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October 15, 2018

Tennessee Valley Authority
1101 Market Street
Chattanooga, Tennessee 37402

Engineer's Certificate of Wetlands Location Demonstration
Slag Ponds 2A and 2B, and Slag Stilling Pond 2C
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 Slag Ponds 2A and 2B, and Slag Stilling Pond 2C are in compliance with the Wetlands location requirements specified in the 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), Slag Ponds 2A and 2B, and Slag Stilling Pond 2C comply with all required 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. Slag Ponds 2A and 2B, and Slag Stilling Pond 2C 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 wetland study determined the wetland soils do not pose erosion stability or migration concern, and closure construction are not expected to result in any substantial impacts to populations of wildlife species. The proposed landfill is not anticipated to have significant effects on the surrounding environment from a catastrophic release, based on the factors of safety demonstrated in the geotechnical evaluation of the proposed unit.

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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 Slag Ponds 2A and 2B, and Slag Stilling Pond 2C meet the requirements of 40 CFR §257.61(a).

SIGNATURE _____ DATE 10/15/18

ADDRESS: AECOM
564 White Pond Drive,
Akron, OH 44320

TELEPHONE: (330)-836-9111

ATTACHMENTS: Engineer's Certification of Wetlands Location Demonstration (40 CFR §257.61) for Coal Combustion Residuals (CCR) Existing Surface Impoundments - Slag Ponds 2A and 2B, and Slag Stilling Pond 2C

COAL COMBUSTION PRODUCT DISPOSAL PROGRAM

TENNESSEE VALLEY AUTHORITY – PARADISE FOSSIL PLANT
SLAG PONDS 2A AND 2B, AND STILLING POND 2C
DRAKESBORO, KENTUCKY

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

EXISTING SURFACE IMPOUNDMENTS

Prepared for

Tennessee Valley Authority
1101 Market Street
Chattanooga, TN 37402-2801

October 15, 2018 – Rev 0

Prepared by

AECOM

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1.0 INTRODUCTION

1.1 OBJECTIVE

The purpose of this demonstration is to document compliance with 40 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 Slag Ponds 2A and 2B, and Slag Stilling Pond 2C at the Tennessee Valley Authority (TVA) Paradise Fossil Plant (PAF).

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).

1.3 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. Slag Ponds 2A and 2B and Slag Stilling Pond 2C are located in the northeast corner of PAF. The slag ponds are located directly east of the coal storage yard, west of the Green River, south of Red Water Pond 2, and north of the plant.

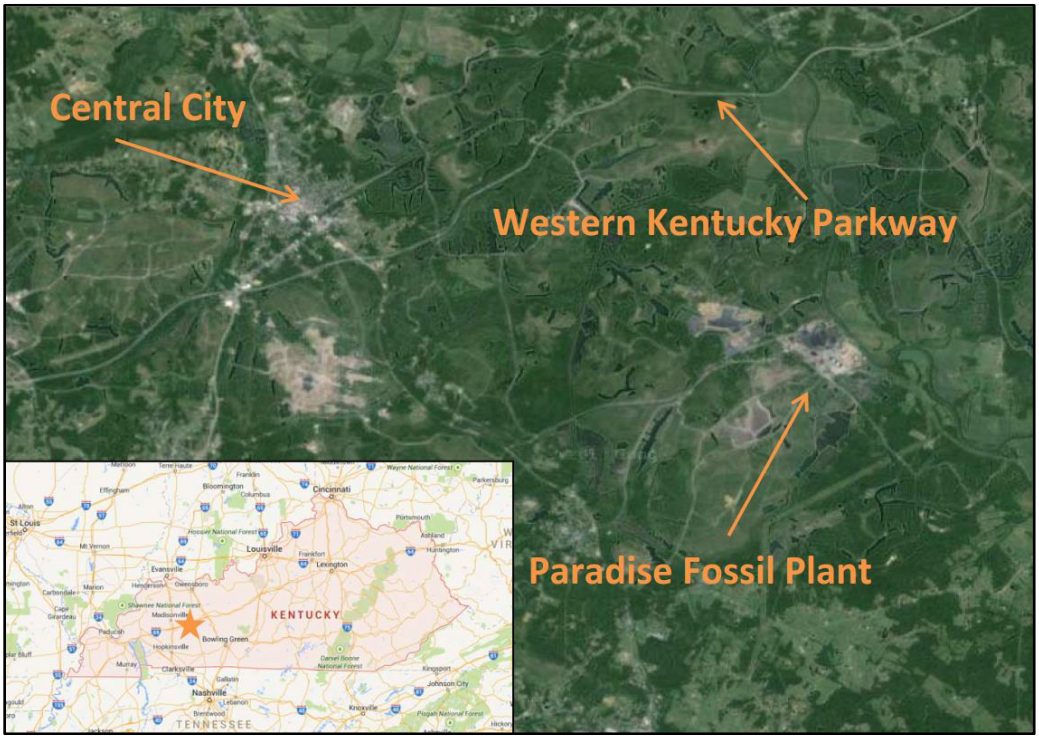

Figure 1: TVA PAF Site Location

Slag Ponds 2A and 2B and Slag Stilling Pond 2C serve as an ash pond management facility for the storage and settling of boiler slag. Influent to this impoundment consists of sluiced boiler slag, which flows into the southeastern portion of Slag Pond 2A via a series of ash inlets. Slag

Ponds 2A and 2B also receive process water from many areas surrounding the ponds such as the Red Water Ponds and Coal Yard Runoff Ponds. Water flows from Slag Pond 2A to Slag Pond 2B to Slag Stilling Pond 2C. Slag Stilling Pond 2C discharges to the Green River.

Boiler slag is sluiced into the south end of Slag Pond 2A, which serves as the primary solids collection pond. Slag Pond 2A is located east of the existing coal pile and immediately west of Slag Pond 2B. Slag Pond 2A has a wetted surface area of approximately 16.5 acres. Accumulated slag is continually excavated and stockpiled for dewatering at the south end of the pond, where it is later removed for beneficial reuse. Slag Pond 2A discharges through three (3) culverts that convey water through a divider dike into the north end of Slag Pond 2B. Slag Pond 2B is located immediately east of Slag Pond 2A and has a wetted surface perimeter of approximately 11.5 acres. After water passes through Slag Pond 2B, it is discharged through a spillway into Stilling Pond 2C. Stilling Pond 2C, having a wetted surface area of approximately 1.2 acres, sits along the southeast border of Pond 2B and to the west of the Green River. Water flowing south through Stilling Pond 2C is decanted into three 36-inch RCP riser pipes which discharge through a permitted KPDES outfall into the Green River.

Paradise Fossil Plant is moving towards dry CCR handling by approximately 2019; as a result, plans are being made to begin the closure process of Slag Ponds 2A/2B/2C. **Figure 2** shows a current aerial of the impoundment.

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 conservative wetlands delineation examining areas within the parameters of the word wetlands as defined in 40 CFR § 232.2 and those adjacent.

Areas on and adjacent to PAF were first assessed for the presence of wetlands by desktop review, using aerial photography, USFWS National Wetland Inventory (USFWS 2015a), publicly available geospatial data (USDA-NRCS 2017), and FEMA floodplain data (2011). Confirmation of remote findings was conducted during onsite reconnaissance. AECOM performed a wetlands determination 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 inAppendix A. Site modifications have resulted in the water features (ponds) including wetlands and streams. Open water wetlands and a stream were preliminary identified by the NWI map which appears 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 breach zone occupies approximately 6 to 7 acres of the 25 acres wetland study area. The surface water features noted within the breach zone, which were previously identified in the 2016 AECOM Wetland Survey, Paradise Fossil Plant PAF, Muhlenberg County, Kentucky," are connected by streams, linear wetlands and wet weather conveyances."

3.0 IMPACTS

The 2017 Wetland Determination performed by AECOM assessed the potential impacts of a breach within the 25 acre wetland study area. The site includes seven potential wetlands, four ponds, one stream and four ephemerals potentially present in the breach zone (see Figure 3). The modeled breach analysis indicates the following impacts may be anticipated:

- Pond Surface – 0.0 ac
- Wetland Area – 0.06 ac
- Stream –0 feet

Process flows and effluent from Slag Ponds 2A and 2B and Slag Stilling Pond 2C discharge through NPDES Outfall 002 to the Green River. The wetland determination further states 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.*

The Final CCR Rule states that the party must make "clear and objective rebuttal of the presumption that an alternative to the CCR unit is reasonably available that does not involve wetlands".

The criterion is not applicable under Section 404 because the CCR Unit was built before Section 404 of the Clean Water Act was promulgated, and before the regulations for jurisdictional wetlands were promulgated in 1972. Additionally, the surface impoundment itself is not a wetland because surface impoundments are wastewater treatment systems, and are exempted as such from the definition of a jurisdictional wetland.

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 40 CFR § 257.61(a)(2)(i) A violation of an applicable state or federal water quality standards;

In accordance with the EPA CCR Rule all applicable impoundment that have the potential to impact wetlands, must comply with the regulatory standards set forth in all applicable governing documents. In examination of the CCR Rule, Slag Ponds 2A and 2B comply with the following state and federal programs, the Clean Water Act (CWA), National Pollutant Discharge Elimination System (NPDES), Marine Protection, Research, and Sanctuaries Act of 1972, 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 criterion 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 constituents, as compared with background concentrations.

3.2.1 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 on the Slag Ponds 2A and 2B discharge. 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 Slag Ponds 2A and 2B that discharge to Outfall 002.

Slag Ponds 2A and 2B serve as an ash pond management facility for the storage and settling of boiler slag. Influent to this impoundment consists of sluiced boiler slag, which flows into the southeastern portion of Slag Pond A through a series of ash inlets. Slag Ponds 2A and 2B also receive process water from many of the areas surrounding the ponds, such as the Red Water Ponds and the Coal Yard Runoff Ponds. Water Flows from the Slag Ponds to the Slag Stilling Pond 2C and eventually discharges into the Green River at Outfall 002.

PAF performs monthly monitoring of ammonia in the intake, and Slag Ponds discharges under a monitoring plan required by KPDES Permit KY0004201. The ammonia levels ranged from below detection (<0.25 milligrams per liter [mg/L]) to 3.05 mg/L for Outfall 001 and ranged from <0.25 mg/L to 1.21 mg/L for the Outfall 002. Intake data, which would be assumed to be representative of the Green River, was generally below detection at <0.25 mg/L with one concentration above detection of 0.7 mg/L.

Table 1. KPDES Permit No. KY0004201 Effluent Limitations – Outfall 002

Effluent Characteristic	Reported Monthly Average	Discharge Daily Maximum	Proposed Monthly Average	Proposed Daily Maximum	Applicable Water Quality Criteria and/or Effluent Guidelines
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	6.00	13	15	401 KAR 5:065, Sections 4 and 5
Hardness (as mg/l $CACO_3$)	178	532	Report	Report	401 KAR 5:065, Section 2(8)
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	8.5	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. TVA

has consistently met the effluent discharge limits set in KPDES Permit KY0004201, no permit limits 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 previous site mining activities and 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
- Hodded Merganser (Lophodytes Cucullatus) – Threatened
- Indiana Bat (Myotis Sodalis) – Endangered
- Northern Long-eared Bat (Myotis Septentrionalis) – Endangered
- Southeastern Bat (Myotis Austroriparius) – Endangered
- Gray Bat (Myotis Grisescens) – Threatened

TVA Environmental has determined that the current operations of the PAF CCR unit is not likely to impact the existence of the listed species.

3.4 40 CFR §257.61(a)(2)(iv) Marine Protection Act

40 CFR §257.61(a)(2)(iv) A violation of any requirement under the Marine Protection, Research, and Sanctuaries Act of 1972 for the protection of a marine sanctuary;

The Marine Protection, Research, and Sanctuaries Act of 1972 (U.S. Congress 1988) does not apply to any TVA sites, does not apply to federal facilities and also does not apply to TVA existing surface impoundments because the CCR Unit is not classified as "marine" as per 15 C.F.R. § 922.3.

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 25 acres analyzed do not pose an erosion stability or migration concern. The perimeter dikes of Slag Ponds 2A and 2B and Slag Stilling Pond 2C, as well as the dike between Slag Ponds 2A and 2B, were constructed using mine spoil built over alluvial deposits consisting of sand and clay. The mine spoils used to construct the embankment consisted of very stiff lean clay (CL), clayey sand (SC), or clayey gravel (CG) with varying quantities of gravel sized rock fragments.

Based on the Structural Stability Assessment and the Initial Safety Factor Assessment performed by AECOM in 2016 no erosion or migration potential is expected. The Safety Factor Assessment results are greater than or equal to the required safety factors specified in 40 CFR §257.73 indicating the impoundment is structurally safe. 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 Slag Ponds were designed to accommodate approximately 0.46 million cubic yards (cy) of CCR (bottom ash). Previous chemical testing of this material has been conducted. The impoundment does not include a liner.

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 3-14) (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 3-14). 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 Species of Conservation Concern within Muhlenberg County and Within 5 Miles of PAF, 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.

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 CCR Unit 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. 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.

The Slag Ponds 2A and 2B and Slag Stilling Pond 2C are 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 documents all 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 Slag Ponds 2A and 2B and Slag Stilling Pond 2C meet 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 Slag Ponds 2A and 2B.

4.0 Conclusions

Based on this assessment, Slag Ponds 2A and 2B and Slag Stilling Pond 2C located at PAF meet the requirements for the wetlands location restriction as required by §257.61 of the EPA Final CCR Rule.

5.0 References

- 257-73(c) History of Construction at Paradise Fossil Plant Slag Ponds 2A and 2B. AECOM. 2016.
- 257-73(d) Structural Stability Assessment at Paradise Fossil Plant Slag Ponds 2A and 2B. AECOM. 2016
- 257-73(e) Safety Factor Assessment at Paradise Fossil Plant Slag Ponds 2A and 2B. AECOM. 2016.
- EPA Final Coal Combustion Residuals (CCR) Rules: Federal Register/ Vol. 80/ No. 74 /Part II. Hazardous and Solid Waste Management System; Disposal of Coal, April 17, 2015
- Paradise CCR Management Operations Environmental Assessment, TVA, June 2017.

FIGURES

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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

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Feet

1:4,000

FILE NUMBER

DESIGNED BY DCW

DRAWN BY MBE

CHECKED BY

AECOM
1000 Corporate Centre Dr
Suite 250
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TVA Paradise Wetland Delineation
USFWS NWI Map, Slag Pond

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **10**

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*	Pleurocera alveare	SOMC	S(S3S4)	N
Mollusks				
Fanshell*	Cyprogenia stegaria	LE	E(S1)	N
Catspaw*	Epioblasma obliquata	LE	E(S1)	N
Pocketbook*	Lampsilis ovata	--	E(S1)	N
Rough Pigtoe*	Pleurobema plenum	LE	E(S1)	N
Pyramid Pigtoe*	Pleurobema rubrum	SOMC	E(S1)	N
Purple Lilliput*	Toxolasma lividus	SOMC	E(S1)	N
Little Spectaclecase*	Villosa lienosa	--	S(SES4)	N
Crustaceans				
Mud River Crayfish	Orconectes ronaldi	--	T(S2S3)	N
Fish				
Lake Chubsucker	Erimyzon sucetta	--	T(S2)	N
Chestnut Lamprey*	Ichthyomyzon castaneus	--	S(S2)	N
Redspotted Sunfish	Lepomis miniatus	--	T(S2)	N
Longhead Darter	Percina macrocephala	--	E(S1)	N
Amphibians				
Eastern Hellbender	Cryptobranchus alleganiensis	SOMC	E(S1)	N
Bird-voiced Treefrog*	Hyla avivoca	--	S(S3)	N
Reptiles				
Eastern Ribbon Snake	Thamnophis sauritus	--	S(S3)	P
Insects				
Broad-winged Skipper	Poanes viator	--	T(S1)	P
Elusive Clubtail	Stylurus notatus	SOMC	E(S1)	N
Birds				
Henslow's Sparrow	Ammodramus henslowii	SOMC	S(S3B)	P
Great Egret*	Ardea alba	--	T(S2B)	P
Short-eared Owl*	Asio flammeus	--	E(S1B,S2N)	N
Long-eared Owl*	Asio otus	--	E(S1B,S1S2N)	N
American Bittern	Botaurus lentiginosus	--	H(SHB)	N
Lark Sparrow	grammacus	--	T(S2S3B)	P
Northern Harrier*	Circus cyaneus	--	T(S1S2B,S4N)	P
Sedge Wren*	Cistothorus platensis	--	S(S3B)	N
Common Gallinule*	Gallinula galeata	--	T(S1S2B)	N
Bald Eagle*	leucocephalus	DM	T(S2B,S2S3N)	N
Least Bittern*	Ixobrychus exilis	--	T(S1S2B)	N
Hodded Merganser*	Lophodytes cucullatus	--	T(S1S2B,S3S4N)	P (foraging only)
Osprey*	Pandion haliaetus	--	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

GYP Stack, Slag Pong and Peabody Ash Pond Potential Breach Area – Wetland Survey

Draft Report
Paradise Fossil Plant (PAF),
Mulhenburg County Kentucky

December 2017

Prepared for:

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Table of Contents

Figures

Tables

1. Introduction

AECOM was contracted by TVA to conduct a wetlands survey associated with coal combustion residuals (CCR) units at the Paradise Fossil Plant (PAF), **Figure 1**. The surveys were conducted in compliance with the CCR Ruling to assess the potential impact of a potential breach in CCR impoundments to wetlands and waterbodies. The surveys included land located in the potential breach zone of three CCR units:

1. The Gypsum Stack (Gyp Stack) and stilling ponds – is the location where gypsum has been stored for a number of years;
2. The Peabody Ash Pond is where bottom ash is sluiced from the facility, and
3. The Slag Pond contains boiler slag generated from the coal plant,

These three CCR Units are located on the southwest, south and northeast side of the PAF facility respectively, **Figures 2, 3 and 4**. The PAF Gyp stack and Peabody ash pond are currently active. These units are 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 at the Gyp stack include:

1. A slope failure of the Gypsum Stack;
2. A failure of the Stilling Pond 1 (aka Upper Stilling Pond);
3. A failure of Stilling Pond 2 (aka Lower Stilling Pond)

In addition to the potential failure of the features at the Gyp stack, potential failure of the Peabody ash pond berm or the slag pond berm were investigated.

The survey was conducted on previously disturbed land (mined) that includes land owned by TVA and bottom land associated with Jacobs Creek and the Green River. The Gyp Stack and associated ponds occupy approximately 280 acres, which includes approximately 250 acre of landfill and 31 acres of impoundments. The breach zone occupies approximately 175 to 200 acres. The eastern portion of the breach zone is designated for potential borrow area, while the western portion is designated a wildlife management area (WMA). The wetland study area was expanded to approximately 350 acres due to the connected waterbodies in the breach zone and flow of water generally to the south in this area. 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 previous mining activity and are not CCR units. These ponds are bordered by wetland fringe, primarily vegetated with *Phragmites* (giant reed). 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 the Gys stack stilling ponds at 440 msl.

The Peabody ash pond occupies approximately 138 acres. The modeling potential breach zone includes approximately 225 to 250 acres and includes several thousand feet (3.6 miles) of Jacobs Creek, tributaries and associated wetlands. The surface elevation of the Peabody ash pond is 415 ft msl. Much of the breach zone is within the 100-year flood elevation at 402 ft msl. The potential breach would flow initially to the west to wetlands along Jacobs Creek, then follow Jacobs Creek to the Green River impacting low areas, primarily with wetlands, along the way.

The Slag pond (two cells) is located north of the plant and occupies approximately 25 acres. It is bordered on the east by the Green River, on the west by the coal pile, on the south by the coal plant and on the north by the coal conveyors. Originally, the slag ponds were used as fly ash sluice ponds. Currently, the slag ponds serve as an ash management facility for the storage and settlement of boiler slag. Influent to the impoundments consists of sluiced boiler slag and process water from many areas surrounding the ponds such as red water ponds and coal yard runoff ponds. The slag pond is discharged through outfall 005 to the Green River. The modeled flow of a potential breach is toward the Green River and covers approximately 6 to 7 acres.

2. Literature Review

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 (hydric characteristics) were met. The Gyp stack breach area was surveyed in September 2017, while the breach area associated with the slag pond and Peabody ash pond were surveyed in October 2017.

The potential for wetlands on the property was reviewed by viewing the United States Fish and Wildlife Service (USFWS) Wetland Inventory Map (NWI) for the three CCR units. 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. All soils were designated as Udothents (previously disturbed land) in the Gyp stack and slag pond breach zones, while numerous native soil types are listed in the Peabody ash pond breach zone. Udothents are not considered a hydric soil. Bonnie silt loam soils occupy approximately 7% of the Peabody ash pond breach zone and are considered hydric soils. No other soil types are designated as hydric.

Following review of these data, a delineation was conducted of the Gyp stack breach zone on September 14-15, 2017, and for the slag pond and Peabody ash pond breach zones on October 24-27, 2017. The field delineation team was led 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) and Ms. Winnie Davis (biologist) assisted with the surveys.

The historic use of the property was reviewed to determine the potential for past activities that may have influenced site conditions. The property has been in industrial use and mining for decades (prior to 1950). These data plus the site inspection were utilized to make the determination of the potential for wetlands on the site and potential jurisdictional status.

2.1 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 of the Gyp stack and slag pond is *Udorthents* (disturbed soils) (**Figure 5 and 7**) The breach zone is also depicted on the soils map as well as the wetland inventory map. 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 filled 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%). Soils in the breach zone of the Peabody ash pond, **Figure 6** included; *dumps, Frondorf-Lenberg complex, 12 to 20 percent slopes, Lindside silt loam, 0 to 2 percent slopes, occasionally flooded, Nolin-Melvin complex, pits, Sadler silt loam, 2 to 6 percent slopes, Belknap silt loam, 0 to 2 percent slopes, occasionally flooded, Bonnie silt loam, 0 to 2 percent slopes, occasionally flooded, Udorthents, Wellston silt loam,* and *Zanesville silt loam*. Most of these soils are prime farmland but only the *Bonnie silt loam* is designated as a hydric soil.

In the field, soils were determined to be either hydric or non-hydric by the methods provided in the 1987 Manual and 2010 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.

2.2 Wetlands

A National Wetlands Inventory map (NWI) was downloaded from the US Fish and Wildlife Service NWI website, see **Figures 8, 9 and 10**. A number of areas identified as open water wetland areas (palustrine unconsolidated, PUBHx or freshwater pond), lakes, ponds emergent (PEM), shrub/scrub (PSS) and riverine, perennial, unconsolidated bottom (R5UB or stream) were indicated in the breach zones by the NWI.

The ponds and streams in the Gyp stack breach zone drain to the south to the Peabody Ash Pond which flows to the breach zone of the Peabody ash pond then 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 Peabody ash pond and slag pond is permitted through the facilities NPDES permit.

2.3 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 areas. None of the Gys stack breach zone is within the 100-year floodplain as the lowest elevation in the study area is 440 msl and the flood elevation is 402 msl, while much of the Peabody ash pond breach zone is within the 100-year floodplain **Figure 11**. Much of the slag pond breach zone is in the 100-year floodplain, with a portion of the breach zone in the floodway of the Green River, **Figure 12**.

3. Methods

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, **Figures 13, 14 and 15**.

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, backwater areas of Green River or areas in the 100-year floodplain. The entire breach zone of each unit was then walked to determine if wetlands were present. Areas outside of the breach zones but downgradient of water features were also reviewed. Wetlands and streams were number based on the numbering system initiated in 2016 for the delineation of wetlands at the landfill area, to keep a running total of wetlands investigated and provide unique identifiers for each wetland. Therefore, there were three wetlands in the Gyp stack breach zone and were numbered 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. One wetland was located in the slag pond breach zone (W-44) while wetlands 29 – 43 were delineated in or near the Peabody ash pond breach zone.

Some wetlands within the Gyp stack breach zone were also previously identified in 2016 by AECOM as part of the investigation of a supplemental investigation area, “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 Gyp stack breach zone. Four of the wetlands and one pond identified in the 2016 survey would potentially be impacted by a breach at 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 areas (Attachment 1). A photolog of the wetland locations is provided in Attachment 2.

4. Field Survey

Based on the results of the literature review, the disturbed areas included ponds and drainages that were a result of the mining activity. Within the breach zone of the Peabody ash pond and 100-year floodplain of Jacobs Creek and the Green River, a number of natural wetlands are present. It is unknown if natural wetlands were historically associated with the disturbed portion of the site. Site modifications have resulted in water features (ponds) including wetlands and streams. Within the seven days prior to the September survey, approximately 0.15 inches of rainfall had occurred, while 1.29 inches fell a week prior to the October survey. During the field surveys, no rainfall was recorded. Wetlands were identified in the field by the designation “W-26”, as well as streams (Str) and wet weather conveyances (WWC). Three ponds with wetland fringes were identified. Nineteen wetlands, 16 streams and 25 WWCs are located within the breach zones of the three CCR units. 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 recommended.

5. Conclusions

Based on the review of literature and maps of the site and field survey, 13 wetlands, one pond, 14 streams and numerous WWCs are present in the potential breach zone of the three CCR Units. The breach zones were overlaid on the GIS shape files to predict the area impacted by a potential breach. Based on the modeled breach zone for each unit, the following potential impact may be anticipated:

Water Feature	Gyp Stack	Peabody Ash Pond	Slag Pond
Pond Surface	0.2 ac	0	0
Wetland Area	8.41 ac	188.04 ac	0.06 ac
Stream	1,000 ft	22,259 ft	0

All of the linear features (linear wetlands and stream) are jurisdictional WOUS as they are connected to other WOUS. Most of the wetlands are also likely jurisdictional based on the hydrologic connection to other waters particularly those in the Jacobs Creek watershed and 100-year floodplain. A number of the small wetlands are isolated and not jurisdictional. The greatest potential for impact to wetlands and water bodies is the Peabody ash pond. The potential breach of this pond could affect wetlands in the 100-year floodplain and several miles of Jacobs Creek. In addition over 4,400 feet of tributaries to Jacobs Creek could be affected. Confirmation of the jurisdictional status should be requested by the Louisville District Corps of Engineers.

Table 1 Water Bodies Potentially Impacted by PAF CCR Units 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
LW-1	None	550 feet	0	WOUS connected to W-26
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

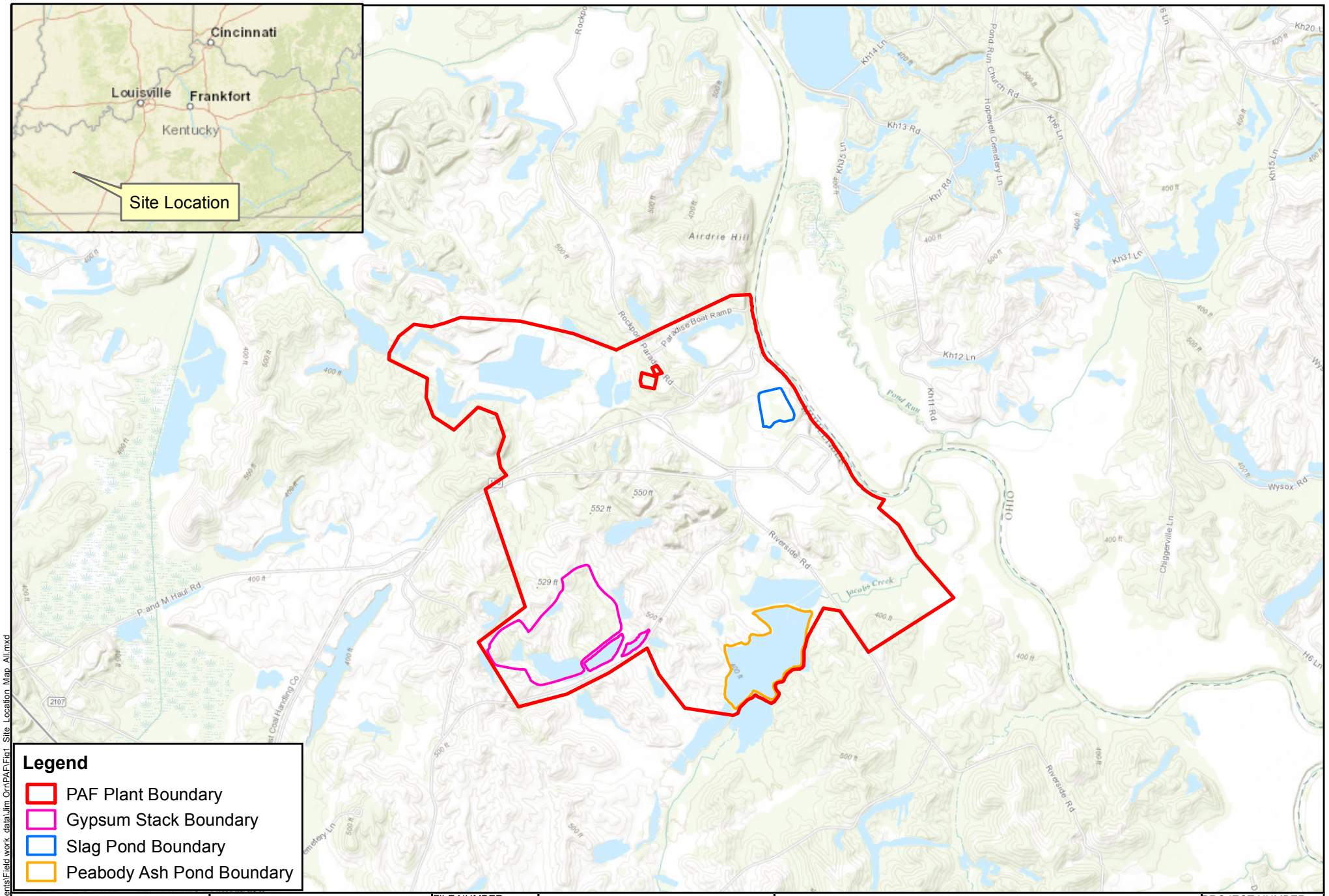
Wetland ID	Wetland Type	Area/Length	Potentially WOUS Impacted	Potential Jurisdictional Status
W-28	PEM/PSS	19.76 acres	0.2 ac	WOUS
W-29	PFO	4.64 acres	0.2 ac	WOUS
W-30	PFO	0.35 acres	None	WOUS
W-31	PFO	0.44 acres	None	WOUS
W-32	PFO	0.9 acres	None	WOUS
W-33	PFO	1.0 acres	0.5 ac	WOUS
W-34	PFO	1.74 acres	0.25 ac	WOUS
W-35	PFO	1.43 acres	0.2 ac	WOUS
W-36	PFO	1.0 acres	None	WOUS
W-37	PFO	42.7 acres	1.0 ac	WOUS
W-38	PEM	166.2 acres	158 ac	WOUS
W-39	PEM	9.58 acres	9.58 ac	WOUS
W-40	PFO	4.04 acres	4.04 ac	WOUS
W-41	PFO	0.94 acres	0.4 ac	WOUS
W-42	PFO	13.87 acres	13.87 ac	WOUS
W-43	PFO	3.58 acres	None	WOUS
W-44	PEM	0.06 acres	0.06 ac	WOUS
Str-2	R5UB	1,404 feet	1,000 ft	WOUS
Str-3	R4SBC	1,126.01 feet	1,126 ft	WOUS
Str-4	R4SBC	319 feet	319 ft	WOUS
Str-5	R4SBC	240.69 feet	40 ft	WOUS
Str-6	R4SBC	510.65 feet	50 ft	WOUS
Str-7	R4SBC	56.21 feet	None	WOUS
Str-8	R4SBC	244.07 feet	120 ft	
Str-9	R4SBC	2,457.2 feet	25 ft	WOUS
Str-10	R4SBC	665.32 feet	665.32 ft	WOUS
Str-11	R4SBC	124.42 feet	124.42 ft	WOUS
Str-12	R5UBH	1,096.12 feet	1,096.12 ft	WOUS

Wetland ID	Wetland Type	Area/Length	Potentially WOUS Impacted	Potential Jurisdictional Status
Str-13	R4SBC	160.76 feet	160.76 ft	WOUS
Str-14	R4SBC	350.17 feet	350.17 ft	WOUS
Str-15	R4SBC	340.62 feet	340.62 ft	WOUS
Str-16 (Jacob's Creek)	R5UBH	18,113 feet	18,113 ft	WOUS
WWC-1	None	103 feet	None	Does not meet Rgl 0505
WWC-2	None	454 feet	None	Does not meet Rgl 0505
WWC-3	None	1,221 feet	None	Does not meet Rgl 0505
WWC-4	None	201 feet	None	Does not meet Rgl 0505
WWC-5	None	125 feet	None	Does not meet Rgl 0505
WWC-6	None	209 feet	None	Does not meet Rgl 0505
WWC-7	None	395 feet	25 ft	Does not meet Rgl 0505
WWC-8	None	196 feet	25 ft	Does not meet Rgl 0505
WWC-9	None	425 feet	25 ft	Does not meet Rgl 0505
WWC-10	None	109 feet	None	Does not meet Rgl 0505
WWC-11	None	244 feet	None	Does not meet Rgl 0505
WWC-12	None	192 feet	None	Does not meet Rgl 0505
WWC-13	None	79 feet	25 ft	Does not meet Rgl 0505
WWC-14	None	263 feet	160 ft	Does not meet Rgl 0505
WWC-15	None	151 feet	151 ft	Does not meet Rgl 0505
WWC-16	None	65 feet	65 ft	Does not meet Rgl 0505
WWC-17	None	287 feet	None	Does not meet Rgl 0505
WWC-18	None	153 feet	153 ft	Does not meet Rgl 0505
WWC-19	None	177 feet	177 ft	Does not meet Rgl 0505
WWC-20	None	101 feet	101 ft	Does not meet Rgl 0505
WWC-21	None	168 feet	150 ft	Does not meet Rgl 0505

Wetland ID	Wetland Type	Area/Length	Potentially WOUS Impacted	Potential Jurisdictional Status
WWC-22	None	144 feet	120 ft	Does not meet Rgl 0505
WWC-23	None	61 feet	45 ft	Does not meet Rgl 0505
WWC-24	None	264 feet	264 ft	Does not meet Rgl 0505
WWC-25	None	156 feet	75 ft	Does not meet Rgl 0505
WWC-26	None	320 feet	320 ft	Does not meet Rgl 0505
WWC-27	None	156 feet	156 ft	Does not meet Rgl 0505
WWC-28	None	29 feet	29 ft	Does not meet Rgl 0505
WWC-29	None	47 feet	47 ft	Does not meet Rgl 0505
WWC-30	None	45 feet	45 ft	Does 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
Ft - feet

Figures



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

N

0 1,550 3,100 6,200

Feet

1:50,000

FILE NUMBER	
DESIGNED BY	DCW
DRAWN BY	MBE
CHECKED BY	

AECOM
1000 Corporate Centre Dr
Suite 250
Franklin, TN 37067

TVA Paradise
Site Location Map

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

PROJECT NUMBER	60478473
DATE	November, 2017
FIGURE NUMBER	1

C:\Users\edmundsm\Documents\Field work data\Jim Ort\PAF\Fig1_Site_Location_Map_All.mxd

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

N

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Feet

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FILE NUMBER

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TVA Paradise Wetland Delineation
Site Location Map, Gypsum Stack

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **2**

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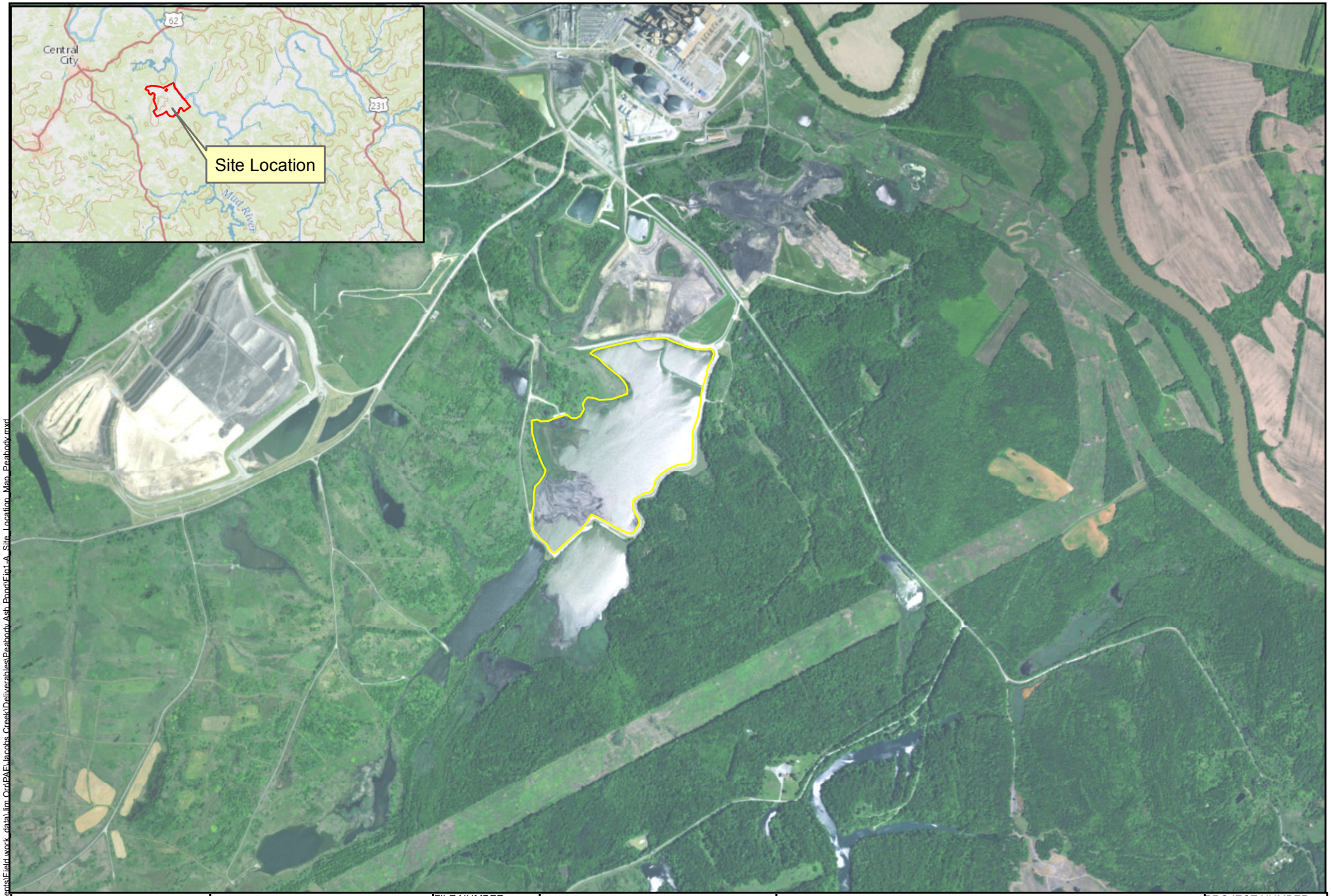

Notes

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Service Layer and Inset Layer Credits: TVA Aerial Imagery 2016

N

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Feet

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TVA Paradise Wetland Delineation
Site Location Map, Peabody Ash Pond

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **3**

C:\Users\edmundsm\Documents\Field work_data\Jim Orr\PAE\Jacobs Creek\Deliverables\Peabody Ash Pond\Fig1-A_Site_Location_Map_Peabody.mxd

C:\Users\edmundsm\Documents\Field work_data\Jim Orr\PAE\Jacobs Creek\Deliverables\Slag Pond Area\Fig1-B_Site_Location_Map_Slagpond.mxd

Notes

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Service Layer and Inset Layer Credits: TVA Aerial Imagery 2016

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0 125 250 500

Feet

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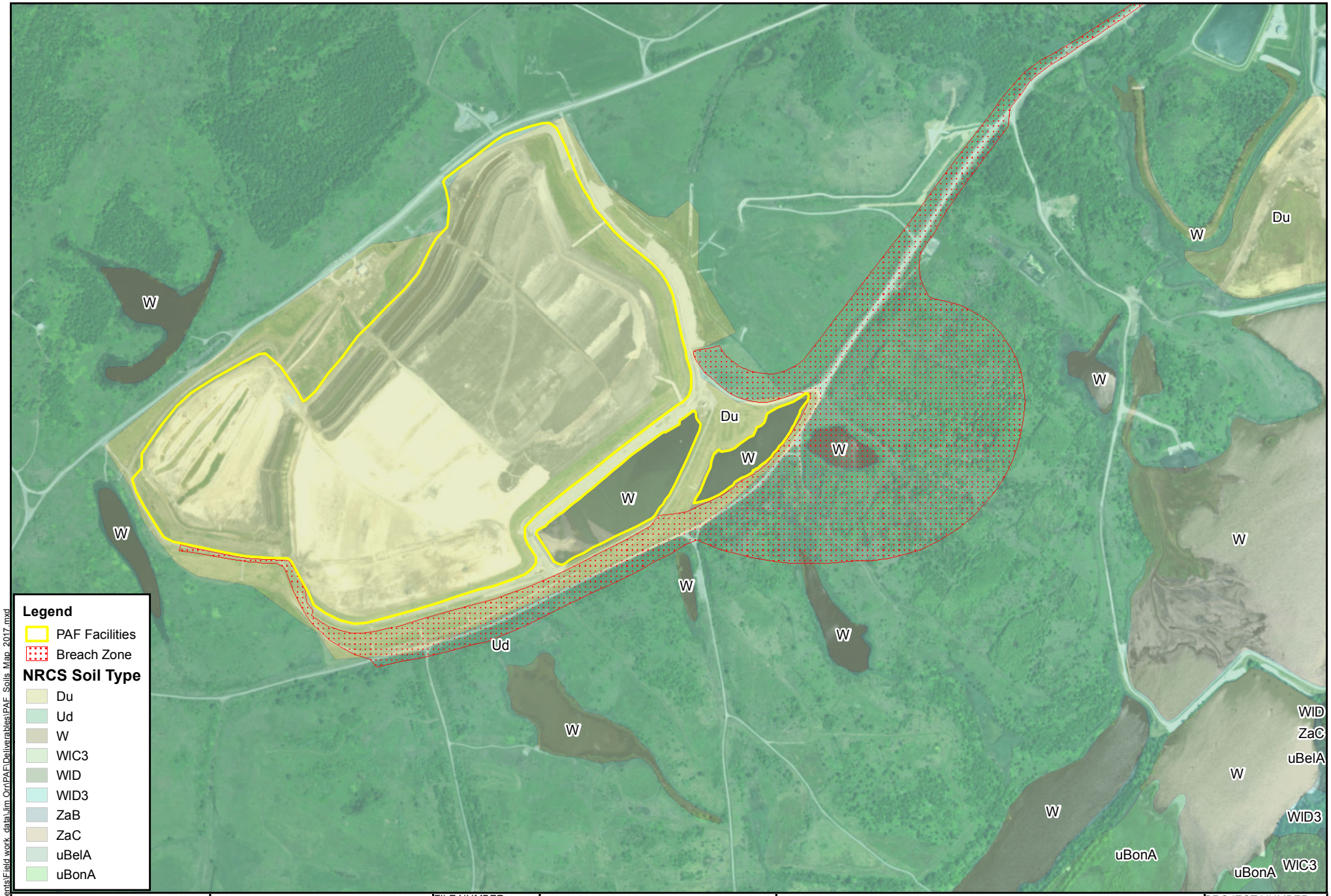
TVA Paradise Wetland Delineation
Site Location Map, Slag Pond

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **4**



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Feet

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FILE NUMBER

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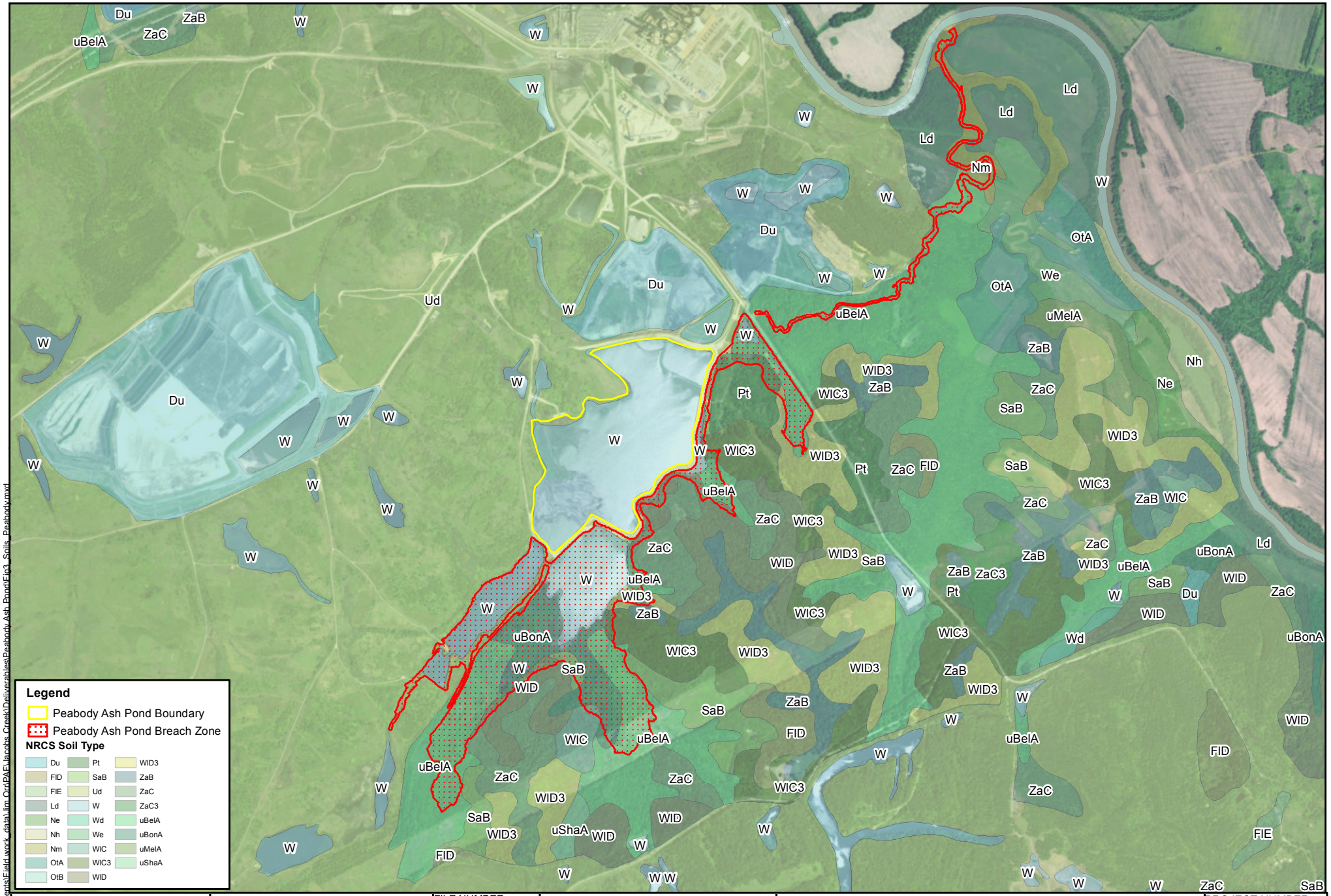
TVA Paradise Wetland Delineation
NRCS Soils Map, Gypsum Stack

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **5**



Notes

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Service Layer and Inset Layer Credits: TVA Aerial Imagery 2016

N

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Feet

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TVA Paradise Wetland Delineation
NRCS Soils Map, Peabody Ash Pond

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER 6

C:\Users\edmundsm\Documents\Field work_data\Jim Orr\PAEL\acobs Creek\Deliverables\Peabody Ash Pond\Fig3_Soils_Peabody.mxd

C:\Users\edmundsm\Documents\Field work_data\Jim Ord\PAE Jacobs Creek\Deliverables\Slag Pond Area\Fig2_Soils_SlagPond.mxd

Notes

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0 125 250 500

Feet

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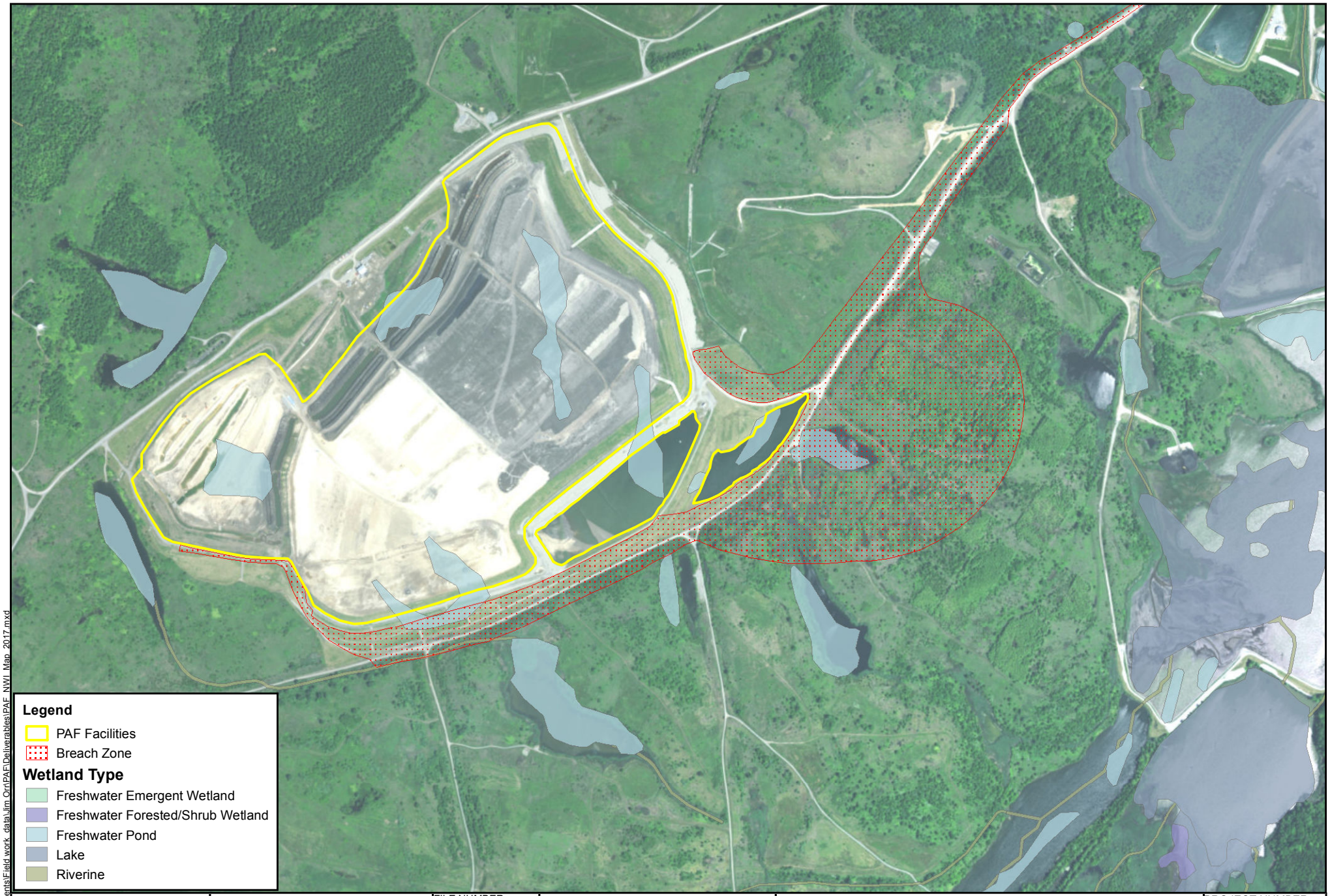
TVA Paradise Wetland Delineation
NRCS Soils Map, Slag Pond

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **7**



C:\Users\edmundsm\Documents\Field work data\Jim Orr\PAF\Deliverables\PAF_NWI_Map_2017.mxd

Notes

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Service Layer and Inset Layer Credits: TVA Aerial Imagery 2016

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0 375 750 1,500

Feet

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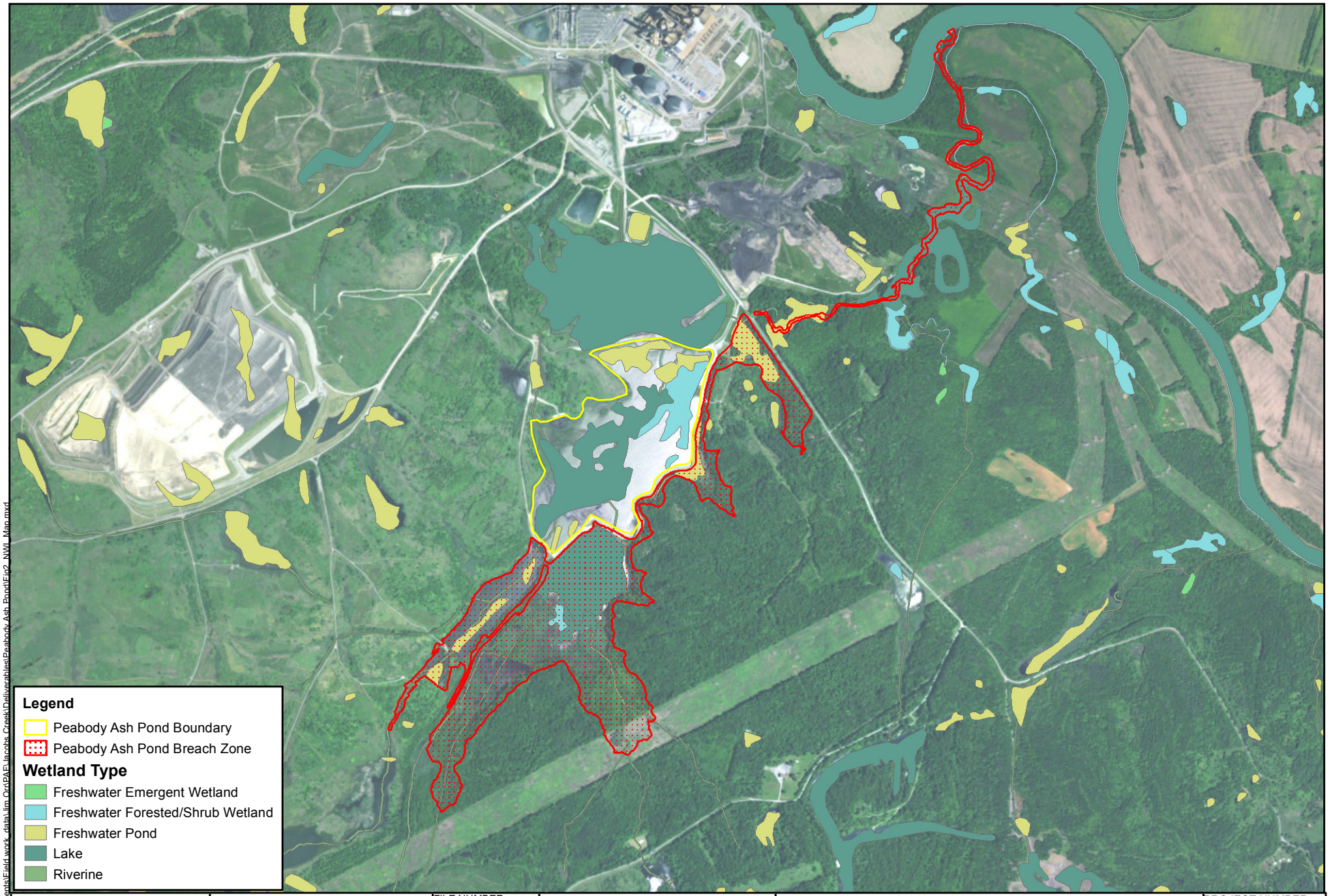
TVA Paradise Wetland Delineation
USFWS NWI Map, Gypsum Stack

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER 8



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Notes

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Service Layer and Inset Layer Credits: TVA Aerial Imagery 2016

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Feet

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TVA Paradise Wetland Delineation
USFWS NWI Map, Peabody Ash Pond

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **9**

Notes

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

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0 125 250 500

Feet

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TVA Paradise Wetland Delineation
USFWS NWI Map, Slag Pond

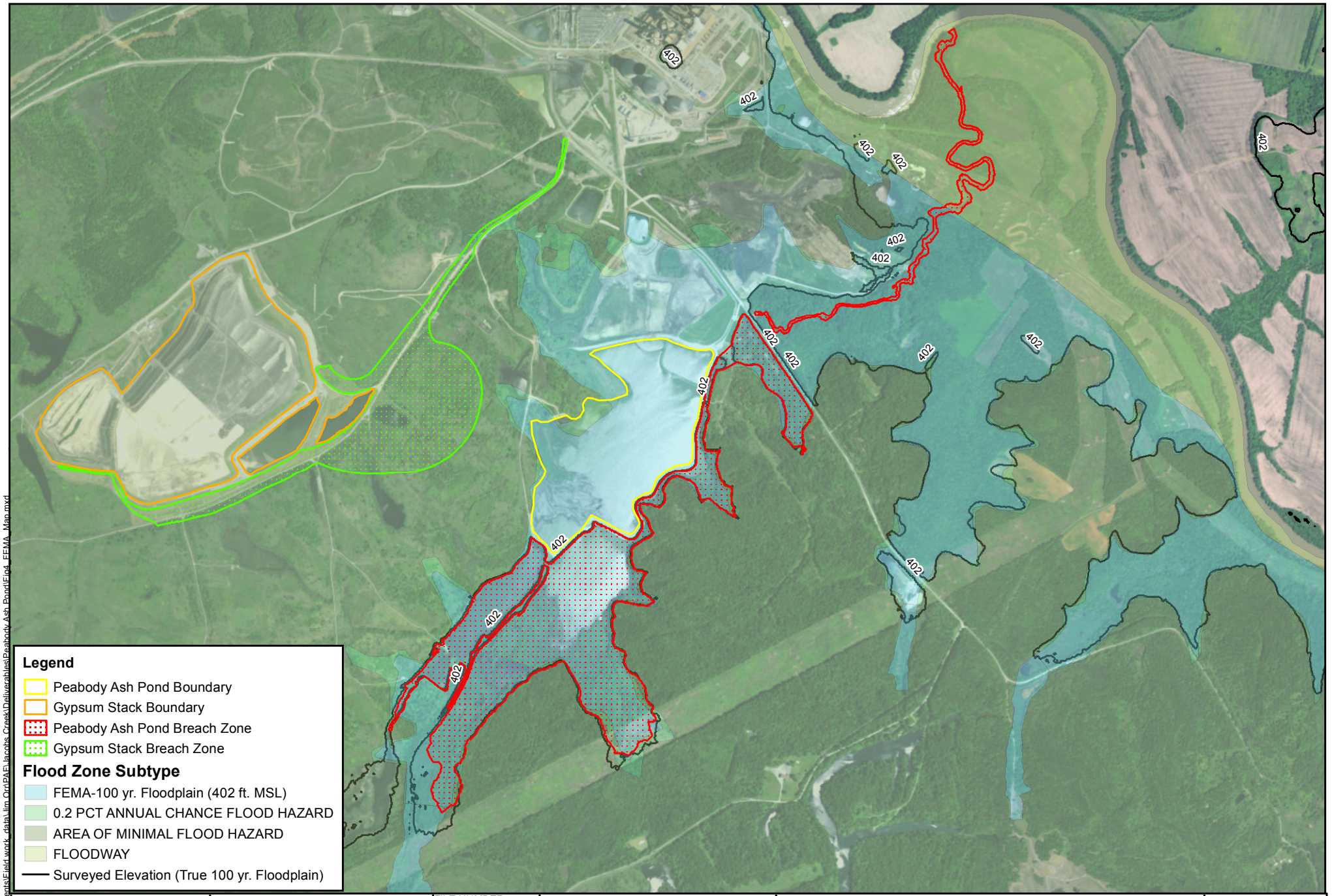
2017 Wetland Delineations
TVA Paradise Fossil Plant
Drakesboro, KY, 42337

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **10**

C:\Users\edmundsm\Documents\Field work data\Jim Ord\PAE\Jacobs Creek\Deliverables\Slag Pond Area\Fig2_NWI_SlagPond.mxd



C:\Users\edmundsm\Documents\Field work data\Jim Orr\PAE\Jacobs Creek\Deliverables\Peabody Ash Pond\Fig4_FEMA_Map.mxd

Notes

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Service Layer and Inset Layer Credits: TVA Aerial Imagery 2016

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TVA Paradise Wetland Delineation

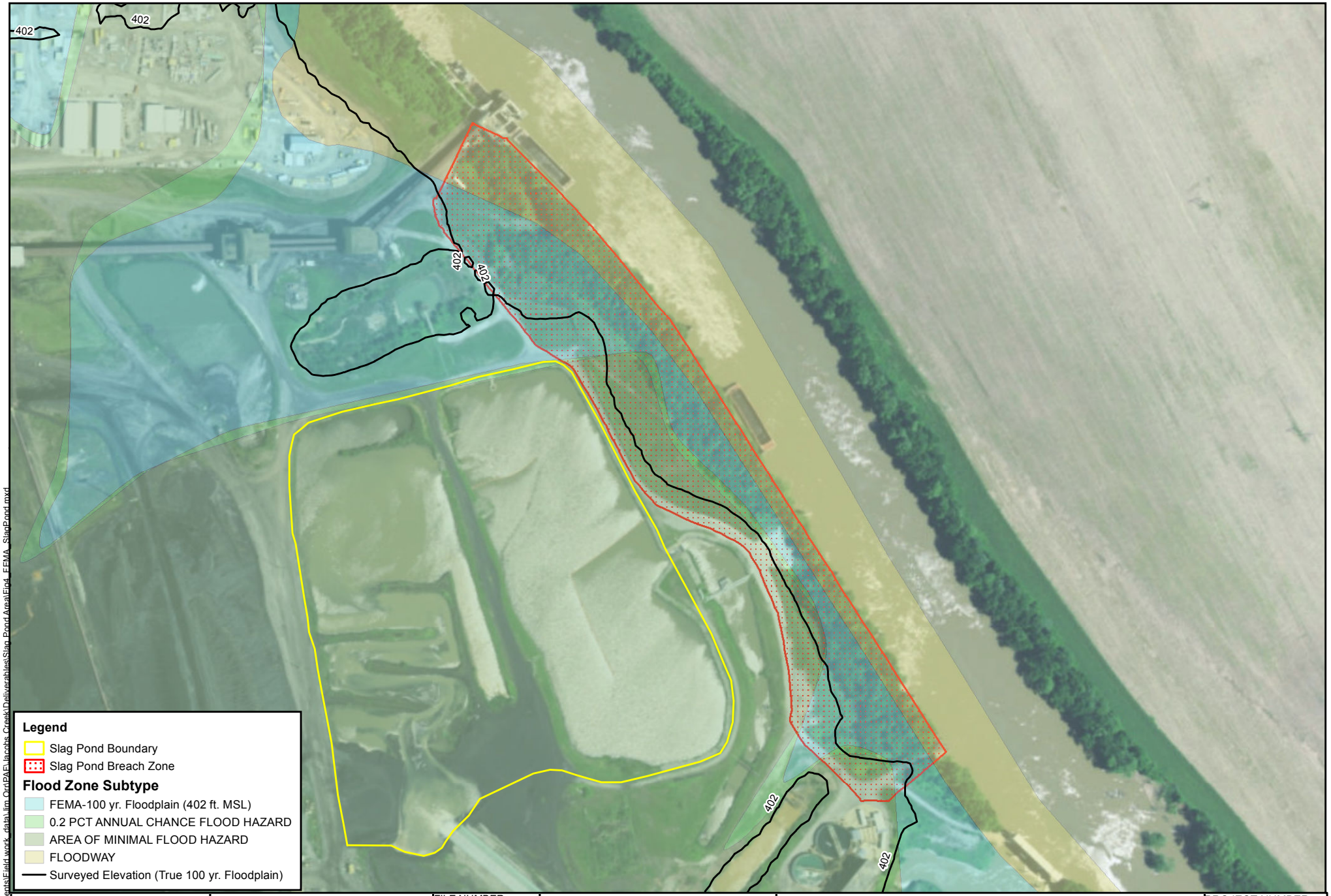
FEMA Flood Zone Map, Gypsum Stack & Peabody Ash Pond

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **11**



C:\Users\edmundsm\Documents\Field work_data\Jim Ord\PAE\Jacobs Creek\Deliverables\Slag Pond Area\Fig4_FEMA_SlagPond.mxd

Notes

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Service Layer and Inset Layer Credits: TVA Aerial Imagery 2016

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0 125 250 500

Feet

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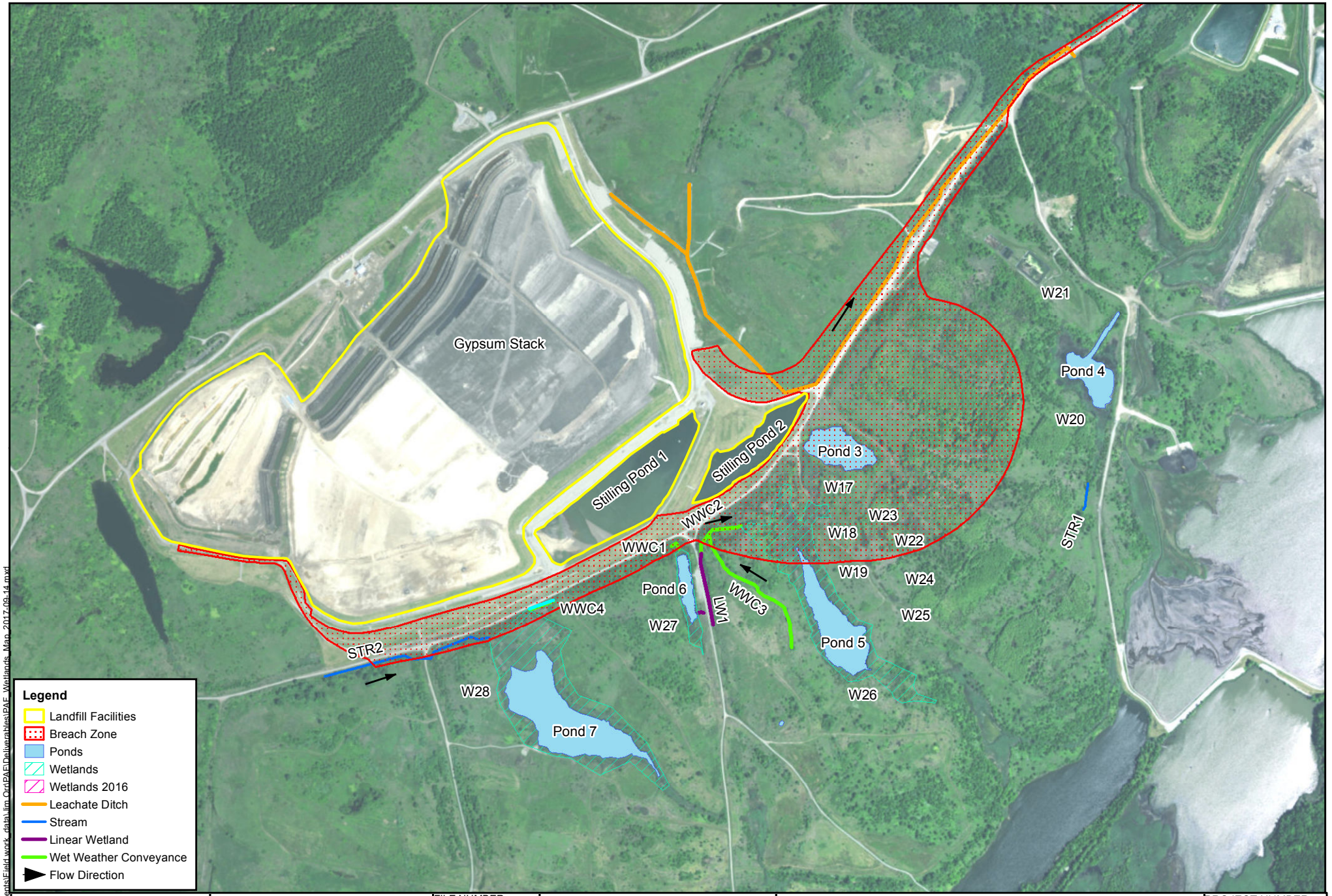
TVA Paradise Wetland Delineation
FEMA Flood Zone Map, Slag Pond

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **12**



C:\Users\edmundsm\Documents\Field work data\Jim Orr\PAF\Deliverables\PAF_Wetlands_Map_2017-09-14.mxd

Notes

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0 375 750 1,500

Feet

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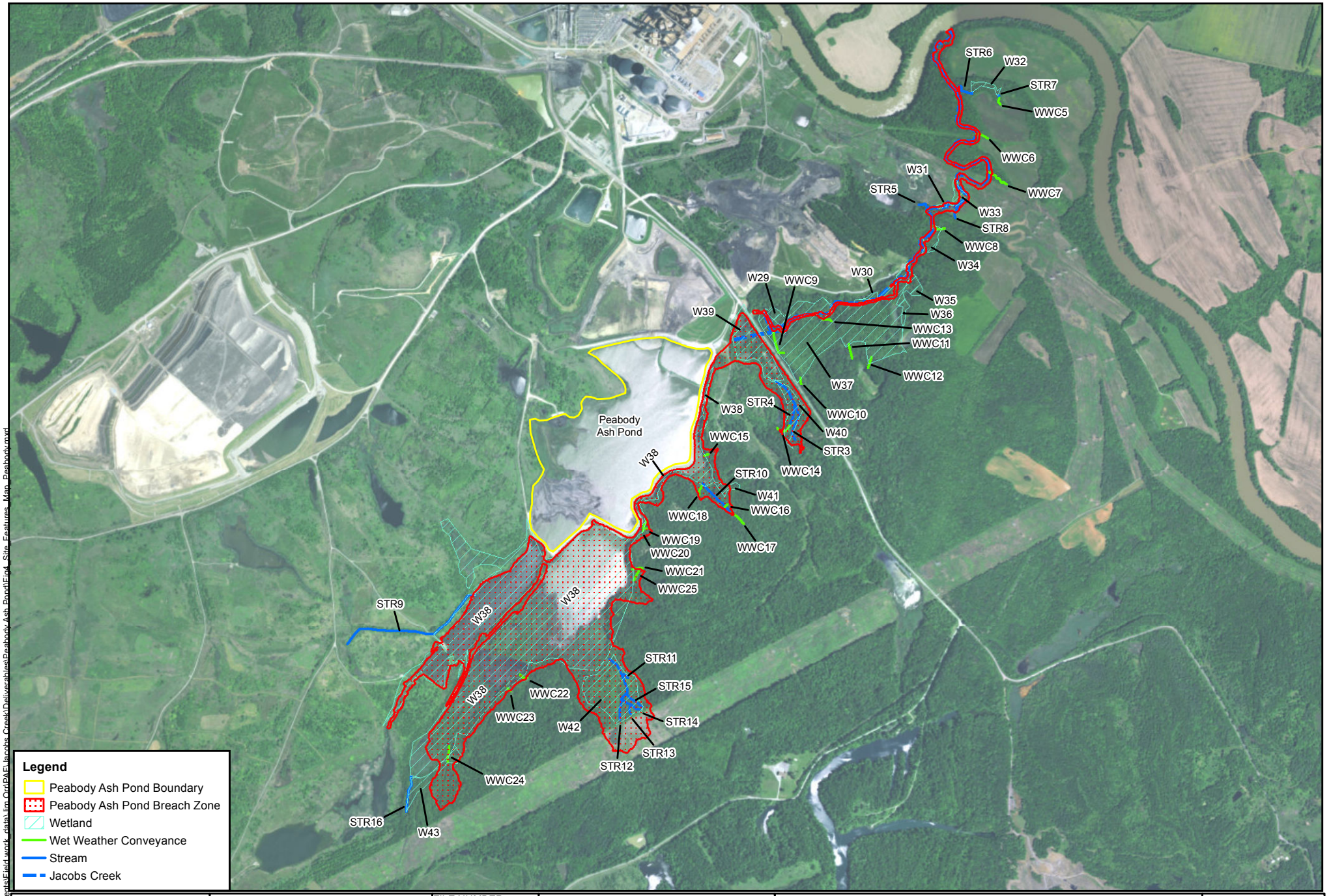
TVA Paradise Wetland Delineation

Site Location and Survey Points, Gypsum Stack

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

PROJECT NUMBER	60478473
DATE	November, 2017
FIGURE NUMBER	13



C:\Users\edmundsm\Documents\Field work_data\Jim Ord\PAE\Jacobs Creek\Deliverables\Peabody Ash Pond\Fig4_Site_Features_Map_Peabody.mxd

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

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0 750 1,500 3,000

Feet

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FILE NUMBER	
DESIGNED BY	DCW
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TVA Paradise Wetland Delineation

Site Location and Survey Points, Peabody Ash Pond

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

PROJECT NUMBER	60478473
DATE	November, 2017
FIGURE NUMBER	14

Notes

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

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N

0 125 250 500

Feet

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FILE NUMBER

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TVA Paradise Wetland Delineation

Site Location and Survey Points, Slag Pond

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **15**

C:\Users\edmundsm\Documents\Field work data\Jim Ord\PAF\Jacobs Creek\Deliverables\Slag Pond Area\Fig4_Site_Features_Map_SlagPond.mxd

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: 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 [✓] No [ ]	**Is the Sampled Area within a Wetland?** Yes [ ] No [✓]
Hydric Soil Present?	Yes [✓] No [ ]	
Wetland Hydrology Present?	Yes [✓] No [ ]	

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)

- [✓] Surface Water (A1)
- [ ] High Water Table (A2)
- [✓] Saturation (A3)
- [✓] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [✓] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [✓] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [✓] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [✓] Stunted or Stressed Plants (D1)
- [✓] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [✓] No [ ] Depth (inches): <1-4
Water Table Present? Yes [ ] No [✓] Depth (inches):
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): 0

Wetland Hydrology Present? Yes [✓] No [ ]

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. Salix nigra	40	X	OBL
2.			
3.			
4.			
5.			
6.			
	40 = Total Cover		
50% of total cover:	20% of total cover:		
Sapling Stratum (Plot size:)			
1. Salix nigra	10	X	OBL
2.			
3.			
4.			
5.			
6.			
	10 = 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. Phragmites australis	40	X	FACW
2. Ambrosia trifida	20	X	FACU
3. Polygomum pensylvanicum	10		FACW
4. Polygonum cuspidatum	10		FACU
5. Carex vulpinoidea	5		OBL
6. Carex pensylvanica	5		FACW
7.			
8.			
9.			
10.			
11.			
	90 = Total Cover		
50% of total cover: 45	20% of total cover: 18		
Woody Vine Stratum (Plot size:)			
1. Toxicodendron radicans	5	X	FAC
2. Lonicera japonica	5	X	FACU
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	55	x 1 =	55
FACW species	55	x 2 =	110
FAC species	5	x 3 =	15
FACU species	35	x 4 =	140
UPL species		x 5 =	
Column Totals:	150 (A)		320 (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 ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: LW-1

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR5/1	95	10YR6/8	5				clay loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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-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 [✓] No [ ]	**Is the Sampled Area within a Wetland?** Yes [ ] No [ ]
Hydric Soil Present?	Yes [✓] No [ ]	
Wetland Hydrology Present?	Yes [✓] No [ ]	

Remarks:
Pond south of road

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [✓] Surface Water (A1)
- [ ] High Water Table (A2)
- [ ] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [✓] Aquatic Fauna (B13)
- [✓] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [✓] No [ ] Depth (inches): 0-48
Water Table Present? Yes [✓] No [ ] Depth (inches): _____
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): _____

Wetland Hydrology Present? Yes [✓] No [ ]

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. Salix nigra	5	x	OBL
2. Populus deltoides	5	x	FAC
3. Platanus occidentalis	10	X	FACW
4.			
5.			
6.			
	20	= Total Cover	

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

Sapling Stratum (Plot size:)			
1. Salix nigra	10	X	OBL
2. Platanus occidentalis	5	X	FACW
3.			
4.			
5.			
6.			
	15	= Total Cover	

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

Shrub Stratum (Plot size:)			
1. Cornus amomum	5	X	FACW
2. Elaeagnus umbellata	20	X	FAC
3.			
4.			
5.			
6.			
	25	= Total Cover	

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

Herb Stratum (Plot size:)			
1. Phragmites australis	95	X	FACW
2. Cyperus esculentus	5		FACW
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:)			
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: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	10	x 1 =	10
FACW species	120	x 2 =	240
FAC species	25	x 3 =	75
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	155 (A)		325 (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 ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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 Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
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

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

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- [x] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [x] 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)**
- [x] Loamy Gleyed Matrix (F2)
- [x] 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 Soils[3]:

- [ ] 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)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes [x] 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: 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 [ ]	No [✓]	**Is the Sampled Area within a Wetland?** Yes [ ] No [✓]
Hydric Soil Present?	Yes [ ]	No [✓]	
Wetland Hydrology Present?	Yes [ ]	No [✓]	

Remarks:
South of Pond 6

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [ ] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes [ ]	No [✓]	Depth (inches):
Water Table Present?	Yes [ ]	No [✓]	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes [ ]	No [✓]	Depth (inches):

Wetland Hydrology Present? Yes [ ] No [✓]

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. Celtis occidentalis	15	x	FACU
2. Juniperus virginiana	7	x	FACU
3. Pyrus calleryana	2		FAC
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. Lespedeza cuneata	65	X	FACU
2. Ambrosia artemisiifolia	25	X	FACU
3. Ambrosia trifida	10		FAC
4. Solidage gigantea	3		FACW
5. Circium vulgare	2		FACU
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 ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: UPL-1

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	2.5Y5/2	100						gravelly fill dirt

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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 [✓] No [ ]	**Is the Sampled Area within a Wetland?** Yes [ ] No [✓]
Hydric Soil Present?	Yes [✓] No [ ]	
Wetland Hydrology Present?	Yes [✓] No [ ]	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [✓] Surface Water (A1)
- [✓] High Water Table (A2)
- [✓] Saturation (A3)
- [✓] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [✓] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [✓] Aquatic Fauna (B13)
- [✓] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [✓] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [✓] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [✓] Stunted or Stressed Plants (D1)
- [✓] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes [✓]	No [ ]	Depth (inches): 1-2
Water Table Present?	Yes [✓]	No [ ]	Depth (inches): -2
Saturation Present? (includes capillary fringe)	Yes [✓]	No [ ]	Depth (inches): 0

Wetland Hydrology Present? Yes [✓] No [ ]

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

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	10		OBL
2. Populus deltoides	40	X	FACW
3. Acer negundo	2		FAC
4. Fraxinus pennsylvanica	20	X	FACW
5.			
6.			
	72	= Total Cover	

50% of total cover: 36 20% of total cover: 14.4

Sapling Stratum (Plot size:)			
1. Salix nigra	10	X	OBL
2. Celtis occidentalis	2		FACU
3. Fraxinus pennsylvanica	5	X	FACW
4.			
5.			
6.			
	17	= Total Cover	

50% of total cover: 8.5 20% of total cover: 3.4

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. Solidago gigantea	80	X	FACW
2. Carex pensylvanica	5		FACW
3. Eupatorium altissimum	2		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	87	= Total Cover	

50% of total cover: 43.5 20% of total cover: 17.4

Woody Vine Stratum (Plot size:)			
1. Parthenocissus quinquefolia	5	X	FACU
2.			
3.			
4.			
5.			
	5	= Total Cover	

50% of total cover: 2.5 20% of total cover:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 83 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	150	x 2 =	300
FAC species	4	x 3 =	12
FACU species	7	x 4 =	28
UPL species		x 5 =	
Column Totals:	181 (A)		360 (B)

Prevalence Index = B/A = 1.98

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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-27

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

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

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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 [✓] No [ ]	**Is the Sampled Area within a Wetland?** Yes [ ] No [ ]
Hydric Soil Present?	Yes [✓] No [ ]	
Wetland Hydrology Present?	Yes [✓] No [ ]	

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)

- [✓] Surface Water (A1)
- [ ] High Water Table (A2)
- [ ] Saturation (A3)
- [✓] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [✓] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [✓] Aquatic Fauna (B13)
- [✓] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [✓] No [ ] Depth (inches): 0-48
Water Table Present? Yes [✓] No [ ] Depth (inches):
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches):

Wetland Hydrology Present? Yes [✓] No [ ]

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. Salix nigra	25	X	OBL
2. Populus deltoides	5		FAC
3. Platanus occidentalis	10	X	FACW
4.			
5.			
6.			
	50 = Total Cover		

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

Sapling Stratum (Plot size:)			
1. Salix nigra	10	X	OBL
2. Platanus occidentalis	5	x	FACW
3.			
4.			
5.			
6.			
	15 = Total Cover		

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

Shrub Stratum (Plot size:)			
1. Cornus amomum	5	X	FACW
2. Elaeagnus umbellata	20	X	FAC
3.			
4.			
5.			
6.			
	25 = Total Cover		

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

Herb Stratum (Plot size:)			
1. Phragmites australis	95	X	FACW
2. Cyperus esculentus	5		FACW
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:)			
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	30	x 1 =	30
FACW species	120	x 2 =	240
FAC species	25	x 3 =	75
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	175 (A)		345 (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 ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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 Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
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

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

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- [x] Histosol (A1)
- [ ] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [x] 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)**
- [x] Loamy Gleyed Matrix (F2)
- [x] 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 Soils[3]:

- [ ] 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)

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

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes [x] No [ ]

Remarks:

WETLAND DETERMINATION DATA FORM – Eastern Mountains and Piedmont Region

Project/Site: Paradise Fossil Plant City/County: Muhlenberg County Sampling Date: 10/24/2017
Applicant/Owner: TVA State: KY Sampling Point: W29
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Valley Local relief (concave, convex, none): Convex Slope (%): 2-4
Subregion (LRR or MLRA): Lat: 37.249 Long: -86.996 Datum: NAD83
Soil Map Unit Name: Belknap silt loam NWI classification: Freshwater Pond
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? N (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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	

Remarks:
This wetland is formed from alluvial deposits that, over time, have become vegetated.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [ ] Saturation (A3)
- [✓] Water Marks (B1)
- [✓] Sediment Deposits (B2)
- [✓] Drift Deposits (B3)
- [✓] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [✓] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [✓] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [✓] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [✓] Drainage Patterns (B10)
- [✓] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [✓] Crayfish Burrows (C8)
- [✓] Saturation Visible on Aerial Imagery (C9)
- [✓] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes [ ]	No [✓]	Depth (inches):
Water Table Present?	Yes [ ]	No [✓]	Depth (inches):
Saturation Present? (includes capillary fringe)	Yes [✓]	No [ ]	Depth (inches): 12

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:
potential pond area resulting from mining

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W29

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus occidentalis	45	x	FACW
2. Acer negundo	30	x	FAC
3. Betula nigra	15		FACW
4.			
5.			
6.			
	90	= Total Cover	
50% of total cover: 45	20% of total cover: 18		

Sapling Stratum (Plot size:)			
1. Acer negundo	20	x	FACW
2. Platanus occidentalis	10	x	FACW
3. Celtis occidentalis	10	x	FACU
4.			
5.			
6.			
	40	= Total Cover	
50% of total cover: 20	20% of total cover: 8		

Shrub Stratum (Plot size:)			
1. Cephalanthus occidentalis	20	x	OBL
2.			
3.			
4.			
5.			
6.			
	20	= Total Cover	
50% of total cover: 10	20% of total cover: 4		

Herb Stratum (Plot size:)			
1. Cyperus esculentus	75	x	FACW
2. Chasmanthium latifolium	20		FACU
3. Laportea canadensis	20		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	115	= Total Cover	
50% of total cover: 57.5	20% of total cover: 23		

Woody Vine Stratum (Plot size:)			
1. Parthenocissus quinquefolia	5		FACU
2. Toxicodendron radicans	20	x	FAC
3. Smilax rotundafolia	2		FAC
4.			
5.			
	27	= Total Cover	
50% of total cover: 13.5	20% of total cover: 5.4		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 87.5% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	160	x 2 =	320
FAC species	77	x 3 =	231
FACU species	35	x 4 =	140
UPL species		x 5 =	
Column Totals:	292 (A)		711 (B)

Prevalence Index = B/A = 2.43

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W29

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/2	100						silty clay
6-12	10YR 5/2	70	10YR 5/8	30				Clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil Plant City/County: Muhlenberg County Sampling Date: 10/24/2017
Applicant/Owner: TVA State: KY Sampling Point: W30
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): valley Local relief (concave, convex, none): Convex Slope (%): 2-3
Subregion (LRR or MLRA): Lat: 37.249 Long: -86.967 Datum: NAD83
Soil Map Unit Name: Belknap silt loam NWI classification: Freshwater Pond
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? N (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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	

Remarks:
This wetland is formed from alluvial deposits that, over time have become vegetated.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [ ] Saturation (A3)
- [✓] Water Marks (B1)
- [✓] Sediment Deposits (B2)
- [✓] Drift Deposits (B3)
- [✓] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [✓] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [✓] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [✓] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [✓] Drainage Patterns (B10)
- [✓] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [✓] Crayfish Burrows (C8)
- [✓] Saturation Visible on Aerial Imagery (C9)
- [✓] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [ ] No [✓] Depth (inches): _____
Water Table Present? Yes [ ] No [✓] Depth (inches): _____
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): 12

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W30

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus occidentalis	45	x	FACW
2. Acer negundo	35	x	FAC
3. Betula nigra	15		FACW
4.			
5.			
6.			
	95	= Total Cover	

50% of total cover: 47.5 20% of total cover: 19

Sapling Stratum (Plot size:)			
1. Acer negundo	20	x	FACW
2. Platanus occidentalis	15	x	FACW
3. Celtis occidentalis	10	x	FACU
4.			
5.			
6.			
	45	= Total Cover	

50% of total cover: 22.5 20% of total cover: 9

Shrub Stratum (Plot size:)			
1. Cephalanthus occidentalis	20	x	OBL
2.			
3.			
4.			
5.			
6.			
	20	= Total Cover	

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

Herb Stratum (Plot size:)			
1. Cyperus esculentus	75	x	FACW
2. Chasmanthium latifolium	20		FACU
3. Laportea canadensis	20		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	115	= Total Cover	

50% of total cover: 57.5 20% of total cover: 23

Woody Vine Stratum (Plot size:)			
1. Parthenocissus quinquefolia	5		FACU
2. Toxicodendron radicans	20	x	FAC
3. Smilax rotundafolia	2		FAC
4.			
5.			
	27	= Total Cover	

50% of total cover: 13.5 20% of total cover: 5.4

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 87.5% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	20	x 1 =	20
FACW species	160	x 2 =	320
FAC species	77	x 3 =	231
FACU species	35	x 4 =	140
UPL species		x 5 =	
Column Totals:	292 (A)		711 (B)

Prevalence Index = B/A = 2.43

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W30

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 2/2	100						silty clay
6-12	10YR 5/2	70	10YR 5/8	30				Clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil Plant City/County: Muhlenberg County Sampling Date: 10/24/2017
Applicant/Owner: TVA State: KY Sampling Point: W31
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): None Slope (%): 0-1
Subregion (LRR or MLRA): Lat: 37.252 Long: -86.965 Datum: NAD83
Soil Map Unit Name: Belknap silt loam/Lindside silt loam NWI classification: Lake
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? N (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 ✓	No ☐	**Is the Sampled Area within a Wetland?** Yes ✓ No ☐
Hydric Soil Present?	Yes ✓	No ☐	
Wetland Hydrology Present?	Yes ✓	No ☐	

Remarks:
This wetland is formed from alluvial deposits that, over time have become vegetated.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ✓ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ True Aquatic Plants (B14)
- ☐ Hydrogen Sulfide Odor (C1)
- ✓ Oxidized Rhizospheres on Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ✓ Surface Soil Cracks (B6)
- ✓ Sparsely Vegetated Concave Surface (B8)
- ✓ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ✓ Stunted or Stressed Plants (D1)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ Microtopographic Relief (D4)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ☐	No ✓	Depth (inches): _____
Water Table Present?	Yes ☐	No ✓	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes ☐	No ✓	Depth (inches): _____

Wetland Hydrology Present? Yes ✓ No ☐

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W31

Tree 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:

Sapling Stratum (Plot size:)			
1. Salix nigra	2	x	FACW
2. Platanus occidentalis	2	x	FACW
3. Celtis occidentalis	3	x	FACU
4.			
5.			
6.			
	7 = Total Cover		

50% of total cover: 3.5 20% of total cover: 1.4

Shrub Stratum (Plot size:)			
1. Cephalanthus occidentalis	35	x	OBL
2.			
3.			
4.			
5.			
6.			
	35 = Total Cover		

50% of total cover: 17.5 20% of total cover: 7

Herb Stratum (Plot size:)			
1. Cyperus esculentus	50	x	FACW
2. Polygonum pensylvanicum	30		FACW
3. Schedonorus arundinaceus	50	x	FACU
4. Ambrosia artimisiifolia	80	x	FACU
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	210 = Total Cover		

50% of total cover: 105 20% of total cover: 42

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: 4 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 57.1% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	35	x 1 =	35
FACW species	54	x 2 =	108
FAC species		x 3 =	
FACU species	133	x 4 =	532
UPL species		x 5 =	
Column Totals:	222 (A)		675 (B)

Prevalence Index = B/A = 3.04

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W31

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	7.5YR 3/1	100						silty clay
10-12	7.5YR 5/6	80	7.5YR 4/1	20				Clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil Plant City/County: Muhlenberg County Sampling Date: 10/24/2017
Applicant/Owner: TVA State: KY Sampling Point: W32
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): None Slope (%): 0-1
Subregion (LRR or MLRA): Lat: 37.258 Long: -86.962 Datum: NAD83
Soil Map Unit Name: Nolin-Melvin complex/Lindside silt loam NWI classification: Lake
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? N Are "Normal Circumstances" present? Yes [✓] No [ ]
Are Vegetation [ ] Soil [ ] or Hydrology [ ] naturally problematic? N (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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	

Remarks:
PFO - swamp

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [✓] Surface Water (A1)
- [ ] High Water Table (A2)
- [✓] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [✓] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [✓] Surface Soil Cracks (B6)
- [✓] Sparsely Vegetated Concave Surface (B8)
- [✓] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [✓] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [✓] No [ ] Depth (inches): 12-16
Water Table Present? Yes [✓] No [ ] Depth (inches): 0
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): 0

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W32

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix nigra	5		OBL
2. Acer negundo	2		FAC
3. Acer saccharinum	80	x	FACW
4.			
5.			
6.			
	87 = Total Cover		

50% of total cover: 43.5 20% of total cover: 17.4

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. Cephalanthus occidentalis	20	x	OBL
2.			
3.			
4.			
5.			
6.			
	20 = Total Cover		

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

Herb Stratum (Plot size:)			
1. Cyperus esculentus	5		FACW
2. Saururus cernuus	70	x	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	75 = Total Cover		

50% of total cover: 37.5 20% of total cover: 13

Woody Vine Stratum (Plot size:)			
1. Smilax rotundifolia	2	x	FAC
2. Campsis radicans	2	x	FAC
3.			
4.			
5.			
	4 = Total Cover		

50% of total cover: 2 20% of total cover: 1

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	95	x 1 =	95
FACW species	85	x 2 =	170
FAC species	6	x 3 =	18
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	186 (A)		283 (B)

Prevalence Index = B/A = 1.52

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W32

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 6/6	100						clay loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil Plant City/County: Muhlenberg County Sampling Date: 10/24/2017
Applicant/Owner: TVA State: KY Sampling Point: W33
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Valley Local relief (concave, convex, none): None Slope (%): 0
Subregion (LRR or MLRA): Lat: 37.252 Long: -86.963 Datum: NAD83
Soil Map Unit Name: Belknap silt loam NWI classification: lake
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? N Are "Normal Circumstances" present? Yes [✓] No [ ]
Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? N (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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [✓] Surface Water (A1)
- [ ] High Water Table (A2)
- [✓] Saturation (A3)
- [✓] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [✓] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [✓] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [✓] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [✓] Sparsely Vegetated Concave Surface (B8)
- [✓] Drainage Patterns (B10)
- [✓] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [✓] Crayfish Burrows (C8)
- [✓] Saturation Visible on Aerial Imagery (C9)
- [✓] Stunted or Stressed Plants (D1)
- [✓] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [✓] No [ ] Depth (inches): 1-2
Water Table Present? Yes [✓] No [ ] Depth (inches): 0-12
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): 0-12

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W33

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Betula nigra	35	x	FACW
2. Platanus occidentalis	55	x	FACW
3.			
4.			
5.			
6.			
	90 = Total Cover		
50% of total cover: 45	20% of total cover: 18		
Sapling Stratum (Plot size:)			
1. Platanus occidentalis	10	x	FACW
2. Celtis occidentalis	15	x	FACU
3.			
4.			
5.			
6.			
	25 = Total Cover		
50% of total cover: 12.5	20% of total cover: 5		
Shrub Stratum (Plot size:)			
1. Cephalanthus occidentalis	5	x	OBL
2.			
3.			
4.			
5.			
6.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		
Herb Stratum (Plot size:)			
1. Cyperus esculentus	75	x	FACW
2. Saururus cernuus	7		OBL
3. Laportea canadensis	10		FACW
4. Ambrosia artimisiifolia	15		FACU
5. Polyganum pensylvanicum	5		FACW
6.			
7.			
8.			
9.			
10.			
11.			
	112 = Total Cover		
50% of total cover: 55.5	20% of total cover: 22.04		
Woody Vine Stratum (Plot size:)			
1. Smilax rotundifolia	20	x	FAC
2.			
3.			
4.			
5.			
	20 = Total Cover		
50% of total cover: 10	20% of total cover: 4		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 85.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	12	x 1 =	12
FACW species	190	x 2 =	380
FAC species		x 3 =	
FACU species	30	x 4 =	120
UPL species		x 5 =	
Column Totals:	232 (A)		512 (B)

Prevalence Index = B/A = 2.21

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W33

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	7.5YR 4/3	100%						clay loam
5-12	7.5YR 5/8	45%	7.5YR 5/2	55%				clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil Plant City/County: Muhlenberg County Sampling Date: 10/24/2017
Applicant/Owner: TVA State: KY Sampling Point: W34
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Valley Local relief (concave, convex, none): None Slope (%): 0-1
Subregion (LRR or MLRA): Lat: 37.251 Long: -86.965 Datum: NAD83
Soil Map Unit Name: Belknap silt loam NWI classification: Lake
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? N Are "Normal Circumstances" present? Yes [✓] No [ ]
Are Vegetation [ ] Soil [ ] or Hydrology [ ] naturally problematic? N (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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	

Remarks:
PFO wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [ ] Saturation (A3)
- [✓] Water Marks (B1)
- [✓] Sediment Deposits (B2)
- [✓] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [✓] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [✓] Sparsely Vegetated Concave Surface (B8)
- [✓] Drainage Patterns (B10)
- [✓] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [✓] Crayfish Burrows (C8)
- [✓] Saturation Visible on Aerial Imagery (C9)
- [✓] Stunted or Stressed Plants (D1)
- [✓] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [ ] No [✓] Depth (inches): _____
Water Table Present? Yes [ ] No [✓] Depth (inches): _____
Saturation Present? (includes capillary fringe) Yes [ ] No [✓] Depth (inches): _____

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W34

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Betula nigra	55	x	FACW
2. Platanus occidentalis	45	x	FACW
3.			
4.			
5.			
6.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		

Sapling Stratum (Plot size:)			
1. Celtis occidentalis	45	x	FACU
2.			
3.			
4.			
5.			
6.			
	45 = Total Cover		
50% of total cover: 22.5	20% of total cover: 9		

Shrub Stratum (Plot size:)			
1. Cephalanthus occidentalis	5	x	OBL
2.			
3.			
4.			
5.			
6.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		

Herb Stratum (Plot size:)			
1. Cyperus esculentus	85	x	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	85 = Total Cover		
50% of total cover: 42.5	20% of total cover: 17		

Woody Vine Stratum (Plot size:)			
1. Smilax rotundifolia	5	x	FAC
2.			
3.			
4.			
5.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 85.7% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	185	x 2 =	370
FAC species	5	x 3 =	15
FACU species	45	x 4 =	180
UPL species		x 5 =	
Column Totals:	240 (A)		570 (B)

Prevalence Index = B/A = 2.38

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W34

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 4/4	100%						clay loam
5-12	10YR 5/1	90%	10YR 5/8	10%				clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil Plant City/County: Muhlenberg County Sampling Date: 10/24/2017
Applicant/Owner: TVA State: KY Sampling Point: W35
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Valley Local relief (concave, convex, none): Convex Slope (%): 0-2
Subregion (LRR or MLRA): Lat: 37.249 Long: -86.966 Datum: NAD83
Soil Map Unit Name: Belknap silt loam NWI classification: Lake
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? N Are "Normal Circumstances" present? Yes [✓] No [ ]
Are Vegetation [ ] Soil [ ] or Hydrology [ ] naturally problematic? N (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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	

Remarks:
PFO wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [✓] Surface Water (A1)
- [ ] High Water Table (A2)
- [✓] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [✓] Sparsely Vegetated Concave Surface (B8)
- [✓] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [✓] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [✓] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [✓] No [ ] Depth (inches): 1-2
Water Table Present? Yes [✓] No [ ] Depth (inches): 0
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): 0

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W35

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Betula nigra	35	x	FACW
2. Platanus occidentalis	45	x	FACW
3. Acer negundo	5		FAC
4. Liquidambar styraciflua	25	x	FAC
5. Acer rubrum	15		FACW
6.			
	125	= Total Cover	

50% of total cover: 62.5 20% of total cover: 25

Sapling Stratum (Plot size:)			
1. Celtis occidentalis	45	x	FACU
2. Liquidambar styraciflua	10		FAC
3. Fraxinus pennsylvanica	5		FACW
4.			
5.			
6.			
	60	= Total Cover	

50% of total cover: 30 20% of total cover: 12

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. Cyperus esculentus	85	x	FACW
2. Saururus cernuus	35	x	OBL
3. Arundinaria gigantea	15		FACW
4. Onoclea sensibilis	5		FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	140	= Total Cover	

50% of total cover: 70 20% of total cover: 28

Woody Vine Stratum (Plot size:)			
1. Smilax rotundifolia	5	x	FAC
2. Toxicodendron radicans	10	x	FAC
3. Vitis vulpina	5	x	FAC
4.			
5.			
	20	= Total Cover	

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

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 88.9% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	35	x 1 =	35
FACW species	200	x 2 =	400
FAC species	50	x 3 =	150
FACU species	45	x 4 =	180
UPL species		x 5 =	
Column Totals:	330 (A)		765 (B)

Prevalence Index = B/A = 2.32

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W35

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-9	2.5YR 2/1	100%						clay loam
9-12	10YR 5/3	80%	7.5YR 4/6	20%				clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil Plant City/County: Muhlenberg County Sampling Date: 10/24/2017
Applicant/Owner: TVA State: KY Sampling Point: W36
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Valley/Depression Local relief (concave, convex, none): Convex Slope (%): 4-5
Subregion (LRR or MLRA): Lat: 37.247 Long: -86.967 Datum: NAD83
Soil Map Unit Name: Belknap silt loam/Wellston silt loam NWI classification: Lake
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? N Are "Normal Circumstances" present? Yes [✓] No [ ]
Are Vegetation [ ], Soil [ ], or Hydrology [ ] naturally problematic? N (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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	

Remarks:
PFO

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [✓] Surface Water (A1)
- [ ] High Water Table (A2)
- [✓] Saturation (A3)
- [✓] Water Marks (B1)
- [✓] Sediment Deposits (B2)
- [✓] Drift Deposits (B3)
- [✓] Algal Mat or Crust (B4)
- [✓] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [✓] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [✓] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [✓] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [✓] Sparsely Vegetated Concave Surface (B8)
- [✓] Drainage Patterns (B10)
- [✓] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [✓] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [✓] Stunted or Stressed Plants (D1)
- [✓] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [✓] No [ ] Depth (inches): 1-4
Water Table Present? Yes [✓] No [ ] Depth (inches): 0
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): 0

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W36

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Betula nigra	35	x	FACW
2. Platanus occidentalis	45	x	FACW
3. Acer rubrum	25	x	FACW
4.			
5.			
6.			
	105 = Total Cover		
50% of total cover: 52.5	20% of total cover: 21		

Sapling Stratum (Plot size:)			
1. Celtis occidentalis	35	x	FACU
2. Acer negundo	15	x	FAC
3.			
4.			
5.			
6.			
	50 = Total Cover		
50% of total cover: 25	20% of total cover: 10		

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. Cyperus esculentus	85	x	FACW
2. Saururus cernuus	15		OBL
3. Polygonum pensylvanica	5		FACW
4.			
5.			
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. Smilax rotundifolia	10	x	FAC
2. Toxicodendron radicans	15	x	FAC
3. Parthenocicus quinquefolia	5		FAC
4.			
5.			
	30 = Total Cover		
50% of total cover: 15	20% of total cover: 6		

Dominance Test worksheet:

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

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 87.5% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15	x 1 =	15
FACW species	195	x 2 =	390
FAC species	45	x 3 =	135
FACU species	35	x 4 =	140
UPL species		x 5 =	
Column Totals:	290 (A)		680 (B)

Prevalence Index = B/A = 2.34

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W36

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	2.5YR 4/2	95%	10YR 5/6	5%				clay loam

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil Plant City/County: Muhlenberg County Sampling Date: 10/24/2017
Applicant/Owner: TVA State: KY Sampling Point: W37
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Valley/Depression Local relief (concave, convex, none): Convex Slope (%): 2-3
Subregion (LRR or MLRA): Lat: 37.248 Long: -86.972 Datum: NAD83
Soil Map Unit Name: Belknap silt loam/Wellston silt loam NWI classification: Lake
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? N (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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	

Remarks:
PFO wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [✓] Saturation (A3)
- [✓] Water Marks (B1)
- [✓] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [✓] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [✓] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [✓] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [ ] No [✓] Depth (inches): _____
Water Table Present? Yes [ ] No [✓] Depth (inches): _____
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): 8

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W37

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Betula nigra	35	x	FACW
2. Platanus occidentalis	45	x	FACW
3. Acer rubrum	25	x	FACW
4.			
5.			
6.			
	105 = Total Cover		
50% of total cover: 52.5	20% of total cover: 21		

Sapling Stratum (Plot size:)			
1. Celtis occidentalis	15	x	FACU
2. Platanus occidentalis	20	x	FACW
3. Fraxinus pennsylvanica	10		FACW
4.			
5.			
6.			
	45 = Total Cover		
50% of total cover: 22.5	20% of total cover: 9		

Shrub Stratum (Plot size:)			
1. Cephalanthus occidentalis	5	x	OBL
2.			
3.			
4.			
5.			
6.			
	5 = Total Cover		
50% of total cover: 2.5	20% of total cover: 1		

Herb Stratum (Plot size:)			
1. Cyperus esculentus	85	x	FACW
2. Ambrosia artimisiifolia	10		OBL
3. Phragmites australis	5		FACW
4. Laportea canadensis	5		FAC
5.			
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. Smilax rotundifolia	10	x	FAC
2. Toxicodendron radicans	15	x	FAC
3. Parthenocicus quinquefolia	2		FAC
4. Vitis vulpina	5		FAC
5.			
	32 = Total Cover		
50% of total cover: 16	20% of total cover: 6.04		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 88.9% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	5	x 1 =	5
FACW species	225	x 2 =	450
FAC species	37	x 3 =	111
FACU species	15	x 4 =	60
UPL species		x 5 =	
Column Totals:	282 (A)		626 (B)

Prevalence Index = B/A = 2.22

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W37

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-10	2.5YR 5/1	20%	10YR 5/6	30%				silt clay loam
0-12	10YR 3/1	50%						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil Plant City/County: Muhlenberg County Sampling Date: 10/25/2017
Applicant/Owner: TVA State: KY Sampling Point: W38
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%):
Subregion (LRR or MLRA): Lat: 37.234 Long: -86.983 Datum: NAD83
Soil Map Unit Name: Bonnie silt loam/Udorthents/Belknap silt loam NWI classification: Lake
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? N (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 [✓] No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓] No [ ]	
Wetland Hydrology Present?	Yes [✓] No [ ]	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [✓] Surface Water (A1)
- [ ] High Water Table (A2)
- [✓] Saturation (A3)
- [✓] Water Marks (B1)
- [✓] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [✓] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [✓] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [✓] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [✓] No [ ] Depth (inches): 72
Water Table Present? Yes [ ] No [✓] Depth (inches):
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): 6

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W38

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus occidentalis	40	x	FACW
2. Betula nigra	40	x	FACW
3. Salix nigra	40	x	OBL
4. Acer negundo	25		FAC
5. Celtis occidentalis	15		FACU
6.			
	160	= Total Cover	
50% of total cover: 80	20% of total cover: 32		

Sapling Stratum (Plot size:)			
1. Celtis occidentalis	10		FACU
2. Platanus occidentalis	30	x	FACW
3. Acer negundo	30	x	FAC
4. Salix nigra	10		OBL
5.			
6.			
	80	= Total Cover	
50% of total cover: 40	20% of total cover: 16		

Shrub Stratum (Plot size:)			
1. Cephalanthus occidentalis	60	x	OBL
2. Elaeagnus umbellata	30		INV
3.			
4.			
5.			
6.			
	90	= Total Cover	
50% of total cover: 45	20% of total cover: 18		

Herb Stratum (Plot size:)			
1. Phragmites	85	x	OBL
2. Typha angustifolia	30		OBL
3. Cyperus esculentus	40	x	FACW
4. Bolboschoenus fluviatilis	25		OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	180	= Total Cover	
50% of total cover: 90	20% of total cover: 36		

Woody Vine Stratum (Plot size:)			
1. Lonicera japonica	15		FACU
2. Toxicodendron radicans	25	x	FAC
3.			
4.			
5.			
	40	= Total Cover	
50% of total cover: 20	20% of total cover: 8		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 9 (A)

Total Number of Dominant Species Across All Strata: 9 (B)

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

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W38

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/1	100						Gravel
4-12	10YR 5/2	85	10YR 5/8	15				Clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil City/County: Muhlenberg County Sampling Date: 10/26/2017
Applicant/Owner: TVA State: KY Sampling Point: W39
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Hillslope/depression Local relief (concave, convex, none): Slope (%): 3-5
Subregion (LRR or MLRA): Lat: 37.246 Long: -86.974 Datum: NAD85
Soil Map Unit Name: Pits NWI classification: Freshwater Pond
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? N (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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	

Remarks:
PFO Wetland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [ ] Surface Water (A1)
- [ ] High Water Table (A2)
- [✓] Saturation (A3)
- [ ] Water Marks (B1)
- [ ] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] True Aquatic Plants (B14)
- [✓] Hydrogen Sulfide Odor (C1)
- [ ] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [✓] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [✓] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [✓] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [✓] No [ ] Depth (inches): >12
Water Table Present? Yes [ ] No [✓] Depth (inches):
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): 12

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W39

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus occidentalis	55	x	FACW
2. Betula nigra	25	x	FACW
3. Salix nigra	15		OBL
4. Liquidambar styraciflua	15		FAC
5. Populus deltoides	5		FAC
6.			
	115 = Total Cover		
50% of total cover: 57.5	20% of total cover: 23		

Sapling Stratum (Plot size:)			
1. Celtis occidentalis	15	x	FACU
2. Liquidambar styraciflua	15	x	FAC
3. Fraxinus pennsylvanica	5		FACW
4. Platanus occidentalis	10	x	FACW
5.			
6.			
	45 = Total Cover		
50% of total cover: 22.5	20% of total cover: 9		

Shrub Stratum (Plot size:)			
1. Cephalanthus occidentalis	45	x	OBL
2.			
3.			
4.			
5.			
6.			
	45 = Total Cover		
50% of total cover: 22.5	20% of total cover:		

Herb Stratum (Plot size:)			
1. Cyperus esculentus	15		FACW
2. Phragmites	85	x	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	100 = Total Cover		
50% of total cover: 50	20% of total cover: 20		

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: 6 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 85 (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species	x 1 =
FACW species	x 2 =
FAC species	x 3 =
FACU species	x 4 =
UPL species	x 5 =
Column Totals: (A)	(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W39

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-1	2.5Y 3/1	100						Organic
1-12	7.5YR 6/8	20	2.5YR 6/1	80				Clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil City/County: Muhlenberg County Sampling Date: 10/26/2017
Applicant/Owner: TVA State: KY Sampling Point: W40
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%): 2-4
Subregion (LRR or MLRA): Lat: 37.243 Long: -86.972 Datum: NAD85
Soil Map Unit Name: Wellston silt loam/Pits 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? N (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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [ ] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	

Remarks:
PFO wetland.
Parallels Riverside road on northwest side.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [✓] Surface Water (A1)
- [ ] High Water Table (A2)
- [✓] Saturation (A3)
- [ ] Water Marks (B1)
- [✓] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [✓] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [✓] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [✓] Sparsely Vegetated Concave Surface (B8)
- [✓] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [✓] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [✓] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [✓] No [ ] Depth (inches): 1
Water Table Present? Yes [ ] No [✓] Depth (inches):
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): 0

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W40

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	75	x	FAC
2. Acer saccharinum	15		FAC
3. Quercus rubra	10		FACU
4. Platanus occidentalis	35	x	FACW
5.			
6.			
	135	= Total Cover	
50% of total cover: 67.5	20% of total cover: 27		

Sapling Stratum (Plot size:)			
1. Liquidambar styraciflua	45	x	FAC
2. Morus rubra	5		FACU
3. Fraxis pennsylvanica	10		FACW
4. Celtis occidentalis	5		FACU
5.			
6.			
	65	= Total Cover	
50% of total cover: 32.5	20% of total cover: 13		

Shrub Stratum (Plot size:)			
1. Lindera	35	x	FAC
2. Rosa multiflora	15		FACU
3.			
4.			
5.			
6.			
		= Total Cover	
50% of total cover: 50	20% of total cover: 10		

Herb Stratum (Plot size:)			
1. Onoclea sensibilis	5		FACW
2. Macrothelypteris torresiana	20	x	FAC
3. Laportea canadensis	5		FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	30	= Total Cover	
50% of total cover: 15	20% of total cover: 6		

Woody Vine Stratum (Plot size:)			
1. Lonicera japonica	2	x	FACU
2. Vitis spp.	2	x	FAC
3.			
4.			
5.			
	4	= Total Cover	
50% of total cover: 2	20% of total cover: .8		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 86 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W40

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10YR 5/2	100						Silt loam
2-12	2.5Y 7/1	60	10YR 5/8	40				Clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil City/County: Muhlenberg County Sampling Date: 10/26/2017
Applicant/Owner: TVA State: KY Sampling Point: W41
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Slope (%): 2-3
Subregion (LRR or MLRA): Lat: 37.241 Long: -86.977 Datum: NAD85
Soil Map Unit Name: Belknap silt loam 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? N (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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	

Remarks:
PFO wetland
STR10 flows into W41.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [✓] Surface Water (A1)
- [✓] High Water Table (A2)
- [✓] Saturation (A3)
- [✓] Water Marks (B1)
- [✓] Sediment Deposits (B2)
- [✓] Drift Deposits (B3)
- [✓] Algal Mat or Crust (B4)
- [✓] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [✓] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [✓] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [✓] Sparsely Vegetated Concave Surface (B8)
- [✓] Drainage Patterns (B10)
- [✓] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [✓] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [✓] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [✓] No [ ] Depth (inches): 1-2
Water Table Present? Yes [✓] No [ ] Depth (inches): 10
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): 8

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W41

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus occidentalis	15		FACW
2. Betula nigra	15		FACW
3. Liquidambar styraciflua	45	x	FAC
4. Acer saccharinum	25	x	FACW
5. Salix nigra	2		OBL
6.			
	102	= Total Cover	

50% of total cover: 51 20% of total cover: 20.4

Sapling Stratum (Plot size:)			
1. Celtis occidentalis	5		FACU
2. Betula nigra	12	x	FACW
3. Platanus occidentalis	10		FACW
4. Liquidambar styraciflua	25	x	FAC
5.			
6.			
	52	= Total Cover	

50% of total cover: 26 20% of total cover: 10.4

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. Microstegium vimineum	55	x	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	55	= Total Cover	

50% of total cover: 27.5 20% of total cover:

Woody Vine Stratum (Plot size:)			
1. Lonicera japonica	10	x	FACU
2. Toxicodendron radicans	10	x	FAC
3.			
4.			
5.			
	20	= Total Cover	

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

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 85 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☐ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W41

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/3	100						
3-12	2.5Y 5/3	90	7.5YR 5/8	10				Clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil City/County: Muhlenberg County Sampling Date: 10/26/2017
Applicant/Owner: TVA State: KY Sampling Point: W42
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Slope (%):
Subregion (LRR or MLRA): Lat: 37.231 Long: -86.981 Datum: NAD85
Soil Map Unit Name: Belknap silt loam/Bonnie silt loam 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? N (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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	

Remarks:
PFO wetland
Includes STR11, STR12, STR13, STR14, and STR15.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [✓] Surface Water (A1)
- [ ] High Water Table (A2)
- [✓] Saturation (A3)
- [✓] Water Marks (B1)
- [✓] Sediment Deposits (B2)
- [✓] Drift Deposits (B3)
- [✓] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [✓] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [✓] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [✓] Sparsely Vegetated Concave Surface (B8)
- [✓] Drainage Patterns (B10)
- [✓] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [✓] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [✓] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [✓] No [ ] Depth (inches): 1-12
Water Table Present? Yes [✓] No [ ] Depth (inches): 8
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): 0

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W42

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	55	x	FAC
2. Betula nigra	10		FACW
3. Acer saccharinum	45	x	FACW
4. Salix nigra	5		OBL
5. Platanus occidentalis	10		FACW
6.			
	125	= Total Cover	

50% of total cover: 62.5 20% of total cover: 25

Sapling Stratum (Plot size:)			
1. Liquidambar styraciflua	35	x	FAC
2. Quercus alba	10		FACU
3. Acer saccharinum	15	x	FACW
4.			
5.			
6.			
	62	= Total Cover	

50% of total cover: 31 20% of total cover: 12.4

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. Chasmanthium latifolium	10	x	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	10	= Total Cover	

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

Woody Vine Stratum (Plot size:)			
1. Smilax rotundifolia	10	x	FAC
2. Toxicodendron radicans	2		FAC
3.			
4.			
5.			
	12	= Total Cover	

50% of total cover: 6 20% of total cover: 1.4

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

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

Percent of Dominant Species That Are OBL, FACW, or FAC: 83 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	1	x 1 =	1
FACW species	4	x 2 =	8
FAC species	3	x 3 =	9
FACU species	1	x 4 =	4
UPL species	0	x 5 =	0
Column Totals:	9 (A)		22 (B)

Prevalence Index = B/A = 2.444

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W42

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	2.5Y 7/1	90	7.5YR 5/8	10				Clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil Plant City/County: Muhlenberg County Sampling Date: 10/26/2017
Applicant/Owner: TVA State: KY Sampling Point: W43
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Slope (%): 4-6
Subregion (LRR or MLRA): Lat: 37.226 Long: -86.993 Datum: NAD85
Soil Map Unit Name: Belknap silt loam 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? N (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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	

Remarks:
Includes STR16

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [✓] Surface Water (A1)
- [✓] High Water Table (A2)
- [✓] Saturation (A3)
- [✓] Water Marks (B1)
- [✓] Sediment Deposits (B2)
- [✓] Drift Deposits (B3)
- [✓] Algal Mat or Crust (B4)
- [✓] Iron Deposits (B5)
- [✓] Inundation Visible on Aerial Imagery (B7)
- [✓] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [✓] Oxidized Rhizospheres on Living Roots (C3)
- [✓] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [✓] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [✓] Sparsely Vegetated Concave Surface (B8)
- [✓] Drainage Patterns (B10)
- [✓] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [✓] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Stunted or Stressed Plants (D1)
- [✓] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [✓] No [ ] Depth (inches): 1-6
Water Table Present? Yes [✓] No [ ] Depth (inches): 1
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): 1

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W43

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1. Betula nigra	45	x	FACW
2. Platanus occidentalis	35	x	FACW
3. Acer rubrum	25	x	FACW
4.			
5.			
6.			
	105	= Total Cover	
50% of total cover: 52.5	20% of total cover: 21		

Sapling Stratum (Plot size:)			
1. Fraxis pennsylvanica	10	x	FACW
2. Platanus occidentalis	10	x	FACW
3. Acer rubrum	5	x	FACW
4.			
5.			
6.			
	25	= Total Cover	
50% of total cover: 12.5	20% of total cover: 5		

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. Onoclea sensibilis	25	x	FACW
2. Microstegium vimineum	20		FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	45	= Total Cover	
50% of total cover: 22.5	20% of total cover: 9		

Woody Vine Stratum (Plot size:)			
1. Toxicodendron radicans	5	x	FAC
2.			
3.			
4.			
5.			
	5	= Total Cover	
50% of total cover: 2.5	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

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

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	7	x 2 =	14
FAC species	2	x 3 =	6
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	8 (A)		20 (B)

Prevalence Index = B/A = 2.5

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W43

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	2.5Y 7/2	95	7.5YR 6/8	5				Clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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: Paradise Fossil City/County: Muhlenberg County Sampling Date: 10/24/2017
Applicant/Owner: TVA State: KY Sampling Point: W44
Investigator(s): HO, WD Section, Township, Range:
Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Slope (%): 4-6
Subregion (LRR or MLRA): Lat: 37.267 Long: -86.981 Datum: NAD85
Soil Map Unit Name: Udorthents NWI classification: N/A
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? Y Are "Normal Circumstances" present? Yes [✓] No [ ]
Are Vegetation [ ] Soil [ ] or Hydrology [ ] naturally problematic? N (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 [✓]	No [ ]	**Is the Sampled Area within a Wetland?** Yes [✓] No [ ]
Hydric Soil Present?	Yes [✓]	No [ ]	
Wetland Hydrology Present?	Yes [✓]	No [ ]	

Remarks:
PSS wetland.
Wetland butts up to gravel haul road to the east; cleared and mowed on all sides of wetland.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- [✓] Surface Water (A1)
- [ ] High Water Table (A2)
- [✓] Saturation (A3)
- [ ] Water Marks (B1)
- [✓] Sediment Deposits (B2)
- [ ] Drift Deposits (B3)
- [ ] Algal Mat or Crust (B4)
- [ ] Iron Deposits (B5)
- [ ] Inundation Visible on Aerial Imagery (B7)
- [ ] Water-Stained Leaves (B9)
- [ ] Aquatic Fauna (B13)
- [ ] True Aquatic Plants (B14)
- [ ] Hydrogen Sulfide Odor (C1)
- [✓] Oxidized Rhizospheres on Living Roots (C3)
- [ ] Presence of Reduced Iron (C4)
- [ ] Recent Iron Reduction in Tilled Soils (C6)
- [ ] Thin Muck Surface (C7)
- [ ] Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- [ ] Surface Soil Cracks (B6)
- [ ] Sparsely Vegetated Concave Surface (B8)
- [ ] Drainage Patterns (B10)
- [ ] Moss Trim Lines (B16)
- [ ] Dry-Season Water Table (C2)
- [ ] Crayfish Burrows (C8)
- [ ] Saturation Visible on Aerial Imagery (C9)
- [ ] Stunted or Stressed Plants (D1)
- [ ] Geomorphic Position (D2)
- [ ] Shallow Aquitard (D3)
- [ ] Microtopographic Relief (D4)
- [ ] FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes [✓] No [ ] Depth (inches): 1-3"
Water Table Present? Yes [ ] No [✓] Depth (inches):
Saturation Present? (includes capillary fringe) Yes [✓] No [ ] Depth (inches): 6"

Wetland Hydrology Present? Yes [✓] No [ ]

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

Remarks:

VEGETATION (Five Strata) – Use scientific names of plants. Sampling Point: W44

Tree 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: _____

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. Phragmites	95	x	FACW
2.			
3.			
4.			
5.			
6.			
	95 = Total Cover		

50% of total cover: 47.5 20% of total cover: _____

Herb Stratum (Plot size:)			
1. Rumex crispus	2	x	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	2 = Total Cover		

50% of total cover: 1 20% of total cover: _____

Woody Vine Stratum (Plot size:)			
1. Lonicera japonica	2	x	FACU
2.			
3.			
4.			
5.			
	2 = Total Cover		

50% of total cover: 1 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	1	x 2 =	2
FAC species	1	x 3 =	3
FACU species	1	x 4 =	4
UPL species	0	x 5 =	0
Column Totals:	3 (A)		9 (B)

Prevalence Index = B/A = 3

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☑ 3 - Prevalence Index is ≤3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators 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: W44

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

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-12	7.5YR 4/3	60	7.5YR 5/8	40				Silty clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: 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 Soils[3]:

- ☐ 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)

[3]Indicators 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:

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: STR3		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2421, -86.9716
Previous Rainfall (7-days) : 1.29in		
Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data :		
Watershed Size : 24.25 acres	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Belknap silt loam		Source:
Surrounding Land Use : clear cut for winter forage/partially forested		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe ☐ Moderate ☑ Slight ☐ Absent ☐		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☐
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☑	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☐	Stream ☑
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☑
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 29

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 17)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☐ 1	☑ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☑ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☐ 1	☑ 2	☐ 3
7. Braided channel	☐ 0	☑ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☐ 0.5	☐ 1	☑ 1.5
9. Natural levees	☐ 0	☐ 1	☑ 2	☐ 3
10. Headcuts	☐ 0	☑ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☐ 0.5	☐ 1	☑ 1.5
13. At least second order channel on existing USGS or NRCS map	☐ No = 0		☑ Yes = 3	

B. **Hydrology** (Subtotal = 5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☐ 0	☑ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☐ 0	☑ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☑ 1	☐ 0.5	☐ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☐ 0.5	☐ 1	☑ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 7)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☑ 2	☐ 1	☐ 0
21. Rooted plants in channel [1]	☐ 3	☑ 2	☐ 1	☐ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☑ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☐ 0	☑ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☐ 0	☑ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 29

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: STR4		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2428, -86.9718
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown ☐

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Belknap silt loam Source:

Surrounding Land Use : forested

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :

Severe ☐ Moderate ☑ Slight ☐ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✓	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	✓	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☐
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✓	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☐
6. Presence of fish (except *Gambusia*)	✓	Stream ☐
7. Presence of naturally occurring ground water table connection	☐	Stream ✓
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ✓
9. Evidence watercourse has been used as a supply of drinking water	✓	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 25

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 13)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☑ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☐ 1	☑ 2	☐ 3
7. Braided channel	☐ 0	☑ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☐ 0.5	☐ 1	☑ 1.5
9. Natural levees	☐ 0	☐ 1	☑ 2	☐ 3
10. Headcuts	☐ 0	☑ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☐ 0.5	☐ 1	☑ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☐ 0	☑ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☐ 0	☑ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☑ 1	☐ 0.5	☐ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☐ 0.5	☐ 1	☑ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 7)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☑ 2	☐ 1	☐ 0
21. Rooted plants in channel [1]	☐ 3	☑ 2	☐ 1	☐ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☑ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☐ 0	☑ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☐ 0	☑ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 25

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody:	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: STR5		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2524, -86.9648
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown ☐

Source of recent & seasonal precip data :

Watershed Size : 0.519 acres	Photos: Y or N (circle) Number :
Soil Type(s) / Geology : Udorthents	Source:
Surrounding Land Use : partially forested	

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :

Severe ☐ Moderate ☑ Slight ☐ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☐
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☑	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☑
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☐	Stream ☑
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 29.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 16)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☐ 1	☑ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☐ 1	☑ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☐ 1	☑ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☑ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☐ 0.5	☑ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☐ No = 0		☑ Yes = 3	

B. **Hydrology** (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☐ 0	☐ 1	☑ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☐ 0	☐ 1	☐ 2	☑ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☑ 1	☐ 0.5	☐ 0
17. Sediment on plants or on debris	☐ 0	☐ 0.5	☑ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☑ No = 0		☐ Yes = 1.5	

C. **Biology** (Subtotal = 11)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☑ 3	☐ 2	☐ 1	☐ 0
21. Rooted plants in channel [1]	☑ 3	☐ 2	☐ 1	☐ 0
22. Crayfish in stream (exclude in floodplain)	☑ 0	☐ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☐ 0.5	☑ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☐ 0	☐ 1	☑ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☑ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☐ 0	☐ 0.5	☑ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 29.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: STR6		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2578, -86.9635
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown ☐

Source of recent & seasonal precip data :

Watershed Size :	Photos: Y or N (circle) Number :
Soil Type(s) / Geology : Nolin-Melin Complex	Source:
Surrounding Land Use : partially forested	

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☐ Absent ☑

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☑	WWC ☐
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☑	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☑
6. Presence of fish (except *Gambusia*)	☐	Stream ☑
7. Presence of naturally occurring ground water table connection	☐	Stream ☑
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☑
9. Evidence watercourse has been used as a supply of drinking water	☐	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 37.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 17)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☐ 1	☑ 2	☐ 3
2. Sinuous channel	☐ 0	☐ 1	☑ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☐ 1	☑ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☐ 1	☑ 2	☐ 3
5. Active/relic floodplain	☐ 0	☑ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☐ 1	☑ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☑ 0	☐ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☐ 1	☑ 2	☐ 3
10. Headcuts	☑ 0	☐ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☐ 0.5	☑ 1	☐ 1.5
12. Natural valley or drainageway	☑ 0	☐ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☐ No = 0		☑ Yes = 3	

B. **Hydrology** (Subtotal = 9)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☐ 0	☐ 1	☑ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☐ 0	☐ 1	☐ 2	☑ 3
16. Leaf litter in channel (January – September)	☑ 1.5	☐ 1	☐ 0.5	☐ 0
17. Sediment on plants or on debris	☐ 0	☐ 0.5	☑ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☐ 0.5	☑ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 11)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☑ 3	☐ 2	☐ 1	☐ 0
21. Rooted plants in channel [1]	☑ 3	☐ 2	☐ 1	☐ 0
22. Crayfish in stream (exclude in floodplain)	☑ 0	☐ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☐ 0.5	☑ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☐ 0	☐ 1	☑ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☑ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☐ 0	☐ 0.5	☑ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 37.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Str 6	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: STR7		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2576, -86.9613
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown ☐

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Lindside silt | Source:

Surrounding Land Use : partially cleared for cropland/partially forested

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☑ Slight ☐ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☑
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☑
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☐	Stream ☑
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☑
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 22

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 11)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☐ 1	☑ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☑ 0	☐ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☑ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☐ 0	☑ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☑ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☑ 1	☐ 2	☐ 3
11. Grade controls	☑ 0	☐ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☐ 0.5	☐ 1	☑ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☐ 0	☑ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☐ 0	☑ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☑ 1	☐ 0.5	☐ 0
17. Sediment on plants or on debris	☐ 0	☐ 0.5	☐ 1	☑ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☐ 0.5	☐ 1	☑ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 3.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☑ 0	☐ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☐ 0	☑ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☑ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☐ 0	☑ 0.5	☐ 1	☐ 1.5
28. Wetland plants in channel [2]	☐ 0	☑ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 22

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: STR8		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2523, -86.9632
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown ☐

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Lindside silt Source:

Surrounding Land Use : partially cleared for cropland/partially forested

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☑ Slight ☐ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☐
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☑
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☐	Stream ☑
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☑
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 20.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 13.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☐ 1	☑ 2	☐ 3
6. Depositional bars or benches	☐ 0	☐ 1	☑ 2	☐ 3
7. Braided channel	☐ 0	☑ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☐ 1	☑ 2	☐ 3
10. Headcuts	☑ 0	☐ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☐ No = 0		☑ Yes = 3	

B. **Hydrology** (Subtotal = 5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☐ 0	☑ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☐ 0	☑ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☑ 0.5	☐ 0
17. Sediment on plants or on debris	☐ 0	☑ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 2)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☑ 0	☐ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☑ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☐ 0	☑ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 20.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: STR9		
USGS quad:	HUC (12 digit):	Lat/Long: 37.233, -86.991
Previous Rainfall (7-days) : 1.29in		
Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data :		
Watershed Size :	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Udorthents		Source:
Surrounding Land Use : clear cut for winter forage/partially forested		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe ☐ Moderate ☑ Slight ☐ Absent ☐		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☐
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☑	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☐	Stream ☑
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☑
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 37

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 22.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☐ 1	☑ 2	☐ 3
2. Sinuous channel	☐ 0	☐ 1	☑ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☐ 1	☑ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☐ 1	☑ 2	☐ 3
5. Active/relic floodplain	☐ 0	☑ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☐ 1	☐ 2	☑ 3
7. Braided channel	☐ 0	☐ 1	☑ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☐ 0.5	☐ 1	☑ 1.5
9. Natural levees	☐ 0	☐ 1	☑ 2	☐ 3
10. Headcuts	☐ 0	☑ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☐ No = 0		☑ Yes = 3	

B. **Hydrology** (Subtotal = 6.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☐ 0	☑ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☐ 0	☐ 1	☑ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☑ 1	☐ 0.5	☐ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☐ 0.5	☑ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 8)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☑ 2	☐ 1	☐ 0
21. Rooted plants in channel [1]	☐ 3	☑ 2	☐ 1	☐ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☐ 0	☑ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☑ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☐ 0	☑ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☐ 0	☑ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 37

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: STR10		
USGS quad:	HUC (12 digit):	Lat/Long: 37.240, -86.977
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size : Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Belknap silt loam Source:

Surrounding Land Use : Forested

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☐ Absent ☑

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☑	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☐	Stream ☑
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 32.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 19.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☐ 1	☑ 2	☐ 3
2. Sinuous channel	☐ 0	☐ 1	☑ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☐ 1	☑ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☐ 1	☑ 2	☐ 3
5. Active/relic floodplain	☐ 0	☐ 1	☑ 2	☐ 3
6. Depositional bars or benches	☐ 0	☐ 1	☑ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☑ 0	☐ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☑ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☐ 0.5	☐ 1	☑ 1.5
13. At least second order channel on existing USGS or NRCS map	☐ No = 0		☑ Yes = 3	

B. **Hydrology** (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☐ 0	☐ 1	☑ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☐ 0	☐ 1	☑ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☑ 0.5	☐ 0
17. Sediment on plants or on debris	☐ 0	☑ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☐ 0.5	☑ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 5.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☑ 1	☐ 0
21. Rooted plants in channel [1]	☐ 3	☑ 2	☐ 1	☐ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☐ 0.5	☑ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☐ 0	☑ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 32.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: STR11		
USGS quad:	HUC (12 digit):	Lat/Long: 37.231, -86.980
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown ☐

Source of recent & seasonal precip data :

Watershed Size :	Photos: Y or N (circle) Number :
Soil Type(s) / Geology : Belknap silt loam	Source:
Surrounding Land Use : Forested	

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✓	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	✓	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	✓	WWC ☐
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✓	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✓	Stream ☐
6. Presence of fish (except *Gambusia*)	✓	Stream ☐
7. Presence of naturally occurring ground water table connection	☐	Stream ✓
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	✓	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 25.5

Justification / Notes :

Cleared power line south/upstream

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 17)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☐ 1	☑ 2	☐ 3
2. Sinuous channel	☐ 0	☐ 1	☑ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☑ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☑ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☑ 2	☐ 3
11. Grade controls	☐ 0	☐ 0.5	☑ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☐ 0.5	☐ 1	☑ 1.5
13. At least second order channel on existing USGS or NRCS map	☐ No = 0		☑ Yes = 3	

B. **Hydrology** (Subtotal = 6.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☐ 0	☐ 1	☑ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☐ 0	☑ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☐ 0	☑ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☐ 0.5	☐ 1	☑ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 2)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☑ 1	☐ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 25.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: STR12		
USGS quad:	HUC (12 digit):	Lat/Long: 37.231, -86.981
Previous Rainfall (7-days) :		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size :	Photos: Y or N (circle) Number :
Soil Type(s) / Geology : Belknap silt loam/ Bonnie silt loam	Source:
Surrounding Land Use : Forested	

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☑	WWC ☐
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☐	Stream ☑
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☑
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 32

Justification / Notes :

Power lines to the south/upstream

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 16.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☐ 1	☑ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☐ 1	☑ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☐ 0	☑ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☐ 0.5	☑ 1	☐ 1.5
9. Natural levees	☐ 0	☐ 1	☑ 2	☐ 3
10. Headcuts	☑ 0	☐ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☐ 0.5	☑ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☐ No = 0		☑ Yes = 3	

B. **Hydrology** (Subtotal = 9)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☐ 0	☐ 1	☐ 2	☑ 3
15. Water in channel and >48 hours since sig. rain	☐ 0	☐ 1	☑ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☑ 0.5	☐ 0
17. Sediment on plants or on debris	☐ 0	☐ 0.5	☑ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☐ 0.5	☑ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 6.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☑ 1	☐ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☑ 1	☐ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☐ 0.5	☑ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☐ 0	☑ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☑ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☐ 0	☐ 0.5	☑ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 32

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to str 12	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: STR13		
USGS quad:	HUC (12 digit):	Lat/Long: 37.231, -86.98
Previous Rainfall (7-days) : 1.29		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown ☐

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Belknap silt loam | Source:

Surrounding Land Use : Forested

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✓	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	✓	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☐
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	✓	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☐
6. Presence of fish (except *Gambusia*)	✓	Stream ☐
7. Presence of naturally occurring ground water table connection	☐	Stream ✓
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ✓
9. Evidence watercourse has been used as a supply of drinking water	✓	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 27

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 15)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☐ 1	☑ 2	☐ 3
2. Sinuous channel	☐ 0	☐ 1	☑ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☑ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☐ 0	☑ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☑ 1	☐ 2	☐ 3
10. Headcuts	☑ 0	☐ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☐ 0.5	☑ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☐ No = 0		☑ Yes = 3	

B. **Hydrology** (Subtotal = 5.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☐ 0	☐ 1	☑ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☐ 0	☑ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☐ 0	☑ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 6.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☑ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☑ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☑ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☐ 0.5	☑ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☐ 0	☑ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☑ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☐ 0	☑ 0.5	☐ 1	☐ 1.5
28. Wetland plants in channel [2]	☐ 0	☑ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 27

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to str 12	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: STR14		
USGS quad:	HUC (12 digit):	Lat/Long: 37.230, -86.988
Previous Rainfall (7-days) : 1.28in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size :	Photos: Y or N (circle) Number :
Soil Type(s) / Geology : Belknap silt loam	Source:
Surrounding Land Use : Forested	

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☐
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☐	Stream ☑
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☑
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 31

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 17.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☐ 1	☑ 2	☐ 3
2. Sinuous channel	☐ 0	☐ 1	☑ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☐ 1	☑ 2	☐ 3
5. Active/relic floodplain	☐ 0	☑ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☐ 0	☐ 1	☑ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☐ 0.5	☑ 1	☐ 1.5
9. Natural levees	☐ 0	☑ 1	☐ 2	☐ 3
10. Headcuts	☑ 0	☐ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☐ 0.5	☑ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☐ No = 0		☑ Yes = 3	

B. **Hydrology** (Subtotal = 6)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☐ 0	☐ 1	☑ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☐ 0	☐ 1	☑ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☐ 0	☐ 0.5	☑ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☐ 0.5	☑ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☑ No = 0		☐ Yes = 1.5	

C. **Biology** (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☑ 1	☐ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☑ 1	☐ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☐ 0.5	☑ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☐ 0.5	☑ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☐ 0	☑ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☐ 1	☑ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☐ 0	☑ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 31

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Str12	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: STR15		
USGS quad:	HUC (12 digit):	Lat/Long: 37.229, -86.978
Previous Rainfall (7-days) : 1.28in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Belknap silt loam, Zanesville silt loam Source:

Surrounding Land Use : Forested

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☐
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☑	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☐	Stream ☑
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☑
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 28

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 14.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☐ 1	☑ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☑ 0	☐ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☐ 1	☑ 2	☐ 3
6. Depositional bars or benches	☐ 0	☐ 1	☑ 2	☐ 3
7. Braided channel	☐ 0	☐ 1	☑ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☐ 0.5	☑ 1	☐ 1.5
9. Natural levees	☐ 0	☐ 1	☑ 2	☐ 3
10. Headcuts	☑ 0	☐ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☐ 0.5	☑ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 7)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☐ 0	☑ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☐ 0	☐ 1	☑ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☑ 0.5	☐ 0
17. Sediment on plants or on debris	☐ 0	☐ 0.5	☑ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☐ 0.5	☑ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 6.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☑ 1	☐ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☑ 1	☐ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☐ 0.5	☑ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☐ 0	☑ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☑ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☐ 0	☐ 0.5	☑ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 28

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: STR16		
USGS quad:	HUC (12 digit):	Lat/Long: 37.226, -86.992
Previous Rainfall (7-days) : 1.28in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size :	Photos: Y or N (circle) Number :
Soil Type(s) / Geology : Udorthents/ Belknap silt loam	Source:
Surrounding Land Use : Forested	

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☐ Absent ☑

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☐
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☑	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☐	Stream ☑
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☑
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = Stream

Secondary Indicator Score (if applicable) = 31

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 16.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☐ 1	☑ 2	☐ 3
2. Sinuous channel	☐ 0	☐ 1	☑ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☐ 1	☑ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☐ 1	☑ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☐ 0	☑ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☐ 1	☑ 2	☐ 3
10. Headcuts	☐ 0	☑ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☐ 0.5	☐ 1	☑ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☐ 0	☐ 1	☑ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☐ 0	☐ 1	☑ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☑ 1	☐ 0.5	☐ 0
17. Sediment on plants or on debris	☐ 0	☐ 0.5	☑ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☐ 0.5	☑ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 7)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☑ 1	☐ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☑ 1	☐ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☐ 0.5	☑ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☐ 0.5	☑ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☐ 1	☑ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☐ 0	☐ 0.5	☑ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 31

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Str 7	Date/Time: 10/24/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC5		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2571, -86.9611
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size :	Photos: Y or N (circle) Number :
Soil Type(s) / Geology : Lindside silt	Source:
Surrounding Land Use : partially cleared for cropland/partially forested	

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☑ Slight ☐ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☑	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☑	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 11.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 9)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☐ 1	☑ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☐ 0.5	☑ 1	☐ 1.5
9. Natural levees	☑ 0	☐ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☑ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 1.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☐ 0	☑ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☐ 0.5	☑ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☑ No = 0		☐ Yes = 1.5	

C. **Biology** (Subtotal = 1)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☑ 0	☐ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☐ 0	☑ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 11.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/24/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC6		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2565, -86.9627
Previous Rainfall (7-days) : 1.29in		
Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown ☐ Source of recent & seasonal precip data :		
Watershed Size :	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Nolin-Melvin complex		Source:
Surrounding Land Use : partially cleared for cropland/partially forested		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe ☐ Moderate ☑ Slight ☐ Absent ☐		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✓	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	✓	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ✓
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✓	Stream ☐
6. Presence of fish (except *Gambusia*)	✓	Stream ☐
7. Presence of naturally occurring ground water table connection	✓	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	✓	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	✓	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 9.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 8.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☑ 0	☐ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☑ 0	☐ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☐ 2	☑ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 1)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☐ 0	☑ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☑ No = 0		☐ Yes = 1.5	

C. **Biology** (Subtotal = 0)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☑ 0	☐ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☑ 0	☐ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28. Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 9.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/24/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC7		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2556, -86.9621
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Lindside silt loam | Source:

Surrounding Land Use : partially cleared for cropland/partially forested

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☑ Slight ☑ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☑	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☑	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 9.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 8.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☑ 0	☐ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☑ 0	☐ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☐ 2	☑ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 1)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☐ 0	☑ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☑ No = 0		☐ Yes = 1.5	

C. **Biology** (Subtotal = 0)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☑ 0	☐ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☑ 0	☐ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 9.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/24/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC8		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2540, -86.9613
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Nolin-Melvin complex Source:

Surrounding Land Use : partially cleared for cropland/partially forested

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☑	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☑	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 10.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☑ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☐ 2	☑ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 1.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☐ 0	☑ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☐ 0.5	☑ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☑ No = 0		☐ Yes = 1.5	

C. **Biology** (Subtotal = 0.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☑ 0	☐ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 12.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/24/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC9		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2506, -86.9646
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size :	Photos: Y or N (circle) Number :
Soil Type(s) / Geology : Belknap silt loam	Source:
Surrounding Land Use : partially cleared for cropland/partially forested	

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☑	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☑	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 9.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☐ 0	☑ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☑ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☑ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 1.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☐ 0	☑ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☐ 0.5	☑ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☑ No = 0		☐ Yes = 1.5	

C. **Biology** (Subtotal = [2])	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☑ 0	☐ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☐ 0.5	☑ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☑ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 12.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to W-37	Date/Time: 10/25/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC10		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2648, -86.9732
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Belknap silt loam Source:

Surrounding Land Use : partially cleared for cropland/partially forested

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☑	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☑	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 16

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 9.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☑ 0	☐ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☐ 1	☐ 2	☑ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☐ 0	☑ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☑ 1	☐ 2	☐ 3
10. Headcuts	☑ 0	☐ 1	☐ 2	☐ 3
11. Grade controls	☑ 0	☐ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☑ 0	☐ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 0.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☑ No = 0		☐ Yes = 1.5	

C. **Biology** (Subtotal = 6)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☐ 0.5	☑ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☐ 0.5	☐ 1	☑ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☑ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☐ 0	☑ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☐ 0	☐ 0.5	☐ 1	☑ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 16

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to W-37	Date/Time: 10/25/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC11		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2449, -86.9719
Previous Rainfall (7-days) : 1.29in		
Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown Source of recent & seasonal precip data :		
Watershed Size :	Photos: Y or N (circle) Number :	
Soil Type(s) / Geology : Belknap silt loam		Source:
Surrounding Land Use : partially cleared for cropland/partially forested		
Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) : Severe ☐ Moderate ☑ Slight ☐ Absent ☐		

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☑	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☑	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 11

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 8)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☑ 0	☐ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☑ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☑ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☑ 0	☐ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 0.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☑ No = 0		☐ Yes = 1.5	

C. **Biology** (Subtotal = 2.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☑ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☐ 0	☑ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 11

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to W-37	Date/Time: 10/25/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC12		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2461, -86.9691
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Belknap silt loam Source:

Surrounding Land Use : partially cleared for cropland/partially forested

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☑ Slight ☐ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☑	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☑	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 8

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 7)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☑ 0	☐ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☑ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☑ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☑ 0	☐ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 0.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☑ No = 0		☐ Yes = 1.5	

C. **Biology** (Subtotal = 0.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☑ 0	☐ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 8

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/25/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC13		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2463, -86.9679
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size :	Photos: Y or N (circle) Number :
Soil Type(s) / Geology : Belknap silt loam	Source:
Surrounding Land Use : partially cleared for cropland/partially forested	

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☑	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☑	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 8

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 7)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☑ 0	☐ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☑ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☑ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☑ 0	☐ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 0.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☑ No = 0		☐ Yes = 1.5	

C. **Biology** (Subtotal = 0.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☑ 0	☐ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 8

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Str 4	Date/Time: 10/25/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC14		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2474, -86.9703
Previous Rainfall (7-days) : 1.29in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size :	Photos: Y or N (circle) Number :
Soil Type(s) / Geology : Belknap silt loam	Source:
Surrounding Land Use : partially cleared for cropland/partially forested	

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☑ Slight ☐ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☐
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☐
6. Presence of fish (except *Gambusia*)	☐	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☑	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☐	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 8.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☑ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☑ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☑ 1	☐ 2	☐ 3
11. Grade controls	☑ 0	☐ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☑ 0	☐ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 2.5)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☐ 0	☑ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 1.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☐ 0	☑ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 12.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to W-41	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC15		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2426, -86.9720
Previous Rainfall (7-days) : 1.28in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown ☐

Source of recent & seasonal precip data :

Watershed Size :	Photos: Y or N (circle) Number :
Soil Type(s) / Geology : Belknap silt loam	Source: USGS
Surrounding Land Use : Managed forested land	

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☑ Moderate ☑ Slight ☐ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = wwc

Secondary Indicator Score (if applicable) = 12

Justification / Notes :

A beaver dam at the head of this wwc forms the pond seen in satellite photos.

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 9)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☑ 0	☐ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☐ 2	☑ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☑ 0	☐ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 2)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 1)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 12

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Str 10	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC16		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2426, -86.9720
Previous Rainfall (7-days) : 1.28in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size :	Photos: Y or N (circle) Number :
Soil Type(s) / Geology : Belknap silt loam	Source: USGS
Surrounding Land Use : Managed forested land	

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☑ Moderate ☑ Slight ☐ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = wwc

Secondary Indicator Score (if applicable) = 12

Justification / Notes :

A beaver dam at the head of this wwc forms the pond seen in satellite photos.

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 9)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☑ 0	☐ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☐ 2	☑ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☑ 0	☐ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 2)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 1)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 12

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Str 10	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC17		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2396, -86.9753
Previous Rainfall (7-days) : 1.28in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size :	Photos: Y or N (circle) Number :
Soil Type(s) / Geology : Belknap silt loam	Source: USGS
Surrounding Land Use : Managed forested land	

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☑

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 9.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☑ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☑ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☑ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 2)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = [1])	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 12.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC18		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2399, -86.9766
Previous Rainfall (7-days) : 1.28in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size :	Photos: Y or N (circle) Number :
Soil Type(s) / Geology : Belknap silt loam	Source: USGS
Surrounding Land Use : Managed forested land	

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☑

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☑	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☑	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 12

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 9.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☐ 0	☑ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☑ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☐ 0	☑ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☑ 1	☐ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 2)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = [1])	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 12.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC20		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2379, -86.9801
Previous Rainfall (7-days) : 1.28in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Wellston silt loam Source: USGS

Surrounding Land Use : Managed forested land

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :

Severe ☐ Moderate ☐ Slight ☑ Absent ☐

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	✓	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	✓	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ✓
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	✓	Stream ☐
6. Presence of fish (except *Gambusia*)	✓	Stream ☐
7. Presence of naturally occurring ground water table connection	✓	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	✓	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	✓	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = wwc

Secondary Indicator Score (if applicable) = 8.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 5.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☑ 0	☐ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☑ 0	☐ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☑ 0	☐ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☑ 0	☐ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☑ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 2)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = [1])	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 8.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC21		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2361, -86.9805
Previous Rainfall (7-days) : 1.28in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown ☐

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Belknap silt loam Source: USGS

Surrounding Land Use : Managed forested land

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☑

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☑	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☑	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = wwc

Secondary Indicator Score (if applicable) = 10.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☑ 0	☐ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☑ 0	☐ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☑ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 2)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = [1])	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28. Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 8.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC22		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2358, -86.9803
Previous Rainfall (7-days) : 1.28in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Belknap silt loam Source: USGS

Surrounding Land Use : Managed forested land

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☑

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = wwc

Secondary Indicator Score (if applicable) = 10.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☐ 0	☑ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☑ 0	☐ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☑ 0	☐ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☑ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 2)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = [1])	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 10.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC23		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2312, -86.9866
Previous Rainfall (7-days) : 1.28in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Bonnie silt loam Source: USGS

Surrounding Land Use : Managed forested land

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☑

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = wwc

Secondary Indicator Score (if applicable) = 9.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 6.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☑ 0	☐ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☑ 0	☐ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☑ 0	☐ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☑ 0	☐ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☑ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 2)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = [1])	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 9.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody: Trib to Jacobs Ck	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC24		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2302 -86.9877
Previous Rainfall (7-days) : 1.28in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Belknap silt loam Source: USGS

Surrounding Land Use : Managed forested land

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☑

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = wwc

Secondary Indicator Score (if applicable) = 10.5

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☑ 0	☐ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☑ 0	☐ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☑ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☑ 0	☐ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☑ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 2)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = [1])	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☑ 0.5	☐ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☑ 0	☐ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☑ 0	☐ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 9.5

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Hydrologic Determination Field Data Sheet

Tennessee Division of Water Pollution Control, Version 1.4

County: Muhlenberg	Named Waterbody:	Date/Time: 10/26/2017
Assessors/Affiliation: HO, WD		Project ID :
Site Name/Description: TVA PAF		
Site Location: WWC25		
USGS quad:	HUC (12 digit):	Lat/Long: 37.2278 -86.9904
Previous Rainfall (7-days) : 1.28in		

Precipitation this Season vs. Normal : very wet ☐ wet ☐ average ☑ dry ☐ drought ☐ unknown ☐

Source of recent & seasonal precip data :

Watershed Size : | Photos: Y or N (circle) Number :

Soil Type(s) / Geology : Belknap silt loam Source: USGS

Surrounding Land Use : Managed forested land

Degree of historical alteration to natural channel morphology & hydrology (circle one & describe fully in Notes) :
Severe ☐ Moderate ☐ Slight ☑ Absent ☑

Primary Field Indicators Observed

Primary Indicators	NO	YES
1. Hydrologic feature exists solely due to a process discharge	☑	WWC ☐
2. Defined bed and bank absent, dominated by upland vegetation / grass	☑	WWC ☐
3. Watercourse dry anytime during February through April 15th, under normal precipitation / groundwater conditions	☐	WWC ☑
4. Daily flow and precipitation records showing feature only flows in direct response to rainfall	☐	WWC ☐
5. Presence of multiple populations of obligate lotic organisms with ≥ 2 month aquatic phase	☐	Stream ☐
6. Presence of fish (except *Gambusia*)	☑	Stream ☐
7. Presence of naturally occurring ground water table connection	☑	Stream ☐
8. Flowing water in channel and 7 days since last precipitation in local watershed	☐	Stream ☐
9. Evidence watercourse has been used as a supply of drinking water	☑	Stream ☐

NOTE : If any Primary Indicators 1-9 = "Yes", then STOP; absent directly contradictory evidence, determination is complete.

In the absence of a primary indicator, or other definitive evidence, complete the secondary indicator table on page 2 of this sheet, and provide score below.

Guidance for the interpretation and scoring of both the primary & secondary indicators is provided in *TDEC-WPC Guidance For Making Hydrologic Determinations, Version 1.4*

Overall Hydrologic Determination = WWC

Secondary Indicator Score (if applicable) = 13

Justification / Notes :

Secondary Field Indicator Evaluation

A. **Geomorphology** (Subtotal = 7.5)	Absent	Weak	Moderate	Strong
1. Continuous bed and bank	☐ 0	☑ 1	☐ 2	☐ 3
2. Sinuous channel	☑ 0	☐ 1	☐ 2	☐ 3
3. In-channel structure: riffle-pool sequences	☑ 0	☐ 1	☐ 2	☐ 3
4. Sorting of soil textures or other substrate	☐ 0	☑ 1	☐ 2	☐ 3
5. Active/relic floodplain	☐ 0	☑ 1	☐ 2	☐ 3
6. Depositional bars or benches	☐ 0	☑ 1	☐ 2	☐ 3
7. Braided channel	☑ 0	☐ 1	☐ 2	☐ 3
8. Recent alluvial deposits	☐ 0	☑ 0.5	☐ 1	☐ 1.5
9. Natural levees	☑ 0	☐ 1	☐ 2	☐ 3
10. Headcuts	☐ 0	☐ 1	☑ 2	☐ 3
11. Grade controls	☐ 0	☑ 0.5	☐ 1	☐ 1.5
12. Natural valley or drainageway	☐ 0	☑ 0.5	☐ 1	☐ 1.5
13. At least second order channel on existing USGS or NRCS map	☑ No = 0		☐ Yes = 3	

B. **Hydrology** (Subtotal = 2)	Absent	Weak	Moderate	Strong
14. Subsurface flow/discharge into channel	☑ 0	☐ 1	☐ 2	☐ 3
15. Water in channel and >48 hours since sig. rain	☑ 0	☐ 1	☐ 2	☐ 3
16. Leaf litter in channel (January – September)	☐ 1.5	☐ 1	☐ 0.5	☑ 0
17. Sediment on plants or on debris	☑ 0	☐ 0.5	☐ 1	☐ 1.5
18. Organic debris lines or piles (wrack lines)	☐ 0	☑ 0.5	☐ 1	☐ 1.5
19. Hydric soils in stream bed or sides of channel	☐ No = 0		☑ Yes = 1.5	

C. **Biology** (Subtotal = 3.5)	Absent	Weak	Moderate	Strong
20. Fibrous roots in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
21. Rooted plants in channel [1]	☐ 3	☐ 2	☐ 1	☑ 0
22. Crayfish in stream (exclude in floodplain)	☐ 0	☐ 0.5	☑ 1	☐ 1.5
23. Bivalves/mussels	☑ 0	☐ 1	☐ 2	☐ 3
24. Amphibians	☐ 0	☐ 0.5	☑ 1	☐ 1.5
25. Macrobenthos (record type & abundance)	☑ 0	☐ 1	☐ 2	☐ 3
26. Filamentous algae; periphyton	☐ 0	☑ 1	☐ 2	☐ 3
27. Iron oxidizing bacteria/fungus	☐ 0	☑ 0.5	☐ 1	☐ 1.5
28.Wetland plants in channel [2]	☑ 0	☐ 0.5	☐ 1	☐ 2

[1] Focus is on the presence of upland plants. [2] Focus is on the presence of aquatic or wetland plants.

Total Points = 13

Under Normal Conditions, Watercourse is a Wet Weather Conveyance if Secondary Indicator Score < 19 points

Notes :

Attachment 2 – Photo Log

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
1	9/13/17

Location

South of Gypsum stack landfill

Description:

Wetland 27

Photo No.	Date:
2	9/13/17

Location:

Gypsum stack landfill

Description:

Upland associated with wetlands south of W-27.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
3	9/13/17

Location

Gypsum stack landfill

Description:

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

Photo No.	Date:
4	9/13/17

Location:

Gypsum stack landfill

Description:

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
5	9/13/17

Location

Gypsum stack landfill

Description:

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

Photo No.	Date:
6	9/13/17

Location:

Gypsum stack landfill

Description:

Soils in LW-1

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
7	9/13/17

Location

Gypsum stack landfill

Description:

Upstream portion of LW-1

Photo No.	Date:
8	9/13/17

Location:

Gypsum stack landfill

Description:

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

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	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.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
11	9/13/17

Location

Gypsum stack landfill

Description:

Str-2 looking downstream, (east).

Photo No.	Date:
12	9/13/17

Location

Gypsum stack landfill

Description:

Str-2 looking upstream, west

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
13	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.	Date:
14	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).

PHOTOGRAPHIC LOG

Client Name:	Site Location: Paradise Fossil Plant, Drakesboro, Kentucky	Project No.
Tennessee Valley Authority		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

PHOTOGRAPHIC LOG

Client Name:	Site Location: Paradise Fossil Plant, Drakesboro, Kentucky	Project No.
Tennessee Valley Authority		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

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
19	9/13/17

Location

Gypsum stack landfill

Description:

Str-2 entering W-28 and Pond 7

Photo No.	Date:
20	9/13/17

Location

Gypsum stack landfill

Description:

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

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
21	9/13/17

Location

Gypsum stack landfill

Description:

North end of Pond 7 looking south away from the landfill

Photo No.	Date:
22	9/13/17

Location

Gypsum stack landfill

Description:

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

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
23	9/13/17

Location

Gypsum stack landfill

Description:

Gyp stack Stilling Pond 2 facing southeast.

Photo No.	Date:
24	9/13/17

Location

Gypsum stack landfill

Description:

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

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	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.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
27	9/13/17

Location

Gypsum stack landfill

Description:

Leachate stream looking west towards the landfill.

Photo No.	Date:
28	9/13/17

Location

Gypsum stack landfill

Description:

Culvert in leachate stream under haul road, facing northeast.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
29	9/13/17

Location

Gypsum stack landfill

Description:

Leachate stream looking east towards the plant.

Photo No.	Date:
30	9/13/17

Location

Gypsum stack landfill

Description:

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

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
31	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.	Date:
32	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.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
33	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.	Date:
34	9/13/17

Location

Gypsum stack landfill

Description:

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

PHOTOGRAPHIC LOG

Client Name:	Site Location: Paradise Fossil Plant, Drakesboro, Kentucky	Project No.
Tennessee Valley Authority		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.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
37	9/13/17

Location

Gypsum stack landfill

Description:

LW-1, eastern end, facing west.

Photo No.	Date:
38	9/13/17

Location

Gypsum stack landfill

Description:

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

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
1	10/26/17

Direction Photo Taken:

Northwest

Description:

Stream 3 flowing through culvert under dirt road off Riverside Road.

Photo No.	Date:
2	10/26/17

Direction Photo Taken:

Northeast

Description:

Upper reach of Stream 4

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
3	10/26/17

Direction Photo Taken:

Southwest

Description:

Confluence of Stream 3 and Stream 4

Photo No.	Date:
4	10/26/17

Direction Photo Taken:

North

Description:

Pond with beaver dam upstream of Stream 4

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
5	10/26/17

Direction Photo Taken:

Southeast

Description:

Lower reach of Stream 3 flowing through Wetland 40.

Photo No.	Date:
6	10/26/17

Direction Photo Taken:

West

Description:

Wetland 40

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
7	10/26/17

Direction Photo Taken:

Northwest

Description:

Wetland 30 on northern bank of Jacob's Creek

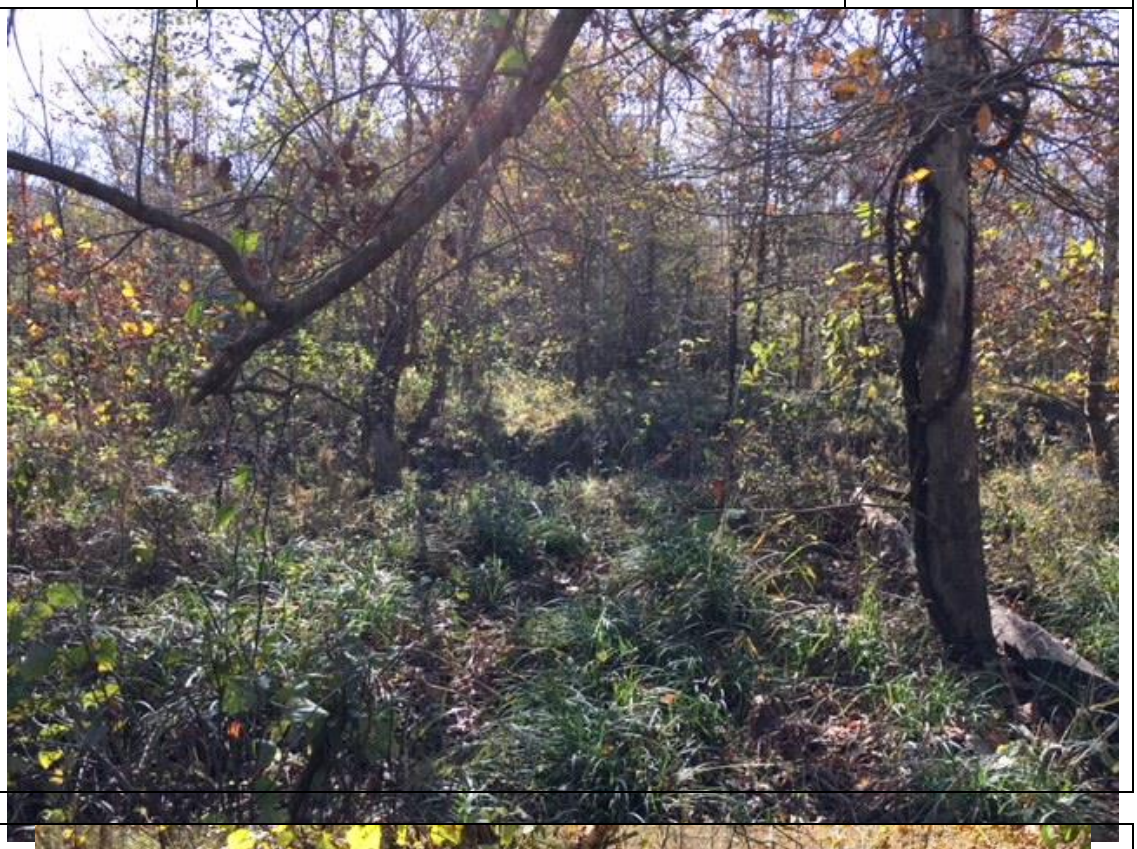


Photo No.	Date:
8	10/26/17

Direction Photo Taken:

Generally Northeast

Description:

Representative photo of Jacobs Creek looking upstream.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
9	10/26/17

Direction Photo Taken:

East

Description:

Wetland 35 from opposite side of Jacobs Creek.

Photo No.	Date:
10	10/26/17

Direction Photo Taken:

East

Description:

Stream 5 flowing into Jacobs Creek.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
11	10/26/17

Direction Photo Taken:

West

Description:

Seep marking the start of Stream 5.

Photo No.	Date:
12	10/26/17

Direction Photo Taken:

Northeast

Description:

Wetland 31with transmission lines in the background.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
13	10/26/17

Direction Photo Taken:

Southwest

Description:

Wetland 31 adjacent to Jacobs Creek.

Photo No.	Date:
14	10/26/17

Direction Photo Taken:

East

Description:

Swamp area of Wetland 32.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
15	10/26/17

Direction Photo Taken:

West

Description:

Wetland 32

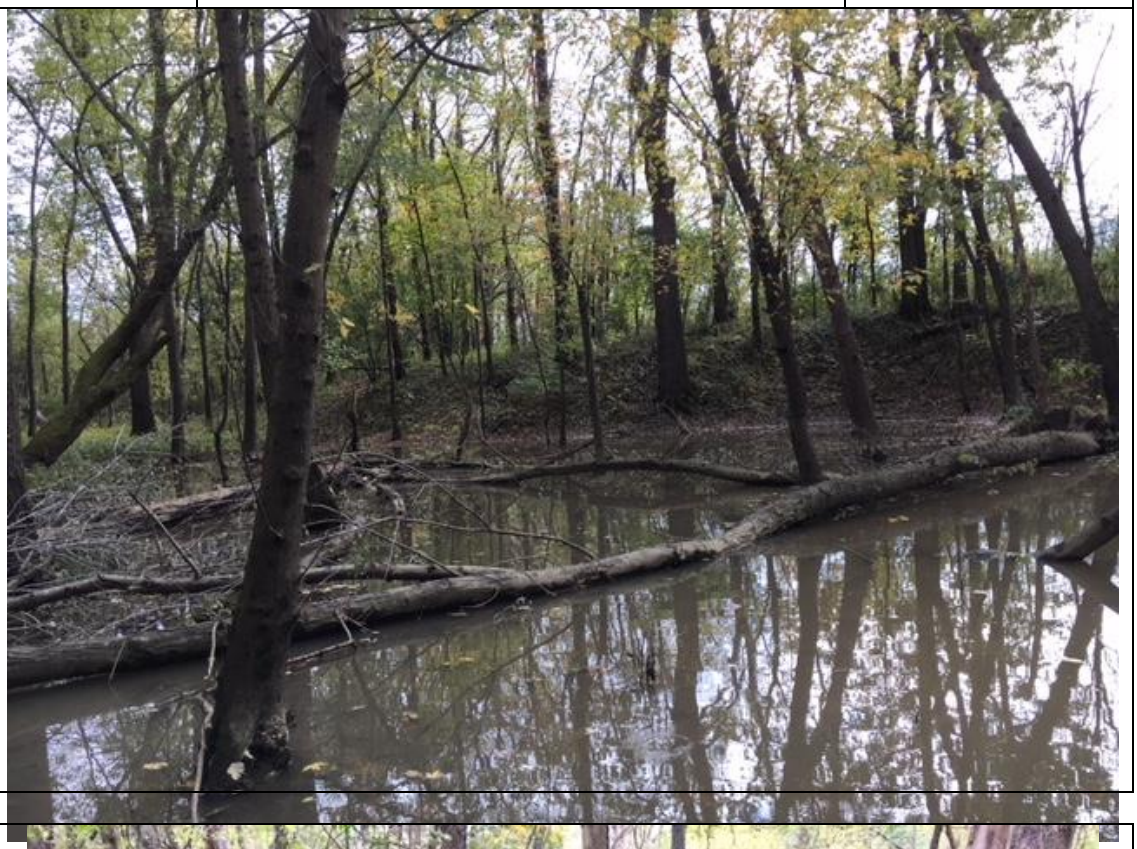


Photo No.	Date:
16	10/26/17

Direction Photo Taken:

East

Description:

Stream 6 flowing out of Wetland 32 and into Jacobs Creek

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
17	10/26/17

Direction Photo Taken:

Southeast

Description:

Upstream of Stream 7 flowing into Wetland 32

Photo No.	Date:
18	10/26/17

Direction Photo Taken:

Northwest

Description:

Representative photo of Wetland 33

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
19	10/26/17

Direction Photo Taken:

South

Description:

Stream 8 looking upstream.

Photo No.	Date:
20	10/26/17

Direction Photo Taken:

Down

Description:

Silty bottom in Stream 8

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
21	10/26/17

Direction Photo Taken:

Southeast

Description:

Dominant vegetation in Wetland 34.

Photo No.	Date:
22	10/26/17

Direction Photo Taken:

Southeast

Description:

Wetland 35 on east bank of Jacobs Creek

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
23	10/26/17

Direction Photo Taken:

West

Description:

Pond formed by beaver dams in Wetland 36.

Photo No.	Date:
24	10/26/17

Direction Photo Taken:

South

Description:

Southern most are of Wetland 36.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
25	10/26/17

Direction Photo Taken:

West

Description:

Wetland 37

Photo No.	Date:
26	10/26/17

Direction Photo Taken:

South

Description:

Dominant vegetation in Wetland 37

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
27	10/26/17

Direction Photo Taken:

West

Description:

Jacobs Creek flowing through culvert under Riverside Road.

Photo No.	Date:
28	10/26/17

Direction Photo Taken:

East

Description:

Wetland 39.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
29	10/26/17

Direction Photo Taken:

East

Description:

Pond marking northern boundary of Wetland 39

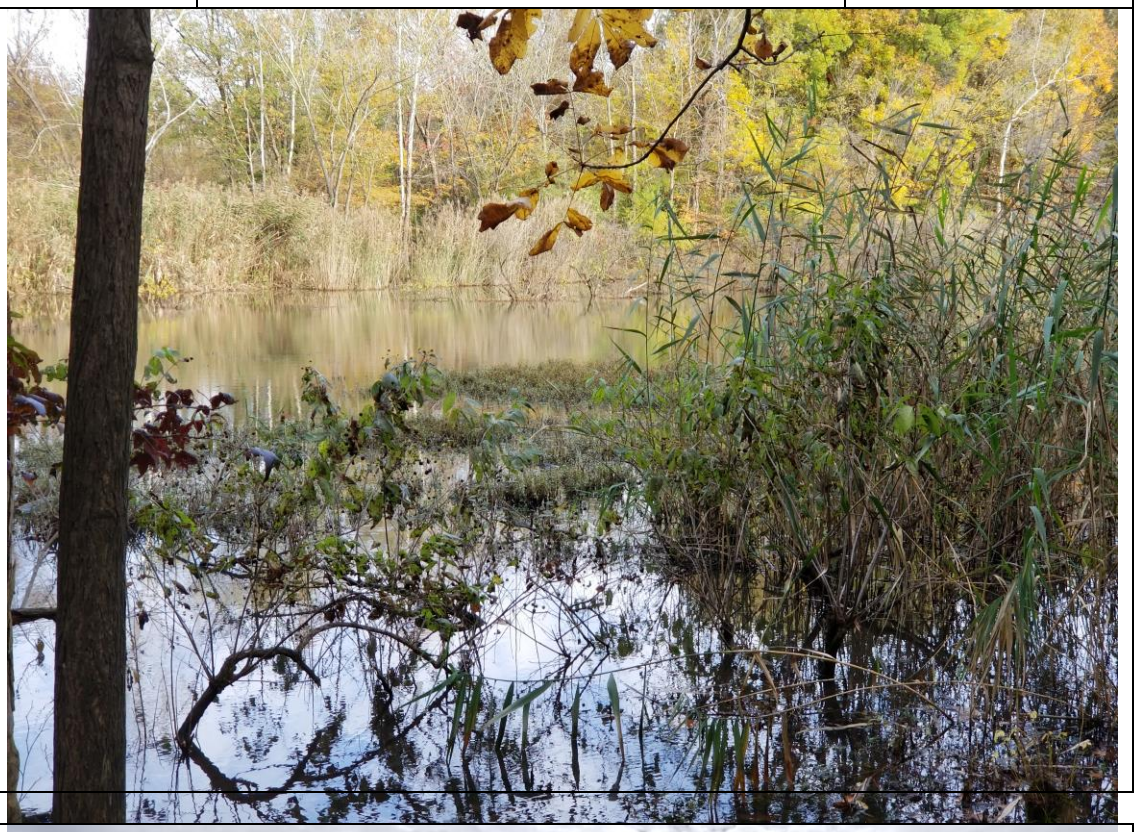


Photo No.	Date:
30	10/26/17

Direction Photo Taken:

Southwest

Description:

Portion of Wetland 38 with pond in the middle. Wetland 38 stretches until treeline.

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
31	10/26/17

Direction Photo Taken:

Northeast

Description:

Middle portion of Wetland 38

Photo No.	Date:
32	10/26/17

Direction Photo Taken:

Northwest

Description:

Pond surrounded by *Phragmites* in Wetland 38

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
33	10/26/17

Direction Photo Taken:

Northeast

Description:

Downstream portion of Wetland 38.

Photo No.	Date:
34	10/26/17

Direction Photo Taken:

Northwest

Description:

Phragmites in Wetland 38

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
35	10/26/17

Direction Photo Taken:

Northeast

Description:

Stream 9 looking downstream just below the culvert under dirt road.

Photo No.	Date:
36	10/26/17

Direction Photo Taken:

Northeast

Description:

Seep upstream of Stream 9

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
37	10/26/17

Direction Photo Taken:

Southeast

Description:

Beginning of Wetland 41

Photo No.	Date:
38	10/26/17

Direction Photo Taken:

Southeast

Description:

Representative photo of stream 10 in Wetland 41

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
39	10/26/17

Direction Photo Taken:

Southeast

Description:

Upper reach of Stream 10

Photo No.	Date:
40	10/26/17

Direction Photo Taken:

Southwest

Description:

Western area of Wetland 42

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
41	10/26/17

Direction Photo Taken:

South

Description:

Stream 13 in Wetland 42

Photo No.	Date:
42	10/26/17

Direction Photo Taken:

Southeast

Description:

Stream 14 in Wetland 42 looking upstream

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
43	10/26/17

Direction Photo Taken:

Northeast

Description:

Stream 15 in Wetland 42 looking downstream

Photo No.	Date:
44	10/26/17

Direction Photo Taken:

Southeast

Description:

Upper reach of Stream 12 in Wetland 42

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
45	10/26/17

Direction Photo Taken:

Northeast

Description:

Stream 11 looking upstream

Photo No.	Date:
46	10/26/17

Direction Photo Taken:

East

Description:

Midreach of Stream 12 in Wetland 42

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	PAF Peabody Ash Pond Breach Zone	60532201

Photo No.	Date:
47	10/26/17

Direction Photo Taken:

East

Description:

Representative shot of Wetland 43

Photo No.	Date:
48	10/26/17

Direction Photo Taken:

Northeast

Description:

Stream 16 flowing into Wetland 43

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky, Slag Pond Breach Area	60532201

Photo No.	Date:
1	10/27/17

Location

Slag pond spillway facing SE

Description:

Spillway of slag pond facing river

Photo No.	Date:
2	10/27/17

Location:

Slag Pond spillway facing SW

Description:

Lower end of spillway

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky, Slag Pond Breach Area	60532201

Photo No.	Date:
3	10/27/17

Location

East of slag pond

Description:

Small sinkhole near Green River Bank

Photo No.	Date:
4	10/27/17

Location:

East of Slag Pond near River Bank

Description:

Forested area on upper bank of Green River

PHOTOGRAPHIC LOG

Client Name:	Site Location: Paradise Fossil Plant, Drakesboro, Kentucky, Slag Pond Breach Area	Project No.
Tennessee Valley Authority		60532201

Photo No. 5	Date: 10/27/17

Location

Green River Bank area east of Slag Pond

Description:

WWC-1

Photo No. 6	Date: 10/27/17

Location:

Lower river bank east of Slag Pond

Description:

Wetland -1 (W-1)

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky, Slag Pond Breach Area	60532201

Photo No.	Date:
7	10/27/17

Location

East of Slag Pond

Description:

Wetland -1 along river bank

Photo No.	Date:
8	10/27/17

Location:

East of Slag Pond along Green River Bank

Description:

WWC-2

AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky, Slag Pond Breach Area	60532201

Photo No.	Date:
9	10/27/17

Location

East of Slag Pond near water intake on Green River

Description:

WWC-3

Photo No.	Date:
10	9/13/17

Location

East of Slag Pond along River Bank

Description:

WWC-4

About AECOM

AECOM is built to deliver a better world. We design, build, finance and operate infrastructure assets for governments, businesses and organizations in more than 150 countries. As a fully integrated firm, we connect knowledge and experience across our global network of experts to help clients solve their most complex challenges. From high-performance buildings and infrastructure, to resilient communities and environments, to stable and secure nations, our work is transformative, differentiated and vital. A Fortune 500 firm, AECOM had revenue of approximately $17.4 billion during fiscal year 2016. See how we deliver what others can only imagine at aecom.com and @AECOM.

APPENDIX B

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

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

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

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 Monthly Average	Reported Discharge Daily Maximum	Proposed Limits Monthly Average	Proposed Limits 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 4 401 KAR 5:031, Section 2
pH (standard units)	7.0 (min)	8.9 (max)	6.0 (min)	9.0 (max)	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 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.

Effluent Characteristics	Reported Discharge Monthly Average	Reported Discharge Daily Maximum	Proposed Limits Monthly Average	Proposed Limits Daily Maximum	Applicable Water Quality Criteria and/or Effluent Guidelines
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 5 401 KAR 5:080, Section 1(2)(c)2
Oil & Grease (mg/l)	5.0	6.0	13	15	401 KAR 5:065, Sections 4 and 5
Hardness (as mg/l) ($CaCO_3$)	178	532	Report	Report	401 KAR 5:065, Section 2(8)
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 4 401 KAR 5:031, Section 2
pH (standard units)	6.5 (min)	8.5 (max)	6.0 (min)	9.0 (max)	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: $TSS_{(Net)} = TSS_{(002\ discharge)} - TSS_{(010\ intake)}$.

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 - 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).

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 Monthly Average	Reported Discharge Daily Maximum	Proposed Limits Monthly Average	Proposed Limits Daily Maximum	Applicable Water Quality Criteria and/or Effluent Guidelines
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 Baceria (#/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 $CBOD_5$ means Carbonaeous 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 $CBOD_5$

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

$CBOD_5$ 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 santiary wastewater is commingled with the waters of the ash pond. In order to gauge compliance with the secondary treatment requirements for biodegrable 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).

Carbonaeous 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 biodegrable 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 Monthly Average	Reported Discharge Daily Maximum	Proposed Limits Monthly Average	Proposed Limits Daily Maximum	Applicable Water Quality Criteria and/or Effluent Guidelines
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 4 401 KAR 5:080, Section 1(2)(c)2
Instream Temperature Change (°F)	2.6	18	Report	10	401 KAR 5:031, Section 4 401 KAR 5:080, Section 1(2)(c)2
Free Available Chlorine (mg/l)	D/C	D/C	0.2	0.5	401 KAR 5:065, Sections 4 and 5
Total Residual Chlorine (mg/l)	D/C	D/C	0.012	0.019	401 KAR 5:031, Section 4 401 KAR 5:065, Sections 4 and 5
Total Residual Oxidants (mg/l)	D/C	D/C	Report	0.2	401 KAR 5:080, Section 1(2)(c)2
Time of Oxidant Addition (Minutes/unit/day)	D/C	D/C	N/A	120	401 KAR 5:080, Section 1(2)(c)2 401 KAR 5:065, Sections 4 and 5
pH (Standard Units)	6.9 (min)	8.6 (max)	6.0 (min)	9.0 (max)	401 KAR 5:031, 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 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 constrains 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 powdex & air preheater washes (1.162 MGD), Units 1 and 2 air preheater sumps (0.008 MGD), chemical bolier 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 bolier 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 Monthly Average	Reported Discharge Daily Maximum	Proposed Limits Monthly Average	Proposed Limits Daily Maximum	Applicable Water Quality Criteria and/or Effluent Guidelines
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(l), 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

(l) 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)	1-Day Flow	30-Day Flow
C is the coefficient of runoff		
I is the rainfall (in inches)	10-year, 24-hour event	Annual Average Rainfall
A is the area (in acres)		
F is the units conversion factor	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.

$$\text{Monthly Average} = \frac{\sum Q_{30} \times F_{30}}{Q_{30}} \qquad \text{Daily Maximum} = \frac{\sum Q_1 \times F_1}{Q_1}$$

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 proceeding pages.

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 002								
Wood Area West of RWD #3 Drainage	0.70	28.50	4.80	44.50	18.71	1.23	1792	1092
Red Water Ditch # 4	1.00	2.30	4.80	44.50	18.71	1.23	207	126
Red Water Ditch # 3	1.00	6.10	4.80	44.50	18.71	1.23	548	334
Red Water Ditch # 5	1.00	2.00	4.80	44.50	18.71	1.23	180	109
Red Water Ditch # 2	1.00	1.50	4.80	44.50	18.71	1.23	135	82
Red Water Ditch # 1	1.00	1.50	4.80	44.50	18.71	1.23	135	82
Coal Wash Refuse Disposal Area	0.49	164.50	4.80	44.50	18.71	1.23	7239	4412
Rail & Truck Unloading Area Drainage	0.53	61.20	4.80	44.50	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	4313	2628
Coal Storage Yard	0.70	177.40	4.80	44.50	18.71	1.23	11152	6797
Coal Yard Drainage Basins 2 & 3	1.00	6.00	4.80	44.50	18.71	1.23	539	328
Coal Wash Plant Area	0.83	10.00	4.80	44.50	18.71	1.23	745	454
Limestone Handling & Cooling Tower Area Drainage	0.43	43.20	4.80	44.50	18.71	1.23	1668	1017
Miscellaneous Plant Drainage	0.79	48.80	4.80	44.50	18.71	1.23	3462	2110
Bottom Ash Pond	1.00	20.30	4.80	44.50	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

Limits Calculations										
Source	Flow (gpm)		Total Suspended Solids				Oil & Grease			
			Factor		Contribution		Factor		Contribution	
	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average	Maximum	Average
Outfall 002										
Wood Area West of RWD #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	11152	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
	96117	81729			7767636	2451855			1463170	1029734
Limit					81	30			15	13

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

Limits Calculations										
Source	Flow (gpm)		Total Suspended Solids				Oil & Grease			
			Factor		Contribution		Factor		Contribution	
	Maximum	Average	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 Preaheater 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	044 Methylene chloride (dichloromethane)	088 Vinyl chloride (chloroethylene)
002 Acrolein	045 Methyl chloride (dichloromethane)	089 Aldrin
003 Acrylonitrile	046 Methyl bromide (bromomethane)	090 Dieldrin
004 Benzene	047 Bromoform (tribromomethane)	091 Chlordane (technical mixture and metabolites)
005 Benzidine	048 Dichlorobromomethane	092 4,4-DDT
006 Carbon tetrachloride (tetrachloromethane)	051 Chlorodibromomethane	093 4,4-DDE (p,p-DDX)
007 Chlorobenzene	052 Hexachlorobutadiene	094 4,4-DDD (p,p-TDE)
008 1,2,4-trichlorobenzene	053 Hexachloromyclopentadiene	095 Alpha-endosulfan
009 Hexachlorobenzene	054 Isophorone	096 Beta-endosulfan
010 1,2-dichloroethane	055 Naphthalene	097 Endosulfan sulfate
011 1,1,1-trichloreothane	056 Nitrobenzene	098 Endrin
012 Hexachloroethane	057 2-nitrophenol	099 Endrin aldehyde
013 1,1-dichloroethane	058 4-nitrophenol	100 Heptachlor
014 1,1,2-trichloroethane	059 2,4-dinitrophenol	101 Heptachlor epoxide (BHC-hexachlorocyclohexane)
015 1,1,2,2-tetrachloroethane	060 4,6-dinitro-o-cresol	102 Alpha-BHC
016 Chloroethane	061 N-nitrosodimethylamine	103 Beta-BHC
018 Bis(2-chloroethyl) ether	062 N-nitrosodiphenylamine	104 Gamma-BHC (lindane)
019 2-chloroethyl vinyl ether (mixed)	063 N-nitrosodi-n-propylamin	105 Delta-BHC (PCB-polychlorinated biphenyls)
020 2-chloronaphthalene	064 Pentachlorophenol	106 PCB-1242 (Arochlor 1242)
021 2,4, 6-trichlorophenol	065 Phenol	107 PCB-1254 (Arochlor 1254)
022 Parachlorometa cresol	066 Bis(2-ethylhexyl) phthalate	108 PCB-1221 (Arochlor 1221)
023 Chloroform (trichloromethane)	067 Butyl benzyl phthalate	109 PCB-1232 (Arochlor 1232)
024 2-chlorophenol	068 Di-N-Butyl Phthalate	110 PCB-1248 (Arochlor 1248)
025 1,2-dichlorobenzene	069 Di-n-octyl phthalate	111 PCB-1260 (Arochlor 1260)
026 1,3-dichlorobenzene	070 Diethyl Phthalate	112 PCB-1016 (Arochlor 1016)
027 1,4-dichlorobenzene	071 Dimethyl phthalate	113 Toxaphene
028 3,3-dichlorobenzidine	072 1,2-benzanthracene (benzo(a)anthracene)	114 Antimony
029 1,1-dichloroethylene	073 Benzo(a)pyrene (3,4-benzo-pyrene)	115 Arsenic
030 1,2-trans-dichloroethylene	074 3,4-Benzofluoranthene (benzo(b)fluoranthene)	116 Asbestos
031 2,4-dichlorophenol	075 11,12-benzofluoranthene (benzo(b)fluoranthene)	117 Beryllium
032 1,2-dichloropropane	076 Chrysene	118 Cadmium
033 1,2-dichloropropylene (1,3-dichloropropene)	077 Acenaphthylene	119 Chromium
034 2,4-dimethylphenol	078 Anthracene	120 Copper
035 2,4-dinitrotoluene	079 1,12-benzoperylene (benzo(ghi) perylene)	121 Cyanide, Total
036 2,6-dinitrotoluene	080 Fluorene	122 Lead
037 1,2-diphenylhydrazine	081 Phenanthrene	123 Mercury
038 Ethylbenzene	082 1,2,5,6-dibenzanthracene (dibenzo(,h) anthracene)	124 Nickel
039 Fluoranthene	083 Indeno (,1,2,3-cd) pyrene (2,3-o-pheynylene pyrene)	125 Selenium
040 4-chlorophenyl phenyl ether	084 Pyrene	126 Silver
041 4-bromophenyl phenyl ether	085 Tetrachloroethylene	127 Thallium
042 Bis(2-chloroisopropyl) ether	086 Toluene	126 Silver
043 Bis(2-chloroethoxy) methane	087 Trichloroethylene	128 Zinc
		129 2,3,7,8-tetrachloro-dibenzo-p-dioxin (TCDD)

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

HIGH QUALITY = ND

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l CV	Criteria / Standards, ug/l: Aquatic Life Acute CDA	Aquatic Life Chronic CDC	Human Health 10^-6 Risk Level Fish Only CDH1	Human Health 10^-6 Risk Level Fish & H20 CDH2	Output (CT), ug/l: Aquatic Life Acute FCP Hardness 400.00	Aquatic Life Chronic Mix Zone Hardness 400.00	Human Health Fish Only Mix Zone	Human Health Fish & H20 Complete Mix	Final Limits Water Quality, ug/l: Average	Final Limits Water Quality, ug/l: Maximum	Justification: Average	Justification: Maximum	Reported Discharge Level ug/l
1 Acenaphthene	N	0.0000	NA	NA	2700.0000	1200.0000	NA	NA	2700.0000	14240.0000	2700.0000	NA	FISH ONLY	NA	0.0000
2 Acenaphytylene	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
3 Acrolein	N	0.0000	NA	NA	780.0000	320.0000	NA	NA	780.0000	3797.3330	780.0000	NA	FISH ONLY	NA	0.0000
4 Acrylonitrile	Y	0.0000	NA	NA	6.5000E-01	5.8000E-02	NA	NA	6.5000E-01	3.992333	6.5000E-01	NA	FISH ONLY	NA	0.0000
5 Aldrin	Y	0.0000	3.0000	NA	1.4000E-04	1.3000E-04	3.0000	NA	1.4000E-04	8.9483E-03	1.4000E-04	3.0000	FISH ONLY	ACUTE	0.0000
6 Aluminum, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
7 Anthracene	N	0.0000	NA	NA	110000	9600.0000	NA	NA	110000	113920	110000	NA	FISH ONLY	NA	0.0000
8 Antimony, Total Recoverable	N	0.0000	NA	NA	4300.0000	6.0000	NA	NA	4300.0000	71.2000	71.2000	NA	FISH & H20	NA	0.0000
9 Arsenic, Total Recoverable	Y	0.0000	NA	50.0000	NA	NA	NA	50.0000	NA	NA	50.0000	NA	CHRONIC	NA	0.0000
10 Arsenic III	Y	0.0000	340.0000	150.0000	NA	NA	340.0000	150.0000	NA	NA	150.0000	340.0000	CHRONIC	ACUTE	0.0000
11 Barium, Total Recoverable	N	0.0000	NA	NA	NA	2000.0000	NA	NA	NA	23733.3300	23733.3300	NA	FISH & H20	NA	0.0000
12 Benzene	Y	0.0000	NA	NA	71.0000	1.2000	NA	NA	71.0000	82.6000	71.0000	NA	FISH ONLY	NA	0.0000
13 Benzidine	Y	0.0000	NA	NA	5.4000E-04	1.2000E-04	NA	NA	5.4000E-04	8.2600E-03	5.4000E-04	NA	FISH ONLY	NA	0.0000
14 Benzo (a) Anthracene	Y	0.0000	NA	NA	4.9000E-02	4.4000E-03	NA	NA	4.9000E-02	3.0287E-01	4.9000E-02	NA	FISH ONLY	NA	0.0000
15 Benzo (a) Pyrene	Y	0.0000	NA	NA	4.9000E-02	4.4000E-03	NA	NA	4.9000E-02	3.0287E-01	4.9000E-02	NA	FISH ONLY	NA	0.0000
16 Benzo (ghi) Perylene	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
17 Benzo (k) Fluoranthene	Y	0.0000	NA	NA	4.9000E-02	4.4000E-03	NA	NA	4.9000E-02	3.0287E-01	4.9000E-02	NA	FISH ONLY	NA	0.0000
18 Benzo-fluoranthene (3,4)	Y	0.0000	NA	NA	4.9000E-02	NA	NA	NA	4.9000E-02	NA	4.9000E-02	NA	FISH ONLY	NA	0.0000
19 Beryllium, Total Recoverable	N	0.0000	NA	NA	NA	4.0000E-03	NA	NA	NA	4.7467E-02	4.7467E-02	NA	FISH & H20	NA	0.0000
20 Boron, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
21 Bromide	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
22 Bromoform	Y	0.0000	NA	NA	360.0000	4.3000	NA	NA	360.0000	295.9833	295.9833	NA	FISH & H20	NA	0.0000
23 Bromophenyl Phenyl Ether (4)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
24 Butyl Benzyl Phthalate	N	0.0000	NA	NA	5200.0000	3000.0000	NA	NA	5200.0000	35600.0000	5200.0000	NA	FISH ONLY	NA	0.0000
25 Cadmium, Total Recoverable	N	0.0000	21.5715	7.311862	NA	5.0000	21.5715	7.311862	NA	59.3333	7.311862	21.5715	CHRONIC	ACUTE	0.0000
26 Carbon Tetrachloride	Y	0.0000	NA	NA	4.4000	2.5000E-01	NA	NA	4.4000	17.2083	4.4000	NA	FISH ONLY	NA	0.0000
27 Chlordane	Y	0.0000	2.4000	0.0043	2.2000E-03	2.1000E-03	2.4000	0.0043	2.2000E-03	1.4455E-01	2.2000E-03	2.4000	FISH ONLY	ACUTE	0.0000
28 Chloride	N	0.0000	1200000	600000	NA	250000	1200000	600000	NA	2966667	600000	1200000	CHRONIC	ACUTE	0.0000
29 Chlorine, Total Residual	N	0.0000	19.0000	11.0000	NA	NA	19.0000	11.0000	NA	NA	11.0000	19.0000	CHRONIC	ACUTE	0.0000
30 Chlorobenzene	N	0.0000	NA	NA	21000.0000	680.0000	NA	NA	21000.0000	8069.3340	8069.3340	NA	FISH & H20	NA	0.0000
31 Chlorodibromomethane	Y	0.0000	NA	NA	34.0000	4.1000E-01	NA	NA	34.0000	28.2217	28.2217	NA	FISH & H20	NA	0.0000
32 Chloroethane	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
33 Chloroethyl Ether (Bis-2)	Y	0.0000	NA	NA	1.4000	3.1000E-02	NA	NA	1.4000	2.133833	1.4000	NA	FISH ONLY	NA	0.0000
34 Chloroethyl Methane (Bis-2)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
35 Chloroethylvinyl Ether (2)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
36 Chloroform	Y	0.0000	NA	NA	470.0000	5.7000	NA	NA	470.0000	392.3500	392.3500	NA	FISH & H20	NA	0.0000
37 Chlorohexyl Ether (Bis-2)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
38 Chloroisopropyl Ether (Bis-2)	N	0.0000	NA	NA	170000	1400.0000	NA	NA	170000	16613.3300	16613.3300	NA	FISH & H20	NA	0.0000
39 Chloronaphthalene (2)	N	0.0000	NA	NA	4300.0000	1700.0000	NA	NA	4300.0000	20173.3300	4300.0000	NA	FISH ONLY	NA	0.0000

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

HIGH QUALITY = ND

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l CU	Criteria / Standards, ug/l: Aquatic Life Acute CIA	Aquatic Life Chronic CIC	Human Health 10^-6 Risk Level: Fish Only CIH1	Human Health 10^-6 Risk Level: Fish & H2O CIH2	Output (CI), ug/l: Aquatic Life Acute EOP Hardness 400.00	Aquatic Life Chronic Mix Zone Hardness 400.00	Human Health Fish Only Mix Zone	Human Health Fish & H2O Complete Mix	Final Limits - Water Quality, ug/l: Average	Maximum	Justification: Average	Maximum	Reported Discharge Level ug/l
40 Chlorophenol (2)	N	0.0000	NA	NA	400.0000	120.0000	NA	NA	400.0000	1424.0000	400.0000	NA	FISH ONLY	NA	0.0000
41 Chlorophenyl Phenyl Ether (4)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
42 Chlorpyrifos	N	0.0000	0.0830	0.0410	NA	NA	0.0830	0.0410	NA	NA	4.1000E-02	0.0830	CHRONIC	ACUTE	0.0000
43 Chromium, Total Recoverable	N	0.0000	NA	NA	NA	100.0000	NA	NA	NA	1186.6670	1186.6670	NA	FISH & H2O	NA	0.0000
44 Chromium III	N	0.0000	5613.9480	268.2742	NA	NA	5613.9480	268.2742	NA	NA	268.2742	5613.9480	CHRONIC	ACUTE	0.0000
45 Chromium VI	N	0.0000	16.0000	11.0000	NA	NA	16.0000	11.0000	NA	NA	11.0000	16.0000	CHRONIC	ACUTE	0.0000
46 Chrysene	Y	0.0000	NA	NA	4.9000E-02	4.4000E-03	NA	NA	4.9000E-02	3.0287E-01	4.9000E-02	NA	FISH ONLY	NA	0.0000
47 Cobalt, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
48 Color (Platinum Cobalt Units)	N	0.0000	NA	NA	NA	75.0000	NA	NA	NA	890.0000	890.0000	NA	FISH & H2O	NA	0.0000
49 Copper, Total Recoverable	N	0.0000	51.6845	30.4994	NA	1000.0000	51.6845	30.4994	NA	11866.6700	30.4994	51.6845	CHRONIC	ACUTE	0.0000
50 Cyanide, Free	N	0.0000	22.0000	5.2000	220000	200.0000	22.0000	5.2000	220000	2373.3330	5.2000	22.0000	CHRONIC	ACUTE	0.0000
51 DDD (4,4')	Y	0.0000	NA	NA	8.4000E-04	8.3000E-04	NA	NA	8.4000E-04	5.7132E-02	8.4000E-04	NA	FISH ONLY	NA	0.0000
52 DDE (4,4')	Y	0.0000	NA	NA	5.9000E-04	5.9000E-04	NA	NA	5.9000E-04	4.0612E-02	5.9000E-04	NA	FISH ONLY	NA	0.0000
53 DDT (4,4')	Y	0.0000	1.1000	0.0010	5.9000E-04	5.9000E-04	1.1000	0.0010	5.9000E-04	4.0612E-02	5.9000E-04	1.1000	FISH ONLY	ACUTE	0.0000
54 Dibenzo (a,h) Anthracene	Y	0.0000	NA	NA	4.9000E-02	4.4000E-03	NA	NA	4.9000E-02	3.0287E-01	4.9000E-02	NA	FISH ONLY	NA	0.0000
55 Dibutyl Phthalate	N	0.0000	NA	NA	NA	2700.0000	NA	NA	NA	32040.0000	32040.0000	NA	FISH & H2O	NA	0.0000
56 Dichlorobenzene (1,2)	N	0.0000	NA	NA	17000.0000	600.0000	NA	NA	17000.0000	7120.0000	7120.0000	NA	FISH & H2O	NA	0.0000
57 Dichlorobenzene (1,3)	N	0.0000	NA	NA	2600.0000	400.0000	NA	NA	2600.0000	4746.6670	2600.0000	NA	FISH ONLY	NA	0.0000
58 Dichlorobenzene (1,4)	N	0.0000	NA	NA	2600.0000	75.0000	NA	NA	2600.0000	890.0000	890.0000	NA	FISH & H2O	NA	0.0000
59 Dichlorobenzidine (3,3')	Y	0.0000	NA	NA	7.7000E-02	4.0000E-02	NA	NA	7.7000E-02	2.753333	7.7000E-02	NA	FISH ONLY	NA	0.0000
60 Dichlorobromomethane	Y	0.0000	NA	NA	46.0000	5.6000E-01	NA	NA	46.0000	38.5467	38.5467	NA	FISH & H2O	NA	0.0000
61 Dichlorodifluoromethane	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
62 Dichloroethane (1,1)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
63 Dichloroethane (1,2)	Y	0.0000	NA	NA	99.0000	3.8000E-01	NA	NA	99.0000	26.1567	26.1567	NA	FISH & H2O	NA	0.0000
64 Dichloroethylene (1,1)	Y	0.0000	NA	NA	3.2000	5.7000E-02	NA	NA	3.2000	3.9235	3.2000	NA	FISH ONLY	NA	0.0000
65 Dichlorophenol (2,4)	N	0.0000	NA	NA	790.0000	93.0000	NA	NA	790.0000	1103.6000	790.0000	NA	FISH ONLY	NA	0.0000
66 Dichloropropane (1,2)	Y	0.0000	NA	NA	39.0000	5.2000E-01	NA	NA	39.0000	35.7933	35.7933	NA	FISH & H2O	NA	0.0000
67 Dichloropropenes	N	0.0000	NA	NA	1700.0000	NA	NA	NA	1700.0000	NA	1700.0000	NA	FISH ONLY	NA	0.0000
68 Dichloropropolyne (1,3)	N	0.0000	NA	NA	1700.0000	10.0000	NA	NA	1700.0000	118.6667	118.6667	NA	FISH & H2O	NA	0.0000
69 Dieldrin	Y	0.0000	0.2400	0.0560	1.4000E-04	1.4000E-04	0.2400	0.0560	1.4000E-04	9.6367E-03	1.4000E-04	0.2400	FISH ONLY	ACUTE	0.0000
70 Diethyl Phthalate	N	0.0000	NA	NA	120000	23000.0000	NA	NA	120000	272933	120000	NA	FISH ONLY	NA	0.0000
71 Dimethyl Phthalate	N	0.0000	NA	NA	2900000	313000	NA	NA	2900000	3714267	2900000	NA	FISH ONLY	NA	0.0000
72 Dimethylphenol (2,4)	N	0.0000	NA	NA	2300.0000	540.0000	NA	NA	2300.0000	6408.0000	2300.0000	NA	FISH ONLY	NA	0.0000
73 Dinitrophenol	N	0.0000	NA	NA	14000.0000	70.0000	NA	NA	14000.0000	830.6667	830.6667	NA	FISH & H2O	NA	0.0000
74 Dinitrotoluene	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
75 Dinitrotoluene (2,4)	Y	0.0000	NA	NA	9.1000	1.1000E-01	NA	NA	9.1000	7.571667	7.571667	NA	FISH & H2O	NA	0.0000
76 Dinitro-O-Cresol (2,4)	N	0.0000	NA	NA	765.0000	13.4000	NA	NA	765.0000	159.0133	159.0133	NA	FISH & H2O	NA	0.0000
77 Diphenylhydrazine (1,2) (as Azobenzene)	Y	0.0000	NA	NA	5.4000E-01	4.0000E-02	NA	NA	5.4000E-01	2.753333	5.4000E-01	NA	FISH ONLY	NA	0.0000
78 Di-N-butyl Phthalate	N	0.0000	NA	NA	12000.0000	2700.0000	NA	NA	12000.0000	32040.0000	12000.0000	NA	FISH ONLY	NA	0.0000
79 Di-N-Octyl Phthalate	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

HIGH QUALITY = NO

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l CV	Criteria / Standards, ug/l: Aquatic Life Acute CMA	Aquatic Life Chronic CMC	Human Health 10^-6 Risk Level: Fish Only CCH1	Human Health 10^-6 Risk Level: Fish & H20 CCH2	Output (CT), ug/l: Aquatic Life Acute EOP Hardness 400.00	Aquatic Life Chronic Mix Zone Hardness 400.00	Human Health Fish Only Mix Zone	Human Health Fish & H20 Complete Mix	Final Limits Water Quality, ug/l: Average	Final Limits Water Quality, ug/l: Maximum	Justification: Average	Justification: Maximum	Reported Discharge Level ug/l
80 Endosulfan Sulfate	N	0.0000	NA	NA	240.0000	110.0000	NA	NA	240.0000	1305.3330	240.0000	NA	FISH ONLY	NA	0.0000
81 Endosulfan (Alpha)	N	0.0000	0.2200	0.0560	240.0000	110.0000	0.2200	0.0560	240.0000	1305.3330	5.6000E-02	0.2200	CHRONIC	ACUTE	0.0000
82 Endosulfan (Beta)	N	0.0000	0.2200	0.0560	240.0000	110.0000	0.2200	0.0560	240.0000	1305.3330	5.6000E-02	0.2200	CHRONIC	ACUTE	0.0000
83 Endrin	N	0.0000	0.0860	0.0360	8.1000E-01	7.6000E-01	0.0860	0.0360	8.1000E-01	9.018666	3.6000E-02	0.0860	CHRONIC	ACUTE	0.0000
84 Endrin Aldehyde	N	0.0000	NA	NA	8.1000E-01	7.6000E-01	NA	NA	8.1000E-01	9.018666	8.1000E-01	NA	FISH ONLY	NA	0.0000
85 Ethylbenzene	N	0.0000	NA	NA	29000.0000	700.0000	NA	NA	29000.0000	8306.6670	8306.6670	NA	FISH & H20	NA	0.0000
86 Ethylhexyl Phthalate (Bis-2)	Y	0.0000	NA	NA	5.9000	1.8000	NA	NA	5.9000	123.9000	5.9000	NA	FISH ONLY	NA	0.0000
87 Fluorene	N	0.0000	NA	NA	14000.0000	1300.0000	NA	NA	14000.0000	15426.6700	14000.0000	NA	FISH ONLY	NA	0.0000
88 Fluoride	N	0.0000	NA	NA	NA	2000.0000	NA	NA	NA	23733.3300	23733.3300	NA	FISH & H20	NA	0.0000
89 Fluoranthene	N	0.0000	NA	NA	370.0000	300.0000	NA	NA	370.0000	3560.0000	370.0000	NA	FISH ONLY	NA	0.0000
90 Halomethanes	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
91 HCH (Alpha)	Y	0.0000	NA	NA	1.3000E-02	3.9000E-03	NA	NA	1.3000E-02	2.6845E-01	1.3000E-02	NA	FISH ONLY	NA	0.0000
92 HCH (Beta)	Y	0.0000	NA	NA	4.6000E-02	1.4000E-02	NA	NA	4.6000E-02	9.6367E-01	4.6000E-02	NA	FISH ONLY	NA	0.0000
93 HCH (Gamma), Lindane	Y	0.0000	0.9500	NA	6.3000E-02	1.9000E-02	0.9500	NA	6.3000E-02	1.307833	6.3000E-02	0.9500	FISH ONLY	ACUTE	0.0000
94 HCH (Technical)	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
95 Heptachlor	Y	0.0000	0.5200	0.0038	2.1000E-04	2.1000E-04	0.5200	0.0038	2.1000E-04	1.4455E-02	2.1000E-04	0.5200	FISH ONLY	ACUTE	0.0000
96 Heptachlor Epoxide	Y	0.0000	0.5200	0.0038	1.1000E-04	1.0000E-04	0.5200	0.0038	1.1000E-04	6.8833E-03	1.1000E-04	0.5200	FISH ONLY	ACUTE	0.0000
97 Hexachlorobenzene	Y	0.0000	NA	NA	7.7000E-04	7.5000E-04	NA	NA	7.7000E-04	5.1625E-02	7.7000E-04	NA	FISH ONLY	NA	0.0000
98 Hexachlorobutadiene	Y	0.0000	NA	NA	50.0000	4.4000E-01	NA	NA	50.0000	30.2867	30.2867	NA	FISH & H20	NA	0.0000
99 Hexachlorocyclopentadiene	N	0.0000	NA	NA	17000.0000	50.0000	NA	NA	17000.0000	593.3333	593.3333	NA	FISH & H20	NA	0.0000
100 Hexachloroethane	Y	0.0000	NA	NA	8.9000	1.9000	NA	NA	8.9000	130.7833	8.9000	NA	FISH ONLY	NA	0.0000
101 Indeno (1,2,3-cd) Pyrene	Y	0.0000	NA	NA	4.9000E-02	4.4000E-03	NA	NA	4.9000E-02	3.0287E-01	4.9000E-02	NA	FISH ONLY	NA	0.0000
102 Iron, Total Recoverable	N	0.0000	4000.0000	1000.0000	NA	NA	4000.0000	1000.0000	NA	NA	1000.0000	4000.0000	CHRONIC	ACUTE	0.0000
103 Isophorone	Y	0.0000	NA	NA	2600.0000	36.0000	NA	NA	2600.0000	2478.0000	2478.0000	NA	FISH & H20	NA	0.0000
104 Lead, Total Recoverable	N	0.0000	476.8177	18.5809	NA	15.0000	476.8177	18.5809	NA	178.0000	18.5809	476.8177	CHRONIC	ACUTE	0.0000
105 Magnesium, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
106 Manganese, Total Recoverable	N	0.0000	NA	NA	100.0000	50.0000	NA	NA	100.0000	593.3333	100.0000	NA	FISH ONLY	NA	0.0000
107 Mercury, Total Recoverable	N	0.0000	1.7000	0.9100	5.1000E-02	5.0000E-02	1.7000	0.9100	5.1000E-02	5.9333E-01	5.1000E-02	1.7000	FISH ONLY	ACUTE	0.0000
108 Methyl Bromide	N	0.0000	NA	NA	4000.0000	48.0000	NA	NA	4000.0000	569.6000	569.6000	NA	FISH & H20	NA	0.0000
109 Methyl Chloride	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
110 Methylene Chloride	Y	0.0000	NA	NA	1600.0000	4.7000	NA	NA	1600.0000	323.5167	323.5167	NA	FISH & H20	NA	0.0000
111 Molybdenum, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
112 Naphthalene	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
113 Nickel, Total Recoverable	N	0.0000	1515.9220	168.5410	4600.0000	100.0000	1515.9220	168.5410	4600.0000	1186.6670	168.5410	1515.9220	CHRONIC	ACUTE	0.0000
114 Nitrate - Nitrite (as N)	N	0.0000	NA	NA	NA	10000.0000	NA	NA	NA	118667	118667	NA	FISH & H20	NA	0.0000
115 Nitrobenzene	N	0.0000	NA	NA	1900.0000	17.0000	NA	NA	1900.0000	201.7333	201.7333	NA	FISH & H20	NA	0.0000
116 Nitrophenol (2)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
117 Nitrophenol (4)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
118 Nitrosodibutylamine (N)	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
119 Nitrosodiethylamine (N)	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

HIGH QUALITY = NO

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l CV	Criteria / Standards, ug/l: Aquatic Life Acute CMA	Aquatic Life Chronic CMC	Human Health 10^-6 Risk Level: Fish Only CRL1	Human Health 10^-6 Risk Level: Fish & H2O CRL2	Output (CT), ug/l: Aquatic Life Acute ECP Hardness 400.00	Aquatic Life Chronic Mix Zone Hardness 400.00	Human Health Fish Only Mix Zone	Human Health Fish & H2O Complete Mix	Final Limits Water Quality, ug/l: Average	Maximum	Justification: Average	Maximum	Reported Discharge Level ug/l
120 Nitrosodimethylamine (N)	Y	0.0000	NA	NA	8.1000	6.9000E-04	NA	NA	8.1000	4.7495E-02	4.7495E-02	NA	FISH & H20	NA	0.0000
121 Nitrosodiphenylamine (N)	Y	0.0000	NA	NA	16.0000	5.0000	NA	NA	16.0000	344.1667	16.0000	NA	FISH ONLY	NA	0.0000
122 Nitrosodi-N-Propylamine (N)	Y	0.0000	NA	NA	1.4000	5.0000E-03	NA	NA	1.4000	3.4417E-01	3.4417E-01	NA	FISH & H20	NA	0.0000
123 Nitrosopyrrolidine (N)	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
124 Parathion	N	0.0000	0.0650	0.0130	NA	NA	0.0650	0.0130	NA	NA	1.3000E-02	0.0650	CHRONIC	ACUTE	0.0000
125 PCB - 1016	Y	0.0000	NA	0.0014	7.9000E-05	7.9000E-05	NA	0.0014	7.9000E-05	5.4378E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
126 PCB - 1221	Y	0.0000	NA	0.0014	7.9000E-05	7.9000E-05	NA	0.0014	7.9000E-05	5.4378E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
127 PCB - 1232	Y	0.0000	NA	0.0014	7.9000E-05	7.9000E-05	NA	0.0014	7.9000E-05	5.4378E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
128 PCB - 1242	Y	0.0000	NA	0.0014	7.9000E-05	7.9000E-05	NA	0.0014	7.9000E-05	5.4378E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
129 PCB - 1248	Y	0.0000	NA	0.0014	7.9000E-05	7.9000E-05	NA	0.0014	7.9000E-05	5.4378E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
130 PCB - 1254	Y	0.0000	NA	0.0014	7.9000E-05	7.9000E-05	NA	0.0014	7.9000E-05	5.4378E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
131 PCB - 1260	Y	0.0000	NA	0.0014	7.9000E-05	7.9000E-05	NA	0.0014	7.9000E-05	5.4378E-03	7.9000E-05	NA	FISH ONLY	NA	0.0000
132 Pentachlorobenzene	N	0.0000	NA	NA	4.1000	3.5000	NA	NA	4.1000	41.5333	4.1000	NA	FISH ONLY	NA	0.0000
133 Pentachlorophenol	Y	0.0000	9.0700	5.7000	8.2000	2.8000E-01	9.0700	5.7000	8.2000	19.2733	5.7000	9.0700	CHRONIC	ACUTE	0.0000
134 Phenanthrene	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
135 Phenol	N	0.0000	NA	NA	4600000	21000.0000	NA	NA	4600000	249200	249200	NA	FISH & H20	NA	0.0000
136 Phenols, Total	N	0.0000	NA	NA	5.0000	NA	NA	NA	5.0000	NA	5.0000	NA	FISH ONLY	NA	0.0000
137 Phosphorous (as P), Total	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
138 Phthalate Esters	N	0.0000	NA	3.0000	NA	NA	NA	3.0000	NA	NA	3.0000	NA	CHRONIC	NA	0.0000
139 Pyrene	N	0.0000	NA	NA	11000.0000	960.0000	NA	NA	11000.0000	11392.0000	11000.0000	NA	FISH ONLY	NA	0.0000
140 P-Chloro-M-Cresol	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
141 Selenium, Total Recoverable	N	0.0000	20.0000	5.0000	NA	50.0000	20.0000	5.0000	NA	593.3333	5.0000	20.0000	CHRONIC	ACUTE	0.0000
142 Silver, Total Recoverable	N	0.0000	44.0497	NA	NA	50.0000	44.0497	NA	NA	593.3333	44.0497	44.0497	ACUTE	ACUTE	0.0000
143 Sulfate (as SO4)	N	0.0000	NA	NA	NA	250000	NA	NA	NA	2966667	2966667	NA	FISH & H20	NA	0.0000
144 Sulfide (Hydrogen Sulfide)	N	0.0000	NA	2.0000	NA	NA	NA	2.0000	NA	NA	2.0000	NA	CHRONIC	NA	0.0000
145 Sulfite (as SO2)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
146 Tetrachlorobenzene (1,2,4,5)	N	0.0000	NA	NA	2.9000	2.3000	NA	NA	2.9000	27.2933	2.9000	NA	FISH ONLY	NA	0.0000
147 Tetrachlorodibenzo-P, Dioxin (2,3,7,8)	Y	0.0000	NA	NA	1.4000E-08	1.3000E-08	NA	NA	1.4000E-08	8.9483E-07	1.4000E-08	NA	FISH ONLY	NA	0.0000
148 Tetrachloroethane (1,1,2,2)	Y	0.0000	NA	NA	10.7000	1.7000E-01	NA	NA	10.7000	11.7017	10.7000	NA	FISH ONLY	NA	0.0000
149 Tetrachloroethylene	Y	0.0000	NA	NA	8.8500	8.0000E-01	NA	NA	8.8500	55.0667	8.8500	NA	FISH ONLY	NA	0.0000
150 Thallium, Total Recoverable	N	0.0000	NA	NA	6.3000	1.7000	NA	NA	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	NA	NA	0.0000
152 Titanium, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
153 Toluene	N	0.0000	NA	NA	200000	1000.0000	NA	NA	200000	11866.6700	11866.6700	NA	FISH & H20	NA	0.0000
154 Total Dissolved Solids	N	0.0000	NA	NA	NA	750000	NA	NA	NA	8900000	8900000	NA	FISH & H20	NA	0.0000
155 Toxaphene	Y	0.0000	0.7300	0.0002	7.5000E-04	7.3000E-04	0.7300	0.0002	7.5000E-04	5.0248E-02	2.0000E-04	0.7300	CHRONIC	ACUTE	0.0000
156 Trans-Dichloroethylene (1,2)	Y	0.0000	NA	NA	140000	NA	NA	NA	140000	NA	140000	NA	FISH ONLY	NA	0.0000
157 Trichlorobenzene (1,2,4)	N	0.0000	NA	NA	940.0000	70.0000	NA	NA	940.0000	830.6667	830.6667	NA	FISH & H20	NA	0.0000
158 Trichloroethane (1,1,1)	N	0.0000	NA	NA	NA	200.0000	NA	NA	NA	2373.3330	2373.3330	NA	FISH & H20	NA	0.0000
159 Trichloroethane (1,1,2)	Y	0.0000	NA	NA	41.8000	6.0000E-01	NA	NA	41.8000	41.3000	41.3000	NA	FISH & H20	NA	0.0000

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

HIGH QUALITY = ND

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l CV	Criteria / Standards, ug/l: Aquatic Life Acute CCA	Aquatic Life Chronic CCC	Human Health 10^-6 Risk Level Fish Only CCH1	Human Health 10^-6 Risk Level Fish & H2O CCH2	Output (CT), ug/l: Aquatic Life Acute FCP Hardness 400.00	Aquatic Life Chronic Mix Zone Hardness 400.00	Human Health Fish Only Mix Zone	Human Health Fish & H2O Complete Mix	Final Limits Water Quality, ug/l: Average	Maximum	Justification: Average	Maximum	Reported Discharge Level ug/l
160 Trichloroethylene	Y	0.0000	NA	NA	81.0000	2.7000	NA	NA	81.0000	185.8500	81.0000	NA	FISH ONLY	NA	0.0000
161 Trichlorofluoromethane	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
162 Trichlorophenol (2,4,5)	N	0.0000	NA	NA	9800.0000	2600.0000	NA	NA	9800.0000	30853.3300	9800.0000	NA	FISH ONLY	NA	0.0000
163 Trichlorophenol (2,4,6)	Y	0.0000	NA	NA	6.5000	2.1000	NA	NA	6.5000	144.5500	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	FISH & H20	NA	0.0000
165 Zinc, Total Recoverable	N	0.0000	387.8303	387.8303	69000.0000	5000.0000	387.8303	387.8303	69000.0000	59333.3300	387.8303	387.8303	CHRONIC	ACUTE	0.0000

REPORT OF ALL CALCULATIONS

HIGH QUALITY = ND

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l CV	Criteria / Standards, ug/l: Aquatic Life Acute CCA	Aquatic Life Chronic CCC	Human Health 10^-6 Risk Level Fish Only CCH1	Human Health 10^-6 Risk Level Fish & H2O CCH2	Output (CT), ug/l: Aquatic Life Acute FCP Hardness 400.00	Aquatic Life Chronic Mix Zone Hardness 400.00	Human Health Fish Only Mix Zone	Human Health Fish & H2O Complete Mix	Final Limits Water Quality, ug/l: Average	Maximum	Justification: Average	Maximum	Reported Discharge Level ug/l
Whole Effluent															
1 Acute Toxicity Units (TUa)	NA	0	0.3	NA	NA	NA	1.0000	0.1000	NA	NA	1.0000	1.0000	CHRONIC	ACUTE	NA
2 Chronic Toxicity Units (TUc)	NA	0	NA	1	NA	NA	NA	1.0000	NA	NA	1.0000	NA	CHRONIC	NA	NA

**** END OF FILE ****

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

Steady State Toxics Wasteload Allocation Model (SSTWAM'95)

04 Feb 2004
7:49:13 AM

SSTWAM'95 OUTPUT FILE

INPUT DATA :

KPDES Number:	KY0004201 002	
Facility Name:	TVA Paradise Fossil Plt	
Receiving Water:	Green River	
Requested by:	Larry Sowder	
Date Entered:	1/7/2004	
User Name	Larry Sowder	
QT =	27	MGD
QU =	323	MGD
QUH1NC =	323	MGD
QUH1C =	2028	MGD
QUH2NC =	326	MGD
QUH2C =	2035	MGD
HT =	400	mg/l as CaCO3
HU =	125	mg/l as CaCO3
ZID =	1	dilutions
MZ =	0.33333	
ACR =	0.1	
HQ =	NO	

CALCULATION METHODOLOGY :

AQUATIC LIFE - CHEMICAL SPECIFIC

ACUTE: IF NO ZONE OF INITIAL DILUTION (ZID) GIVEN, THEN ACUTE CRITERIA APPLIES AT END OF PIPE (EOP), CT=CDA
IF ZID IS GIVEN THEN CT=(CDA-CU) (ZID)

CHRONIC: MIXING ZONE / COMPLETE MIX
CT=(CDC[(QT+(MZ)QU)]-CU(MZ)QU)/QT

HUMAN HEALTH - CHEMICAL SPECIFIC

FISH ONLY: MIXING ZONE / COMPLETE MIX
CARCINOGEN: CT=(CDH1[(QT+(MZ)QUH1C)]-CU(MZ)QUH1C)/QT
NON-CARCINOGEN: CT=(CDH1[(QT+(MZ)QUH1NC)]-CU(MZ)QUH1NC)/QT

FISH & WATER: COMPLETE MIX, APPLICABLE AT POINT OF WITHDRAWAL
CARCINOGEN: CT=(CDH2[(QT+QUH2C)]-CU(QUH2C))/QT
NON-CARCINOGEN: CT=(CDH2[(QT+QUH2NC)]-CU(QUH2NC))/QT

AQUATIC LIFE - WHOLE EFFLUENT

ACUTE: IF NO ZID GIVEN, THEN ACUTE CRITERIA APPLIES AT EOP, CT=CDA, IN ACUTE TOXICITY UNITS
IF ZID IS GIVEN, THEN CT=[(CDA-CU)] (ZID)

CHRONIC: MIXING ZONE / COMPLETE MIX
CT, IN CHRONIC TOXICITY UNITS = (CDC[(QT+(MZ)QU)]-CU(MZ)QU)/QT
CT, IN ACUTE TOXICITY UNITS = (CT, IN CHRONIC TOXICITY UNITS) (ACR)

DEFINITIONS :

ACR= ACUTE TO CHRONIC RATIO
CDA= ACUTE DOWNSTREAM CONCENTRATION (CRITERIA) FOR AQUATIC LIFE
CDC= CHRONIC DOWNSTREAM CONCENTRATION (CRITERIA) FOR AQUATIC LIFE
CDH1= DOWNSTREAM CONCENTRATION (CRITERIA) FOR HUMAN HEALTH FISH CONSUMPTION ONLY
CDH2= DOWNSTREAM CONCENTRATION (CRITERIA) FOR HUMAN HEALTH FISH AND WATER CONSUMPTION
CT= END OF PIPE OUTPUT LIMIT
CU= CONCENTRATION UPSTREAM (BACKGROUND CONCENTRATION)
EOP= END OF PIPE
HM= HARMONIC MEAN STREAM FLOW
HT= EFFLUENT HARDNESS
HU= STREAM HARDNESS
MGD= MILLION GALLONS PER DAY
MZ= MIXING ZONE FACTOR
QT= TOTAL EFFLUENT FLOW
QUH1C= STREAM FLOW (HM) FOR HUMAN HEALTH, FISH CONSUMPTION, CARCINOGEN, AT POINT OF DISCHARGE
QUH1NC= STREAM FLOW (7Q10) FOR HUMAN HEALTH, FISH CONSUMPTION, NON-CARCINOGEN, AT POINT OF DISCHARGE
QUH2C= STREAM FLOW (HM) FOR HUMAN HEALTH, FISH & WATER CONSUMPTION, CARCINOGEN, AT POINT OF WITHDRAWAL
QUH2NC= STREAM FLOW (7Q10) FOR HUMAN HEALTH, FISH & WATER CONSUMPTION, NON-CARCINOGEN, AT POINT OF WITHDRAWAL
QU= STREAM FLOW (7Q10) FOR WATER QUALITY AT POINT OF DISCHARGE
TUa= ACUTE TOXICITY UNITS
TUc= CHRONIC TOXICITY UNITS
ug/l= MICROGRAMS PER LITER
ZID= ZONE OF INITIAL DILUTION FACTOR
HQ= HIGH QUALITY INDICATOR

CAP ON HARDNESS FOR METALS = 400 mg/l CaCO3

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

HIGH QUALITY = NO

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l CV	Criteria / Standards, ug/l: Aquatic Life Acute CMA	Aquatic Life Chronic CMC	Human Health 10^-6 Risk Level: Fish Only CRL1	Fish & H20 CRL2	Output (CT), ug/l: Aquatic Life Acute EOP Hardness 400.00	Aquatic Life Chronic Mix Zone Hardness 180.14	Human Health Fish Only Mix Zone	Human Health Fish & H20 Complete Mix	Final Limits Water Quality, ug/l: Average	Maximum	Justification: Average	Maximum	Reported Discharge Level ug/l
1 Acenaphthene	N	0.0000	NA	NA	2700.0000	1200.0000	NA	NA	13466.5600	15688.8900	13466.5600	NA	FISH ONLY	NA	0.0000
2 Acenaphtylene	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
3 Acrolein	N	0.0000	NA	NA	780.0000	320.0000	NA	NA	3890.3390	4183.7040	3890.3390	NA	FISH ONLY	NA	0.0000
4 Acrylonitrile	Y	0.0000	NA	NA	6.5000E-01	5.8000E-02	NA	NA	16.9239	4.429482	4.429482	NA	FISH & H20	NA	0.0000
5 Aldrin	Y	0.0000	3.0000	NA	1.4000E-04	1.3000E-04	3.0000	NA	3.6452E-03	9.9281E-03	3.6452E-03	3.0000	FISH ONLY	ACUTE	0.0000
6 Aluminum, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
7 Anthracene	N	0.0000	NA	NA	110000	9600.0000	NA	NA	548638	125511	125511	NA	FISH & H20	NA	0.0000
8 Antimony, Total Recoverable	N	0.0000	NA	NA	4300.0000	6.0000	NA	NA	21446.7400	78.4444	78.4444	NA	FISH & H20	NA	0.0000
9 Arsenic, Total Recoverable	Y	0.0000	NA	50.0000	NA	NA	NA	249.3807	NA	NA	249.3807	NA	CHRONIC	NA	0.0000
10 Arsenic III	Y	0.0000	340.0000	150.0000	NA	NA	340.0000	748.1422	NA	NA	340.0000	340.0000	ACUTE	ACUTE	0.0000
11 Barium, Total Recoverable	N	0.0000	NA	NA	NA	2000.0000	NA	NA	NA	26148.1500	26148.1500	NA	FISH & H20	NA	0.0000
12 Benzene	Y	0.0000	NA	NA	71.0000	1.2000	NA	NA	1848.6120	91.6444	91.6444	NA	FISH & H20	NA	0.0000
13 Benzidine	Y	0.0000	NA	NA	5.4000E-04	1.2000E-04	NA	NA	1.4060E-02	9.1644E-03	9.1644E-03	NA	FISH & H20	NA	0.0000
14 Benzo (a) Anthracene	Y	0.0000	NA	NA	4.9000E-02	4.4000E-03	NA	NA	1.275802	3.3603E-01	3.3603E-01	NA	FISH & H20	NA	0.0000
15 Benzo (a) Pyrene	Y	0.0000	NA	NA	4.9000E-02	4.4000E-03	NA	NA	1.275802	3.3603E-01	3.3603E-01	NA	FISH & H20	NA	0.0000
16 Benzo (ghi) Perylene	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
17 Benzo (k) Fluoranthene	Y	0.0000	NA	NA	4.9000E-02	4.4000E-03	NA	NA	1.275802	3.3603E-01	3.3603E-01	NA	FISH & H20	NA	0.0000
18 Benzo-fluoranthene (3,4)	Y	0.0000	NA	NA	4.9000E-02	NA	NA	NA	1.275802	NA	1.275802	NA	FISH ONLY	NA	0.0000
19 Beryllium, Total Recoverable	N	0.0000	NA	NA	NA	4.0000E-03	NA	NA	NA	5.2296E-02	5.2296E-02	NA	FISH & H20	NA	0.0000
20 Boron, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
21 Bromide	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
22 Bromoform	Y	0.0000	NA	NA	360.0000	4.3000	NA	NA	9373.2430	328.3926	328.3926	NA	FISH & H20	NA	0.0000
23 Bromophenyl Phenyl Ether (4)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
24 Butyl Benzyl Phthalate	N	0.0000	NA	NA	5200.0000	3000.0000	NA	NA	25935.6000	39222.2200	25935.6000	NA	FISH ONLY	NA	0.0000
25 Cadmium, Total Recoverable	N	0.0000	21.5715	3.908311	NA	5.0000	21.5715	19.4931	NA	65.3704	19.4931	21.5715	CHRONIC	ACUTE	0.0000
26 Carbon Tetrachloride	Y	0.0000	NA	NA	4.4000	2.5000E-01	NA	NA	114.5619	19.0926	19.0926	NA	FISH & H20	NA	0.0000
27 Chlordane	Y	0.0000	2.4000	0.0043	2.2000E-03	2.1000E-03	2.4000	0.02144674	5.7281E-02	1.6038E-01	2.1447E-02	2.4000	CHRONIC	ACUTE	0.0000
28 Chloride	N	0.0000	1200000	600000	NA	250000	1200000	2992569	NA	3268519	1200000	1200000	ACUTE	ACUTE	0.0000
29 Chlorine, Total Residual	N	0.0000	19.0000	11.0000	NA	NA	19.0000	54.8638	NA	NA	19.0000	19.0000	ACUTE	ACUTE	0.0000
30 Chlorobenzene	N	0.0000	NA	NA	21000.0000	680.0000	NA	NA	104740	8890.3700	8890.3700	NA	FISH & H20	NA	0.0000
31 Chlorodibromomethane	Y	0.0000	NA	NA	34.0000	4.1000E-01	NA	NA	885.2507	31.3119	31.3119	NA	FISH & H20	NA	0.0000
32 Chloroethane	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
33 Chloroethyl Ether (Bis-2)	Y	0.0000	NA	NA	1.4000	3.1000E-02	NA	NA	36.4515	2.367481	2.367481	NA	FISH & H20	NA	0.0000
34 Chloroethyl Methane (Bis-2)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
35 Chloroethylvinyl Ether (2)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
36 Chloroform	Y	0.0000	NA	NA	470.0000	5.7000	NA	NA	12237.2900	435.3111	435.3111	NA	FISH & H20	NA	0.0000
37 Chlorohexyl Ether (Bis-2)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
38 Chloroisopropyl Ether (Bis-2)	N	0.0000	NA	NA	170000	1400.0000	NA	NA	847894	18303.7000	18303.7000	NA	FISH & H20	NA	0.0000
39 Chloronaphthalene (2)	N	0.0000	NA	NA	4300.0000	1700.0000	NA	NA	21446.7400	22225.9300	21446.7400	NA	FISH ONLY	NA	0.0000

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

HIGH QUALITY = ND

			Criteria / Standards, ug/l				Output (CT), ug/l								
			Aquatic Life		Human Health 10^-6 Risk Level		Aquatic Life		Human Health		Final Limits Water Quality, ug/l		Justification		
Chemical Specific Parameter	Carcinogen	Background Conc. ug/l CV	Acute CCA	Chronic CCC	Fish Only CCH1	Fish & H20 CCH2	Acute EOP Hardness 400.00	Chronic Mix Zone Hardness 180.14	Fish Only Mix Zone	Fish & H20 Complete Mix	Average	Maximum	Average	Maximum	Reported Discharge Level ug/l
40 Chlorophenol (2)	N	0.0000	NA	NA	400.0000	120.0000	NA	NA	1995.0460	1568.8890	1568.8890	NA	FISH & H20	NA	0.0000
41 Chlorophenyl Phenyl Ether (4)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
42 Chlorpyrifos	N	0.0000	0.0830	0.0410	NA	NA	0.0830	0.2044922	NA	NA	8.3000E-02	0.0830	ACUTE	ACUTE	0.0000
43 Chromium, Total Recoverable	N	0.0000	NA	NA	NA	100.0000	NA	NA	NA	1307.4070	1307.4070	NA	FISH & H20	NA	0.0000
44 Chromium III	N	0.0000	5613.9480	139.5821	NA	NA	5613.9480	696.1816	NA	NA	696.1816	5613.9480	CHRONIC	ACUTE	0.0000
45 Chromium VI	N	0.0000	16.0000	11.0000	NA	NA	16.0000	54.8638	NA	NA	16.0000	16.0000	ACUTE	ACUTE	0.0000
46 Chrysene	Y	0.0000	NA	NA	4.9000E-02	4.4000E-03	NA	NA	1.275802	3.3603E-01	3.3603E-01	NA	FISH & H20	NA	0.0000
47 Cobalt, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
48 Color (Platinum Cobalt Units)	N	0.0000	NA	NA	NA	75.0000	NA	NA	NA	980.5555	980.5555	NA	FISH & H20	NA	0.0000
49 Copper, Total Recoverable	N	0.0000	51.6845	15.4256	NA	1000.0000	51.6845	76.9370	NA	13074.0700	51.6845	51.6845	ACUTE	ACUTE	0.0000
50 Cyanide, Free	N	0.0000	22.0000	5.2000	220000	200.0000	22.0000	25.9356	1097275	2614.8150	22.0000	22.0000	ACUTE	ACUTE	0.0000
51 DDD (4,4')	Y	0.0000	NA	NA	8.4000E-04	8.3000E-04	NA	NA	2.1871E-02	6.3387E-02	2.1871E-02	NA	FISH ONLY	NA	0.0000
52 DDE (4,4')	Y	0.0000	NA	NA	5.9000E-04	5.9000E-04	NA	NA	1.5362E-02	4.5059E-02	1.5362E-02	NA	FISH ONLY	NA	0.0000
53 DDT (4,4')	Y	0.0000	1.1000	0.0010	5.9000E-04	5.9000E-04	1.1000	0.00498761	1.5362E-02	4.5059E-02	4.9876E-03	1.1000	CHRONIC	ACUTE	0.0000
54 Dibenzo (a,h) Anthracene	Y	0.0000	NA	NA	4.9000E-02	4.4000E-03	NA	NA	1.275802	3.3603E-01	3.3603E-01	NA	FISH & H20	NA	0.0000
55 Dibutyl Phthalate	N	0.0000	NA	NA	NA	2700.0000	NA	NA	NA	35300.0000	35300.0000	NA	FISH & H20	NA	0.0000
56 Dichlorobenzene (1,2)	N	0.0000	NA	NA	17000.0000	600.0000	NA	NA	84789.4500	7844.4440	7844.4440	NA	FISH & H20	NA	0.0000
57 Dichlorobenzene (1,3)	N	0.0000	NA	NA	2600.0000	400.0000	NA	NA	12967.8000	5229.6290	5229.6290	NA	FISH & H20	NA	0.0000
58 Dichlorobenzene (1,4)	N	0.0000	NA	NA	2600.0000	75.0000	NA	NA	12967.8000	980.5555	980.5555	NA	FISH & H20	NA	0.0000
59 Dichlorobenzidine (3,3')	Y	0.0000	NA	NA	7.7000E-02	4.0000E-02	NA	NA	2.004833	3.054815	2.004833	NA	FISH ONLY	NA	0.0000
60 Dichlorobromomethane	Y	0.0000	NA	NA	46.0000	5.6000E-01	NA	NA	1197.6920	42.7674	42.7674	NA	FISH & H20	NA	0.0000
61 Dichlorodifluoromethane	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
62 Dichloroethane (1,1)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
63 Dichloroethane (1,2)	Y	0.0000	NA	NA	99.0000	3.8000E-01	NA	NA	2577.6420	29.0207	29.0207	NA	FISH & H20	NA	0.0000
64 Dichloroethylene (1,1)	Y	0.0000	NA	NA	3.2000	5.7000E-02	NA	NA	83.3177	4.353111	4.353111	NA	FISH & H20	NA	0.0000
65 Dichlorophenol (2,4)	N	0.0000	NA	NA	790.0000	93.0000	NA	NA	3940.2150	1215.8890	1215.8890	NA	FISH & H20	NA	0.0000
66 Dichloropropane (1,2)	Y	0.0000	NA	NA	39.0000	5.2000E-01	NA	NA	1015.4350	39.7126	39.7126	NA	FISH & H20	NA	0.0000
67 Dichloropropene	N	0.0000	NA	NA	1700.0000	NA	NA	NA	8478.9440	NA	8478.9440	NA	FISH ONLY	NA	0.0000
68 Dichloropropolyne (1,3)	N	0.0000	NA	NA	1700.0000	10.0000	NA	NA	8478.9440	130.7407	130.7407	NA	FISH & H20	NA	0.0000
69 Dieldrin	Y	0.0000	0.2400	0.0560	1.4000E-04	1.4000E-04	0.2400	0.2793064	3.6452E-03	1.0692E-02	3.6452E-03	0.2400	FISH ONLY	ACUTE	0.0000
70 Diethyl Phthalate	N	0.0000	NA	NA	120000	23000.0000	NA	NA	598514	300704	300704	NA	FISH & H20	NA	0.0000
71 Dimethyl Phthalate	N	0.0000	NA	NA	2900000	313000	NA	NA	14464080	4092185	4092185	NA	FISH & H20	NA	0.0000
72 Dimethylphenol (2,4)	N	0.0000	NA	NA	2300.0000	540.0000	NA	NA	11471.5100	7060.0000	7060.0000	NA	FISH & H20	NA	0.0000
73 Dinitrophenol	N	0.0000	NA	NA	14000.0000	70.0000	NA	NA	69826.6000	915.1852	915.1852	NA	FISH & H20	NA	0.0000
74 Dinitrotoluene	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
75 Dinitrotoluene (2,4)	Y	0.0000	NA	NA	9.1000	1.1000E-01	NA	NA	236.9348	8.400741	8.400741	NA	FISH & H20	NA	0.0000
76 Dinitro-O-Cresol (2,4)	N	0.0000	NA	NA	765.0000	13.4000	NA	NA	3815.5250	175.1926	175.1926	NA	FISH & H20	NA	0.0000
77 Diphenylhydrazine (1,2) (as Azobenzene)	Y	0.0000	NA	NA	5.4000E-01	4.0000E-02	NA	NA	14.0599	3.054815	3.054815	NA	FISH & H20	NA	0.0000
78 Di-N-butyl Phthalate	N	0.0000	NA	NA	12000.0000	2700.0000	NA	NA	59851.3800	35300.0000	35300.0000	NA	FISH & H20	NA	0.0000
79 Di-N-Octyl Phthalate	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

HIGH QUALITY = ND

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l CV	Criteria / Standards, ug/l: Aquatic Life Acute CMA	Aquatic Life Chronic CMC	Human Health 10^-6 Risk Level: Fish Only CRH1	Human Health 10^-6 Risk Level: Fish & H20 CRH2	Output (CT), ug/l: Aquatic Life Acute EOP Hardness 400.00	Aquatic Life Chronic Mix Zone Hardness 180.14	Human Health Fish Only Mix Zone	Human Health Fish & H20 Complete Mix	Final Limits Water Quality, ug/l: Average	Maximum	Justification: Average	Maximum	Reported Discharge Level ug/l
80 Endosulfan Sulfate	N	0.0000	NA	NA	240.0000	110.0000	NA	NA	1197.0280	1438.1480	1197.0280	NA	FISH ONLY	NA	0.0000
81 Endosulfan (Alpha)	N	0.0000	0.2200	0.0560	240.0000	110.0000	0.2200	0.2793064	1197.0280	1438.1480	2.2000E-01	0.2200	ACUTE	ACUTE	0.0000
82 Endosulfan (Beta)	N	0.0000	0.2200	0.0560	240.0000	110.0000	0.2200	0.2793064	1197.0280	1438.1480	2.2000E-01	0.2200	ACUTE	ACUTE	0.0000
83 Endrin	N	0.0000	0.0860	0.0360	8.1000E-01	7.6000E-01	0.0860	0.1795541	4.039968	9.936296	8.6000E-02	0.0860	ACUTE	ACUTE	0.0000
84 Endrin Aldehyde	N	0.0000	NA	NA	8.1000E-01	7.6000E-01	NA	NA	4.039968	9.936296	4.039968	NA	FISH ONLY	NA	0.0000
85 Ethylbenzene	N	0.0000	NA	NA	29000.0000	700.0000	NA	NA	144641	9151.8520	9151.8520	NA	FISH & H20	NA	0.0000
86 Ethylhexyl Phthalate (Bis-2)	Y	0.0000	NA	NA	5.9000	1.8000	NA	NA	153.6171	137.4667	137.4667	NA	FISH & H20	NA	0.0000
87 Fluorene	N	0.0000	NA	NA	14000.0000	1300.0000	NA	NA	69826.6000	16996.3000	16996.3000	NA	FISH & H20	NA	0.0000
88 Fluoride	N	0.0000	NA	NA	NA	2000.0000	NA	NA	NA	26148.1500	26148.1500	NA	FISH & H20	NA	0.0000
89 Fluoranthene	N	0.0000	NA	NA	370.0000	300.0000	NA	NA	1845.4170	3922.2220	1845.4170	NA	FISH ONLY	NA	0.0000
90 Halomethanes	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
91 HCH (Alpha)	Y	0.0000	NA	NA	1.3000E-02	3.9000E-03	NA	NA	3.3848E-01	2.9784E-01	2.9784E-01	NA	FISH & H20	NA	0.0000
92 HCH (Beta)	Y	0.0000	NA	NA	4.6000E-02	1.4000E-02	NA	NA	1.197692	1.069185	1.069185	NA	FISH & H20	NA	0.0000
93 HCH (Gamma), Lindane	Y	0.0000	0.9500	NA	6.3000E-02	1.9000E-02	0.9500	NA	1.640318	1.451037	9.5000E-01	0.9500	ACUTE	ACUTE	0.0000
94 HCH (Technical)	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
95 Heptachlor	Y	0.0000	0.5200	0.0038	2.1000E-04	2.1000E-04	0.5200	0.01895294	5.4677E-03	1.6038E-02	5.4677E-03	0.5200	FISH ONLY	ACUTE	0.0000
96 Heptachlor Epoxide	Y	0.0000	0.5200	0.0038	1.1000E-04	1.0000E-04	0.5200	0.01895294	2.8640E-03	7.6370E-03	2.8640E-03	0.5200	FISH ONLY	ACUTE	0.0000
97 Hexachlorobenzene	Y	0.0000	NA	NA	7.7000E-04	7.5000E-04	NA	NA	2.0048E-02	5.7278E-02	2.0048E-02	NA	FISH ONLY	NA	0.0000
98 Hexachlorobutadiene	Y	0.0000	NA	NA	50.0000	4.4000E-01	NA	NA	1301.8390	33.6030	33.6030	NA	FISH & H20	NA	0.0000
99 Hexachlorocyclopentadiene	N	0.0000	NA	NA	17000.0000	50.0000	NA	NA	84789.4500	653.7037	653.7037	NA	FISH & H20	NA	0.0000
100 Hexachloroethane	Y	0.0000	NA	NA	8.9000	1.9000	NA	NA	231.7274	145.1037	145.1037	NA	FISH & H20	NA	0.0000
101 Indeno (1,2,3-cd) Pyrene	Y	0.0000	NA	NA	4.9000E-02	4.4000E-03	NA	NA	1.275802	3.3603E-01	3.3603E-01	NA	FISH & H20	NA	0.0000
102 Iron, Total Recoverable	N	0.0000	4000.0000	1000.0000	NA	NA	4000.0000	4987.6140	NA	NA	4000.0000	4000.0000	ACUTE	ACUTE	0.0000
103 Isophorone	Y	0.0000	NA	NA	2600.0000	36.0000	NA	NA	67695.6500	2749.3330	2749.3330	NA	FISH & H20	NA	0.0000
104 Lead, Total Recoverable	N	0.0000	476.8177	6.730165	NA	15.0000	476.8177	33.5675	NA	196.1111	33.5675	476.8177	CHRONIC	ACUTE	0.0000
105 Magnesium, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
106 Manganese, Total Recoverable	N	0.0000	NA	NA	100.0000	50.0000	NA	NA	498.7614	653.7037	498.7614	NA	FISH ONLY	NA	0.0000
107 Mercury, Total Recoverable	N	0.0000	1.7000	0.9100	5.1000E-02	5.0000E-02	1.7000	4.538729	2.5437E-01	6.5370E-01	2.5437E-01	1.7000	FISH ONLY	ACUTE	0.0000
108 Methyl Bromide	N	0.0000	NA	NA	4000.0000	48.0000	NA	NA	19950.4600	627.5555	627.5555	NA	FISH & H20	NA	0.0000
109 Methyl Chloride	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
110 Methylene Chloride	Y	0.0000	NA	NA	1600.0000	4.7000	NA	NA	41658.8600	358.9407	358.9407	NA	FISH & H20	NA	0.0000
111 Molybdenum, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
112 Naphthalene	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
113 Nickel, Total Recoverable	N	0.0000	1515.9220	85.8227	4600.0000	100.0000	1515.9220	428.0504	22943.0300	1307.4070	428.0504	1515.9220	CHRONIC	ACUTE	0.0000
114 Nitrate - Nitrite (as N)	N	0.0000	NA	NA	NA	10000.0000	NA	NA	NA	130741	130741	NA	FISH & H20	NA	0.0000
115 Nitrobenzene	N	0.0000	NA	NA	1900.0000	17.0000	NA	NA	9476.4680	222.2593	222.2593	NA	FISH & H20	NA	0.0000
116 Nitrophenol (2)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
117 Nitrophenol (4)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
118 Nitrosodibutylamine (N)	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
119 Nitrosodiethylamine (N)	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000

ATTACHMENT B - STEADY STATE TOXICS WASTELOAD ALLOCATION (SSTWAM95)

REPORT OF ALL CALCULATIONS

HIGH QUALITY = NO

Chemical Specific Parameter	Carcinogen	Background Conc. ug/l CV	Criteria / Standards, ug/l: Aquatic Life Acute CMA	Aquatic Life Chronic CMC	Human Health 10^-6 Risk Level: Fish Only CRL	Fish & H20 CRL	Output (CT), ug/l: Aquatic Life Acute MDP Hardness 400.00	Aquatic Life Chronic Mix Zone Hardness 180.14	Human Health Fish Only Mix Zone	Human Health Fish & H20 Complete Mix	Final Limits - Water Quality, ug/l: Average	Maximum	Justification: Average	Maximum	Reported Discharge Level ug/l
120 Nitrosodimethylamine (N)	Y	0.0000	NA	NA	8.1000	6.9000E-04	NA	NA	210.8980	5.2696E-02	5.2696E-02	NA	FISH & H20	NA	0.0000
121 Nitrosodiphenylamine (N)	Y	0.0000	NA	NA	16.0000	5.0000	NA	NA	416.5886	381.8518	381.8518	NA	FISH & H20	NA	0.0000
122 Nitrosodi-N-Propylamine (N)	Y	0.0000	NA	NA	1.4000	5.0000E-03	NA	NA	36.4515	3.8185E-01	3.8185E-01	NA	FISH & H20	NA	0.0000
123 Nitrosopyrrolidine (N)	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
124 Parathion	N	0.0000	0.0650	0.0130	NA	NA	0.0650	0.06483899	NA	NA	6.4839E-02	0.0650	CHRONIC	ACUTE	0.0000
125 PCB - 1016	Y	0.0000	NA	0.0014	7.9000E-05	7.9000E-05	NA	0.00698266	2.0569E-03	6.0333E-03	2.0569E-03	NA	FISH ONLY	NA	0.0000
126 PCB - 1221	Y	0.0000	NA	0.0014	7.9000E-05	7.9000E-05	NA	0.00698266	2.0569E-03	6.0333E-03	2.0569E-03	NA	FISH ONLY	NA	0.0000
127 PCB - 1232	Y	0.0000	NA	0.0014	7.9000E-05	7.9000E-05	NA	0.00698266	2.0569E-03	6.0333E-03	2.0569E-03	NA	FISH ONLY	NA	0.0000
128 PCB - 1242	Y	0.0000	NA	0.0014	7.9000E-05	7.9000E-05	NA	0.00698266	2.0569E-03	6.0333E-03	2.0569E-03	NA	FISH ONLY	NA	0.0000
129 PCB - 1248	Y	0.0000	NA	0.0014	7.9000E-05	7.9000E-05	NA	0.00698266	2.0569E-03	6.0333E-03	2.0569E-03	NA	FISH ONLY	NA	0.0000
130 PCB - 1254	Y	0.0000	NA	0.0014	7.9000E-05	7.9000E-05	NA	0.00698266	2.0569E-03	6.0333E-03	2.0569E-03	NA	FISH ONLY	NA	0.0000
131 PCB - 1260	Y	0.0000	NA	0.0014	7.9000E-05	7.9000E-05	NA	0.00698266	2.0569E-03	6.0333E-03	2.0569E-03	NA	FISH ONLY	NA	0.0000
132 Pentachlorobenzene	N	0.0000	NA	NA	4.1000	3.5000	NA	NA	20.4492	45.7593	20.4492	NA	FISH ONLY	NA	0.0000
133 Pentachlorophenol	Y	0.0000	9.0700	5.7000	8.2000	2.8000E-01	9.0700	28.4294	213.5016	21.3837	9.0700	9.0700	ACUTE	ACUTE	0.0000
134 Phenanthrene	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
135 Phenol	N	0.0000	NA	NA	4600000	21000.0000	NA	NA	2294030	274556	274556	NA	FISH & H20	NA	0.0000
136 Phenols, Total	N	0.0000	NA	NA	5.0000	NA	NA	NA	24.9381	NA	24.9381	NA	FISH ONLY	NA	0.0000
137 Phosphorous (as P), Total	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
138 Phthalate Esters	N	0.0000	NA	3.0000	NA	NA	NA	14.9628	NA	NA	14.9628	NA	CHRONIC	NA	0.0000
139 Pyrene	N	0.0000	NA	NA	11000.0000	960.0000	NA	NA	54863.7600	12551.1100	12551.1100	NA	FISH & H20	NA	0.0000
140 P-Chloro-M-Cresol	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
141 Selenium, Total Recoverable	N	0.0000	20.0000	5.0000	NA	50.0000	20.0000	24.9381	NA	653.7037	20.0000	20.0000	ACUTE	ACUTE	0.0000
142 Silver, Total Recoverable	N	0.0000	44.0497	NA	NA	50.0000	44.0497	NA	NA	653.7037	44.0497	44.0497	ACUTE	ACUTE	0.0000
143 Sulfate (as SO4)	N	0.0000	NA	NA	NA	250000	NA	NA	NA	3268519	3268519	NA	FISH & H20	NA	0.0000
144 Sulfide (Hydrogen Sulfide)	N	0.0000	NA	2.0000	NA	NA	NA	9.975229	NA	NA	9.975229	NA	CHRONIC	NA	0.0000
145 Sulfite (as SO2)	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
146 Tetrachlorobenzene (1,2,4,5)	N	0.0000	NA	NA	2.9000	2.3000	NA	NA	14.4641	30.0704	14.4641	NA	FISH ONLY	NA	0.0000
147 Tetrachlorodibenzo-P, Dioxin (2,3,7,8)	Y	0.0000	NA	NA	1.4000E-08	1.3000E-08	NA	NA	3.6452E-07	9.9281E-07	3.6452E-07	NA	FISH ONLY	NA	0.0000
148 Tetrachloroethane (1,1,2,2)	Y	0.0000	NA	NA	10.7000	1.7000E-01	NA	NA	278.5936	12.9830	12.9830	NA	FISH & H20	NA	0.0000
149 Tetrachloroethylene	Y	0.0000	NA	NA	8.8500	8.0000E-01	NA	NA	230.4256	61.0963	61.0963	NA	FISH & H20	NA	0.0000
150 Thallium, Total Recoverable	N	0.0000	NA	NA	6.3000	1.7000	NA	NA	31.4220	22.2259	22.2259	NA	FISH & H20	NA	0.0000
151 Tin, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
152 Titanium, Total Recoverable	N	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
153 Toluene	N	0.0000	NA	NA	200000	1000.0000	NA	NA	997523	13074.0700	13074.0700	NA	FISH & H20	NA	0.0000
154 Total Dissolved Solids	N	0.0000	NA	NA	NA	750000	NA	NA	NA	9805556	9805556	NA	FISH & H20	NA	0.0000
155 Toxaphene	Y	0.0000	0.7300	0.0002	7.5000E-04	7.3000E-04	0.7300	0.00099752	1.9528E-02	5.5750E-02	9.9752E-04	0.7300	CHRONIC	ACUTE	0.0000
156 Trans-Dichloroethylene (1,2)	Y	0.0000	NA	NA	140000	NA	NA	NA	3645150	NA	3645150	NA	FISH ONLY	NA	0.0000
157 Trichlorobenzene (1,2,4)	N	0.0000	NA	NA	940.0000	70.0000	NA	NA	4688.3570	915.1852	915.1852	NA	FISH & H20	NA	0.0000
158 Trichloroethane (1,1,1)	N	0.0000	NA	NA	NA	200.0000	NA	NA	NA	2614.8150	2614.8150	NA	FISH & H20	NA	0.0000
159 Trichloroethane (1,1,2)	Y	0.0000	NA	NA	41.8000	6.0000E-01	NA	NA	1088.3380	45.8222	45.8222	NA	FISH & H20	NA	0.0000

REPORT OF ALL CALCULATIONS

HIGH QUALITY = NO

			Criteria / Standards, ug/l				Output (CT), ug/l								
			Aquatic Life		Human Health 10^-6 Risk Level		Aquatic Life		Human Health		Final Limits Water Quality, ug/l		Justification		
Chemical Specific Parameter	Carcinogen	Background Conc. ug/l CV	Acute CCA	Chronic CCC	Fish Only CCH1	Fish & H20 CCH2	Acute EOP Hardness 400.00	Chronic Mix Zone Hardness 180.14	Fish Only Mix Zone	Fish & H20 Complete Mix	Average	Maximum	Average	Maximum	Reported Discharge Level ug/l
160 Trichloroethylene	Y	0.0000	NA	NA	81.0000	2.7000	NA	NA	2108.9800	206.2000	206.2000	NA	FISH & H20	NA	0.0000
161 Trichlorofluoromethane	Y	0.0000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0000
162 Trichlorophenol (2,4,5)	N	0.0000	NA	NA	9800.0000	2600.0000	NA	NA	48878.6200	33992.5900	33992.5900	NA	FISH & H20	NA	0.0000
163 Trichlorophenol (2,4,6)	Y	0.0000	NA	NA	6.5000	2.1000	NA	NA	169.2391	160.3778	160.3778	NA	FISH & H20	NA	0.0000
164 Vinyl Chloride	Y	0.0000	NA	NA	525.0000	2.0000	NA	NA	13669.3100	152.7407	152.7407	NA	FISH & H20	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	387.8303	ACUTE	ACUTE	0.0000

REPORT OF ALL CALCULATIONS

HIGH QUALITY = NO

			Criteria / Standards, ug/l				Output (CT), ug/l								
			Aquatic Life		Human Health 10^-6 Risk Level		Aquatic Life		Human Health		Final Limits Water Quality, ug/l		Justification		
Chemical Specific Parameter	Carcinogen	Background Conc. ug/l CV	Acute CCA	Chronic CCC	Fish Only CCH1	Fish & H20 CCH2	Acute EOP Hardness 400.00	Chronic Mix Zone Hardness 180.14	Fish Only Mix Zone	Fish & H20 Complete Mix	Average	Maximum	Average	Maximum	Reported Discharge Level ug/l
Whole Effluent															
1 Acute Toxicity Units (TUa)	NA	0	0.3	NA	NA	NA	1.0000	0.4987615	NA	NA	1.0000	1.0000	CHRONIC	ACUTE	NA
2 Chronic Toxicity Units (TUc)	NA	0	NA	1	NA	NA	NA	4.987615	NA	NA	4.987615	NA	CHRONIC	NA	NA

**** END OF FILE ****

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 Judgement 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	None
Acenaphtylene	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
Dieldrin	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
Acenaphtylene	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	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	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

Jeffrey W. Pratt, Director
Division of Water

Lloyd R. Cress
Commissioner

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: $TSS_{(Net)} = TSS_{(002\ discharge)} - TSS_{(010\ intake)}$.

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:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type
Flow (MGD)	Report	Report	1/Month	Instantaneous
$CBOD_5$ (mg/l)	30	45	1/Month	Grab
Fecal Coliform Baceria (#/100 ml)	200	400	1/Month	Grab

The abbreviation $CBOD_5$ means Carbonaeous 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.

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

[2]See 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:

EFFLUENT CHARACTERISTICS	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	Monthly Avg.	Daily Max.	Measurement Frequency	Sample Type

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

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

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 bolier 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	DISCHARGE LIMITATIONS		MONITORING REQUIREMENTS	
	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 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 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.

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 IC_{25} (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 ($\geq$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 LC_{50} 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 ($\geq$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."

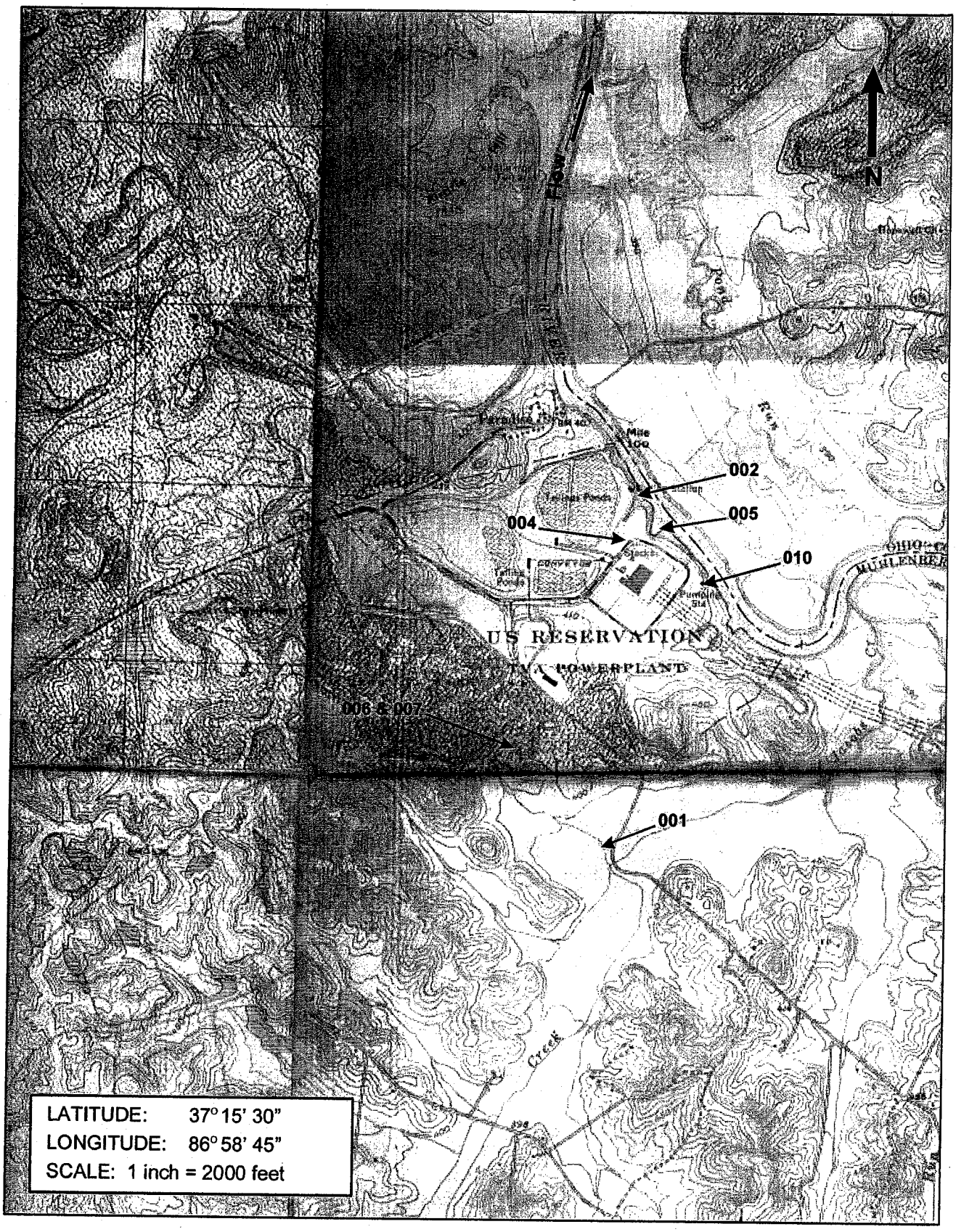
10. Modification for Ineffectiveness

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



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 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.

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
G2 = Imperiled
G3 = Vulnerable
G4 = Apparently secure
G5 = Secure
GH = Historic, possibly extinct
GX = Presumed extinct
GU = Unrankable
G#? = Inexact rank (e.g. G2?)
G#Q = Questionable taxonomy
G#T# = Infraspecific taxa (Subspecies and variety abundances are coded with a 'T' suffix; the 'G' portion of the rank then refers to the entire species)
GNR = Unranked
GNA = Not applicable

SRANK: Estimate of element abundance in Kentucky:

S1 = Critically imperiled
S2 = Imperiled
S3 = Vulnerable
S4 = Apparently secure
S5 = Secure
SH = Historic, possibly extirpated
SX = Presumed extirpated
SU = Unrankable
S#? = Inexact rank (e.g. G2?)
S#Q = Questionable taxonomy
S#T# = Infraspecific taxa
SNR = Unranked
SNA = Not applicable

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
S#M = Rank of transient population

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

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