyl Benzyl Ether (4)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000	NA	0.0000
42 Chlorocyclohexane	N	0.0000	0.0630	0.0410	NA	NA	NA	NA	NA	4.1000E-02	NA	0.0630	CHRONIC	NA	0.0000	NA	0.0000
43 Chromium, Total Recoverable	N	0.0000	NA	NA	100.0000	NA	NA	1186.6670	1186.6670	1186.6670	NA	NA	FISH & H2O	NA	0.0000	NA	0.0000
44 Chromium III	N	0.0000	5613.9480	268.2742	NA	NA	NA	NA	NA	268.2742	NA	5613.9480	CHRONIC	NA	0.0000	NA	0.0000
45 Chromium VI	N	0.0000	16.0000	11.0000	NA	NA	NA	NA	NA	11.0000	NA	16.0000	CHRONIC	NA	0.0000	NA	0.0000
46 Chryse	Y	0.0000	NA	NA	4.9000E-02	4.4000E-03	NA	4.9000E-02	3.0287E-01	4.9000E-02	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
47 Cobalt, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	890.0000	890.0000	NA	NA	FISH & H2O	NA	0.0000	NA	0.0000
48 Cadm (Elemental Chalc. Units)	N	0.0000	51.6895	30.4694	NA	1000.0000	NA	11866.6700	11866.6700	30.4694	NA	51.6895	CHRONIC	NA	0.0000	NA	0.0000
49 Copper, Total Recoverable	N	0.0000	22.0000	5.2000	220000	200.0000	NA	2373.3330	5.2000	5.2000	NA	22.0000	CHRONIC	NA	0.0000	NA	0.0000
50 Cyanide, Free	Y	0.0000	NA	NA	8.4000E-04	8.3000E-04	NA	8.4000E-04	5.7132E-02	8.4000E-04	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
51 DDE (4,4')	Y	0.0000	NA	NA	5.9000E-04	5.9000E-04	NA	5.9000E-04	4.0612E-02	5.9000E-04	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
52 DDE (4,4')	Y	0.0000	1.1000	0.0010	5.9000E-04	5.9000E-04	NA	5.9000E-04	4.0612E-02	5.9000E-04	NA	1.1000	FISH ONLY	NA	0.0000	NA	0.0000
53 DDT (4,4')	Y	0.0000	NA	NA	4.9000E-02	4.4000E-03	NA	4.9000E-02	3.0287E-01	4.9000E-02	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
54 Dibenzo (a,b) Antrozene	N	0.0000	NA	NA	NA	2700.0000	NA	3040.0000	3040.0000	3040.0000	NA	NA	FISH & H2O	NA	0.0000	NA	0.0000
55 Dibenzyl Ethylalate	N	0.0000	NA	NA	1700.0000	600.0000	NA	1700.0000	7120.0000	7120.0000	NA	NA	FISH & H2O	NA	0.0000	NA	0.0000
56 Dichlorobenzene (1,2)	N	0.0000	NA	NA	NA	400.0000	NA	4746.6670	2600.0000	2600.0000	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
57 Dichlorobenzene (1,3)	N	0.0000	NA	NA	NA	75.0000	NA	890.0000	890.0000	890.0000	NA	NA	FISH & H2O	NA	0.0000	NA	0.0000
58 Dichlorobenzene (1,4)	N	0.0000	NA	NA	4.0000E-02	4.0000E-02	NA	7.7000E-02	2.753333	7.7000E-02	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
59 Dichlorobenzidine (3,3')	Y	0.0000	NA	NA	46.0000	5.6000E-01	NA	46.0000	38.5467	38.5467	NA	NA	FISH & H2O	NA	0.0000	NA	0.0000
60 Dichlorodimethylamine	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH & H2O	NA	0.0000	NA	0.0000
61 Dichlorodifluoromethane	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH & H2O	NA	0.0000	NA	0.0000
62 Dichloroethane (1,1)	N	0.0000	NA	NA	3.8000E-01	NA	NA	99.0000	26.1557	26.1557	NA	NA	FISH & H2O	NA	0.0000	NA	0.0000
63 Dichloroethane (1,2)	Y	0.0000	NA	NA	5.7000E-02	NA	NA	3.2000	3.9235	3.2000	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
64 Dichloroethylene (1,1)	Y	0.0000	NA	NA	790.0000	99.0000	NA	790.0000	1103.6000	790.0000	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
65 Dichloroethanol (2,4)	Y	0.0000	NA	NA	5.2000E-01	NA	NA	39.0000	35.7933	35.7933	NA	NA	FISH & H2O	NA	0.0000	NA	0.0000
66 Dichloroethane (1,2)	N	0.0000	NA	NA	1700.0000	NA	NA	1700.0000	1700.0000	1700.0000	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
67 Dichloroethane (1,3)	N	0.0000	0.2400	0.0560	1.4000E-04	1.4000E-04	NA	1.4000E-04	118.6667	118.6667	NA	0.2400	FISH & H2O	NA	0.0000	NA	0.0000
68 Dichloroethylene (1,3)	Y	0.0000	NA	NA	2900.0000	NA	NA	27933	12000	12000	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
70 Dimethyl Ethylalate	N	0.0000	NA	NA	313000	NA	NA	3714267	2900000	2900000	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
71 Dimethyl Ethylalate	N	0.0000	NA	NA	540.0000	NA	NA	6498.0000	2300.0000	2300.0000	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
72 Dimethylalcohol (2,4)	N	0.0000	NA	NA	70.0000	NA	NA	890.6667	890.6667	890.6667	NA	NA	FISH & H2O	NA	0.0000	NA	0.0000
73 Dimethylalcohol	Y	0.0000	NA	NA	1.1000E-01	NA	NA	9.1000	7.571667	7.571667	NA	NA	FISH & H2O	NA	0.0000	NA	0.0000
74 Dimethylalcohol (2,4)	Y	0.0000	NA	NA	13.4000	NA	NA	159.0133	159.0133	159.0133	NA	NA	FISH & H2O	NA	0.0000	NA	0.0000
75 Dimethylalcohol (2,4)	N	0.0000	NA	NA	4.0000E-01	NA	NA	5.4000E-01	5.4000E-01	5.4000E-01	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
76 Dimethylalcohol (1,2) (as Acetazene)	Y	0.0000	NA	NA	2700.0000	NA	NA	32040.0000	12000.0000	12000.0000	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
77 Di-n-butyl Ethylalate	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000
78 Di-n-butyl Ethylalate	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH ONLY	NA	0.0000	NA	0.0000

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALLOCATIONS

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l	Acute		Chronic		Fish Only		Fish & H2O		Acute		Chronic		Fish Only		Fish & H2O		Average	Medium	Justification	Reported Discharge Level ug/l	
			CFR	CFE	CFR	CFE	CFR	CFE	CFR	CFE	CFR	CFE	CFR	CFE	CFR	CFE	CFR	CFE					
80 Ethsulfan sulfate	N	0.000	NA	NA	NA	NA	240.0000	110.0000	1905.3330	240.0000	0.0560	NA	NA	240.0000	1905.3330	240.0000	110.0000	240.0000	NA	NA	NA	0.000	
81 Ethsulfan (Alpha)	N	0.000	0.2200	0.0560	0.0560	0.0560	240.0000	110.0000	1905.3330	240.0000	0.0560	0.2200	0.0560	240.0000	1905.3330	240.0000	110.0000	5.6000E-02	0.2200	CHRONIC	NA	0.000	
82 Ethsulfan (Beta)	N	0.000	0.0660	0.0560	0.0560	0.0560	8.1000E-01	7.6000E-01	9.018666	8.1000E-01	0.0660	0.0660	0.0660	8.1000E-01	9.018666	8.1000E-01	7.6000E-01	5.6000E-02	0.0660	CHRONIC	NA	0.000	
83 Ethin	N	0.000	NA	NA	NA	NA	8.1000E-01	7.6000E-01	9.018666	8.1000E-01	NA	NA	NA	8.1000E-01	9.018666	8.1000E-01	7.6000E-01	5.6000E-02	NA	FISH ONLY	NA	0.000	
84 Ethin Aldehyde	N	0.000	NA	NA	NA	NA	2900.0000	700.0000	8906.6670	2900.0000	NA	NA	NA	2900.0000	8906.6670	8906.6670	700.0000	8906.6670	NA	FISH & H2O	NA	0.000	
85 Ethylbenzene	N	0.000	NA	NA	NA	NA	5.9000	1.8000	123.9000	5.9000	NA	NA	NA	5.9000	123.9000	5.9000	1.8000	123.9000	NA	FISH ONLY	NA	0.000	
86 Ethylhexyl Ethylate (Bis-2)	N	0.000	NA	NA	NA	NA	14000.0000	1300.0000	15426.6700	14000.0000	NA	NA	NA	14000.0000	15426.6700	14000.0000	1300.0000	14000.0000	NA	FISH ONLY	NA	0.000	
87 Fluorene	N	0.000	NA	NA	NA	NA	370.0000	300.0000	3560.0000	370.0000	NA	NA	NA	370.0000	3560.0000	370.0000	300.0000	3560.0000	NA	FISH ONLY	NA	0.000	
88 Fluoride	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000	
89 Fluoranthene	Y	0.000	NA	NA	NA	NA	1.3000E-02	3.9000E-03	2.6845E-01	1.3000E-02	NA	NA	NA	1.3000E-02	2.6845E-01	1.3000E-02	3.9000E-03	1.3000E-02	NA	FISH ONLY	NA	0.000	
90 Halomethanes	Y	0.000	NA	NA	NA	NA	4.6000E-02	1.4000E-01	9.6367E-01	4.6000E-02	NA	NA	NA	4.6000E-02	9.6367E-01	4.6000E-02	1.4000E-01	4.6000E-02	NA	FISH ONLY	NA	0.000	
91 HH (Alpha)	Y	0.000	0.9500	0.9500	0.9500	6.3000E-02	1.9000E-02	1.307833	6.3000E-02	0.9500	0.9500	0.9500	6.3000E-02	1.307833	6.3000E-02	1.9000E-02	1.307833	6.3000E-02	0.9500	FISH ONLY	NA	0.000	
92 HH (Beta)	Y	0.000	0.5200	0.0038	0.0038	2.1000E-04	2.1000E-04	1.4455E-04	2.1000E-04	0.5200	0.0038	0.0038	2.1000E-04	1.4455E-04	2.1000E-04	2.1000E-04	2.1000E-04	1.4455E-04	0.5200	FISH ONLY	NA	0.000	
93 HH (Gamma), Lindane	Y	0.000	0.5200	0.0038	0.0038	1.1000E-04	1.1000E-04	6.8838E-03	1.1000E-04	0.5200	0.0038	0.0038	1.1000E-04	6.8838E-03	1.1000E-04	1.1000E-04	1.1000E-04	6.8838E-03	0.5200	FISH ONLY	NA	0.000	
94 HH (Technical)	Y	0.000	NA	NA	NA	7.7000E-04	7.5000E-04	5.1625E-02	7.7000E-04	NA	NA	NA	7.7000E-04	5.1625E-02	7.7000E-04	7.5000E-04	5.1625E-02	7.7000E-04	NA	FISH ONLY	NA	0.000	
95 Heptachlor	Y	0.000	NA	NA	NA	50.0000	4.4000E-01	30.2867	50.0000	NA	NA	NA	50.0000	30.2867	50.0000	4.4000E-01	30.2867	50.0000	NA	FISH & H2O	NA	0.000	
96 Heptachlor Epoxide	Y	0.000	NA	NA	NA	1700.0000	50.0000	593.3333	1700.0000	NA	NA	NA	1700.0000	593.3333	1700.0000	50.0000	593.3333	1700.0000	NA	FISH & H2O	NA	0.000	
97 Heptachlorobenzene	Y	0.000	NA	NA	NA	8.9000	1.9000	130.7833	8.9000	NA	NA	NA	8.9000	130.7833	8.9000	1.9000	130.7833	8.9000	NA	FISH ONLY	NA	0.000	
98 Heptachlorocyclopentadiene	Y	0.000	NA	NA	NA	4.9000E-02	4.4000E-03	3.0282E-01	4.9000E-02	NA	NA	NA	4.9000E-02	3.0282E-01	4.9000E-02	4.4000E-03	3.0282E-01	4.9000E-02	NA	FISH ONLY	NA	0.000	
100 Heptachlorobenzene	Y	0.000	4000.0000	1000.0000	1000.0000	2600.0000	36.0000	2478.0000	2600.0000	4000.0000	1000.0000	1000.0000	2600.0000	2478.0000	2600.0000	36.0000	2478.0000	4000.0000	1000.0000	CHRONIC	NA	0.000	
102 Iron, Total Recoverable	Y	0.000	476.8177	18.5869	18.5869	NA	15.0000	178.0000	476.8177	476.8177	18.5869	18.5869	476.8177	178.0000	476.8177	15.0000	178.0000	476.8177	18.5869	CHRONIC	NA	0.000	
104 Lead, Total Recoverable	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000	
105 Manganese, Total Recoverable	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000	
106 Mercury, Total Recoverable	N	0.000	1.7000	0.9100	0.9100	5.1000E-02	5.0000E-02	5.9338E-01	5.1000E-02	1.7000	0.9100	0.9100	5.1000E-02	5.9338E-01	5.1000E-02	5.0000E-02	5.9338E-01	1.7000	1.7000	FISH ONLY	NA	0.000	
107 Mercury, Total Recoverable	N	0.000	NA	NA	NA	4000.0000	48.0000	569.6000	4000.0000	NA	NA	NA	4000.0000	569.6000	4000.0000	48.0000	569.6000	4000.0000	NA	FISH & H2O	NA	0.000	
108 Methyl Bromide	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000	
109 Methyl Chloride	N	0.000	NA	NA	NA	1600.0000	4.7000	323.5167	1600.0000	NA	NA	NA	1600.0000	323.5167	1600.0000	4.7000	323.5167	1600.0000	NA	FISH & H2O	NA	0.000	
110 Methylene Chloride	Y	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000	
111 Methylene Chloride	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000	
112 Naphthalene	N	0.000	1515.9220	168.5410	168.5410	4600.0000	100.0000	1186.6670	4600.0000	1515.9220	168.5410	168.5410	4600.0000	1186.6670	1515.9220	100.0000	1186.6670	1515.9220	168.5410	CHRONIC	NA	0.000	
113 Nickel, Total Recoverable	N	0.000	NA	NA	NA	NA	10000.0000	1186.6670	1186.6670	NA	NA	NA	10000.0000	1186.6670	1186.6670	1186.6670	1186.6670	1186.6670	1186.6670	1186.6670	FISH & H2O	NA	0.000
114 Nitrate - Nitrite (as N)	N	0.000	NA	NA	NA	1900.0000	17.0000	201.7333	1900.0000	NA	NA	NA	1900.0000	201.7333	1900.0000	17.0000	201.7333	1900.0000	NA	FISH & H2O	NA	0.000	
115 Nitrobenzene	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000	
116 Nitrophenol (2)	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000	
117 Nitrophenol (4)	Y	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000	
118 Nitrodimethylamine (N)	Y	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000	
119 Nitrosodimethylamine (N)	Y	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000	

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l	Acute		Chronic CFC	Fish Only		Fish & H2O CH2	Criteria / Standards, ug/l		Output (OT), ug/l		Firm Limits		Reported Discharge Level ug/l
			CFA	CIA		Chronic CFC	Chronic CFC		Human Health	Human Health	Average	Maximum	Average	Maximum	
120 Nitrosodimethylamine (N)	Y	0.0000	NA	NA	NA	8.1000	6.9000E-04	8.1000	8.1000	4.7495E-02	4.7495E-02	NA	FISH & H2O	NA	0.0000
121 Nitrosodichloroamine (N)	Y	0.0000	NA	NA	NA	16.0000	5.0000E-03	16.0000	16.0000	344.1667	16.0000	NA	FISH ONLY	NA	0.0000
122 Nitrosodi-N-propylamine (N)	Y	0.0000	NA	NA	NA	1.4000	5.0000E-03	1.4000	1.4000	3.4417E-01	3.4417E-01	NA	FISH & H2O	NA	0.0000
123 Nitrosopyrrolidone (N)	N	0.0000	0.0650	0.0130	0.0130	7.9000E-05	7.9000E-05	7.9000E-05	7.9000E-05	NA	1.3000E-02	0.0650	CHRONIC	ACUTE	0.0000
124 Parathion	Y	0.0000	NA	0.0014	0.0014	7.9000E-05	7.9000E-05	7.9000E-05	7.9000E-05	5.4578E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
125 RB - 1016	Y	0.0000	NA	0.0014	0.0014	7.9000E-05	7.9000E-05	7.9000E-05	7.9000E-05	5.4578E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
126 RB - 1221	Y	0.0000	NA	0.0014	0.0014	7.9000E-05	7.9000E-05	7.9000E-05	7.9000E-05	5.4578E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
127 RB - 1232	Y	0.0000	NA	0.0014	0.0014	7.9000E-05	7.9000E-05	7.9000E-05	7.9000E-05	5.4578E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
128 RB - 1242	Y	0.0000	NA	0.0014	0.0014	7.9000E-05	7.9000E-05	7.9000E-05	7.9000E-05	5.4578E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
129 RB - 1248	Y	0.0000	NA	0.0014	0.0014	7.9000E-05	7.9000E-05	7.9000E-05	7.9000E-05	5.4578E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
130 RB - 1254	Y	0.0000	NA	0.0014	0.0014	7.9000E-05	7.9000E-05	7.9000E-05	7.9000E-05	5.4578E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
131 RB - 1260	Y	0.0000	NA	0.0014	0.0014	7.9000E-05	7.9000E-05	7.9000E-05	7.9000E-05	5.4578E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
132 Benzochlorobenzene	N	0.0000	9.0700	5.7000	5.7000	8.2000	3.5000	8.2000	8.2000	41.5333	4.1000	9.0700	CHRONIC	ACUTE	0.0000
133 Benzochlorophenol	Y	0.0000	NA	NA	NA	2.8000E-01	2.8000E-01	2.8000E-01	2.8000E-01	19.2733	5.7000	NA	FISH & H2O	NA	0.0000
134 Benzothiazene	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	289200	289200	NA	FISH & H2O	NA	0.0000
135 Benzol	N	0.0000	NA	NA	NA	460000	2100.0000	460000	460000	289200	289200	NA	FISH & H2O	NA	0.0000
136 Benzols, Total	N	0.0000	NA	NA	NA	5.0000	NA	5.0000	5.0000	5.0000	5.0000	NA	FISH ONLY	NA	0.0000
137 Bupropion (as P), Total	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH ONLY	NA	0.0000
138 Ethylene Esters	N	0.0000	NA	NA	NA	3.0000	NA	3.0000	3.0000	3.0000	3.0000	NA	FISH ONLY	NA	0.0000
139 Ethers	N	0.0000	NA	NA	NA	11000.0000	960.0000	11000.0000	11000.0000	11392.0000	11000.0000	NA	FISH ONLY	NA	0.0000
140 P-Chloro-N-Cresol	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH ONLY	NA	0.0000
141 Selenium, Total Recoverable	N	0.0000	20.0000	5.0000	5.0000	50.0000	50.0000	50.0000	50.0000	593.3333	5.0000	20.0000	CHRONIC	ACUTE	0.0000
142 Silver, Total Recoverable	N	0.0000	44.0497	44.0497	44.0497	44.0497	44.0497	44.0497	44.0497	2966667	44.0497	44.0497	FISH & H2O	ACUTE	0.0000
143 Sulfate (as SO4)	N	0.0000	NA	NA	NA	2.0000	250000	2.0000	2.0000	2966667	2.0000	NA	CHRONIC	ACUTE	0.0000
144 Sulfide (Hydrogen Sulfide)	N	0.0000	NA	NA	NA	2.0000	NA	2.0000	2.0000	2.0000	2.0000	NA	CHRONIC	ACUTE	0.0000
145 Sulfite (as SO2)	N	0.0000	NA	NA	NA	2.0000	NA	2.0000	2.0000	2.0000	2.0000	NA	CHRONIC	ACUTE	0.0000
146 Tetrahydrofuran (1,2,4,5)	N	0.0000	NA	NA	NA	2.9000	2.3000	2.9000	2.9000	27.2533	2.9000	NA	FISH ONLY	NA	0.0000
147 Tetrahydrofuran-P, Dioxin	Y	0.0000	NA	NA	NA	1.4000E-08	1.3000E-08	1.4000E-08	1.4000E-08	8.9483E-07	1.4000E-08	NA	FISH ONLY	NA	0.0000
148 Tetrahydrofuran (1,1,2,2)	Y	0.0000	NA	NA	NA	10.7000	1.7000E-01	10.7000	10.7000	11.7017	10.7000	NA	FISH ONLY	NA	0.0000
149 Tetrahydrofuran	Y	0.0000	NA	NA	NA	8.8500	8.0000E-01	8.8500	8.8500	55.0667	8.8500	NA	FISH ONLY	NA	0.0000
150 Thallium, Total Recoverable	N	0.0000	NA	NA	NA	6.3000	1.7000	6.3000	6.3000	20.1733	6.3000	NA	FISH ONLY	NA	0.0000
151 Tin, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH ONLY	NA	0.0000
152 Titanium, Total Recoverable	N	0.0000	NA	NA	NA	20000	100.0000	20000	20000	1186.6700	1186.6700	NA	FISH & H2O	NA	0.0000
153 Toluene	N	0.0000	NA	NA	NA	75000	75000	75000	75000	890000	890000	NA	FISH & H2O	NA	0.0000
154 Total Dissolved Solids	Y	0.0000	0.7500	0.0002	0.0002	7.5000E-04	7.3000E-04	7.5000E-04	7.5000E-04	5.0248E-02	2.0000E-04	0.7500	CHRONIC	ACUTE	0.0000
155 Toluene	Y	0.0000	NA	NA	NA	140000	20.0000	140000	140000	890.6667	140000	NA	FISH ONLY	NA	0.0000
156 Tris-Dichloroethylene (1,2)	N	0.0000	NA	NA	NA	940.0000	70.0000	940.0000	940.0000	890.6667	890.6667	NA	FISH & H2O	NA	0.0000
157 Trichloroethylene (1,2,4)	N	0.0000	NA	NA	NA	20.0000	20.0000	20.0000	20.0000	2973.3330	2973.3330	NA	FISH & H2O	NA	0.0000
158 Trichloroethylene (1,1,1)	N	0.0000	NA	NA	NA	41.8000	6.0000E-01	41.8000	41.8000	41.3000	41.3000	NA	FISH & H2O	NA	0.0000
159 Trichloroethylene (1,1,2)	Y	0.0000	NA	NA	NA	6.0000E-01	6.0000E-01	6.0000E-01	6.0000E-01	41.3000	41.3000	NA	FISH & H2O	NA	0.0000

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l	Criteria / Standards, ug/l		Acute		Chronic		Fish Only		Fish & H2O		Human Health		Fetal Limits		Reported Discharge Level ug/l
			CU	CA	CU	CA	CU	CA	CU	CA	CU	CA	CU	CA	CU	CA	
160 Trichlorethylene	Y	0.0000	NA	NA	81.0000	2.7000	NA	NA	81.0000	185.8500	NA	NA	81.0000	NA	FISH ONLY	NA	0.0000
161 Trichloroethylene	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
162 Trichloroethanol (2,4,5)	N	0.0000	NA	NA	9800.0000	2600.0000	NA	NA	9800.0000	3085.3300	9800.0000	NA	9800.0000	NA	FISH ONLY	NA	0.0000
163 Trichloroethanol (2,4,6)	Y	0.0000	NA	NA	6.5000	2.1000	NA	NA	6.5000	144.5500	6.5000	NA	6.5000	NA	FISH ONLY	NA	0.0000
164 Vinyl Chloride	Y	0.0000	NA	NA	525.0000	2.0000	NA	NA	525.0000	137.6667	137.6667	NA	525.0000	NA	FISH & H2O	NA	0.0000
165 Zinc, Total Recoverable	N	0.0000	387.8903	387.8903	69000.0000	5000.0000	387.8903	387.8903	69000.0000	59333.3300	387.8903	387.8903	69000.0000	387.8903	CHRONIC	ACUTE	0.0000

REPORT OF ALL CALCULATIONS

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l	Criteria / Standards, ug/l		Acute		Chronic		Fish Only		Fish & H2O		Human Health		Fetal Limits		Reported Discharge Level ug/l
			CU	CA	CU	CA	CU	CA	CU	CA	CU	CA	CU	CA	CU	CA	
Whole Effluent	NA	0	0.3	NA	NA	NA	NA	NA	0.1000	0.1000	NA	NA	NA	1.0000	CHRONIC	ACUTE	NA
1 Acute Toxicity Units (ATU)	NA	0	NA	1	NA	NA	NA	NA	1.0000	1.0000	NA	NA	NA	1.0000	CHRONIC	NA	NA
2 Chronic Toxicity Units (CTU)	NA	0	NA	1	NA	NA	NA	NA	1.0000	1.0000	NA	NA	NA	1.0000	CHRONIC	NA	NA

*** END OF FILE ***

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSITWAM95)

Steady State Toxics Wasteload Allocation Model (SSITWAM95)

04 FEB 2004
7:49:13 AM

SSITWAM95 OUTPUT FILE

INPUT DATA :

RIDES Number: KX0004201 002
 Facility Name: TVA Paradise Fossil Plt
 Receiving Water: Green River
 Requested by: Larry Swader
 Date Entered: 1/7/2004
 User Name: Larry Swader

QT = 27 MGD
 Q1 = 323 MGD
 Q2 = 323 MGD
 Q3 = 208 MGD
 Q4 = 326 MGD
 Q5 = 208 MGD
 H1 = 400 mg/l as CaCO3
 H2 = 125 mg/l as CaCO3
 Z1 = 1 dilutions
 Z2 = 0.33333
 Z3 = 0.1
 H3 = NO

CALCULATION METHODOLOGY :

AQUATIC LIFE - CHEMICAL SPECIFIC

ACUTE: IF NO ZONE OF INITIAL DILUTION (ZID) GIVEN, THEN ACUTE CRITERIA
 APPLIES AT END OF PIER (CE), CP-CIA
 IF ZID IS GIVEN THEN CE=(CP-CU) (ZID)

CHRONIC: MIXING ZONE / COMPLETE MIX
 $CE=CDL[(Q1+Q2)/Q] - CUM(Q)/QT$

HUMAN HEALTH - CHEMICAL SPECIFIC

FISH ONLY: MIXING ZONE / COMPLETE MIX
 CRITERIA: $CE=CDL[(Q1+Q2)/Q] - CUM(Q)/QT$
 NON-CRITERIA: $CE=CDL[(Q1+Q2)/Q] - CUM(Q)/QT$

FISH & WATER: COMPLETE MIX, APPLICABLE AT POINT OF WITHDRAWAL
 CRITERIA: $CE=CDL[(Q1+Q2)/Q] - CUM(Q)/QT$
 NON-CRITERIA: $CE=CDL[(Q1+Q2)/Q] - CUM(Q)/QT$

AQUATIC LIFE - WHOLE EFFLUENT

ACUTE: IF NO ZID GIVEN, THEN ACUTE CRITERIA APPLIES AT CEP, CP-CIA, IN ACUTE TOXICITY UNITS
 IF ZID IS GIVEN, THEN CE=(CP-CU) (ZID)

CHRONIC: MIXING ZONE / COMPLETE MIX
 CE, IN CHRONIC TOXICITY UNITS = $CDL[(Q1+Q2)/Q] - CUM(Q)/QT$
 CE, IN ACUTE TOXICITY UNITS = (CE, IN CHRONIC TOXICITY UNITS) (ACR)

DEFINITIONS :

ACR= ACUTE TO CHRONIC RATIO
 CE= ACUTE DOWNSTREAM CONCENTRATION (CRITERIA) FOR AQUATIC LIFE
 CD= CHRONIC DOWNSTREAM CONCENTRATION (CRITERIA) FOR AQUATIC LIFE
 CEH= DOWNSTREAM CONCENTRATION (CRITERIA) FOR HUMAN HEALTH FISH CONSUMPTION ONLY
 CEH= DOWNSTREAM CONCENTRATION (CRITERIA) FOR HUMAN HEALTH FISH AND WATER CONSUMPTION
 CE= END OF PIER OUTPUT LIMIT
 CE= CONCENTRATION UPSTREAM (BACKGROUND CONCENTRATION)
 CEP= END OF PIER
 HAF= HUMAN HEALTH AVERAGE FISH CONSUMPTION
 H= EFFLUENT FLOW
 H= STREAM FLOW
 H= MILLION GALLONS PER DAY
 M= MIXING ZONE FACTOR
 Q= TOTAL EFFLUENT FLOW
 Q1= STREAM FLOW (MG) FOR HUMAN HEALTH, FISH CONSUMPTION, CRITERIA, AT POINT OF DISCHARGE
 Q2= STREAM FLOW (MG) FOR HUMAN HEALTH, FISH CONSUMPTION, NON-CRITERIA, AT POINT OF DISCHARGE
 Q3= STREAM FLOW (MG) FOR HUMAN HEALTH, FISH & WATER CONSUMPTION, CRITERIA, AT POINT OF WITHDRAWAL
 Q4= STREAM FLOW (MG) FOR HUMAN HEALTH, FISH & WATER CONSUMPTION, NON-CRITERIA, AT POINT OF WITHDRAWAL
 Q= ACUTE TOXICITY UNITS
 T= CHRONIC TOXICITY UNITS
 W/L= MICROGRAMS PER LITER
 ZID= ZONE OF INITIAL DILUTION FACTOR
 H= HIGH QUALITY INDIATOR

CAP ON HARDNESS FOR METALS = 400 mg/l CaCO3

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l	Criteria / Standards, ug/l		Aquatic Life		Human Health		Fetal Limits		Reported Discharge Level ug/l				
			Acute CDA	Chronic CCI	Fish Only CHL	Fish & H2O CH2	Acute RFP	Chronic Mix Zone	Hardness 400.00	Hardness 180.14		Fish Only Mix Zone	Fish & H2O Complete Mix	Average	Maximum
1 Acetophenone	N	0.000	NA	NA	2700.000	1200.000	NA	NA	13466.5600	15688.8900	13466.5600	NA	FISH ONLY	NA	0.000
2 Acetylcholine	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
3 Acrolein	N	0.000	NA	NA	780.000	320.000	NA	NA	3890.3390	4183.7040	3890.3390	NA	FISH ONLY	NA	0.000
4 Acrylonitrile	Y	0.000	NA	NA	6.500E-01	5.800E-02	NA	NA	16.9239	4.429482	16.9239	NA	FISH & H2O	NA	0.000
5 Aldrin	Y	0.000	3.0000	NA	1.400E-04	1.300E-04	NA	NA	3.6452E-03	9.9281E-03	3.6452E-03	ACUTE	FISH ONLY	NA	0.000
6 Aluminum, Total Recoverable	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
7 Arsenic	N	0.000	NA	NA	110000	9600.000	NA	NA	546638	125511	125511	NA	FISH & H2O	NA	0.000
8 Atrazine, Total Recoverable	Y	0.000	NA	NA	4300.000	6.0000	NA	NA	21446.7400	78.4444	78.4444	NA	FISH & H2O	NA	0.000
9 Asenic, Total Recoverable	Y	0.000	NA	NA	NA	NA	NA	NA	249.3807	NA	249.3807	NA	CHRONIC	NA	0.000
10 Avenic III	Y	0.000	340.0000	150.0000	NA	NA	NA	NA	746.1422	NA	340.0000	ACUTE	FISH ONLY	NA	0.000
11 Barium, Total Recoverable	Y	0.000	NA	NA	NA	2000.000	NA	NA	NA	26148.1570	26148.1570	NA	FISH & H2O	NA	0.000
12 Benzene	Y	0.000	NA	NA	71.0000	1.2000	NA	NA	1848.6120	91.6444	91.6444	NA	FISH & H2O	NA	0.000
13 Benzidine	Y	0.000	NA	NA	5.400E-04	1.200E-04	NA	NA	1.4060E-02	9.1644E-03	1.4060E-02	NA	FISH & H2O	NA	0.000
14 Benz (a) Anthracene	Y	0.000	NA	NA	4.900E-02	4.400E-03	NA	NA	1.278302	3.3603E-01	3.3603E-01	NA	FISH & H2O	NA	0.000
15 Benz (a) Pyrene	Y	0.000	NA	NA	4.900E-02	4.400E-03	NA	NA	1.278302	3.3603E-01	3.3603E-01	NA	FISH & H2O	NA	0.000
16 Benz (k) Fluoranthene	Y	0.000	NA	NA	4.900E-02	4.400E-03	NA	NA	1.278302	3.3603E-01	3.3603E-01	NA	FISH & H2O	NA	0.000
17 Benzofluoranthene (3,4)	Y	0.000	NA	NA	4.900E-02	4.400E-03	NA	NA	1.278302	3.3603E-01	3.3603E-01	NA	FISH & H2O	NA	0.000
18 Benzofluoranthene (3,4)	Y	0.000	NA	NA	4.900E-02	4.400E-03	NA	NA	1.278302	3.3603E-01	3.3603E-01	NA	FISH & H2O	NA	0.000
19 Beryllium, Total Recoverable	N	0.000	NA	NA	NA	NA	NA	NA	NA	5.2296E-02	5.2296E-02	NA	FISH & H2O	NA	0.000
20 Bromine	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
21 Bromide	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
22 Bromoform	Y	0.000	NA	NA	360.0000	4.3000	NA	NA	9373.2430	328.3926	328.3926	NA	FISH & H2O	NA	0.000
23 Bromophenyl Ethyl Ether (4)	N	0.000	NA	NA	5200.000	3000.000	NA	NA	29395.6000	39222.2200	29395.6000	NA	FISH ONLY	NA	0.000
24 Butyl Benzyl Ethyl Ether	N	0.000	NA	NA	NA	NA	NA	NA	NA	65.3704	19.4931	NA	CHRONIC	ACUTE	0.000
25 Calcium, Total Recoverable	N	0.000	NA	NA	4.4000	2.500E-01	NA	NA	114.5619	19.0926	19.0926	NA	FISH & H2O	NA	0.000
26 Carbon Tetrachloride	Y	0.000	2.4000	0.0043	2.200E-03	2.100E-03	NA	NA	0.02144674	1.6038E-02	2.1447E-02	2.4000	CHRONIC	ACUTE	0.000
27 Chlorobenzene	N	0.000	120000	60000	NA	250000	NA	NA	2992569	3268519	120000	ACUTE	FISH ONLY	NA	0.000
28 Chloride	N	0.000	19.0000	11.0000	NA	NA	NA	NA	54.8638	8890.3700	8890.3700	NA	FISH & H2O	NA	0.000
29 Chlorine, Total Residual	N	0.000	NA	NA	34.0000	4.100E-01	NA	NA	885.2507	31.3119	31.3119	NA	FISH & H2O	NA	0.000
30 Chloroacetylene	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
31 Chlorodibromomethane	Y	0.000	NA	NA	1.4000	3.100E-02	NA	NA	36.4515	2.367481	2.367481	NA	FISH & H2O	NA	0.000
32 Chloroethane	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
33 Chloroethyl Ether (Eis-2)	Y	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
34 Chloroethyl Methane (Eis-2)	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
35 Chloroethylvinyl Ether (2)	Y	0.000	NA	NA	470.0000	5.7000	NA	NA	12237.2900	435.3111	435.3111	NA	FISH & H2O	NA	0.000
36 Chloroform	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
37 Chlorobenzyl Ether (Eis-2)	N	0.000	NA	NA	170000	1400.000	NA	NA	847894	18303.7000	18303.7000	NA	FISH & H2O	NA	0.000
38 Chlorobenzyl Ether (Eis-2)	N	0.000	NA	NA	4300.000	1700.000	NA	NA	21446.7400	22225.9900	21446.7400	NA	FISH ONLY	NA	0.000
39 Chloroacetaldehyde (2)	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSWTWAM95)

REPORT OF ALL CALCULATIONS

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l	Aquatic Life		Human Health		Human Health		Human Health		Human Health		Reported Discharge Level ug/l	
			Acute	Chronic	Fish Only	Fish & H2O	Acute	Chronic	Fish Only	Fish & H2O	Average	Maximum		Average
40 Chloroform (2)	N	0.000	NA	NA	400.000	120.000	NA	NA	1995.0460	1568.8890	NA	FISH & H2O	NA	0.0000
41 Chlorophenyl Benzyl Ether (4)	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
42 Chloropyrides	N	0.000	0.0800	NA	NA	NA	NA	NA	0.204622	8.3000E-02	0.0890	ACUTE	NA	0.0000
43 Chromium, Total Recoverable	N	0.000	NA	NA	100.000	NA	NA	NA	1307.4070	1307.4070	NA	FISH & H2O	NA	0.0000
44 Chromium III	N	0.000	5613.9480	139.5821	NA	NA	NA	NA	696.1816	696.1816	5613.9480	CHRONIC	NA	0.0000
45 Chromium VI	N	0.000	16.0000	11.0000	NA	NA	NA	NA	54.8638	16.0000	16.0000	CHRONIC	NA	0.0000
46 Chrysenes	Y	0.000	NA	NA	4.9000E-02	4.4000E-03	NA	NA	1.275902	3.3603E-01	3.3603E-01	FISH & H2O	NA	0.0000
47 Cobalt, Total Recoverable	N	0.000	NA	NA	NA	75.0000	NA	NA	NA	980.5555	980.5555	FISH & H2O	NA	0.0000
48 Color (Platinum Cobalt Units)	N	0.000	51.6945	15.4256	NA	1000.000	NA	NA	76.9970	13074.0700	51.6945	ACUTE	NA	0.0000
49 Copper, Total Recoverable	N	0.000	22.0000	5.2000	200.000	200.000	NA	NA	25.9956	2614.8150	22.0000	ACUTE	NA	0.0000
50 Cyanide, Free	Y	0.000	NA	NA	8.4000E-04	8.3000E-04	NA	NA	2.1870E-02	6.3307E-02	2.1870E-02	FISH ONLY	NA	0.0000
51 DDD (4,4')	Y	0.000	NA	NA	5.9000E-04	5.9000E-04	NA	NA	1.5962E-02	4.5962E-02	1.5962E-02	FISH ONLY	NA	0.0000
52 DDE (4,4')	Y	0.000	1.1000	0.0010	5.9000E-04	5.9000E-04	NA	NA	1.5962E-02	4.5962E-02	1.5962E-02	CHRONIC	NA	0.0000
53 DIB (4,4')	Y	0.000	NA	NA	4.9000E-02	4.4000E-03	NA	NA	1.275902	3.3603E-01	3.3603E-01	FISH & H2O	NA	0.0000
54 Dibenz (a,b) Anthracene	Y	0.000	NA	NA	2700.000	2700.000	NA	NA	35300.0000	35300.0000	35300.0000	FISH & H2O	NA	0.0000
55 Dibutyl Hydroxide	N	0.000	NA	NA	600.000	600.000	NA	NA	84789.4500	7844.4440	7844.4440	FISH & H2O	NA	0.0000
56 Dieldrin (1,2)	N	0.000	NA	NA	17000.000	17000.000	NA	NA	12867.8000	5229.6290	5229.6290	FISH & H2O	NA	0.0000
57 Dieldrin (1,3)	N	0.000	NA	NA	2600.000	2600.000	NA	NA	12967.8000	980.5555	980.5555	FISH & H2O	NA	0.0000
58 Dieldrin (1,4)	N	0.000	NA	NA	7.7000E-02	4.0000E-02	NA	NA	2.004833	3.054815	2.004833	FISH ONLY	NA	0.0000
59 Dieldrin (2,4)	Y	0.000	NA	NA	46.0000	5.6000E-01	NA	NA	1197.6920	42.7674	42.7674	FISH & H2O	NA	0.0000
60 Dichlorobenzene	Y	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH & H2O	NA	0.0000
61 Dichlorodifluoromethane	Y	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH & H2O	NA	0.0000
62 Dichloroethane (1,1)	Y	0.000	NA	NA	99.0000	3.8000E-01	NA	NA	2577.6620	29.0207	29.0207	FISH & H2O	NA	0.0000
63 Dichloroethane (1,2)	Y	0.000	NA	NA	3.2000	5.7000E-02	NA	NA	83.3177	4.353111	4.353111	FISH & H2O	NA	0.0000
64 Dichloroethane (1,1)	Y	0.000	NA	NA	790.0000	99.0000	NA	NA	3940.2150	1215.8890	1215.8890	FISH & H2O	NA	0.0000
65 Dichloroethane (2,4)	Y	0.000	NA	NA	39.0000	5.2000E-01	NA	NA	1015.4350	39.7126	39.7126	FISH & H2O	NA	0.0000
66 Dichloropropane (1,2)	N	0.000	NA	NA	1700.000	1700.000	NA	NA	8478.9440	130.7407	130.7407	FISH ONLY	NA	0.0000
67 Dichloropropane	N	0.000	NA	NA	1700.000	1700.000	NA	NA	8478.9440	130.7407	130.7407	FISH & H2O	NA	0.0000
68 Dichloropropylene (1,3)	Y	0.000	0.2400	0.0560	1.4000E-04	1.4000E-04	NA	NA	3.6452E-03	1.0820E-02	0.2400	FISH ONLY	NA	0.0000
69 Dieldrin	N	0.000	NA	NA	12000.000	23000.000	NA	NA	596534	300704	300704	FISH & H2O	NA	0.0000
70 Diethyl Hydroxide	N	0.000	NA	NA	313000	313000	NA	NA	4092185	4092185	4092185	FISH & H2O	NA	0.0000
71 Dimethyl Hydroxide	N	0.000	NA	NA	2300.000	540.0000	NA	NA	11471.5100	7690.0000	7690.0000	FISH & H2O	NA	0.0000
72 Dimethylhydroxide (2,4)	N	0.000	NA	NA	14000.000	70.0000	NA	NA	69826.6000	915.1852	915.1852	FISH & H2O	NA	0.0000
73 Dinitrophenol	Y	0.000	NA	NA	9.1000	1.1000E-01	NA	NA	8.400741	8.400741	8.400741	FISH & H2O	NA	0.0000
74 Dinitrochlorobenzene (2,4)	Y	0.000	NA	NA	785.0000	13.4000	NA	NA	3815.5250	175.1926	175.1926	FISH & H2O	NA	0.0000
75 Dinitro-O-Cresol (2,4)	N	0.000	NA	NA	5.4000E-01	4.0000E-02	NA	NA	3.054815	3.054815	3.054815	FISH & H2O	NA	0.0000
76 Dinitrophenylamine (1,2) (as Acetanilide)	N	0.000	NA	NA	12000.000	2700.000	NA	NA	59651.3600	35300.0000	35300.0000	FISH & H2O	NA	0.0000
77 Di-N-Butyl Hydroxide	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH & H2O	NA	0.0000
78 Di-N-Octyl Hydroxide	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH & H2O	NA	0.0000

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSITWAM95)

REPORT OF ALL CALCULATIONS

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l	Criteria / Standards, ug/l		Aquatic Life		Human Health		Fetal Limits		Reported Discharge Level ug/l	
			CR	Chronic CIC	Fish Only CHL	Fish & H2O CH2	Acute HC	Chronic HC	Acute	Chronic		Water Quality, ug/l
80 Eribsulfan Sulfate	N	0.000	NA	NA	240.000	110.000	NA	1438.1480	1197.0280	NA	NA	0.000
81 Eribsulfan (Alpha)	N	0.000	0.2200	0.0560	240.000	110.000	0.2200	1438.1480	2.200E-01	ACUTE	ACUTE	0.000
82 Eribsulfan (Beta)	N	0.000	0.2200	0.0560	240.000	110.000	0.2200	1438.1480	2.200E-01	ACUTE	ACUTE	0.000
83 Endrin	N	0.000	0.0860	0.0360	8.100E-01	7.600E-01	0.0860	9.996296	8.600E-02	ACUTE	ACUTE	0.000
84 Endrin Aldehyde	N	0.000	NA	NA	8.100E-01	7.600E-01	NA	9.996296	4.039968	NA	FISH ONLY	0.000
85 Ethylbenzene	N	0.000	NA	NA	2800.000	700.000	NA	9151.8520	9151.8520	NA	FISH & H2O	0.000
86 Ethylhexyl Benzoate (Bis-2)	N	0.000	NA	NA	5.9000	1.8000	NA	137.4667	137.4667	NA	FISH & H2O	0.000
87 Fluorene	N	0.000	NA	NA	14000.000	1300.000	NA	16996.3000	26148.1500	NA	FISH & H2O	0.000
88 Fluoride	N	0.000	NA	NA	370.0000	300.0000	NA	3922.2220	1845.4170	NA	FISH ONLY	0.000
89 Fluoranthene	N	0.000	NA	NA	1.300E-02	3.900E-03	NA	2.9784E-01	2.9784E-01	NA	NA	0.000
90 Halonitrates	Y	0.000	NA	NA	4.600E-02	1.400E-02	NA	1.069185	1.069185	NA	FISH & H2O	0.000
91 KH (Alpha)	Y	0.000	NA	NA	6.300E-02	1.900E-02	NA	1.451037	9.500E-01	0.9500	ACUTE	0.000
92 KH (Beta)	Y	0.000	0.9500	NA	NA	NA	0.9500	1.451037	9.500E-01	0.9500	ACUTE	0.000
93 KH (Gamma), Lindane	Y	0.000	0.5200	0.0088	2.100E-04	2.100E-04	0.5200	1.6038E-02	5.467E-03	0.5200	FISH ONLY	0.000
94 KH (Technical)	Y	0.000	0.5200	0.0088	1.100E-04	1.100E-04	0.5200	6.370E-03	2.8640E-03	0.5200	FISH ONLY	0.000
95 Heptachlor	Y	0.000	NA	NA	7.700E-04	7.500E-04	NA	5.7278E-02	2.0048E-02	NA	FISH ONLY	0.000
96 Heptachlor Epoxide	Y	0.000	NA	NA	50.0000	50.0000	NA	653.7037	653.7037	NA	FISH & H2O	0.000
97 Heptachlor Epoxide	Y	0.000	NA	NA	1700.0000	4.400E-01	NA	84789.4500	33.6090	NA	FISH & H2O	0.000
98 Heptachlor Epoxide	Y	0.000	NA	NA	8.9000	1.9000	NA	145.1037	145.1037	NA	FISH & H2O	0.000
100 Heptachlor Epoxide	Y	0.000	NA	NA	4.900E-02	4.400E-03	NA	3.3603E-01	3.3603E-01	NA	FISH & H2O	0.000
101 Iridar (1,2,3-ep) Pyrene	Y	0.000	4000.0000	1000.0000	NA	NA	4000.0000	2749.3330	4000.0000	4000.0000	ACUTE	0.000
102 Iron, Total Recoverable	Y	0.000	476.8177	6.730165	2600.0000	36.0000	476.8177	196.1111	33.5675	476.8177	CHRONIC	0.000
103 Isoprene	N	0.000	NA	NA	NA	15.0000	NA	NA	NA	NA	NA	0.000
104 Lead, Total Recoverable	N	0.000	NA	NA	100.0000	50.0000	NA	653.7037	498.7614	NA	FISH ONLY	0.000
105 Manganese, Total Recoverable	N	0.000	1.7000	0.9100	5.100E-02	5.000E-02	1.7000	6.5374E-01	2.5437E-01	1.7000	FISH ONLY	0.000
106 Mercury, Total Recoverable	N	0.000	NA	NA	400.0000	48.0000	NA	627.5555	627.5555	NA	FISH & H2O	0.000
108 Methyl Bromide	N	0.000	NA	NA	160.0000	4.7000	NA	358.9407	358.9407	NA	NA	0.000
109 Methyl Chloride	Y	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
110 Methylene Chloride	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
111 Methylene Chloride, Total Recoverable	N	0.000	1515.9220	85.8227	460.0000	100.0000	1515.9220	1307.4070	428.0504	1515.9220	CHRONIC	0.000
112 Naphthalene	N	0.000	NA	NA	10000.0000	10000.0000	NA	130741	130741	NA	FISH & H2O	0.000
113 Nickel, Total Recoverable	N	0.000	NA	NA	1900.0000	17.0000	NA	222.2593	222.2593	NA	FISH & H2O	0.000
114 Nitrate - Nitrites (as N)	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
115 Nitrobenzene	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
116 Nitrophenol (2)	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
117 Nitrophenol (4)	Y	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
118 Nitrodimethylamine (N)	Y	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000
119 Nitrosodimethylamine (N)	Y	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.000

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l	Aquatic Life		Human Health		Output (CT), ug/l		Fetal Limits		Reported Discharge Level ug/l			
			Acute CDA	Chronic CC	Fish Only CHL	Fish & H2O CH2	Acute KP	Chronic Mx Zone	Hardness 400.00	Hardness 180.14		Fish Only Mx Zone	Fish & H2O Complete Mix	Average
120 Nitrosodimethylamine (N)	Y	0.000	NA	NA	8.100	6.900E-04	NA	NA	210.890	5.2696E-02	NA	FISH & H2O	NA	0.000
121 Nitrosodiphenylamine (N)	Y	0.000	NA	NA	16.000	5.000E-03	NA	NA	416.5966	381.8518	NA	FISH & H2O	NA	0.000
122 Nitrosodi-N-propylamine (N)	Y	0.000	NA	NA	1.400	5.000E-03	NA	NA	36.4515	3.8185E-01	NA	FISH & H2O	NA	0.000
123 Nitrosopyrrolidine (N)	Y	0.000	0.0650	NA	NA	NA	NA	NA	NA	0.0650	CHRONIC	NA	0.000	
124 Benathion	N	0.000	0.0130	NA	7.900E-05	7.900E-05	NA	NA	2.0569E-03	6.0333E-03	NA	FISH ONLY	NA	0.000
125 RB - 1016	Y	0.000	NA	0.0014	7.900E-05	7.900E-05	NA	NA	2.0569E-03	6.0333E-03	NA	FISH ONLY	NA	0.000
126 RB - 1221	Y	0.000	NA	0.0014	7.900E-05	7.900E-05	NA	NA	2.0569E-03	6.0333E-03	NA	FISH ONLY	NA	0.000
127 RB - 1232	Y	0.000	NA	0.0014	7.900E-05	7.900E-05	NA	NA	2.0569E-03	6.0333E-03	NA	FISH ONLY	NA	0.000
128 RB - 1242	Y	0.000	NA	0.0014	7.900E-05	7.900E-05	NA	NA	2.0569E-03	6.0333E-03	NA	FISH ONLY	NA	0.000
129 RB - 1248	Y	0.000	NA	0.0014	7.900E-05	7.900E-05	NA	NA	2.0569E-03	6.0333E-03	NA	FISH ONLY	NA	0.000
130 RB - 1254	Y	0.000	NA	0.0014	7.900E-05	7.900E-05	NA	NA	2.0569E-03	6.0333E-03	NA	FISH ONLY	NA	0.000
131 RB - 1260	Y	0.000	NA	0.0014	7.900E-05	7.900E-05	NA	NA	2.0569E-03	6.0333E-03	NA	FISH ONLY	NA	0.000
132 Benzothiazene	N	0.000	NA	4.100	3.500	NA	NA	20.4482	45.7593	20.4482	NA	FISH ONLY	NA	0.000
133 Benzothiazophenol	Y	0.000	9.0700	8.200	2.800E-01	NA	NA	21.3577	21.3577	9.0700	ACUTE	NA	0.000	
134 Benzothiazene	Y	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH & H2O	NA	0.000
135 Benzol	N	0.000	NA	460000	21000.000	NA	NA	2294000	274556	274556	NA	FISH & H2O	NA	0.000
136 Benzols, Total	N	0.000	NA	5.000	NA	NA	NA	24.9381	NA	24.9381	NA	FISH ONLY	NA	0.000
137 BHTs (as P), Total	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	CHRONIC	NA	0.000
138 Ethylene Esters	N	0.000	NA	3.000	NA	NA	NA	14.9628	NA	14.9628	NA	FISH & H2O	NA	0.000
139 Pyrene	N	0.000	NA	11000.000	960.000	NA	NA	5463.7600	1251.1100	1251.1100	NA	FISH & H2O	NA	0.000
140 p-Chloro-m-Cresol	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH & H2O	NA	0.000
141 Selenium, Total Recoverable	N	0.000	20.0000	5.0000	NA	50.0000	NA	63.7037	20.0000	20.0000	ACUTE	NA	0.000	
142 Silver, Total Recoverable	N	0.000	44.0497	NA	NA	50.0000	NA	63.7037	44.0497	44.0497	ACUTE	NA	0.000	
143 Sulfate (as SO4)	N	0.000	NA	NA	NA	25000	NA	3268519	3268519	3268519	NA	FISH & H2O	NA	0.000
144 Sulfide (Hydrogen Sulfide)	N	0.000	NA	2.000	NA	NA	NA	9.975229	NA	9.975229	NA	CHRONIC	NA	0.000
145 Sulfite (as SO3)	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH & H2O	NA	0.000
146 Benzothiazene (1,2,4,5)	N	0.000	NA	NA	2.900	2.300	NA	14.4641	30.0704	14.4641	NA	FISH ONLY	NA	0.000
147 Benzothiazene-P, Dioxin	Y	0.000	NA	1.400E-08	1.300E-08	NA	NA	3.6492E-07	9.9281E-07	3.6492E-07	NA	FISH ONLY	NA	0.000
148 Benzothiazene (1,1,2,2)	Y	0.000	NA	10.700	1.700E-01	NA	NA	278.5936	12.9830	12.9830	NA	FISH & H2O	NA	0.000
149 Benzothiazene	Y	0.000	NA	8.880	8.000E-01	NA	NA	230.4256	61.0963	61.0963	NA	FISH & H2O	NA	0.000
150 Thallium, Total Recoverable	N	0.000	NA	6.300	1.700	NA	NA	31.4220	22.2259	22.2259	NA	FISH & H2O	NA	0.000
151 Tin, Total Recoverable	N	0.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	FISH & H2O	NA	0.000
152 Thallium, Total Recoverable	N	0.000	NA	20000	1000.000	NA	NA	997523	13074.0700	13074.0700	NA	FISH & H2O	NA	0.000
153 Thiurea	N	0.000	NA	NA	75000	NA	NA	9403556	9403556	9403556	NA	FISH & H2O	NA	0.000
154 Total Dissolved Solids	N	0.000	0.7300	0.0002	7.500E-04	7.300E-04	NA	1.9528E-02	0.7300	0.7300	CHRONIC	NA	0.000	
155 Thiurea	Y	0.000	NA	14000	NA	NA	NA	3645150	3645150	3645150	NA	FISH ONLY	NA	0.000
156 Para-Dichloroethylene (1,2)	Y	0.000	NA	940.000	70.000	NA	NA	4688.3570	915.1652	915.1652	NA	FISH & H2O	NA	0.000
157 Trichloroethylene (1,2,4)	N	0.000	NA	NA	200.000	NA	NA	2614.8150	2614.8150	2614.8150	NA	FISH & H2O	NA	0.000
158 Trichloroethylene (1,1,1)	N	0.000	NA	NA	NA	NA	NA	1088.3380	45.8222	45.8222	NA	FISH & H2O	NA	0.000
159 Trichloroethylene (1,1,2)	Y	0.000	NA	41.800	6.000E-01	NA	NA	1088.3380	45.8222	45.8222	NA	FISH & H2O	NA	0.000

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l	Criteria / Standards, ug/l			Output (CT), ug/l			Final Limits			Reported Discharge Level ug/l		
			Acute	Chronic	Fish Only	Acute	Chronic	Fish Only	Water Quality, ug/l	Human Health	Fish & H2O		Justification	
160 Trichloroethylene	Y	0.0000	NA	NA	81.0000	2.7000	NA	2108.9800	206.2000	206.2000	NA	FISH & H2O	NA	0.0000
161 Trichlorofluoromethane	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
162 Trichloroethanol (2,4,5)	N	0.0000	NA	NA	9800.0000	2600.0000	NA	48878.6200	33992.5000	33992.5000	NA	FISH & H2O	NA	0.0000
163 Trichloroethanol (2,4,6)	Y	0.0000	NA	NA	6.5000	2.1000	NA	169.2391	160.3778	160.3778	NA	FISH & H2O	NA	0.0000
164 Vinyl Chloride	Y	0.0000	NA	NA	525.0000	2.0000	NA	13669.3100	152.7407	152.7407	NA	FISH & H2O	NA	0.0000
165 Zinc, Total Recoverable	N	0.0000	387.8303	197.2822	69000.0000	5000.0000	387.8303	983.9673	344145	65370.3700	387.8303	ACUTE	ACUTE	0.0000

REPORT OF ALL CALCULATIONS

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l	Criteria / Standards, ug/l			Output (CT), ug/l			Final Limits			Reported Discharge Level ug/l		
			Acute	Chronic	Fish Only	Acute	Chronic	Fish Only	Water Quality, ug/l	Human Health	Fish & H2O		Justification	
Whole Effluent	NA	0	0.3	NA	NA	NA	NA	0.4887615	NA	NA	1.0000	CHRONIC	ACUTE	NA
1 Acute Toxicity Units (TUa)	NA	0	NA	1	NA	NA	NA	4.987615	NA	NA	4.987615	CHRONIC	NA	NA
2 Chronic Toxicity Units (TUc)	NA	0	NA	1	NA	NA	NA	1.0000	NA	NA	1.0000	CHRONIC	NA	NA

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ATTACHMENT C -- REASONABLE POTENTIAL ANALYSIS

A reasonable potential analysis is a determination by the Division of Water of whether effluent limitations, monitoring only, or no requirements are imposed for a particular parameter on a specific permit. To perform the analysis, the values reported on either the permit application or a summarization of the discharge monitoring data are divided by the expected effluent limit generated using SSTWAM95 and converted to a percentage for each pollutant. That percentage is then compared to the following criteria:

Percentage	Requirement
Less than 70%	None
Greater than 70% but less than 90%	Monitoring Only Required (MOR)
Greater than 90%	Limit Required (LR)

In all cases, the Division of Water still may exercise its Best Professional Judgment in the implementation of the results, i.e. should insufficient data points exist to make a reasonable determination that a limit should be applied, then DOW may require additional monitoring to insure the appropriate requirement is imposed. This may take the form of additional monitoring requested during the development of the permit or may be required as part of the final permit.

The following table illustrates the results of the reasonable potential analysis performed on Outfall 001.

Chemical Specific Parameter	Limits		Reported Values		Percentage		Effluent Limitations	
	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum
	Acenaphthene	2700	NA	0	0	0.00%	0.00%	None
Acenaphthylene	NA	NA	0	0	0.00%	0.00%	None	None
Acrolein	780	NA	0	0	0.00%	0.00%	None	None
Acrylonitrile	6.50E-01	NA	0	0	0.00%	0.00%	None	None
Aldrin	1.40E-04	3	0	0	0.00%	0.00%	None	None
Aluminum, Total Recoverable	NA	NA	460	460	0.00%	0.00%	None	None
Anthracene	110000	NA	0	0	0.00%	0.00%	None	None
Antimony, Total Recoverable	71.2	NA	0	0	0.00%	0.00%	None	None
Arsenic, Total Recoverable	50	NA	23	23	46.00%	0.00%	None	None
Arsenic III	150	340	0	0	0.00%	0.00%	None	None
Barium, Total Recoverable	23733.33	NA	290	290	1.22%	0.00%	None	None
Benzene	71	NA	0	0	0.00%	0.00%	None	None
Benzidine	5.40E-04	NA	0	0	0.00%	0.00%	None	None
Benzo (a) Anthracene	4.90E-02	NA	0	0	0.00%	0.00%	None	None
Benzo (a) Pyrene	4.90E-02	NA	0	0	0.00%	0.00%	None	None
Benzo (ghi) Perylene	NA	NA	0	0	0.00%	0.00%	None	None
Benzo (k) Fluoroanthene	4.90E-02	NA	0	0	0.00%	0.00%	None	None
Benzo-fluoroanthene (3,4)	4.90E-02	NA	0	0	0.00%	0.00%	None	None
Beryllium, Total Recoverable	4.75E-02	NA	0	0	0.00%	0.00%	None	None
Boron, Total Recoverable	NA	NA	4300	4300	0.00%	0.00%	None	None

ATTACHMENT C - REASONABLE POTENTIAL ANALYSIS

Chemical Specific Parameter	Limits		Reported Values		Percentage		Effluent Limitations	
	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum
Bromide	NA	NA	0	0	0.00%	0.00%	None	None
Bromoform	295.9833	NA	0	0	0.00%	0.00%	None	None
Bromophenyl Phenyl Ether (4)	NA	NA	0	0	0.00%	0.00%	None	None
Butyl Benzyl Phthalate	5200	NA	0	0	0.00%	0.00%	None	None
Cadmium, Total Recoverable	7.311862	21.5715	0.3	0.3	4.10%	1.39%	None	None
Carbon Tetrachloride	4.4	NA	0	0	0.00%	0.00%	None	None
Chlordane	2.20E-03	2.4	0	0	0.00%	0.00%	None	None
Chloride	600000	1200000	36000	36000	6.00%	3.00%	None	None
Chlorine, Total Residual	11	19	0	0	0.00%	0.00%	None	None
Chlorobenzene	8069.334	NA	0	0	0.00%	0.00%	None	None
Chlorodibromomethane	28.2217	NA	0	0	0.00%	0.00%	None	None
Chloroethane	NA	NA	0	0	0.00%	0.00%	None	None
Chloroethyl Ether (Bis-2)	1.4	NA	0	0	0.00%	0.00%	None	None
Chloroethyl Methane (Bis-2)	NA	NA	0	0	0.00%	0.00%	None	None
Chloroethylvinyl Ether (2)	NA	NA	0	0	0.00%	0.00%	None	None
Chloroform	392.35	NA	0	0	0.00%	0.00%	None	None
Chlorohexyl Ether (Bis-2)	NA	NA	0	0	0.00%	0.00%	None	None
Chloroisopropyl Ether (Bis-2)	16613.33	NA	0	0	0.00%	0.00%	None	None
Chloronaphthalene (2)	4300	NA	0	0	0.00%	0.00%	None	None
Chlorophenol (2)	400	NA	0	0	0.00%	0.00%	None	None
Chlorophenyl Phenyl Ether (4)	NA	NA	0	0	0.00%	0.00%	None	None
Chloropyrifos	4.10E-02	0.083	0	0	0.00%	0.00%	None	None
Chromium, Total Recoverable	1186.667	NA	0	0	0.00%	0.00%	None	None
Chromium III	268.2742	5613.948	0	0	0.00%	0.00%	None	None
Chromium VI	11	16	0	0	0.00%	0.00%	None	None
Chrysene	4.90E-02	NA	0	0	0.00%	0.00%	None	None
Cobalt, Total Recoverable	NA	NA	1	1	0.00%	0.00%	None	None
Color (Platinum Cobalt Units)	890	NA	0	0	0.00%	0.00%	None	None
Copper, Total Recoverable	30.4994	51.6845	2.6	2.6	8.52%	5.03%	None	None
Cyanide, Free	5.2	22	0	0	0.00%	0.00%	None	None
DDD (4,4')	8.40E-04	NA	0	0	0.00%	0.00%	None	None
DDE (4,4')	5.90E-04	NA	0	0	0.00%	0.00%	None	None
DDT (4,4')	5.90E-04	1.1	0	0	0.00%	0.00%	None	None
Dibenzo (a,h) Anthracene	4.90E-02	NA	0	0	0.00%	0.00%	None	None
Dibutyl Phthalate	32040	NA	0	0	0.00%	0.00%	None	None
Dichlorobenzene (1,2)	7120	NA	0	0	0.00%	0.00%	None	None
Dichlorobenzene (1,3)	2600	NA	0	0	0.00%	0.00%	None	None
Dichlorobenzene (1,4)	890	NA	0	0	0.00%	0.00%	None	None

ATTACHMENT C – REASONABLE POTENTIAL ANALYSIS

Chemical Specific Parameter	Limits		Reported Values		Percentage		Effluent Limitations	
	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum
Dichlorobenzidine (3,3')	7.70E-02	NA	0	0	0.00%	0.00%	None	None
Dichlorobromomethane	38.5467	NA	0	0	0.00%	0.00%	None	None
Dichlorodifluoromethane	NA	NA	0	0	0.00%	0.00%	None	None
Dichloroethane (1,1)	NA	NA	0	0	0.00%	0.00%	None	None
Dichloroethane (1,2)	26.1567	NA	0	0	0.00%	0.00%	None	None
Dichloroethylene (1,1)	3.2	NA	0	0	0.00%	0.00%	None	None
Dichlorophenol (2,4)	790	NA	0	0	0.00%	0.00%	None	None
Dichloropropane (1,2)	35.7933	NA	0	0	0.00%	0.00%	None	None
Dichloropropenes	1700	NA	0	0	0.00%	0.00%	None	None
Dichloropropylene (1,3)	118.6667	NA	0	0	0.00%	0.00%	None	None
Diethrin	1.40E-04	0.24	0	0	0.00%	0.00%	None	None
Diethyl Phthalate	120000	NA	0	0	0.00%	0.00%	None	None
Dimethyl Phthalate	2900000	NA	0	0	0.00%	0.00%	None	None
Dimethylphenol (2,4)	2300	NA	0	0	0.00%	0.00%	None	None
Dinitrophenol	830.6667	NA	0	0	0.00%	0.00%	None	None
Dinitrotoluene	NA	NA	0	0	0.00%	0.00%	None	None
Dinitrotoluene (2,4)	7.571667	NA	0	0	0.00%	0.00%	None	None
Dinitro-O-Cresol (2,4)	159.0133	NA	0	0	0.00%	0.00%	None	None
Diphenylhydrazine (1,2) (as Asobenzene)	5.40E-01	NA	0	0	0.00%	0.00%	None	None
Di-N-butyl Phthalate	12000	NA	0	0	0.00%	0.00%	None	None
Di-N-Octyl Phthalate	NA	NA	0	0	0.00%	0.00%	None	None
Endosulfan Sulfate	240	NA	0	0	0.00%	0.00%	None	None
Endosulfan (Alpha)	5.60E-02	0.22	0	0	0.00%	0.00%	None	None
Endosulfan (Beta)	5.60E-02	0.22	0	0	0.00%	0.00%	None	None
Endrin	3.60E-02	0.086	0	0	0.00%	0.00%	None	None
Endrin Aldehyde	8.10E-01	NA	0	0	0.00%	0.00%	None	None
Ethylbenzene	8306.667	NA	0	0	0.00%	0.00%	None	None
Ethylhexyl Phthalate (Bis-2)	5.9	NA	0	0	0.00%	0.00%	None	None
Fluorene	14000	NA	0	0	0.00%	0.00%	None	None
Fluoride	23733.33	NA	0	0	0.00%	0.00%	None	None
Fluoroanthene	370	NA	0	0	0.00%	0.00%	None	None
Halomethanes	NA	NA	0	0	0.00%	0.00%	None	None
HCH (Alpha)	1.30E-02	NA	0	0	0.00%	0.00%	None	None
HCH (Beta)	4.60E-02	NA	0	0	0.00%	0.00%	None	None
HCH (Gamma), Lindane	6.30E-02	0.95	0	0	0.00%	0.00%	None	None
HCH (Technical)	NA	NA	0	0	0.00%	0.00%	None	None
Heptachlor	2.10E-04	0.52	0	0	0.00%	0.00%	None	None
Heptachlor Epoxide	1.10E-04	0.52	0	0	0.00%	0.00%	None	None

ATTACHMENT C - REASONABLE POTENTIAL ANALYSIS

Chemical Specific Parameter	Limits		Reported Values		Percentage		Effluent Limitations	
	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum
Hexachlorobenzene	7.70E-04	NA	0	0	0.00%	0.00%	None	None
Hexachlorobutadiene	30.2867	NA	0	0	0.00%	0.00%	None	None
Hexachlorocyclopentadiene	593.3333	NA	0	0	0.00%	0.00%	None	None
Hexachloroethane	8.9	NA	0	0	0.00%	0.00%	None	None
Indeno (1,2,3-cd) Pyrene	4.90E-02	NA	0	0	0.00%	0.00%	None	None
Iron, Total Recoverable	1000	4000	110	110	11.00%	2.75%	None	None
Isophorone	2478	NA	0	0	0.00%	0.00%	None	None
Lead, Total Recoverable	18.5809	476.8177	0	0	0.00%	0.00%	None	None
Magnesium, Total Recoverable	NA	NA	39000	39000	0.00%	0.00%	None	None
Manganese, Total Recoverable	100	NA	25	25	25.00%	0.00%	None	None
Mercury, Total Recoverable	5.10E-02	1.7	0	0	0.00%	0.00%	None	None
Methyl Bromide	569.6	NA	0	0	0.00%	0.00%	None	None
Methyl Chloride	NA	NA	0	0	0.00%	0.00%	None	None
Methylene Chloride	323.5167	NA	0	0	0.00%	0.00%	None	None
Molybdenum, Total Recoverable	NA	NA	160	160	0.00%	0.00%	None	None
Naphthalene	NA	NA	0	0	0.00%	0.00%	None	None
Nickel, Total Recoverable	168.541	1515.922	8.9	8.9	5.28%	0.59%	None	None
Nitrate - Nitrite (as N)	118667	NA	330	330	0.28%	0.00%	None	None
Nitrobenzene	201.7333	NA	0	0	0.00%	0.00%	None	None
Nitrophenol (2)	NA	NA	0	0	0.00%	0.00%	None	None
Nitrophenol (4)	NA	NA	0	0	0.00%	0.00%	None	None
Nitrosodibutylamine (N)	NA	NA	0	0	0.00%	0.00%	None	None
Nitrosodiethylamine (N)	NA	NA	0	0	0.00%	0.00%	None	None
Nitrosodimethylamine (N)	4.75E-02	NA	0	0	0.00%	0.00%	None	None
Nitrosodiphenylamine (N)	16	NA	0	0	0.00%	0.00%	None	None
Nitrosodi-N-Propylamine (N)	3.44E-01	NA	0	0	0.00%	0.00%	None	None
Nitrosopyrrolidine (N)	NA	NA	0	0	0.00%	0.00%	None	None
Parathion	1.30E-02	0.065	0	0	0.00%	0.00%	None	None
PCB - 1016	7.90E-05	NA	0	0	0.00%	0.00%	None	None
PCB - 1221	7.90E-05	NA	0	0	0.00%	0.00%	None	None
PCB - 1232	7.90E-05	NA	0	0	0.00%	0.00%	None	None
PCB - 1242	7.90E-05	NA	0	0	0.00%	0.00%	None	None
PCB - 1248	7.90E-05	NA	0	0	0.00%	0.00%	None	None
PCB - 1254	7.90E-05	NA	0	0	0.00%	0.00%	None	None
PCB - 1260	7.90E-05	NA	0	0	0.00%	0.00%	None	None
Pentachlorobenzene	4.1	NA	0	0	0.00%	0.00%	None	None
Pentachlorophenol	5.7	9.07	0	0	0.00%	0.00%	None	None
Phenanthrene	NA	NA	0	0	0.00%	0.00%	None	None

ATTACHMENT C – REASONABLE POTENTIAL ANALYSIS

Chemical Specific Parameter	Limits		Reported Values		Percentage		Effluent Limitations	
	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum
Phenol	249200	NA	0	0	0.00%	0.00%	None	None
Phenols, Total	5	NA	16	26	320.00%	0.00%	LR	None
Phosphorous (as P), Total	NA	NA	160	160	0.00%	0.00%	None	None
Phthalate Esters	3	NA	0	0	0.00%	0.00%	None	None
Pyrene	11000	NA	0	0	0.00%	0.00%	None	None
P-Chloro-M-Cresol	NA	NA	0	0	0.00%	0.00%	None	None
Selenium, Total Recoverable	5	20	13	13	260.00%	65.00%	LR	None
Silver, Total Recoverable	44.0497	44.0497	0	0	0.00%	0.00%	None	None
Sulfate (as SO4)	2966667	NA	330000	330000	11.12%	0.00%	None	None
Sulfide (Hydrogen Sulfide)	2	NA	20	20	1000.00%	0.00%	LR	None
Sulfite (as SO2)	NA	NA	1000	1000	0.00%	0.00%	None	None
Tetrachlorobenzene (1,2,4,5)	2.9	NA	0	0	0.00%	0.00%	None	None
Tetrachlorodibenzo-P, Dioxin (2,3,7,8)	1.40E-08	NA	0	0	0.00%	0.00%	None	None
Tetrachloroethane (1,1,2,2)	10.7	NA	0	0	0.00%	0.00%	None	None
Tetrachloroethylene	8.85	NA	0	0	0.00%	0.00%	None	None
Thallium, Total Recoverable	6.3	NA	8.5	8.5	134.92%	0.00%	LR	None
Tin, Total Recoverable	NA	NA	50	50	0.00%	0.00%	None	None
Titanium, Total Recoverable	NA	NA	12	12	0.00%	0.00%	None	None
Toluene	11866.67	NA	0	0	0.00%	0.00%	None	None
Total Dissolved Solids	8900000	NA	0	0	0.00%	0.00%	None	None
Toxaphene	2.00E-04	0.73	0	0	0.00%	0.00%	None	None
Trans-Dichloroethylene (1,2)	140000	NA	0	0	0.00%	0.00%	None	None
Trichlorobenzene (1,2,4)	830.6667	NA	0	0	0.00%	0.00%	None	None
Trichloroethane (1,1,1)	2373.333	NA	0	0	0.00%	0.00%	None	None
Trichloroethane (1,1,2)	41.3	NA	0	0	0.00%	0.00%	None	None
Trichloroethylene	81	NA	0	0	0.00%	0.00%	None	None
Trichlorofluoromethane	NA	NA	0	0	0.00%	0.00%	None	None
Trichlorophenol (2,4,5)	9800	NA	0	0	0.00%	0.00%	None	None
Trichlorophenol (2,4,6)	6.5	NA	0	0	0.00%	0.00%	None	None
Vinyl Chloride	137.6667	NA	0	0	0.00%	0.00%	None	None
Zinc, Total Recoverable	387.8303	387.8303	7.6	7.6	1.96%	1.96%	None	None

ATTACHMENT C – REASONABLE POTENTIAL ANALYSIS

The following table illustrates the results of the reasonable potential analysis performed on Outfall 002.

Chemical Specific Parameter	Limits		Reported Values		Percentage		Effluent Limitations	
	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum
Acenaphthene	13466.56	NA	0	0	0.00%	0.00%	None	None
Acenaphthylene	NA	NA	0	0	0.00%	0.00%	None	None
Acrolein	3890.339	NA	0	0	0.00%	0.00%	None	None
Acrylonitrile	4.429482	NA	0	0	0.00%	0.00%	None	None
Aldrin	3.65E-03	3	0	0	0.00%	0.00%	None	None
Aluminum, Total Recoverable	NA	NA	2200	2200	0.00%	0.00%	None	None
Anthracene	125511	NA	0	0	0.00%	0.00%	None	None
Antimony, Total Recoverable	78.4444	NA	0	0	0.00%	0.00%	None	None
Arsenic, Total Recoverable	249.3807	NA	0	0	0.00%	0.00%	None	None
Arsenic III	340	340	0	0	0.00%	0.00%	None	None
Barium, Total Recoverable	26148.15	NA	82	82	0.31%	0.00%	None	None
Benzene	91.6444	NA	0	0	0.00%	0.00%	None	None
Benzidine	9.16E-03	NA	0	0	0.00%	0.00%	None	None
Benzo (a) Anthracene	3.36E-01	NA	0	0	0.00%	0.00%	None	None
Benzo (a) Pyrene	3.36E-01	NA	0	0	0.00%	0.00%	None	None
Benzo (ghi) Perylene	NA	NA	0	0	0.00%	0.00%	None	None
Benzo (k) Fluoroanthene	3.36E-01	NA	0	0	0.00%	0.00%	None	None
Benzo-fluoroanthene (3,4)	1.275802	NA	0	0	0.00%	0.00%	None	None
Beryllium, Total Recoverable	5.23E-02	NA	0	0	0.00%	0.00%	None	None
Boron, Total Recoverable	NA	NA	0	0	0.00%	0.00%	None	None
Bromide	NA	NA	0	0	0.00%	0.00%	None	None
Bromoform	328.3926	NA	0	0	0.00%	0.00%	None	None
Bromophenyl Phenyl Ether (4)	NA	NA	0	0	0.00%	0.00%	None	None
Butyl Benzyl Phthalate	25935.6	NA	0	0	0.00%	0.00%	None	None
Cadmium, Total Recoverable	19.4931	21.5715	5	5	25.65%	23.18%	None	None
Carbon Tetrachloride	19.0926	NA	0	0	0.00%	0.00%	None	None
Chlordane	2.14E-02	2.4	0	0	0.00%	0.00%	None	None
Chloride	1200000	1200000	13000	13000	1.08%	1.08%	None	None
Chlorine, Total Residual	19	19	0	0	0.00%	0.00%	None	None
Chlorobenzene	8890.37	NA	0	0	0.00%	0.00%	None	None
Chlorodibromomethane	31.3119	NA	0	0	0.00%	0.00%	None	None
Chloroethane	NA	NA	0	0	0.00%	0.00%	None	None
Chloroethyl Ether (Bis-2)	2.367481	NA	0	0	0.00%	0.00%	None	None
Chloroethyl Methane (Bis-2)	NA	NA	0	0	0.00%	0.00%	None	None
Chloroethylvinyl Ether (2)	NA	NA	0	0	0.00%	0.00%	None	None
Chloroform	435.3111	NA	0	0	0.00%	0.00%	None	None

ATTACHMENT C - REASONABLE POTENTIAL ANALYSIS

Chemical Specific Parameter	Limits		Reported Values		Percentage		Effluent Limitations	
	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum
	Chloronaphthalene (2)	21446.74	NA	0	0	0.00%	0.00%	None
Chlorophenol (2)	1568.889	NA	0	0	0.00%	0.00%	None	None
Chlorophenyl Phenyl Ether (4)	NA	NA	0	0	0.00%	0.00%	None	None
Chloropyrifos	8.30E-02	0.083	0	0	0.00%	0.00%	None	None
Chromium, Total Recoverable	1307.407	NA	2.4	2.4	0.18%	0.00%	None	None
Chromium III	696.1816	5613.948	0	0	0.00%	0.00%	None	None
Chromium VI	16	16	0	0	0.00%	0.00%	None	None
Chrysene	3.36E-01	NA	0	0	0.00%	0.00%	None	None
Cobalt, Total Recoverable	NA	NA	0	0	0.00%	0.00%	None	None
Color (Platinum Cobalt Units)	980.5555	NA	0	0	0.00%	0.00%	None	None
Copper, Total Recoverable	51.6845	51.6845	35	35	67.72%	67.72%	None	None
Cyanide, Free	22	22	0	0	0.00%	0.00%	None	None
DDD (4,4')	2.19E-02	NA	0	0	0.00%	0.00%	None	None
DDE (4,4')	1.54E-02	NA	0	0	0.00%	0.00%	None	None
DDT (4,4')	4.99E-03	1.1	0	0	0.00%	0.00%	None	None
Dibenzo (a,h) Anthracene	3.36E-01	NA	0	0	0.00%	0.00%	None	None
Dibutyl Phthalate	35300	NA	0	0	0.00%	0.00%	None	None
Dichlorobenzene (1,2)	7844.444	NA	0	0	0.00%	0.00%	None	None
Dichlorobenzene (1,3)	5229.629	NA	0	0	0.00%	0.00%	None	None
Dichlorobenzene (1,4)	980.5555	NA	0	0	0.00%	0.00%	None	None
Dichlorobenzidine (3,3')	2.004833	NA	0	0	0.00%	0.00%	None	None
Dichlorobromomethane	42.7674	NA	0	0	0.00%	0.00%	None	None
Dichlorodifluoromethane	NA	NA	0	0	0.00%	0.00%	None	None
Dichloroethane (1,1)	NA	NA	0	0	0.00%	0.00%	None	None
Dichloroethane (1,2)	29.0207	NA	0	0	0.00%	0.00%	None	None
Dichloroethylene (1,1)	4.353111	NA	0	0	0.00%	0.00%	None	None
Dichlorophenol (2,4)	1215.889	NA	0	0	0.00%	0.00%	None	None
Dichloropropane (1,2)	39.7126	NA	0	0	0.00%	0.00%	None	None
Dichloropropenes	8478.944	NA	0	0	0.00%	0.00%	None	None
Dichloropropylene (1,3)	130.7407	NA	0	0	0.00%	0.00%	None	None
Dieldrin	3.65E-03	0.24	0	0	0.00%	0.00%	None	None
Diethyl Phthalate	300704	NA	0	0	0.00%	0.00%	None	None
Dimethyl Phthalate	4092185	NA	0	0	0.00%	0.00%	None	None
Dimethylphenol (2,4)	7060	NA	0	0	0.00%	0.00%	None	None
Dinitrophenol	915.1852	NA	0	0	0.00%	0.00%	None	None
Dinitrotoluene	NA	NA	0	0	0.00%	0.00%	None	None
Dinitrotoluene (2,4)	8.400741	NA	0	0	0.00%	0.00%	None	None
Dinitro-O-Cresol (2,4)	175.1926	NA	0	0	0.00%	0.00%	None	None

ATTACHMENT C - REASONABLE POTENTIAL ANALYSIS

Chemical Specific Parameter	Limits		Reported Values		Percentage		Effluent Limitations	
	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum
Diphenylhydrazine (1,2) (as Asobenzene)	3.054815	NA	0	0	0.00%	0.00%	None	None
Di-N-butyl Phthalate	35300	NA	0	0	0.00%	0.00%	None	None
Di-N-Octyl Phthalate	NA	NA	0	0	0.00%	0.00%	None	None
Endosulfan Sulfate	1197.028	NA	0	0	0.00%	0.00%	None	None
Endosulfan (Alpha)	2.20E-01	0.22	0	0	0.00%	0.00%	None	None
Endosulfan (Beta)	2.20E-01	0.22	0	0	0.00%	0.00%	None	None
Endrin	8.60E-02	0.086	0	0	0.00%	0.00%	None	None
Endrin Aldehyde	4.039968	NA	0	0	0.00%	0.00%	None	None
Ethylbenzene	9151.852	NA	0	0	0.00%	0.00%	None	None
Ethylhexyl Phthalate (Bis-2)	137.4667	NA	0	0	0.00%	0.00%	None	None
Fluorene	16996.3	NA	0	0	0.00%	0.00%	None	None
Fluoride	26148.15	NA	0	0	0.00%	0.00%	None	None
Fluoroanthene	1845.417	NA	0	0	0.00%	0.00%	None	None
Halomethanes	NA	NA	0	0	0.00%	0.00%	None	None
HCH (Alpha)	2.98E-01	NA	0	0	0.00%	0.00%	None	None
HCH (Beta)	1.069185	NA	0	0	0.00%	0.00%	None	None
HCH (Gamma), Lindane	9.50E-01	0.95	0	0	0.00%	0.00%	None	None
HCH (Technical)	NA	NA	0	0	0.00%	0.00%	None	None
Heptachlor	5.47E-03	0.52	0	0	0.00%	0.00%	None	None
Heptachlor Epoxide	2.86E-03	0.52	0	0	0.00%	0.00%	None	None
Hexachlorobenzene	2.00E-02	NA	0	0	0.00%	0.00%	None	None
Hexachlorobutadiene	33.603	NA	0	0	0.00%	0.00%	None	None
Hexachlorocyclopentadiene	653.7037	NA	0	0	0.00%	0.00%	None	None
Hexachloroethane	145.1037	NA	0	0	0.00%	0.00%	None	None
Indeno (1,2,3-cd) Pyrene	3.36E-01	NA	0	0	0.00%	0.00%	None	None
Iron, Total Recoverable	4000	4000	2400	2400	60.00%	60.00%	None	None
Isophorone	2749.333	NA	0	0	0.00%	0.00%	None	None
Lead, Total Recoverable	33.5675	476.8177	6	6	17.87%	1.26%	None	None
Magnesium, Total Recoverable	NA	NA	8100	8100	0.00%	0.00%	None	None
Manganese, Total Recoverable	498.7614	NA	92	92	18.45%	0.00%	None	None
Mercury, Total Recoverable	2.54E-01	1.7	1	1	393.13%	58.82%	LR	None
Methyl Bromide	627.5555	NA	0	0	0.00%	0.00%	None	None
Methyl Chloride	NA	NA	0	0	0.00%	0.00%	None	None
Methylene Chloride	358.9407	NA	0	0	0.00%	0.00%	None	None
Molybdenum, Total Recoverable	NA	NA	0	0	0.00%	0.00%	None	None
Naphthalene	NA	NA	0	0	0.00%	0.00%	None	None
Nickel, Total Recoverable	428.0504	1515.922	5.5	5.5	1.28%	0.36%	None	None
Nitrate - Nitrite (as N)	130741	NA	1500	1500	1.15%	0.00%	None	None

ATTACHMENT C - REASONABLE POTENTIAL ANALYSIS

Chemical Specific Parameter	Limits		Reported Values		Percentage		Effluent Limitations	
	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum
Nitrobenzene	222.2593	NA	0	0	0.00%	0.00%	None	None
Nitrophenol (2)	NA	NA	0	0	0.00%	0.00%	None	None
Nitrophenol (4)	NA	NA	0	0	0.00%	0.00%	None	None
Nitrosodibutylamine (N)	NA	NA	0	0	0.00%	0.00%	None	None
Nitrosodiethylamine (N)	NA	NA	0	0	0.00%	0.00%	None	None
Nitrosodimethylamine (N)	5.27E-02	NA	0	0	0.00%	0.00%	None	None
Nitrosodiphenylamine (N)	381.8518	NA	0	0	0.00%	0.00%	None	None
Nitrosodi-N-Propylamine (N)	3.82E-01	NA	0	0	0.00%	0.00%	None	None
Nitrosopyrrolidine (N)	NA	NA	0	0	0.00%	0.00%	None	None
Parathion	6.48E-02	0.065	0	0	0.00%	0.00%	None	None
PCB - 1016	2.06E-03	NA	0	0	0.00%	0.00%	None	None
PCB - 1221	2.06E-03	NA	0	0	0.00%	0.00%	None	None
PCB - 1232	2.06E-03	NA	0	0	0.00%	0.00%	None	None
PCB - 1242	2.06E-03	NA	0	0	0.00%	0.00%	None	None
PCB - 1248	2.06E-03	NA	0	0	0.00%	0.00%	None	None
PCB - 1254	2.06E-03	NA	0	0	0.00%	0.00%	None	None
PCB - 1260	2.06E-03	NA	0	0	0.00%	0.00%	None	None
Pentachlorobenzene	20.4492	NA	0	0	0.00%	0.00%	None	None
Pentachlorophenol	9.07	9.07	0	0	0.00%	0.00%	None	None
Phenanthrene	NA	NA	0	0	0.00%	0.00%	None	None
Phenol	274556	NA	0	0	0.00%	0.00%	None	None
Phenols, Total	24.9381	NA	0	0	0.00%	0.00%	None	None
Phosphorous (as P), Total	NA	NA	130	130	0.00%	0.00%	None	None
Phthalate Esters	14.9628	NA	0	0	0.00%	0.00%	None	None
Pyrene	12551.11	NA	0	0	0.00%	0.00%	None	None
P-Chloro-M-Cresol	NA	NA	0	0	0.00%	0.00%	None	None
Selenium, Total Recoverable	20	20	0	0	0.00%	0.00%	None	None
Silver, Total Recoverable	44.0497	44.0497	0	0	0.00%	0.00%	None	None
Sulfate (as SO4)	3268519	NA	44000	44000	1.35%	0.00%	None	None
Sulfide (Hydrogen Sulfide)	9.975229	NA	0	0	0.00%	0.00%	None	None
Sulfite (as SO2)	NA	NA	0	0	0.00%	0.00%	None	None
Tetrachlorobenzene (1,2,4,5)	14.4641	NA	0	0	0.00%	0.00%	None	None
Tetrachlorodibenzo-P, Dioxin (2,3,7,8)	3.65E-07	NA	0	0	0.00%	0.00%	None	None
Tetrachloroethane (1,1,2,2)	12.983	NA	0	0	0.00%	0.00%	None	None
Tetrachloroethylene	61.0963	NA	0	0	0.00%	0.00%	None	None
Thallium, Total Recoverable	22.2259	NA	0	0	0.00%	0.00%	None	None
Tin, Total Recoverable	NA	NA	0	0	0.00%	0.00%	None	None
Titanium, Total Recoverable	NA	NA	71	71	0.00%	0.00%	None	None

ATTACHMENT C – REASONABLE POTENTIAL ANALYSIS

Chemical Specific Parameter	Limits		Reported Values		Percentage		Effluent Limitations	
	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum
	Toluene	13074.07	NA	0	0	0.00%	0.00%	None
Total Dissolved Solids	9805556	NA	0	0	0.00%	0.00%	None	None
Toxaphene	9.98E-04	0.73	0	0	0.00%	0.00%	None	None
Trans-Dichloroethylene (1,2)	3645150	NA	0	0	0.00%	0.00%	None	None
Trichlorobenzene (1,2,4)	915.1852	NA	0	0	0.00%	0.00%	None	None
Trichloroethane (1,1,1)	2614.815	NA	0	0	0.00%	0.00%	None	None
Trichloroethane (1,1,2)	45.8222	NA	0	0	0.00%	0.00%	None	None
Trichloroethylene	206.2	NA	0	0	0.00%	0.00%	None	None
Trichlorofluoromethane	NA	NA	0	0	0.00%	0.00%	None	None
Trichlorophenol (2,4,5)	33992.59	NA	0	0	0.00%	0.00%	None	None
Trichlorophenol (2,4,6)	160.3778	NA	0	0	0.00%	0.00%	None	None
Vinyl Chloride	152.7407	NA	0	0	0.00%	0.00%	None	None
Zinc, Total Recoverable	387.8303	387.8303	6.9	6.9	1.78%	1.78%	None	None

KPDES



KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT

PERMIT NO.: KY0004201

AUTHORIZATION TO DISCHARGE UNDER THE KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

Pursuant to Authority in KRS 224,

Tennessee Valley Authority
1101 Market Street, LP 3K
Chattanooga, Tennessee 37402-2801

is authorized to discharge from a facility located at

Tennessee Valley Authority
Paradise Fossil Plant
13246 State Route 176
Drakesboro, Muhlenberg County, Kentucky

to receiving waters named

Outfall 001 is to Jacob's Creek.
Outfalls 002 and 005 are to the Green River.
Outfall 004 is an internal outfall to the bottom ash pond (Outfall 002).
Outfall 006 has been inactivated.
Outfall 007 is an internal outfall to the fly ash pond (Outfall 001).
Outfall 010, the plant intake, is to Green River.

in accordance with effluent limitations, monitoring requirements, and other conditions set forth in PARTS I, II, III, IV, and V hereof. The permit consists of this cover sheet and PART I 8 pages, PART II 1 page, PART III 1 page, PART IV 5 pages, and PART V 3 pages.

This permit shall become effective on November 1, 2004.

This permit and the authorization to discharge shall expire at midnight, October 31, 2009.

APR 27 2004

Date Signed

A handwritten signature in black ink, appearing to read 'Jeffrey W. Pratt', written over a horizontal line.

Jeffrey W. Pratt, Director
Division of Water

Lloyd R. Cress
Commissioner

DEPARTMENT FOR ENVIRONMENTAL PROTECTION
Division of Water, Frankfort Office Park, 14 Reilly Road, Frankfort, Kentucky 40601

A1. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial number: 001 - Combined wastewaters of the ash slurry sump (2.41 MGD), fly ash sluice water Unit 3 and air preheater hopper wastewater Units 1 and 2 (22.4 MGD), air preheater wastewater sumps Units 1 and 2 (0.033 MGD), storm water runoff (reclaimed strip mine area (9.17 MGD), fly ash pond surface (22.92 MGD), chemical treatment pond (0.62 MGD), east and west dredge ponds (0.67 MGD), FGD slurry settling pond (17.77 MGD), FGD drainage area (13.11 MGD), and dry ash storage areas (6.0 MGD) - all are calculated maximums), and bottom ash pond (138.41 MGD - calculated maximum).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	2/Month	Weir
Total Suspended Solids (mg/l)	30	74	2/Month	Grab
Oil & Grease (mg/l)	11	13	2/Month	Grab
Hardness (as mg/l CaCO ₃)	Report	Report	2/Month	Grab
Total Recoverable Metals (mg/l)	Report	Report	1/Quarter	Grab
Chronic Toxicity (TU _c)	N/A	1.00	1/Quarter	3 Composite

The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 2/Month by grab sample.

There shall be no discharge of floating solids or visible foam or sheen in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: nearest accessible point after final treatment, but prior to actual discharge to or mixing with the receiving waters or wastestreams from other outfalls.

The abbreviation N/A means Not Applicable.

The effluent characteristic "Total Recoverable Metals" means Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc. To report the results of the analyses for this parameter, the permittee shall total the results of the analyses for each individual parameter, and report that aggregate value on the DMR. The laboratory bench sheets showing the results for each parameter shall be attached to the DMR.

A2. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial number: 002 - Combined wastewaters of the ash pit sumps Units 1 and 2 (2.92 MGD), station sumps Units 1, 2, and 3 (10.55 MGD), bottom ash sluice water Units 1, 2, and 3 (61.46 MGD), unwatering sumps Units 1, and 2 (9.17 MGD), demineralizer sumps Units 1, and 2 (0.002 MGD), water treatment sump (0.85 MGD), Unit 3 extension area sump (0.35 MGD), sewage treatment plant (0.041 MGD), and storm water runoff (wooded area west of Red Water Ditch (RWD) 3 (2.58 MGD), RWD 4 (0.298 MGD), RWD 3 (0.789 MGD), RWD 5 (0.259 MGD), RWD 2 (0.194 MGD), RWD 1 (0.194 MGD), coal wash refuse disposal area (10.42 MGD), rail and truck unloading area (4.19 MGD), area north, west, and southwest of coal wash plant (6.21 MGD), coal storage yard (16.1 MGD), coal yard drainage basins 2, and 3 (0.776 MGD), coal wash plant area (1.07 MGD), limestone handling and cooling tower area (2.40 MGD), miscellaneous plant drainage (4.99 MGD), and bottom ash pond surface (2.63 MGD) - all are calculated maximums). A portion of the discharge from this outfall discharges to the fly ash pond of Outfall 001.

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	2/Month	Weir
Total Suspended Solids (mg/l)	30	81	2/Month	Grab
Oil & Grease (mg/l)	13	15	2/Month	Grab
Hardness (as mg/l CaCO ₃)	Report	Report	2/Month	Grab
Total Recoverable Metals (mg/l)	Report	Report	1/Quarter	Grab
Acute Toxicity (TU _a)	N/A	1.00	1/Quarter	2 Grabs

The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 2/Month by grab sample.

There shall be no discharge of floating solids or visible foam or sheen in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: nearest accessible point after final treatment, but prior to actual discharge to or mixing with the receiving waters or wastestreams from other outfalls.

The abbreviation N/A means Not Applicable.

The effluent characteristic "Total Recoverable Metals" means Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc. To report the results of the analyses for this parameter, the permittee shall total the results of the analyses for each individual parameter, and report that aggregate value on the DMR. The laboratory bench sheets showing the results for each parameter shall be attached to the DMR.

The limits for Total Suspended Solids shall be applied as net limitations when the Total Suspended Solids concentration in the raw water, as measured at Outfall 010 - Plant Intake, exceeds the proposed effluent limitations. The following formula shall be used to determine compliance: $TSS_{(Net)} = TSS_{(002 \text{ discharge})} - TSS_{(010 \text{ intake})}$.

A3. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial number: 004 - Sanitary wastewater (internal outfall of Outfall 002).

Such discharges shall be limited and monitored by the permittee as specified below:

	<u>DISCHARGE LIMITATIONS</u>		<u>MONITORING REQUIREMENTS</u>	
	<u>Monthly Avg.</u>	<u>Daily Max.</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
Flow (MGD)	Report	Report	1/Month	Instantaneous
CBOD ₅ (mg/l)	30	45	1/Month	Grab
Fecal Coliform Bacteria (#/100 ml)	200	400	1/Month	Grab

The abbreviation CBOD₅ means Carbonaceous Biochemical Oxygen Demand, 5-day.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: nearest accessible point after final treatment, but prior to actual discharge to or mixing with the receiving waters or wastestreams from other outfalls.

Pursuant to 401 KAR 5:010, Sections 2 and 8, the operation of this wastewater treatment plant requires a Class One certified operator, who must maintain appropriate records to assure compliance with the proper operation and maintenance requirements of 401 KAR 5:065, Section 1(5).

A4. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial number: 005 - Condenser cooling water (306.23 MGD).

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	Continuous	Recorder
Discharge Temperature (°F)	Report	Report	1/Day	Grab
Mixed River Temperature (°F)	Report	89	1/Day	Calculated ¹
Instream Temperature Change (°F)	Report	10	1/Day	Calculated ²
Free Available Chlorine (mg/l)	0.2	0.5	Occurrence	Multiple Grab
Total Residual Chlorine (mg/l)	0.012	0.019	Occurrence	Multiple Grab
Total Residual Oxidants (mg/l)	Report	0.2	Occurrence	Multiple Grab
Time of Oxidant Addition (Minutes/unit/day)	N/A	120	Occurrence	Log

The pH of the effluent shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/Month by grab sample.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: nearest accessible point after final treatment, but prior to actual discharge to or mixing with the other wastestreams from other outfalls.

The term Total Residual Oxidants (TRO) means the value obtained using the amperometric titration or DPD methods for total residual chlorine described in 40 CFR Part 136. In the event of addition of an oxidant other than chlorine, the permittee shall receive prior approval from the Division of Water permitting staff before the initial use.

The measurement frequency "Occurrence" means during periods of chlorination or oxidant addition, but no more frequent than once per week.

The sample type "Multiple Grab" means grab samples collected at the approximate beginning of oxidant discharge and once every fifteen (15) minutes thereafter until the end of oxidant discharge.

The abbreviation N/A means Not Applicable.

¹See page I-5 for the method to be used for calculating the Mixed River Temperature.

²See page I-5 for the method to be used for calculating the Instream Temperature Change.

A4. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - CONTINUED

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial number: 005 - Condenser cooling water (306.23 MGD).

Such discharges shall be limited and monitored by the permittee as specified below:

<u>EFFLUENT CHARACTERISTICS</u>	<u>DISCHARGE LIMITATIONS</u>		<u>MONITORING REQUIREMENTS</u>	
	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type

Mixed River Temperature shall be calculated daily using the following formula:

$$T_m = \frac{(T_i)(Q_i - Q_{misc}) + (T_d)(Q_d - Q_{misc})}{Q_u - Q_{misc}}$$

- Where T_m = Mixed River Temperature downstream of Outfall 005
- T_i = Intake Temperature (Outfall 010)
- T_d = Discharge Temperature (Outfall 005)
- Q_u = Upstream Flow of Green River
- Q_i = Intake Flow (Outfall 010)
- Q_{misc} = Cooling water used for ash sluice and tower evaporation flows taken from the intake flow not discharged as cooling water.

Instream Temperature Change shall be calculated daily using the following formula:

$$\Delta T = T_m - T_i$$

- Where ΔT = Instream Temperature Change
- T_m = Mixed River Temperature downstream of Outfall 005
- T_i = Intake Temperature (Outfall 010)

A5. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial number: 007 - Combined wastewaters of Unit 3 ash slurry sump including Unit 3 powdex & air preheater washes (1.162 MGD), Units 1 and 2 air preheater sumps (0.008 MGD), chemical boiler cleaning Units 1, 2, and 3 (0.033 MGD), and storm water runoff including pond 006 (0.621 MGD - calculated maximum). This outfall discharges to the fly ash pond of Outfall 001.

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	1/Batch	Calculated
Total Copper (mg/l)	1.0	1.0	1/Batch	Grab
Total Iron (mg/l)	1.0	1.0	1/Batch	Grab

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: nearest accessible point after final treatment, but prior to actual discharge to or mixing with the wastestreams from other outfalls in the fly ash pond (Outfall 001).

The term metal cleaning waste means any wastewater resulting from cleaning [with or without chemical cleaning compounds] any metal process equipment including, but not limited to, boiler tube cleaning, boiler fireside cleaning, and air preheater cleaning. In accordance with the conditions of the previous permits, the permittee is allowed to discharge air preheater wash directly to the ash pond without limitations or monitoring requirements pursuant to the Jordan Memorandum. Monitoring is required only when chemical metal cleaning activities are being performed.

A6. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning on the effective date of this permit and lasting through the term of this permit, the permittee is authorized to discharge from Outfall serial number: Outfall 010 - Plant Intake.

Such discharges shall be limited and monitored by the permittee as specified below:

EFFLUENT CHARACTERISTICS

	<u>DISCHARGE LIMITATIONS</u>		<u>MONITORING REQUIREMENTS</u>	
	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	2/Month	Calculated
Temperature (°F)	Report	Report	2/Month	Grab
Total Suspended Solids (mg/l)	Report	Report	2/Month	Grab
Hardness (as mg/l CaCO ₃)	Report	Report	2/Month	Grab
pH (standard units)	Report	Report	2/Month	Grab
Total Recoverable Metals (mg/l)	Report	Report	1/Quarter	Grab

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location: the plant intake except that temperature may be monitored at the condenser inlet.

The effluent characteristic "Total Recoverable Metals" means Antimony, Arsenic, Beryllium, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc. To report the results of the analyses for this parameter, the permittee shall total the results of the analyses for each individual parameter, and report that aggregate value on the DMR. The laboratory bench sheets showing the results for each parameter shall be attached to the DMR.

B. Schedule of Compliance

The permittee shall achieve compliance with all requirements on the effective date of this permit.

C. Cooling Water Additives, FIFRA, and Mollusk Control

The discharge of any product registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) in cooling water which ultimately may be released to the waters of the Commonwealth is prohibited, except Herbicides, unless specifically identified and authorized by the KPDES permit. In the event the permittee needs to use a biocide or chemical not previously reported for mollusk control or other purpose the permittee shall submit sufficient information, a minimum of thirty (30) days prior to the commencement of use of said biocides or chemicals, to the Division of Water for review and establishment of appropriate control parameters. Such information requirements shall include:

1. Name and general composition of biocide or chemical,
2. Any and all aquatic organism toxicity data,
3. Quantities to be used,
4. Frequencies of use,
5. Proposed discharge concentrations, and
6. EPA registration number, if applicable.

D. Polychlorinated Biphenyls

Pursuant to the requirements of 401 KAR 5:065, Section 4(4) (40 CFR Parts 423.12(b)(2) and 423.13(a)), there shall be no discharge from any point source of polychlorinated biphenyl compounds such as those commonly used in transformer fluids. The permittee shall implement this requirement as a specific section of the BMP plan developed for this station.

E. Selective Catalytic Reduction Devices or Systems (SCRs) and Nonselective Catalytic Reduction Devices or Systems (NSCRs)

In response to recent Clean Air Act amendments, the installation of these devices for NO_x reduction may become necessary. Associated with the installation and operation of these units, an "ammonia slip" may occur resulting in the discharge of ammonia to the ash pond. The impact of such an occurrence on the performance of the ash pond and any eventual impact on the environment are not known. Therefore, should it become necessary to install these devices, the permittee shall develop and implement an Ammonia Monitoring Plan. The plan shall be submitted to the Division of Water within ninety (90) days of the determination that these devices will be installed, and shall include at a minimum influent and effluent monitoring of each unit on a monthly basis with submission of the data as a quarterly report.

F. Section 311, Clean Water Act Exclusion

The permittee is relieved of the reporting and liability requirements under Section 311 of the Clean Water Act for the following substances, consistent with Exclusion 2, authorized by Section 311(a)(a)(B) and 40 CFR Part 117.12 for: Ammonium Hydroxide, Sodium Hypochlorite, Ethylene Diaminetetracetic Acid (EDTA), Sodium Hydroxide, Sodium Nitrite, Sodium Phosphate (Dibasic), and Sulfuric Acid.

PART II
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STANDARD CONDITIONS FOR KPDES PERMIT

The permittee is also advised that all KPDES permit conditions in KPDES Regulation 401 KAR 5:065, Section 1 will apply to all discharges authorized by this permit.

This permit has been issued under the provisions of KRS Chapter 224 and regulations promulgated pursuant thereto. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any other permits or licenses required by this Cabinet and other state, federal, and local agencies.

It is the responsibility of the permittee to demonstrate compliance with permit parameter limitations by utilization of sufficiently sensitive analytical methods.

PART III

OTHER REQUIREMENTS

A. Reporting of Monitoring Results

Monitoring results obtained during each month must be reported on a preprinted Discharge Monitoring Report (DMR) Form, which will be mailed to you. Each month's completed DMR must be sent to the Division of Water at the address listed below (with a copy to the appropriate Regional Office) postmarked no later than the 28th day of the month following the month for which monitoring results were obtained.

Division of Water
Madisonville Regional Office
Madisonville State Office Bldg.
625 Hospital Drive
Madisonville, Kentucky 42431-1683
ATTN: Supervisor

Kentucky Natural Resources and
Environmental Protection Cabinet
Dept. for Environmental Protection
Division of Water/KPDES Branch
14 Reilly Road, Frankfort Office Park
Frankfort, Kentucky 40601

B. Reopener Clause

This permit shall be modified, or alternatively revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved under 401 KAR 5:050 through 5:080, if the effluent standard or limitation so issued or approved:

1. Contains different conditions or is otherwise more stringent than any effluent limitation in the permit; or
2. Controls any pollutant not limited in the permit.

The permit as modified or reissued under this paragraph shall also contain any other requirements of KRS Chapter 224 when applicable.

PART IV
CHRONIC CONCERNS
Biomonitoring

In accordance with PART I of this permit, the permittee shall initiate the series of tests described below within 30 days of the effective date of this permit to evaluate wastewater toxicity of the discharge from Outfall 001. If the permittee is using a more sensitive species, the initial four (4) tests shall be conducted using both test species as indicated below to provide confirmation of previously identified most sensitive test organism.

1. Test Requirements

- A. The permittee shall perform one (1) short-term fathead minnow (*Pimephales promelas*) growth test and one (1) short-term daphnid (*Ceriodaphnia* sp.) life-cycle test. Tests shall be conducted with appropriate replicates of 100% effluent, a control, and a minimum of four (4) evenly spaced effluent concentrations. If the permit limit is less than 100% effluent and greater than or equal to 75% effluent, then one (1) concentration should be 100%. If the permit limit is less than 75% effluent, the permit limit concentration shall be bracketed with two (2) concentrations above and two (2) concentrations below. The selection of the effluent concentrations is subject to revision by the Division. Controls shall be tested concurrently with effluent testing using a synthetic water. The analysis will be deemed reasonable and good only if the minimum control requirements are met (i.e. >80% survival; 60% adults with 3 broods and 15 young/female for the *Ceriodaphnia* test; an average 0.25 mg weight for the minnow growth test). Any test that does not meet the control acceptability criteria shall be repeated as soon as practicable within the monitoring period (i.e. monthly or quarterly). Noncompliance with the toxicity limit will be demonstrated if the IC₂₅ (inhibition concentration) for reproduction or growth is less than 100% effluent. The average reproduction for *Ceriodaphnia* shall be calculated by dividing the total number of live *Ceriodaphnia* young in each concentration by the total number of organisms used to initiate that concentration; the average growth for the fathead minnows shall be calculated by dividing the total weight of surviving minnow larvae in each replicate by the total number of organisms used to initiate that replicate.
- B. Tests shall be conducted quarterly or at a frequency to be determined by the permitting authority.

A minimum of three (3) Composite samples will be collected at a frequency of one (1) sample every other day, or at a frequency to be determined by the permitting authority. For example, the first sample would be used for test initiation, day 1, and for test solution renewal on day 2. The second sample would be used for test solution renewal on days 3 and 4. The third sample would be used for test solution renewal on days 5, 6, and 7. The lapsed time from collection of the last aliquot of the composite and its first use for test initiation, or for test solution renewal shall not exceed 36 hours. Grab samples shall be iced during collection and maintained at 4° C until used.

After the first four (4) tests with both species, upon written request to the Division of Water's Bioassay Section, subsequent testing may be performed using only the most sensitive species.

2. Reporting Requirements

Results of all tests conducted with any organism shall be reported according to the most recent format provided by the Division of Water. Test results shall be submitted to the Division of Water with the next regularly scheduled discharge monitoring report.

Due to administrative and regulatory constraints regarding the requirements of Section 3 of this Part, monthly DMRs shall be submitted. Those required to conduct tests on a frequency other than monthly shall submit DMRs with "Not required this monitoring period" typed or written in the parameter row in addition to the DMR reporting the results of the test. All DMRs for Biomonitoring shall be submitted monthly regardless of required monitoring frequency.

3. Chronic Toxicity

- A. If noncompliance with the toxicity limit occurs (IC_{25} for reproduction or growth is less than 100% effluent), the permittee must conduct a second test within 15 days of the first failure. This test will be used in evaluating the persistence of the toxic event and the possible need for a Toxicity Reduction Evaluation (TRE).

If the second test demonstrates noncompliance with the toxicity limit, the permittee will be required to perform either of the options listed below. The Division must be notified of the option selected within five (5) days of the failure of this second test.

1) Accelerated Testing

Complete four (4) tests within 90 days of selection of this option to evaluate the frequency and degree of toxicity. The results of the two (2) tests specified in Section 3.A and of the four (4) additional tests will be used for purposes of this evaluation.

If results from two (2) of any six (6) tests show a significant non-compliance with the chronic limit (≥ 1.2 times the TU_c), or results from four (4) of any six (6) tests show chronic toxicity (as defined in 1.A), a Toxicity Reduction Evaluation (TRE) will be required. The Division reserves the right to require a TRE in situations of recurring toxicity.

2) Toxicity Reduction Evaluation (TRE)

If it is determined that a TRE is required, a plan and implementation schedule must be submitted to the Division within 30 days of notification. The TRE shall include appropriate measures such as in-plant controls, additional wastewater treatment, or changes in the operation of the wastewater discharge to meet permit conditions. The TRE protocol shall follow that outlined in the most recent edition of EPA's guidance for conducting TRES.

- B. If a violation of the toxicity limit occurs, different or more stringent monitoring requirements may be imposed in lieu of the normal requirements of this permit for whatever period of time is specified by the Division of Water. The Division reserves the right to require additional testing or a TRE in situations of recurring toxicity.

4. Test Methods

All test organisms, procedures and quality assurance criteria used shall be in accordance with Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms (Third Edition), EPA-600-4-91-002, or the most recent edition of this publication.

PART IV
ACUTE CONCERNS
Biomonitoring

In accordance with Part I of this permit, the permittee shall initiate the series of tests described below within 30 days of the effective date of this permit to evaluate wastewater toxicity of the discharge from Outfall 002. If the permittee is using a more sensitive species, the initial four (4) tests shall be conducted using both test species as indicated below to provide confirmation of previously identified most sensitive test organism.

1. Test Requirements

- A. The permittee shall perform a 48-hour static toxicity test with Ceriodaphnia sp. and a 48-hour static toxicity test with fathead minnow (Pimephales promelas). Tests shall be conducted on each of two (2) grab samples taken over a 24-hour period (e.g. discrete sample 1 taken at 9:00 a.m., sample 2 taken at 9:00 p.m.). Tests shall be conducted with appropriate replicates of 100% effluent, a control and a minimum of four (4) evenly spaced effluent concentrations. If the permit limit is less than 100% effluent and greater than or equal to 75% effluent, then one (1) concentration should be 100%. If the permit limit is less than 75% effluent, the permit limit concentration shall be bracketed with two (2) concentrations above and two (2) concentrations below. The selection of the effluent concentrations is subject to revision by the Division. Testing of the effluent shall be initiated within 36 hours of each sample collection. Controls shall be conducted concurrently with effluent testing using a synthetic water. The analysis will be deemed reasonable and good only if control survival is 90% or greater in test organisms held in synthetic water. Any test that does not meet the control acceptability criteria shall be repeated as soon as practicable within the monitoring period (i.e. monthly or quarterly). Noncompliance with the toxicity limit will be demonstrated if the LC₅₀ is less than 100% effluent.
- B. Tests shall be conducted quarterly or at a frequency to be determined by the permitting authority.

After the first four (4) tests with both species, the permittee may request a determination be made by the Division whether one or both organisms will be used for subsequent routine monitoring tests.

2. Reporting Requirements

Results of all tests conducted with any organism shall be reported according to the most recent format provided by the Division of Water. Test results shall be submitted to the Division of Water with the next regularly scheduled discharge monitoring report.

Due to administrative and regulatory constraints regarding the requirements of Section 3 of this Part, monthly DMRs shall be submitted. Those required to conduct tests on a frequency other than monthly shall submit DMRs with "Not required this monitoring period" typed or written in the parameter row in addition to the DMR reporting the results of the test. All DMRs for biomonitoring shall be submitted monthly regardless of required monitoring frequency.

3. Acute Toxicity

- A. If noncompliance with the toxicity limit occurs (the LC_{50} is less than 100% effluent), the permittee must conduct a second test within 10 days of the first failure. This test will be used in evaluating the persistence of the toxic event and the possible need for a toxics reduction evaluation (TRE).

If the second test demonstrates noncompliance with the toxicity limit, the permittee will be required to perform either of the options listed below. The Division must be notified of the option selected within five (5) days of the failure of this second test.

1) Accelerated Testing

Complete four (4) tests within 60 days of selection of this option to evaluate the frequency and degree of toxicity. The results of the two (2) tests specified in Section 3.A and of the four (4) additional tests will be used for purposes of this evaluation.

If results from two (2) of any six (6) tests show a significant noncompliance with the acute limit (>1.2 times the TU_a), or results from four (4) of any six (6) tests show acute toxicity (as defined in 1.A), a Toxicity Reduction Evaluation (TRE) will be required. The Division reserves the right to require a TRE in situations of recurring toxicity.

2) Toxicity Reduction Evaluation (TRE)

If it is determined that a TRE is required, a plan and implementation schedule must be submitted to the Division within 30 days of notification. The TRE shall include appropriate measures such as in-plant controls, additional treatment, or changes in the operation of the wastewater discharge to meet permit conditions. The TRE protocol shall follow that outlined in the most recent edition of EPA's guidance manual for conducting TREs.

- B. If a violation of the toxicity limit occurs, different or more stringent monitoring requirements may be imposed in lieu of the normal requirements of this permit for whatever period of time is specified by the Division of Water. The Division reserves the right to require additional testing or a TRE in situations of recurring toxicity.

4. Test Methods

All test organisms, procedures, and quality assurance criteria used shall be in accordance with Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, EPA/600/4-90/027F (4th edition) or the most recently published edition of this publication.

PART V

BEST MANAGEMENT PRACTICES

SECTION A. GENERAL CONDITIONS

1. Applicability

These conditions apply to all permittees who use, manufacture, store, handle, or discharge any pollutant listed as: (1) toxic under Section 307(a)(1) of the Clean Water Act; (2) oil, as defined in Section 311(a)(1) of the Act; (3) any pollutant listed as hazardous under Section 311 of the Act; or (4) is defined as a pollutant pursuant to KRS 224.01-010(35) and who have ancillary manufacturing operations which could result in (1) the release of a hazardous substance, pollutant, or contaminant, or (2) an environmental emergency, as defined in KRS 224.01-400, as amended, or any regulation promulgated pursuant thereto (hereinafter, the "BMP pollutants"). These operations include material storage areas; plant site runoff; in-plant transfer, process and material handling areas; loading and unloading operations, and sludge and waste disposal areas.

2. BMP Plan

The permittee shall develop and implement a Best Management Practices (BMP) plan consistent with 401 KAR 5:065, Section 2(10) pursuant to KRS 224.70-110, which prevents or minimizes the potential for the release of "BMP pollutants" from ancillary activities through plant site runoff; spillage or leaks, sludge or waste disposal; or drainage from raw material storage. A Best Management Practices (BMP) plan will be prepared by the permittee unless the permittee can demonstrate through the submission of a BMP outline that the elements and intent of the BMP have been fulfilled through the use of existing plans such as the Spill Prevention Control and Countermeasure (SPCC) plans, contingency plans, and other applicable documents.

3. Implementation

If this is the first time for the BMP requirement, then the plan shall be developed and submitted to the Division of Water within 90 days of the effective date of the permit. Implementation shall be within 180 days of that submission. For permit renewals the plan in effect at the time of permit reissuance shall remain in effect. Modifications to the plan as a result of ineffectiveness or plan changes to the facility shall be submitted to the Division of Water and implemented as soon as possible.

4. General Requirements

The BMP plan shall:

- a. Be documented in narrative form, and shall include any necessary plot plans, drawings, or maps.
- b. Establish specific objectives for the control of toxic and hazardous pollutants.
 - (1) Each facility component or system shall be examined for its potential for causing a release of "BMP pollutants" due to equipment failure, improper operation, natural phenomena such as rain or snowfall, etc.

- (2) Where experience indicates a reasonable potential for equipment failure (e.g., a tank overflow or leakage), natural condition (e.g., precipitation), or other circumstances which could result in a release of "BMP pollutants," the plan should include a prediction of the direction, rate of flow, and total quantity of the pollutants which could be released from the facility as result of each condition or circumstance.
- c. Establish specific Best Management Practices to meet the objectives identified under paragraph b of this section, addressing each component or system capable of causing a release of "BMP pollutants."
- d. Include any special conditions established in part b of this section.
- e. Be reviewed by plant engineering staff and the plant manager.

5. Specific Requirements

The plan shall be consistent with the general guidance contained in the publication entitled "NPDES Best Management Practices Guidance Document," and shall include the following baseline BMPs as a minimum.

- a. BMP Committee
- b. Reporting of BMP Incidents
- c. Risk Identification and Assessment
- d. Employee Training
- e. Inspections and Records
- f. Preventive Maintenance
- g. Good Housekeeping
- h. Materials Compatibility
- i. Security
- j. Materials Inventory

6. SPCC Plans

The BMP plan may reflect requirements for Spill Prevention Control and Countermeasure (SPCC) plans under Section 311 of the Act and 40 CFR Part 151, and may incorporate any part of such plans into the BMP plan by reference.

7. Hazardous Waste Management

The permittee shall assure the proper management of solid and hazardous waste in accordance with the regulations promulgated under the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1978 (RCRA) (40 U.S.C. 6901 et seq.) Management practices required under RCRA regulations shall be referenced in the BMP plan.

8. Documentation

The permittee shall maintain a description of the BMP plan at the facility and shall make the plan available upon request to NREPC personnel. Initial copies and modifications thereof shall be sent to the following addresses when required by Section 3:

Division of Water
Madisonville Regional Office
Madisonville State Office Bldg.
625 Hospital Drive
Madisonville, Kentucky 42431-1683
ATTN: Supervisor

Kentucky Natural Resources and
Environmental Protection Cabinet
Dept. for Environmental Protection
Division of Water/KPDES Branch
14 Reilly Road, Frankfort Office Park
Frankfort, Kentucky 40601

9. BMP Plan Modification

The permittee shall amend the BMP plan whenever there is a change in the facility or change in the operation of the facility which materially increases the potential for the ancillary activities to result in the release of "BMP pollutants."

10. Modification for Ineffectiveness

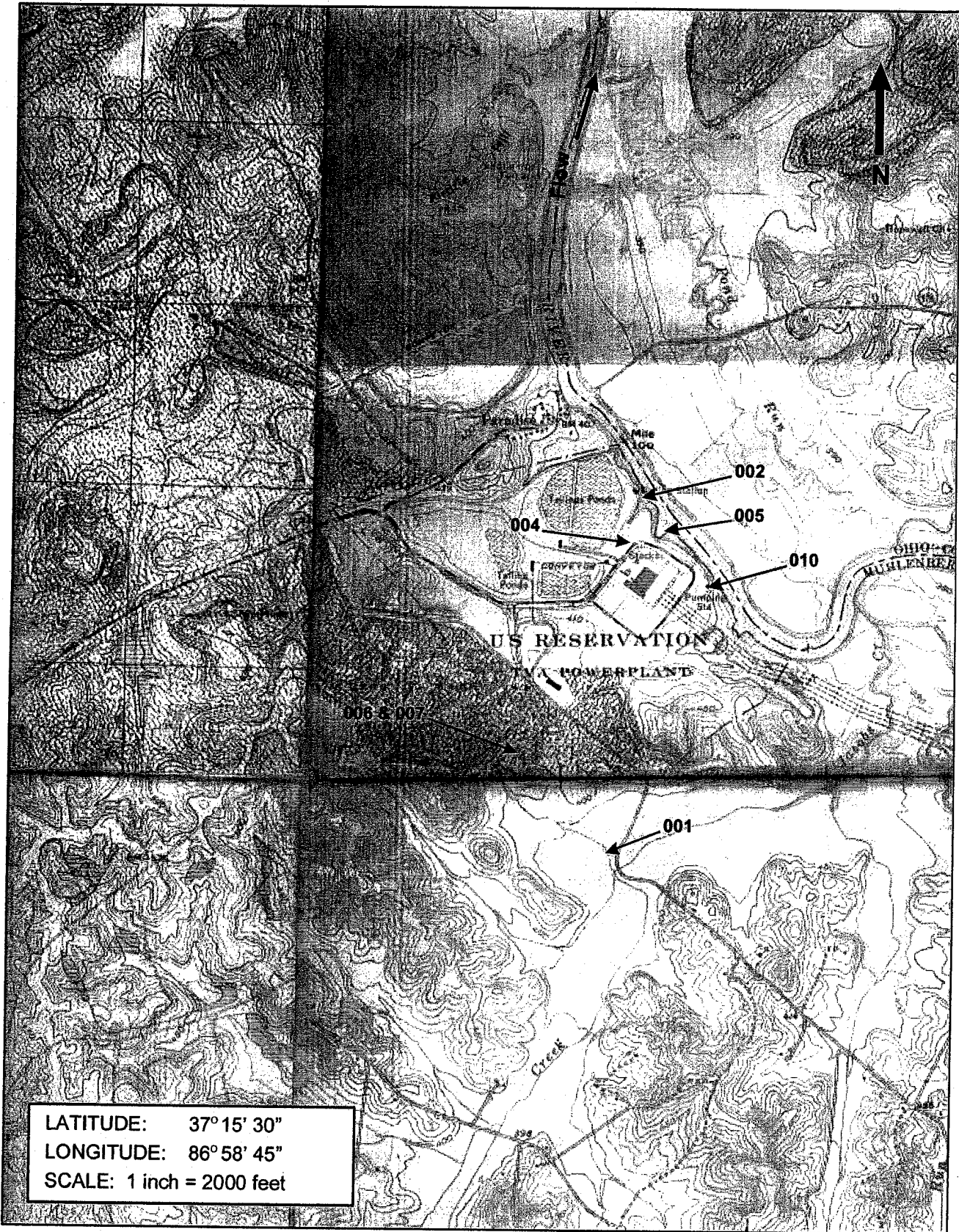
If the BMP plan proves to be ineffective in achieving the general objective of preventing the release of "BMP pollutants," then the specific objectives and requirements under paragraphs b and c of Section 4, the permit, and/or the BMP plan shall be subject to modification to incorporate revised BMP requirements. If at any time following the issuance of this permit the BMP plan is found to be inadequate pursuant to a state or federal site inspection or plan review, the plan shall be modified to incorporate such changes necessary to resolve the concerns.

SECTION B. SPECIFIC CONDITIONS

Periodically Discharged Wastewaters Not Specifically Covered By Effluent Conditions

The permittee shall include in this BMP plan procedures and controls necessary for the handling of periodically discharged wastewaters such as intake screen backwash, meter calibration, fire protection, hydrostatic testing water, water associated with demolition projects, etc.

PARADISE FOSSIL PLANT
Muhlenberg County, Kentucky



LATITUDE: 37° 15' 30"
LONGITUDE: 86° 58' 45"
SCALE: 1 inch = 2000 feet



ERNIE FLETCHER
GOVERNOR

ENVIRONMENTAL AND PUBLIC PROTECTION CABINET

DEPARTMENT FOR ENVIRONMENTAL PROTECTION

DIVISION OF WATER

14 REILLY ROAD

FRANKFORT, KENTUCKY 40601-1190

www.kentucky.gov

LAJUANA S. WILCHER
SECRETARY

APR 27 2004

Ms. Janet K. Watts
Environmental Affairs
Tennessee Valley Authority
5D Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

Re: TVA - Paradise Fossil Plant
KPDES No.: KY0004201
Muhlenberg County, Kentucky

Dear Ms. Watts:

Your comments concerning the above-referenced draft permit have been reviewed and responses prepared in accordance with Kentucky Pollutant Discharge Elimination System (KPDES) regulation 401 KAR 5:075, Section 12. The comments have been briefly described below and our responses to those comments follow:

- COMMENT 1:** In regards to Outfalls 001, 002, and 007 the Tennessee Valley Authority (TVA) requests the flow values be deleted from the descriptions to prevent confusion regarding the normal operation of the facility. Additionally, the description of Outfall 005 should be expanded to include the various sources of cooling waters contributing to this outfall. In regards to Outfall 007, TVA has requested that the pond from Outfall 006 be added to its description due to possible discharges resulting from rainfall.
- RESPONSE 1:** The descriptions of Outfalls 001, 002, and 007 are consistent throughout the various sections of the fact sheet and permit, and are representative of the values used in the derivation of the permit limits. As the derivation of the effluent limits for Outfall 005 were not depended on the sources of cooling waters, a more generic description was used. The fact sheet has been amended to address the combining of Outfall 006 with Outfall 007.
- COMMENT 2:** In regards to the chronic and acute toxicity requirements, TVA requested a number of changes. Concerning the sample type for the chronic toxicity, TVA requested a change from "3 grabs" to "3 composites". Additionally, TVA stated that the requirement to conduct chronic toxicity tests using *Ceriodaphnia dubia* was overprotective and requested that only *Pimephales promelas* be used. In support of this request, TVA cited prior studies regarding Jacobs Creek. TVA recommended a number of language changes to the acute and chronic toxicity requirements for clarification.



RESPONSE TO COMMENTS

Ms. Janet K. Watts

TVA - Paradise Fossil Plant/KY0004201

Page Two

RESPONSE 2: In regards to the sample type, the Division of Water (DOW) agrees and has made the change. Concerning the use of *Ceriodaphnia dubia*, upon renewal of any permit containing Whole Effluent Toxicity (WET) testing requirements the DOW requires the permittee to confirm the previous species selection by performing the first four (4) sets of tests on both species. After completing the first four quarterly tests, TVA may submit to the DOW a request to use only the *Pimephales promelas*. In regards to the language changes for clarification, the DOW does not agree these changes are necessary.

COMMENT 3: TVA has requested a number of foot notes be added to the permit. First, in regards to Total Recoverable Metals, TVA has requested a foot note that allows for the reduction of monitoring frequency and/or parameters after the first year. TVA has also requested a foot note be added to Outfall 002 regarding the reporting of net limitations. Regarding Outfall 005, TVA requested that two foot notes be added, one to address reporting during calendar months when oxidants are not added to the cooling waters, and the second to indicate that the Free Available Chlorine limitations were to apply at the outlet from each cooling water unit prior to commingling, and that the Total Residual Chlorine concentration would be calculated based on the outlet concentration of the individual unit being chlorinated and adjusted for flows from non-chlorinated units. In regard to the requirements to develop an ammonia monitoring plan, TVA requested language be added to this to indicate that TVA had installed NO_x reduction devices and that the plan should continue in affect.

RESPONSE 3: The DOW does not agree that these foot notes are necessary for clarification of the permit. In regards to monitoring frequency and parameter reduction, the proposed foot note is inconsistent with DOW protocols. Regarding the reporting of net limitations, a zero should be reported when the resultant calculation is a negative amount. Finally, in regards to the two foot notes for the cooling water, entering "NA" when oxidant addition does not occur is appropriate. In the case of chlorine and related parameters, the application of effluent requirements occurs at each unit as required by the effluent guidelines, except in the case of Total Residual Chlorine, the limitation for which is a water quality standard that is to be met at the point of discharge into the receiving waters. Previous permits have not required TVA to report these individually, however if TVA so desires, the DOW can add sufficient outfalls to the permit to address each. In regards to the ammonia monitoring, TVA has complied with the requirements and to add the foot note is redundant.

COMMENT 4: Typographical errors on pages I-5, I-6, IV-1, IV-2, and IV-5 of the permit and pages 14 and 21 of the fact sheet were noted by TVA.

RESPONSE 4: The DOW has corrected these errors.

RESPONSE TO COMMENTS

Ms. Janet K. Watts

TVA - Paradise Fossil Plant/KY0004201

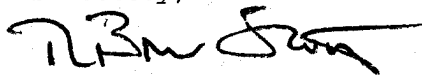
Page Three

Any person aggrieved by the issuance of a permit final decision may demand a hearing pursuant to KRS 224.10-420(2) within thirty (30) days from the date of the issuance of this letter. Any demand for a hearing on the permit shall be filed in accordance with the procedures specified in KRS 224.10-420, 224.10-440, 224.10-470, and the regulations promulgated thereto. The request for hearing should be submitted in writing to the Environmental and Public Protection Cabinet, Office of Administrative Hearings, 35-36 Fountain Place, Frankfort, Kentucky 40601 and the Commonwealth of Kentucky, Environmental and Public Protection Cabinet, Division of Water, 14 Reilly Road, Frankfort, Kentucky 40601. For your record keeping purposes, it is recommended that these requests be sent by certified mail. The written request must conform to the appropriate statutes referenced above.

If you have any questions regarding these responses, please contact Larry Sowder, KPDES Branch, at (502) 564-2225, extension 472 or by e-mail at larry.sowder@ky.gov.

Further information on procedures and legal matters pertaining to the hearing request may be obtained by contacting the Office of Administrative Hearings at (502) 564-7312.

Sincerely,



Jeffrey W. Pratt, Director
Division of Water

JWP:LJS:cw

c. Division of Water Files

APPENDIX C

**Report of
Endangered, Threatened, and Special Concern
Plants, Animals, and Natural Communities
for Muhlenberg County, Kentucky**

**Kentucky State Nature Preserves
Commission
801 Schenkel Lane
Frankfort, KY 40601
(502) 573-2886 (phone)
(502) 573-2355 (fax)**

www.naturepreserves.ky.gov

Kentucky State Nature Preserves Commission

Key for County List Report

Within a county, elements are arranged first by taxonomic complexity (plants first, natural communities last), and second by scientific name. A key to status, ranks, and count data fields follows.

STATUS

KSNPC: Kentucky State Nature Preserves Commission status:

N or blank = none E = endangered T = threatened S = special concern H = historic X = extirpated

USESA: U.S. Fish and Wildlife Service status:

blank = none C = candidate LT = listed as threatened LE = listed as endangered

PT = proposed threatened PE = proposed endangered

SOMC = Species of Management Concern

RANKS

GRANK: Estimate of element abundance on a global scale:

G1 = Critically imperiled

GU = Unrankable

G2 = Imperiled

G#? = Inexact rank (e.g. G2?)

G3 = Vulnerable

G#Q = Questionable taxonomy

G4 = Apparently secure

G#T# = Intraspecific taxa (Subspecies and variety abundances are coded with a 'T' suffix; the 'G' portion of the rank then refers to the entire species)

G5 = Secure

GH = Historic, possibly extinct

GNR = Unranked

GX = Presumed extinct

GNA = Not applicable

SRANK: Estimate of element abundance in Kentucky:

S1 = Critically imperiled

SU = Unrankable

Migratory species may have separate ranks for different population segments (e.g. S1B, S2N, S4M):

S2 = Imperiled

S#? = Inexact rank (e.g. G2?)

S#B = Rank of breeding population

S3 = Vulnerable

S#Q = Questionable taxonomy

S#N = Rank of non-breeding population

S4 = Apparently secure

S#T# = Intraspecific taxa

S#M = Rank of transient population

S5 = Secure

SNR = Unranked

SH = Historic, possibly extirpated

SNA = Not applicable

SX = Presumed extirpated

COUNT DATA FIELDS

OF OCCURRENCES: Number of occurrences of a particular element from a county. Column headings are as follows:

E - currently reported from the county

H - reported from the county but not seen for at least 20 years

F - reported from county & cannot be relocated but for which further inventory is needed

X - known to have extirpated from the county

U - reported from a county but cannot be mapped to a quadrangle or exact location.

The data from which the county report is generated is continually updated. The date on which the report was created is in the report footer. Contact KSNPC for a current copy of the report.

Please note that the quantity and quality of data collected by the Kentucky Natural Heritage Program are dependent on the research and observations of many individuals and organizations. In most cases, this information is not the result of comprehensive or site-specific field surveys; many natural areas in Kentucky have never been thoroughly surveyed, and new species of plants and animals are still being discovered. For these reasons, the Kentucky Natural Heritage Program cannot provide a definitive statement on the presence, absence, or condition of biological elements in any part of Kentucky. Heritage reports summarize the existing information known to the Kentucky Natural Heritage Program at the time of the request regarding the biological elements or locations in question. They should never be regarded as final statements on the elements or areas being considered, nor should they be substituted for on-site surveys required for environmental assessments.

KSNPC appreciates the submission of any endangered species data for Kentucky from field observations. For information on data reporting or other data services provided by KSNPC, please contact the Data Manager at:

Kentucky State Nature Preserves Commission
801 Schenkel Lane
Frankfort, KY 40601
(502) 573-2886 (phone)
(502) 573-2355 (fax)
email: naturepreserves@ky.gov
internet: www.naturepreserves.ky.gov

County Report of Endangered, Threatened, and Special Concern Plants, Animals, and Natural Communities of Kentucky
 Kentucky State Nature Preserves Commission

County	Taxonomic Group	Scientific name	Common name	Statuses	Ranks	# of Occurrences				
						E	H	F	X	U
Muhlenberg	Vascular Plants	<i>Carya aquatica</i>	Water Hickory	T /	G5 / S2S3	1	1	0	0	0
Muhlenberg	Vascular Plants	<i>Chelone obliqua var. speciosa</i>	Rose Turtlehead	S /	G4T3 / S3	1	0	0	0	0
Muhlenberg	Vascular Plants	<i>Didiplis diandra</i>	Water-purslane	E /	G5 / S1S2	1	0	0	0	0
Muhlenberg	Vascular Plants	<i>Dodecatheon frenchii</i>	French's Shooting Star	S /	G3 / S3	1	0	0	0	0
Muhlenberg	Vascular Plants	<i>Muhlenbergia glabrifloris</i>	Hair Grass	S /	G4? / S2S3	1	0	0	0	0
Muhlenberg	Vascular Plants	<i>Trepocarpus aethusae</i>	Trepocarpus	S /	G4G5 / S3	1	0	0	0	0
Muhlenberg	Vascular Plants	<i>Trifolium reflexum</i>	Buffalo Clover	E /	G3G4 / S1S2	0	1	0	0	0
Muhlenberg	Vascular Plants	<i>Zizaniopsis miliacea</i>	Southern Wild Rice	T /	G5 / S1S2	2	1	0	0	0
Muhlenberg	Aquatic Snails	<i>Pleurocera alveare</i>	Rugged Hornsnail	S / SOMC	G3 / S3S4	0	1	0	0	0
Muhlenberg	Freshwater Mussels	<i>Cyprogenia stegaria</i>	Fanshell	E / LE	G1Q / S1	2	1	0	0	0
Muhlenberg	Freshwater Mussels	<i>Epioblasma obliquata obliquata</i>	Catspaw	E / LE	G1T1 / S1	0	1	0	0	0
Muhlenberg	Freshwater Mussels	<i>Lampsilis ovata</i>	Pocketbook	E /	G5 / S1	0	1	0	0	0
Muhlenberg	Freshwater Mussels	<i>Pleurobema plenum</i>	Rough Pigtoe	E / LE	G1 / S1	0	1	0	0	0
Muhlenberg	Freshwater Mussels	<i>Pleurobema rubrum</i>	Pyramid Pigtoe	E / SOMC	G2G3 / S1	2	2	0	0	0
Muhlenberg	Freshwater Mussels	<i>Toxolasma lividus</i>	Purple Lilliput	E / SOMC	G3Q / S1	0	1	0	0	0
Muhlenberg	Freshwater Mussels	<i>Villosa lienosa</i>	Little Spectaclecase	S /	G5 / S3S4	2	2	1	0	0
Muhlenberg	Crustaceans	<i>Orconectes ronaldi</i>	Mud River Crayfish	T /	G3 / S2S3	1	0	0	0	0
Muhlenberg	Insects	<i>Poanes viator</i>	Broad-winged Skipper	T /	G5 / S1	1	0	0	0	0
Muhlenberg	Insects	<i>Stylurus notatus</i>	Elusive Clubtail	E / SOMC	G3 / S1	0	0	0	0	1
Muhlenberg	Fishes	<i>Erimyzon sucetta</i>	Lake Chubsucker	T /	G5 / S2	0	2	0	0	0
Muhlenberg	Fishes	<i>Ichthyomyzon castaneus</i>	Chestnut Lamprey	S /	G4 / S2	0	1	0	0	0
Muhlenberg	Fishes	<i>Lepomis miniatus</i>	Redspotted Sunfish	T /	G5 / S2	5	0	0	0	0
Muhlenberg	Amphibians	<i>Cryptobranchus alleganiensis alleganiensis</i>	Eastern Hellbender	E / SOMC	G3G4T3T4 / S1	1	0	0	0	0
Muhlenberg	Amphibians	<i>Hyla avivoca</i>	Bird-voiced Treefrog	S /	G5 / S3	2	0	0	0	0
Muhlenberg	Reptiles	<i>Thamnophis sauritus sauritus</i>	Eastern Ribbon Snake	S /	G5T5 / S3	4	0	0	0	0
Muhlenberg	Breeding Birds	<i>Ammodramus henslowii</i>	Henslow's Sparrow	S / SOMC	G4 / S3B	3	0	0	0	0
Muhlenberg	Breeding Birds	<i>Ardea alba</i>	Great Egret	T /	G5 / S2B	1	0	0	0	0
Muhlenberg	Breeding Birds	<i>Asio flammeus</i>	Short-eared Owl	E /	G5 / S1B,S2N	1	0	0	0	0

County Report of Endangered, Threatened, and Special Concern Plants, Animals, and Natural Communities of Kentucky
 Kentucky State Nature Preserves Commission

County	Taxonomic Group	Scientific name	Common name	Statuses	Ranks	# of Occurrences				
						E	H	F	X	U
Muhlenberg	Breeding Birds	<i>Asio otus</i>	Long-eared Owl	E /	G5 / S1B,S1S2N	1	0	0	0	0
Muhlenberg	Breeding Birds	<i>Botaurus lentiginosus</i>	American Bittern	H /	G4 / SHB	0	1	0	0	0
Muhlenberg	Breeding Birds	<i>Chondestes grammacus</i>	Lark Sparrow	T /	G5 / S2S3B	1	0	0	1	0
Muhlenberg	Breeding Birds	<i>Circus cyaneus</i>	Northern Harrier	T /	G5 / S1S2B,S4N	2	0	0	0	0
Muhlenberg	Breeding Birds	<i>Cistothorus platensis</i>	Sedge Wren	S /	G5 / S3B	1	0	0	0	0
Muhlenberg	Breeding Birds	<i>Gallinula galeata</i>	Common Gallinule	T /	G5 / S1S2B	1	0	0	0	0
Muhlenberg	Breeding Birds	<i>Haliaeetus leucocephalus</i>	Bald Eagle	T / Delisted	G5 / S2B,S2S3N	3	0	0	0	0
Muhlenberg	Breeding Birds	<i>Ixobrychus exilis</i>	Least Bittern	T /	G5 / S1S2B	1	0	0	0	0
Muhlenberg	Breeding Birds	<i>Pandion haliaetus</i>	Osprey	S /	G5 / S2S3B	2	0	0	0	0
Muhlenberg	Breeding Birds	<i>Riparia riparia</i>	Bank Swallow	S /	G5 / S3B	1	0	0	0	0
Muhlenberg	Breeding Birds	<i>Tyto alba</i>	Barn Owl	S /	G5 / S3	1	0	0	0	0
Muhlenberg	Breeding Birds	<i>Vireo bellii</i>	Bell's Vireo	S / SOMC	G5 / S2S3B	4	0	0	0	0
Muhlenberg	Mammals	<i>Myotis austroriparius</i>	Southeastern Myotis	E / SOMC	G3G4 / S1S2	1	0	0	0	0
Muhlenberg	Mammals	<i>Myotis grisescens</i>	Gray Myotis	T / LE	G3 / S2	1	0	0	0	0
Muhlenberg	Mammals	<i>Myotis sodalis</i>	Indiana Bat	E / LE	G2 / S1S2	0	0	0	0	1
Muhlenberg	Mammals	<i>Nycticeius humeralis</i>	Evening Bat	S /	G5 / S3	2	0	0	0	0
Muhlenberg	Communities	<i>Bottomland hardwood forest</i>		S /	GNR / S3	3	0	0	0	0
Muhlenberg	Communities	<i>Bottomland marsh</i>		T /	GNR / S1S2	1	0	0	0	0
Muhlenberg	Communities	<i>Cypress (tupelo) swamp</i>		E /	GNR / S1	1	0	0	0	0
Muhlenberg	Communities	<i>Riparian forest</i>		N /	GNR / S5	1	0	0	0	0
Muhlenberg County Total:						61	17	1	1	2