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October 12, 2018

Tennessee Valley Authority
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Engineer's Determination of Wetlands Location Demonstration
Peabody Ash Pond
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 Peabody Ash Pond is in compliance with the Wetlands location requirements specified in the EPA Final CCR Rule at 40 CFR § 257.61.

2.0 BACKGROUND

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

3.0 SUMMARY OF FINDINGS

In accordance with § 257.61(a), Peabody Ash Pond complies 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 and delineations performed by AECOM, no known threatened and endangered (T&E) species have been noted within the site. Peabody Ash Pond meet the requirements of 40 CFR § 257.61(a).

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

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4.0 Qualified Professional Engineer Certification

I, Nicholas Golden, being a Professional Engineer in good standing in the State of Kentucky, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this certification is prepared in accordance with generally accepted engineering practice; that the information contained herein is accurate as of the date of my signature below; and that TVA Paradise Fossil Plant's Peabody Ash Pond meet the requirements of 40 CFR §257.61(a).

SIGNATURE _____ DATE 10/15/18

ADDRESS: AECOM
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ATTACHMENTS: Engineer's Certification of Wetlands Location Demonstration (40 CFR §257.61) for Coal Combustion Residuals (CCR) Existing Surface Impoundment – Peabody Ash Pond



COAL COMBUSTION PRODUCT DISPOSAL PROGRAM

TENNESSEE VALLEY AUTHORITY – PARADISE FOSSIL PLANT
PEABODY ASH POND
DRAKESBORO, KENTUCKY

ENGINEER'S CERTIFICATE OF WETLANDS LOCATION DEMONSTRATION (40 CFR §257. 61) FOR COAL COMBUSTION RESIDUALS (CCR)

EXISTING SURFACE IMPOUNDMENT

Prepared for

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

October 15, 2018 – Rev 0



Prepared by
AECOM

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 Objective 1
1.2 Rule Requirements 1
1.3 Site Description 3

2.0 ASSESSMENT OF SITE WETLANDS 4

2.1 Location and Condition of Wetlands 4

3.0 IMPACTS 4

3.1 40 CFR §257.61(a)(1) – Location Alternatives 5
3.2 40 CFR §257.61(A)(2)(i&ii) Applicable Water Quality Standards 5
3.2.1 Kentucky Administrative Regulations (KAR) 5
3.2.2 40 CFR §257.61(A)(2)(ii) Applicable Effluent Limitations 6
3.3 40 CFR §257.61(a)(2)(iii) Endangered and Threatened Species 7
3.4 40 CFR §257.61(a)(2)(iv) Marine Protection Act 9
3.5 §257.61(A)(3)(I&II) Erosion, Stability, and Migration Potential 9
3.6 40 CFR §257.61(A)(3)(iii) CCR Volume and Chemical Nature 10
3.7 §257.61(A)(3)(iV) Fish and Wildlife Impacts 11
3.8 §257.61(A)(3)(V) Potential Effects from a Catastrophic Release (Environmental Impacts) 11
3.9 40 CFR §257.61(a)(4) - Wetland Mitigation 12

4.0 CONCLUSIONS 12

5.0 REFERENCES 13

FIGURES

Figure 1: TVA PAF Site Location

Figure 2: Site Overview

Figure 3: USFWS NWI Map

TABLES

Table 1: KPDES Permit No. KY0004201 Effluent Limitations

Table 2: Species of Conservation Concern within Muhlenberg County and within 5 miles of PAF

APPENDICES

Appendix A: Gyp Stack, Slag Pond, and Peabody Ash Pond Potential Breach Area Wetland Survey PAF, Muhlenberg County, KY

1.0 INTRODUCTION

1.1 OBJECTIVE

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

1.2 RULE REQUIREMENTS

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

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

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

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

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

(v) Erosion, stability, and migration potential of native wetland soils, muds, and deposits used to support the CCR unit;
(vi) Erosion, stability, and migration potential of dredged and fill materials used to support the CCR unit;
(vii) The volume and chemical nature of the CCR;
(viii) Impacts on fish, wildlife, and other aquatic resources and their habitat from release of CCR;
(ix) The potential effects of catastrophic release of CCR to the wetland and the resulting impacts on the environment; and
(x) Any additional factors, as necessary, to demonstrate that ecological

resources in the wetland are sufficiently protected.

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

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

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

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

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

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

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

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

40 CFR § 257.61(d) *The owner or operator must comply with the recordkeeping requirements specified in 40 CFR § 257.105(e), the notification requirements specified in 40 CFR § 257.106(e), and the internet requirements specified in 40 CFR § 257.107(e).*

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

1.3 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. Units 1 and 2 at PAF were retired in 2017.

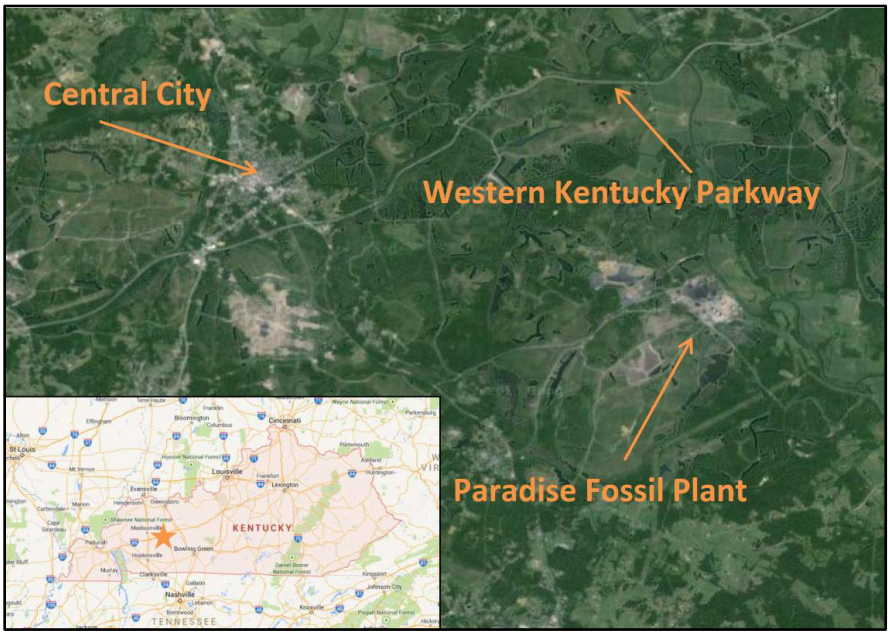


Figure 1: TVA PAF Site Location

The Peabody Ash Pond is an active Coal Combustion Residual (CCR) impoundment used to manage process water flow and CCR waste during power generation. Peabody Ash Pond is located in the southeast corner of the Paradise Facility (**Figure 2**). The pond currently serves as a waste water treatment and fly ash pond. An internal divider dike separates the main pond from the stilling pond located on the north end 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 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 the PAF were first assessed for the presence of wetlands by desktop review, using aerial photography, USFWS National Wetland Inventory (USFWS, 2018) and FEMA floodplain data (2018). Confirmation of remote findings was conducted during onsite reconnaissance. AECOM performed a wetlands delineation in accordance with the procedures outlined in the Corps of Engineers Wetland Delineation Manual (1987) as well as the regional supplement for the eastern mountains and Piedmont Region (2008), report in Appendix A. Site modifications have resulted in the water features (ponds) including wetlands and streams. Open water wetlands and a stream were preliminarily identified by the NWI map. The entire site was then walked to determine if wetlands were present, particularly within the breach zone and downgradient of the ponds. Peabody Ash Pond occupies approximately 138 acres. A modeled breach zone of approximately 250 acres was assessed.

3.0 IMPACTS

The 2017 Breach Area Wetland Survey performed by AECOM assessed the potential impacts of a breach within the 250 acre wetland study area. A review of literature and maps of the site show seven potential wetlands, four ponds, one stream and four WWCs potentially present in

the breach zone (see Figure 3). A modeled breach analysis indicates the following impacts may be anticipated:

- Pond Surface – 0.0 ac
- Wetland Area – 188.04 ac
- Stream –22,259 feet

The Breach Area Wetland Survey indicates flow initially runs west to wetlands along Jacobs Creek, and then follows Jacobs Creek to the Green River impacting low areas, primarily with wetlands along the way. 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 is an existing unit. 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;

In accordance with the EPA CCR Rule 40 CFR §257.61(a)(2), 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, Peabody Ash Pond complies 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 criteria and list the maximum allowable concentrations for specific pollutants. These regulations will supersede the federal standards where more stringent. Kentucky also has an antidegradation policy (401 KAR 10.030) for surface waters of notable quality (i.e., categorized as an outstanding national resource water (ONRW),

exceptional water). State regulations are incorporated as conditions on the issued NPDES/KPDES permit for the facility.

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

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

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

TVA is required under KPDES Permit No. KY0004201 to meet pH, total suspended solids, oil and grease, and chronic whole effluent toxicity limits on the Peabody Ash Impoundment discharge. The KPDES permit 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 Peabody Ash Pond discharge Outfall 001.

The Peabody Ash Impoundment provides settling of suspended solids, ammonia removal, and limited metals precipitation before treated water flows to a stilling impoundment for further settling. Effluent (about 33 MGD) from the stilling impoundment is discharged into Jacobs Creek through KPDES Outfall 001(see attached in **Appendix A**). Normal operating conditions can result in lower discharge flows in the range of 17 to 20 MGD. The pH of effluent discharged from the Peabody Ash Impoundment generally ranges from 6.0 to 9.0; however a CO_2 system is in place to provide pH control when needed to meet discharge limits.

Table 1. KPDES Permit No. KY0004201 Effluent Limitations

Effluent Characteristic	Reported Monthly Average	Discharge Daily Maximum	Proposed Monthly Average	Proposed Daily Maximum	Applicable Water Quality Criteria and/or Effluent Guidelines
Flow (MGD)	29	59	Report	Report	401 KAR 5:065, Section 2(8)
Total Suspended Solids (mg/l)	6.72	190	30	74	401 KAR 5:065, Sections 4 and 5
Oil & Grease (mg/l)	5.01	8.0	11	13	401 KAR 5:065, Sections 4 and 5
Hardness (as mg/l $CACO_3$)	496	693	Report	Report	401 KAR 5:065, Section 2(8)
Total Recoverable Metals (mg/l)	0.122	0.255	Report	Report	401 KAR 5:065, Section 2(8)
Chronic Toxicity (TU_c)	N/A	<3.40	N/A	1.00	401 KAR 5:029, Section 4
pH (standard units)	7.0	8.9	6.0	9.0	401 KAR 5:031, Section 2

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

3.3 40 CFR §257.61(a)(2)(iii) Endangered and Threatened Species

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

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

The primary aquatic environments related to the PAF CCR actions include Jacobs Creek and the Green River. The Green River adjacent to PAF is characterized as having steep banks with limited suitable spawning habitat for fishes. TVA collected fish from the PAF intake structure as part of the CWA Section 316(b). TVA sampled fish upstream and downstream of PAF. The most abundant species downstream of PAF were emerald shiner (20 percent), bullhead minnow (18 percent), spotfin shiner (15 percent), and bluegill (15 percent). Upstream of PAF, 887 fish (37 species) were collected. The most abundant species upstream of PAF were Mississippi silvery minnow (32 percent), emerald shiner (17 percent), and gizzard shad (11 percent) (TVA 2012a).

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

As ash impoundments are considered treatment systems and not aquatic habitat, direct impacts to aquatic habitat would primarily be avoided with closure activities. There are no aquatic habitats within the proposed borrow areas, thus direct impacts to aquatic biota from the removal of material from these areas are not anticipated. Should minor alterations of surface waters be

required to support construction activities (e.g., culverted crossing of drainage that leads to Jacobs Creek for construction access), any activities within areas containing aquatic resources would be appropriately permitted and would utilize approved BMPs.

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

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

Peabody Ash Pond 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

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

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

3.5 §257.61(A)(3)(I&II) Erosion, Stability, and Migration Potential

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

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

- Weekly visual inspections must be performed to identify any potential structural issues that could negatively affect the function or safety of the CCR Unit.

- Weekly inspections of all hydraulic discharges are also required weekly, observing for any indication of abnormal coloration of discharge, as well as any debris or sediment in discharge.

- Monthly inspections are required of all CCR Unit instrumentation.

A soil survey was performed for the site from the National Resources Conservation Service Web Soil Survey. The soils in the Peabody Ash Pond area consisted of three types, Udorthents (disturbed soils), Belknap silt loam, 0 to 2 percent slopes, occasionally flooded and Dumps. The soils have very slow infiltration rates, are clayey, have a high water table, or shallow to an impervious layer.

The wetland study determined the wetland soils within the 250 acres do not pose an erosion stability or migration concern.

The original embankment fill material generally consisted of moist, stiff, silty, lean clay (LC) with irregular quantities of silt, sand, coal and rock fragments that indicates the embankments were constructed using local mine spoil materials.

The raised embankment of the Peabody Ash Pond dike consists of moist, stiff, lean clay (LC) with some rock fragments. The embankment materials consist of mine spoils, and the embankment was constructed in a controlled manner of compactive effort. The embankment fill extends from the crest elevation (approximately 408 feet) to elevations of approximately 400 feet to 395 feet, resulting in an embankment varying from 8 to 13 feet in thickness.

Underlying the embankment fill along the upstream portion of the crest is compacted bottom ash underlain by sluiced ash. Beneath the bottom ash and extending to bedrock is lean clay and clayey sand. The foundation of the dike consists entirely of mine spoils.

A slope stability assessment was completed near the southern terminus of the dike which indicated a factor of safety of 1.7 against slope failure in the downstream direction. Seepage analyses indicated a very low potential for piping through the dam. The Breach Area Wetland Survey in conjunction with the Structural Stability Assessment indicates no erosion or migration potential.

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 Peabody Ash Pond was designed to accommodate approximately 1.7 million cubic yards (CY) of fly ash. Testing was performed to identify the constituents present within the fly ash placed in the Peabody Ash Pond. Testing concluded no constituents reached levels of concern

outside the prescribed limits of fly ash. As such the impoundment is not lined and is planned for closure in accordance with 40 CFR § 257.101.

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

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

According to the KSNPC, 45 species of conservation concern occur in Muhlenberg County (Table 2) (KSNPC 2015). A review of the TVA Regional Natural Heritage database in November 2016 indicated that of those species listed by USFWS and KYNPC, 21 species are currently known or have been known to occur within a 5-mile radius of PAF (as indicated by asterisks in Table 2). 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..

A modeled breach analysis (see attached) was performed to further assess the potential impact a breach event would have on fish and wildlife within the designated 250 acre wetland study area. The breach analysis determined 188.04 acres of wetlands, 22,259 feet of streams and 0 acres of ponds have the potential to be affected. However, no impact is expected as the facility and surrounding area are within the KPDES permit limits and meet all criteria set forth. The area of potential impact is constantly monitored and any potential impact would be mitigated immediately.

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 Peabody Ash Pond will not cause or contribute to significant degradation of wetlands and the environment due to the potential effects from a catastrophic release of CCR. A breach analysis (Appendix A) to determine the extent of a catastrophic release was conducted. The breach analysis determined 188.04 acres of wetlands and 22,259 feet of streams have the potential to be affected. In the unlikely but hypothetical

event of a failure, the potential inundation area identified in the breach analysis and wetlands therein could be flooded in water and CCR material. Additionally, CCR material could be carried downstream in Jacobs Creek. Trees and other vegetation as well as any existing wildlife in the area inundated by the breach would be impacted. However, while there are potential wetlands within the footprint of the breach extents that would likely be affected by a catastrophic release, the likelihood of a release is minimal for the following reasons.

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

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

As the Peabody Ash Pond meets 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 time period of the Peabody Ash Pond.

4.0 CONCLUSIONS

Based on this assessment, the Peabody Ash Pond located at PAF meets the requirements for the wetlands location restriction as required by §257.61 of the EPA Final CCR Rule.

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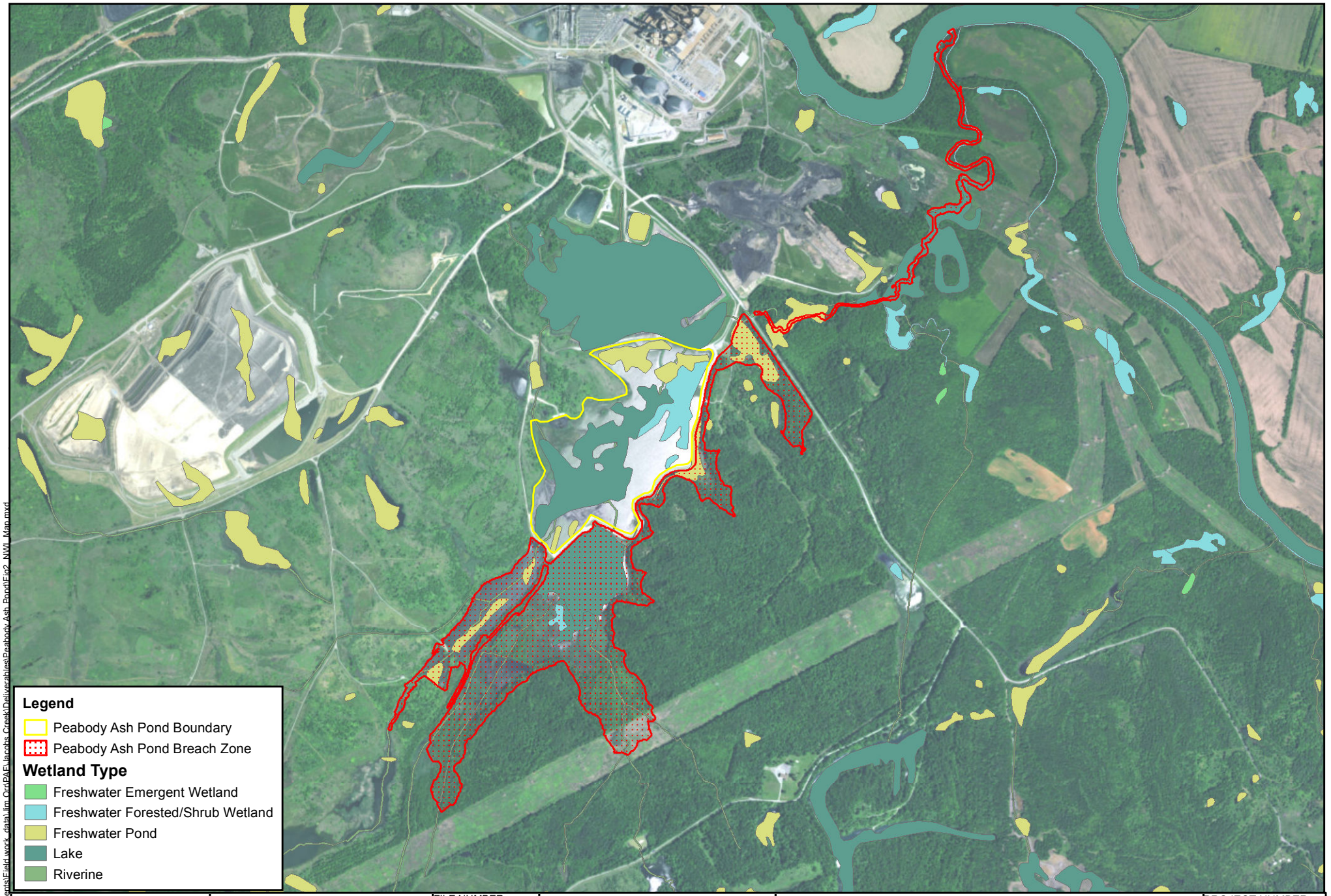
APPENDIX A

APPENDIX B

APPENDIX C

FIGURES

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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FILE NUMBER

DESIGNED BY DCW

DRAWN BY MBE

CHECKED BY

AECOM

1000 Corporate Centre Dr
Suite 250
Franklin, TN 37067

TVA Paradise Wetland Delineation
USFWS NWI Map, Peabody Ash Pond

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **3**

TABLES

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

Common Name	Scientific Name	Status		Suitable Habitat Present[4]
		Federal[1]	State [2] (Rank[3])	
Aquatic Snails				
Rugged Hornsnail*	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

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Table of Contents

1. Introduction 1
2. Literature Review 3
   2.1 Soils 3
   2.2 Wetlands 4
   2.3 Hydrology 4
3. Methods 5
4. Field Survey 6
5. Conclusions 7
Figures 11
Attachment 1 – Field Data Forms 12
Attachment 2 – Photo Log 13

Figures

Figure 1 TVA Paradis Site Location Map
Figure 2 TVA Paradise Wetland Delineation Gypsum Stack Site Location
Figure 3 TVA Paradise Wetland Delineation Peabody Ash Pond Site Location
Figure 4 TVA Paradise Wetland Delineation Slag Pond Site Location
Figure 5 TVA Paradise Wetland Delineation Gypsum Stack NRCS Soils Map
Figure 6 TVA Paradise Wetland Delineation Peabody Ash Pond NRCS Soils Map
Figure 7 TVA Paradise Wetland Delineation Slag Pond NRCS Soils Map
Figure 8 TVA Paradise Wetland Delineation Gypsum Stack USFWS NWI Map
Figure 9 TVA Paradise Wetland Delineation Peabody Ash Pond USFWS NWI Map
Figure 10 TVA Paradise Wetland Delineation Slag Pond USFWS NWI Map
Figure 11 TVA Paradise Wetland Delineation Gypsum Stack and Peabody Ash Pond FEMA Flood Zone Map
Figure 12 TVA Paradise Wetland Delineation Slag Pond FEMA Flood Zone Map
Figure 13 TVA Paradise Wetland Delineation Gypsum Stack Site Location and Survey Points
Figure 14 TVA Paradise Wetland Delineation Peabody Ash Pond Site Location and Survey Points
Figure 15 TVA Paradise Wetland Delineation Slag Pond Site Location and Survey Points

Tables

Table 1. Water Bodies Potentially Impacted by PAF CCR Units Breach 7

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

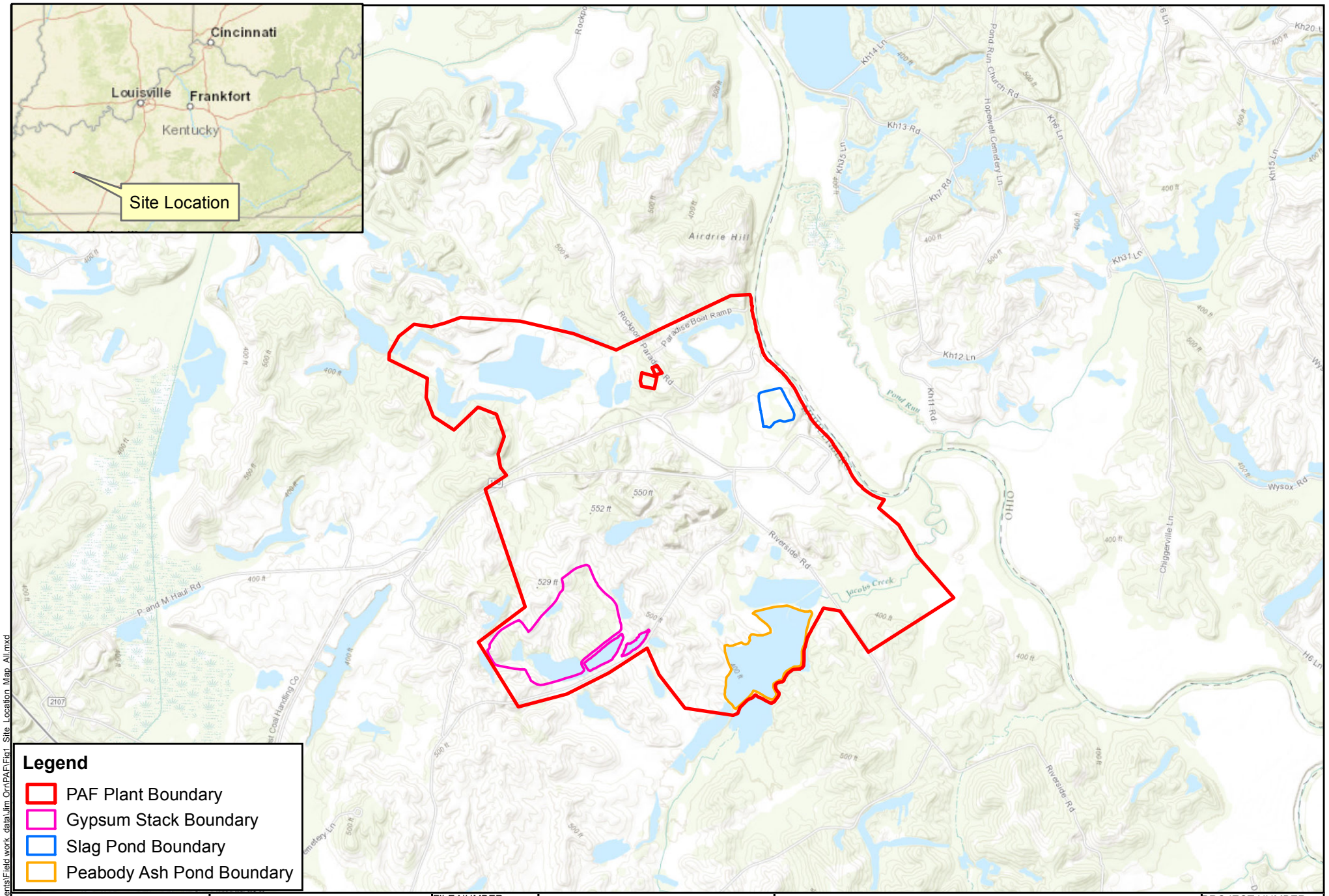
Wetland ID	Wetland Type	Area/Length	Potentially WOUS Impacted	Potential Jurisdictional Status
W-28	PEM/PSS	19.76 acres	0.2 ac	WOUS
W-29	PFO	4.64 acres	0.2 ac	WOUS
W-30	PFO	0.35 acres	None	WOUS
W-31	PFO	0.44 acres	None	WOUS
W-32	PFO	0.9 acres	None	WOUS
W-33	PFO	1.0 acres	0.5 ac	WOUS
W-34	PFO	1.74 acres	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



C:\Users\edmundsm\Documents\Field work data\Jim Orr\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

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FILE NUMBER	
DESIGNED BY	DCW
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TVA Paradise
Site Location Map

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

PROJECT NUMBER	60478473
DATE	November, 2017
FIGURE NUMBER	1



Notes

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TVA Paradise Wetland Delineation
Site Location Map, Gypsum Stack

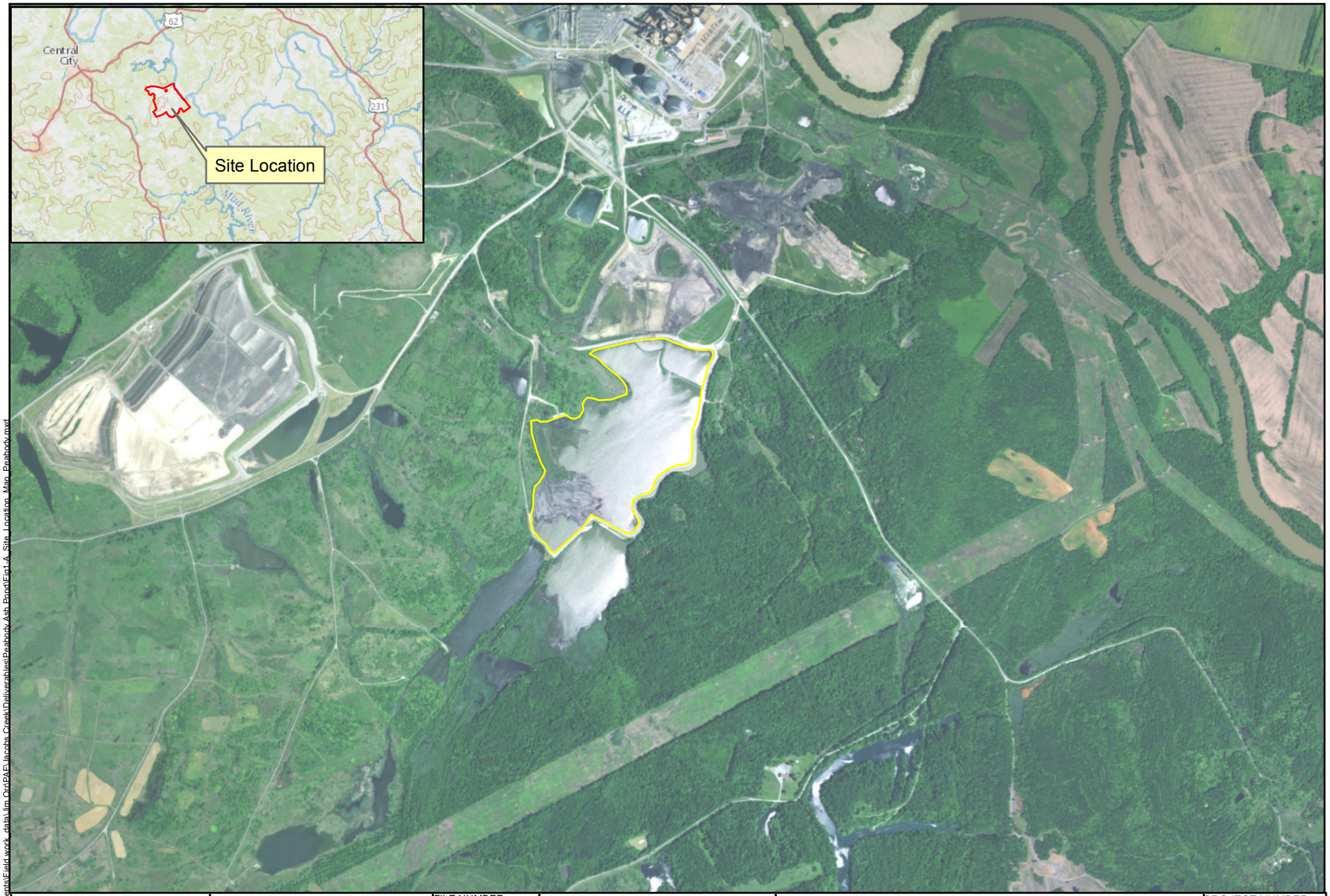
2017 Wetland Delineations
TVA Paradise Fossil Plant
Drakesboro, KY, 42337

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **2**

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Notes

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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



Notes

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TVA Paradise Wetland Delineation
Site Location Map, Slag Pond

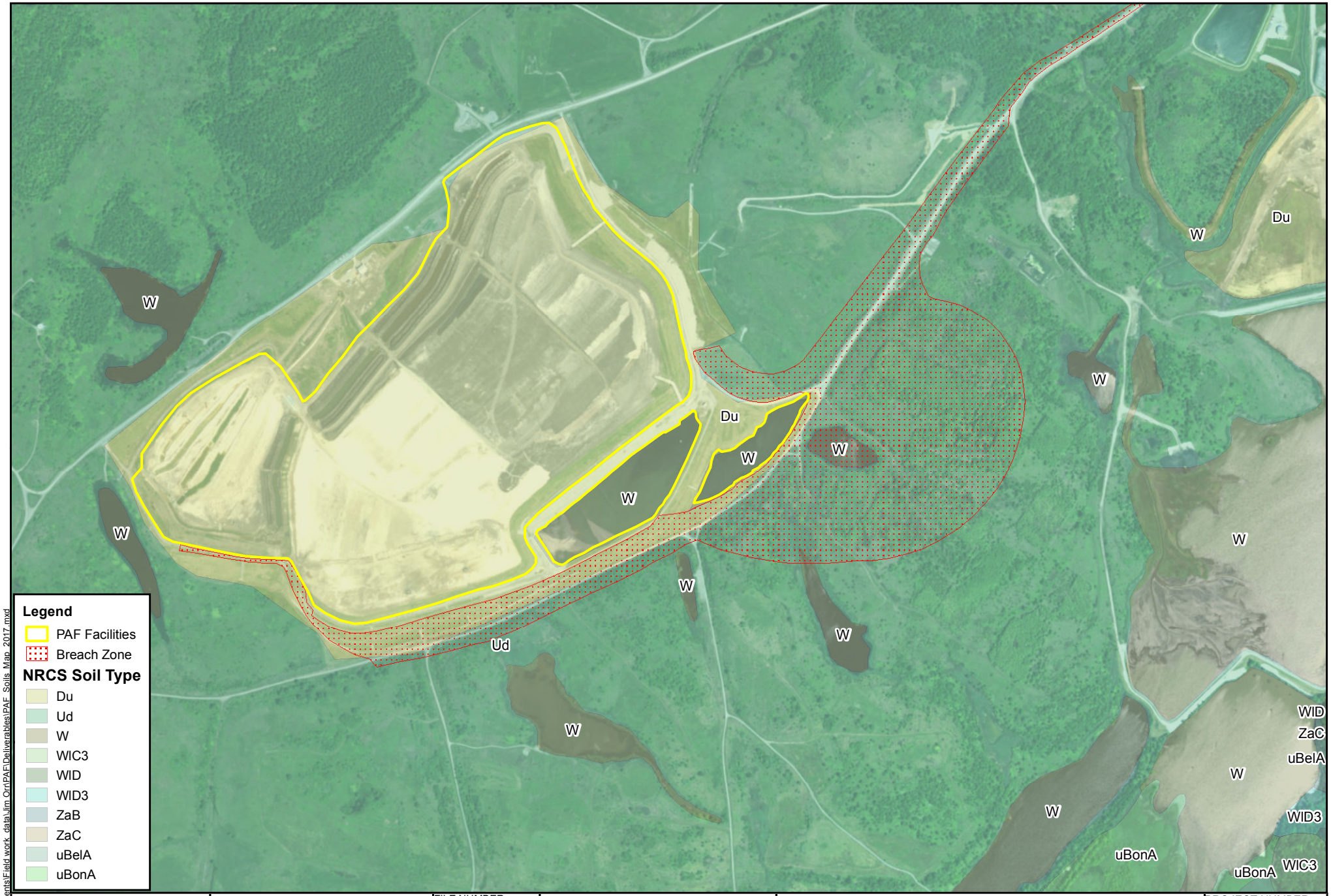
2017 Wetland Delineations
TVA Paradise Fossil Plant
Drakesboro, KY, 42337

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **4**

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Notes

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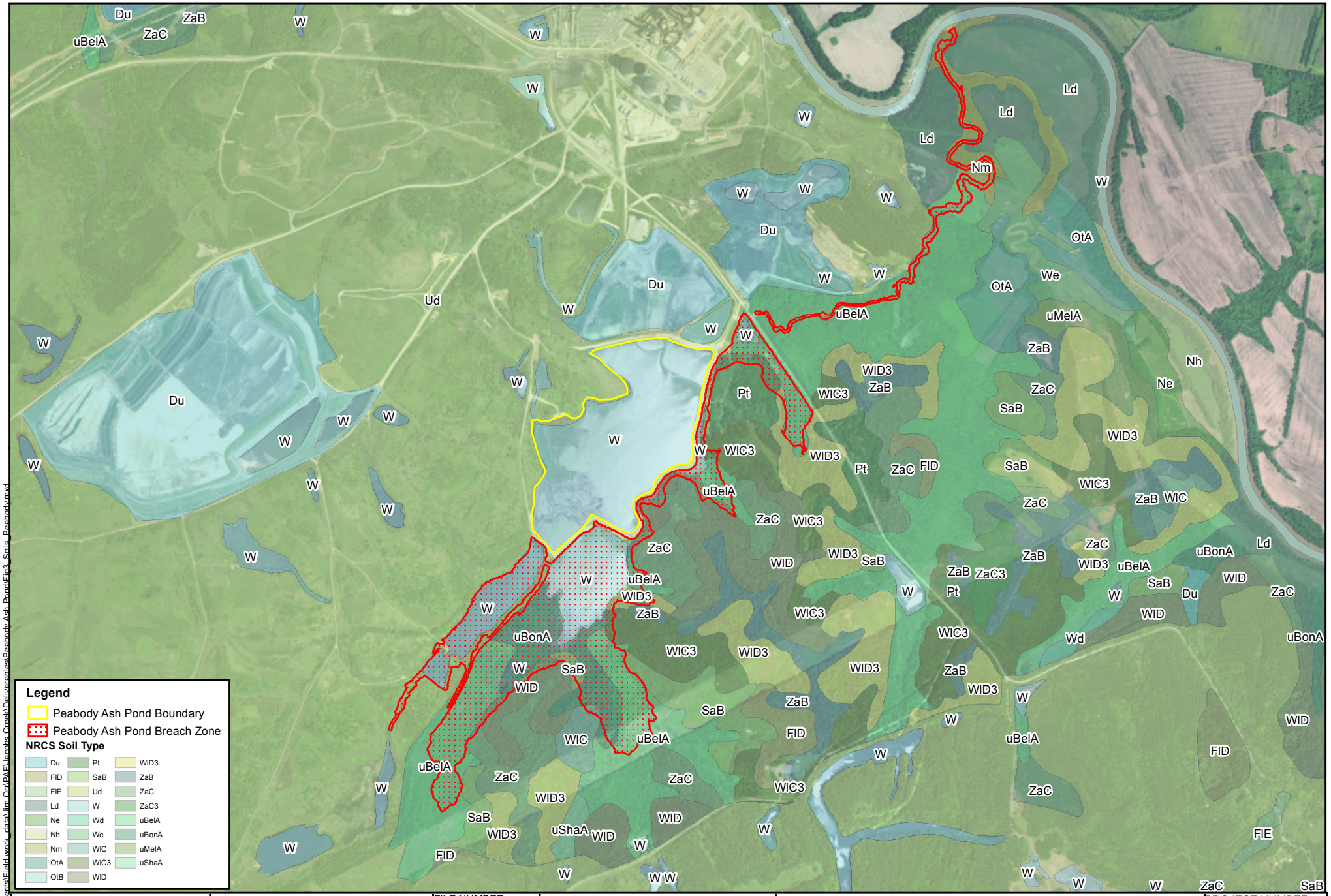
TVA Paradise Wetland Delineation
NRCS Soils Map, Gypsum Stack

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **5**



Notes

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

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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

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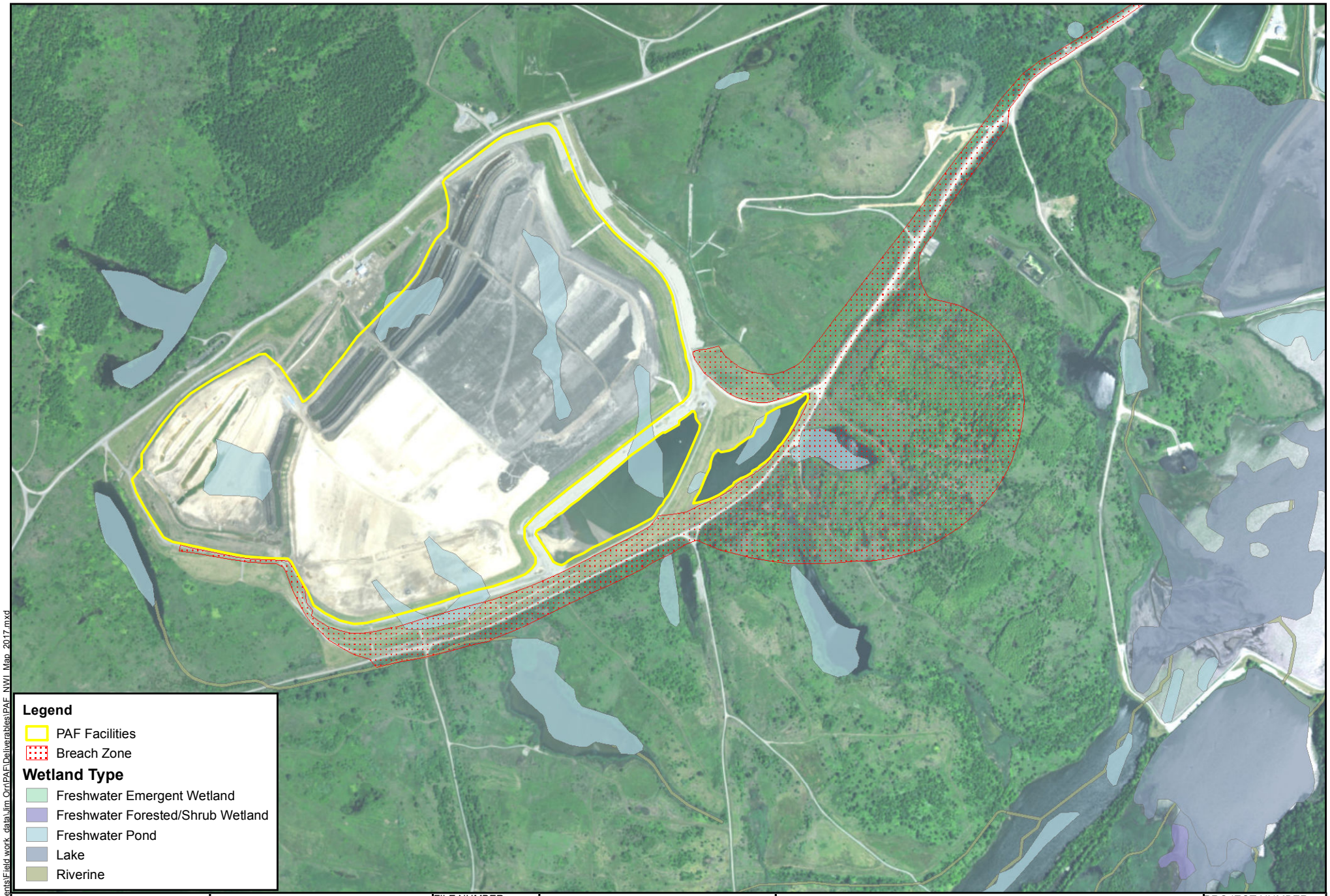
TVA Paradise Wetland Delineation
NRCS Soils Map, Slag Pond

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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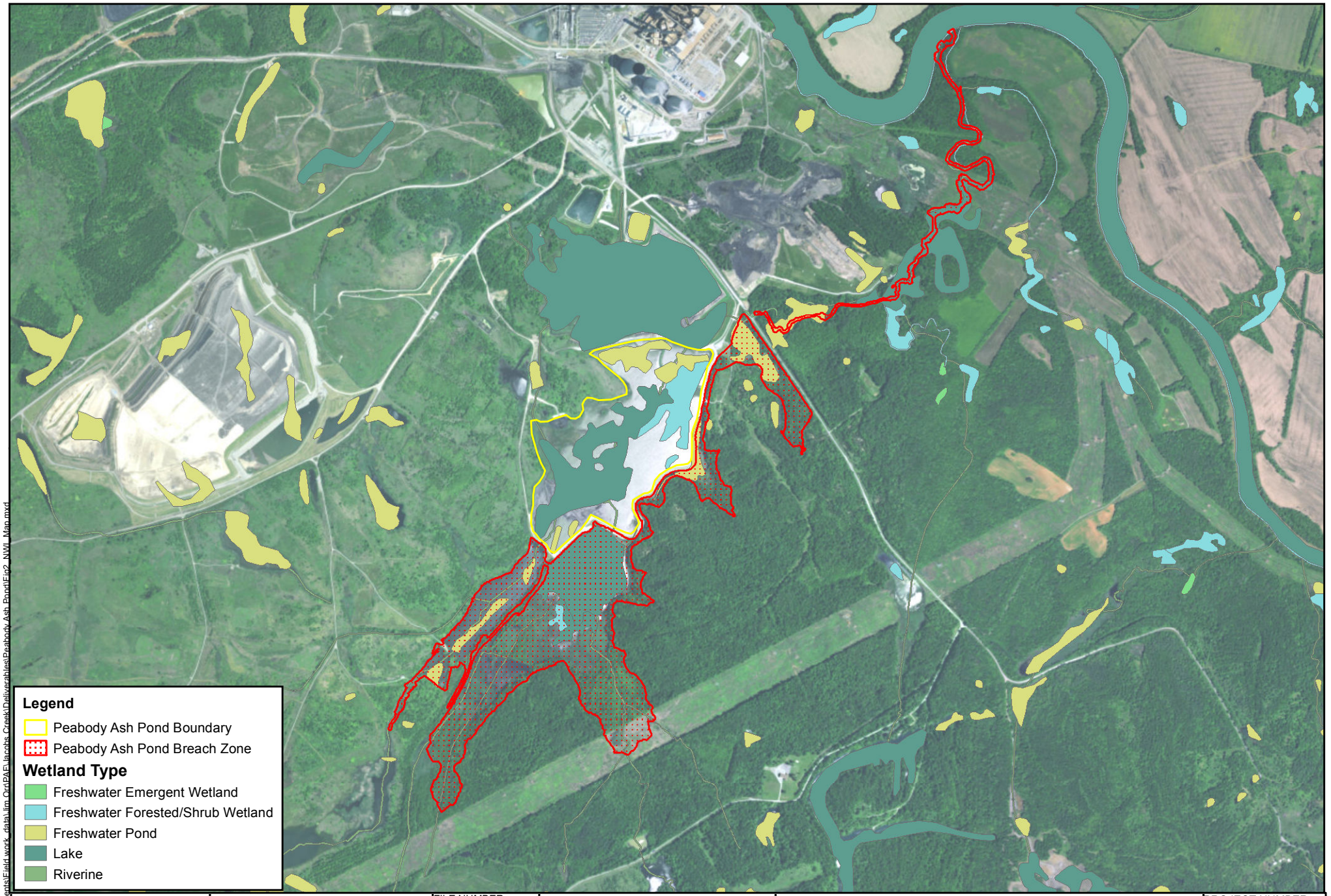
TVA Paradise Wetland Delineation
USFWS NWI Map, Gypsum Stack

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

PROJECT NUMBER 60478473

DATE November, 2017

FIGURE NUMBER **8**



C:\Users\edmundsm\Documents\Field work_data\Jim Ord\PAE\Jacobs Creek\Deliverables\Peabody Ash Pond\Fig2_NWI_Map.mxd

Notes

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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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TVA Paradise Wetland Delineation
USFWS NWI Map, Slag Pond

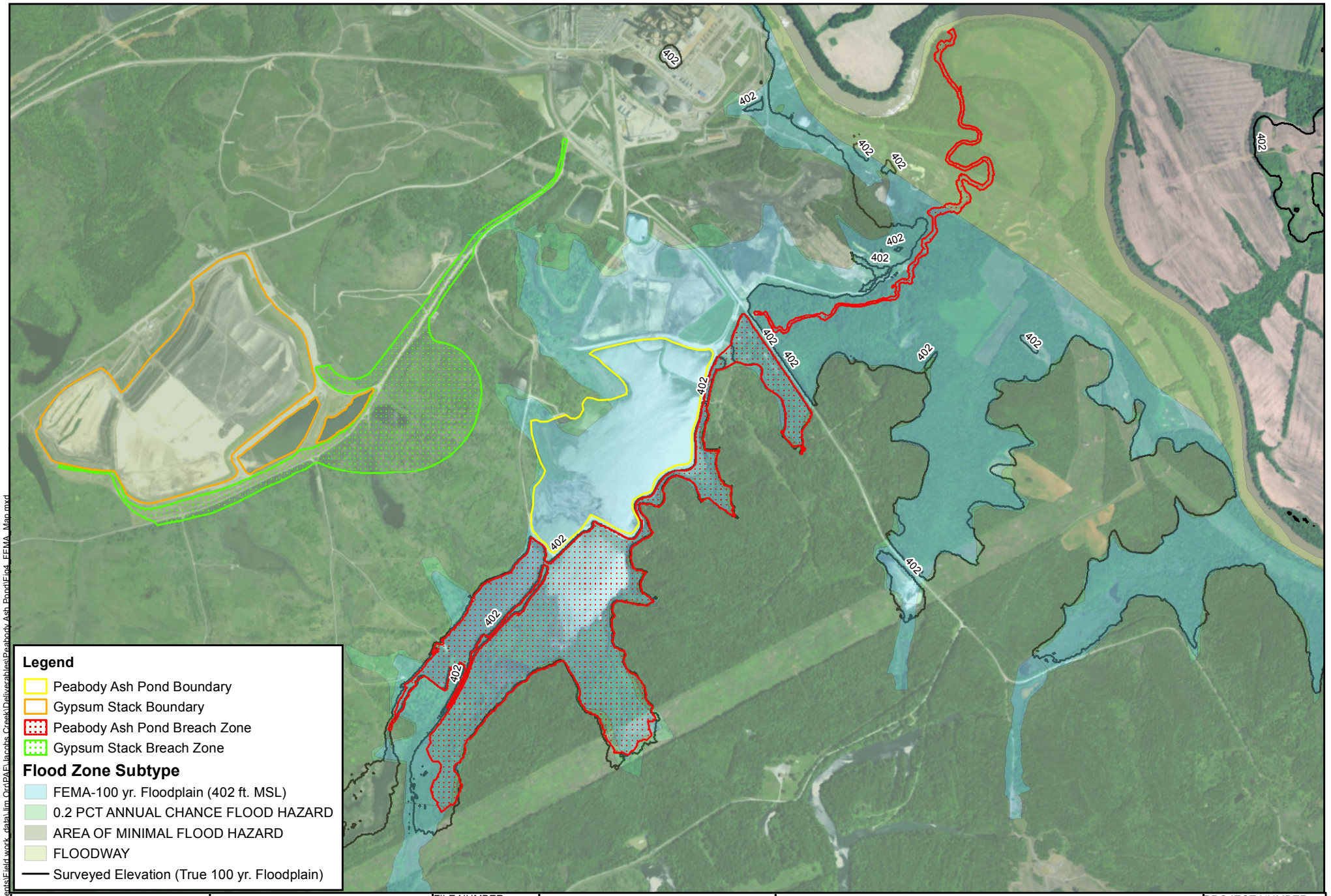
2017 Wetland Delineations
TVA Paradise Fossil Plant
Drakesboro, KY, 42337

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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TVA Paradise Wetland Delineation

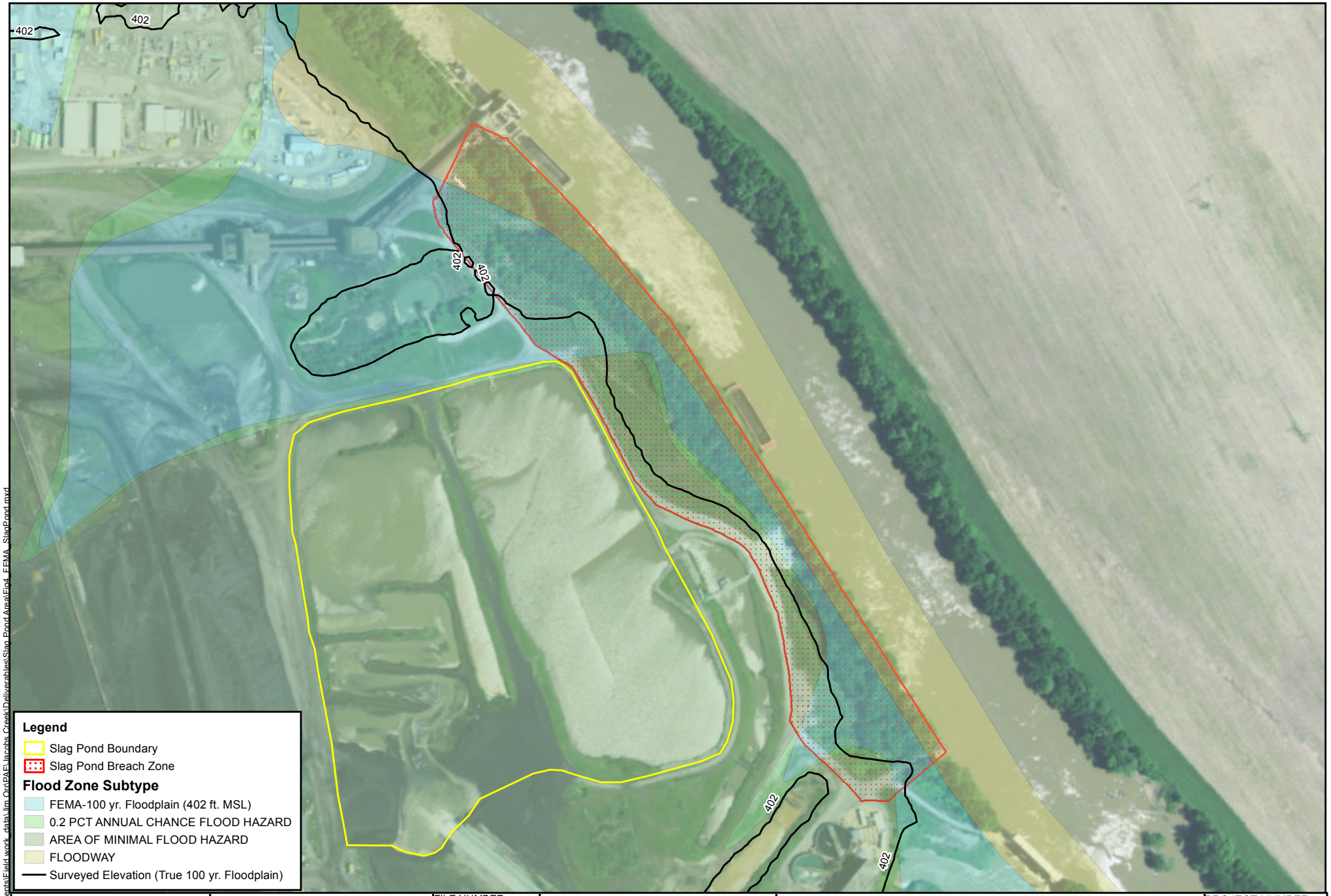
FEMA Flood Zone Map, Gypsum Stack & Peabody Ash Pond

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

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

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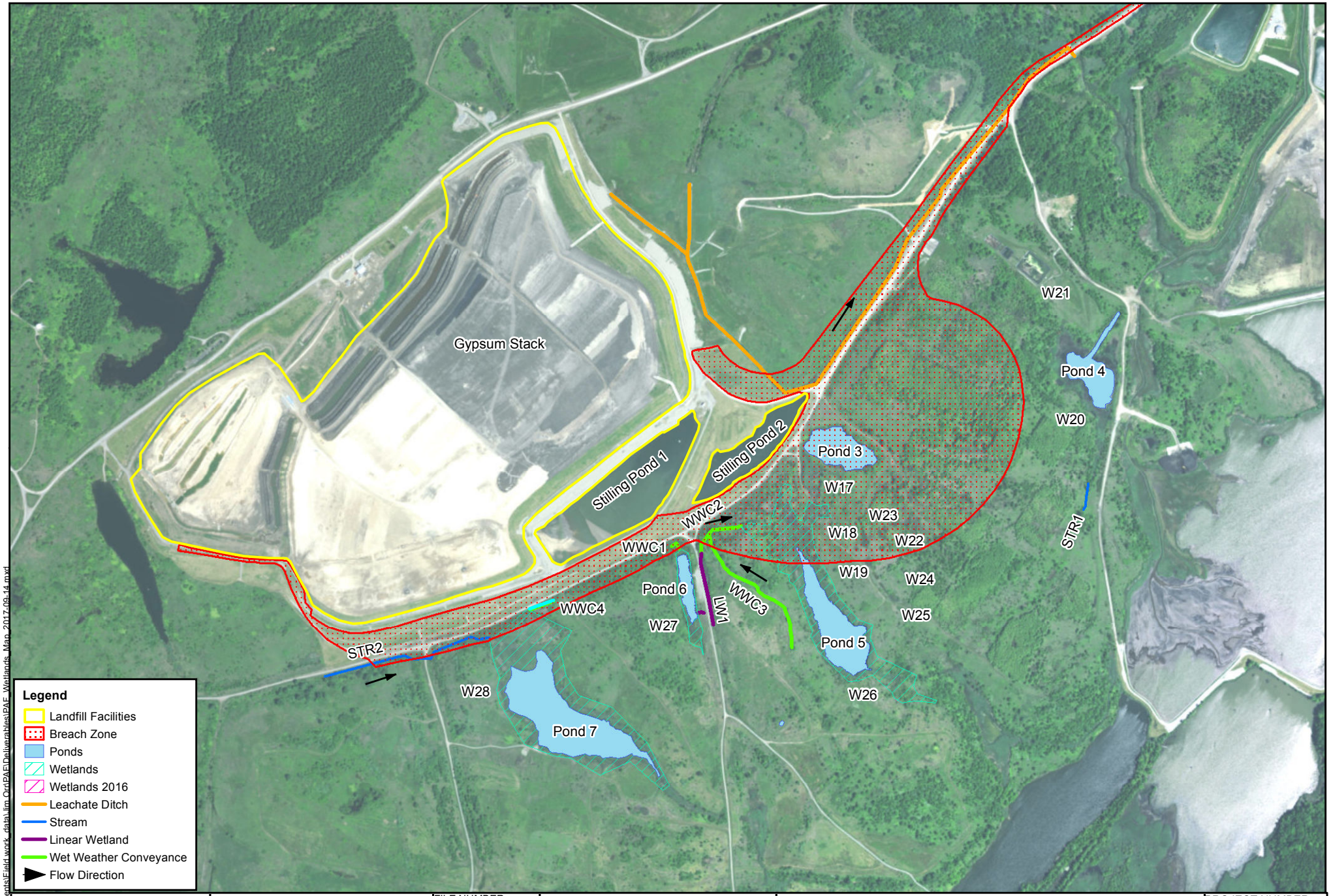
TVA Paradise Wetland Delineation
FEMA Flood Zone Map, Slag Pond

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 Ort\PAF\Deliverables\PAF_Wetlands_Map_2017-09-14.mxd

Notes

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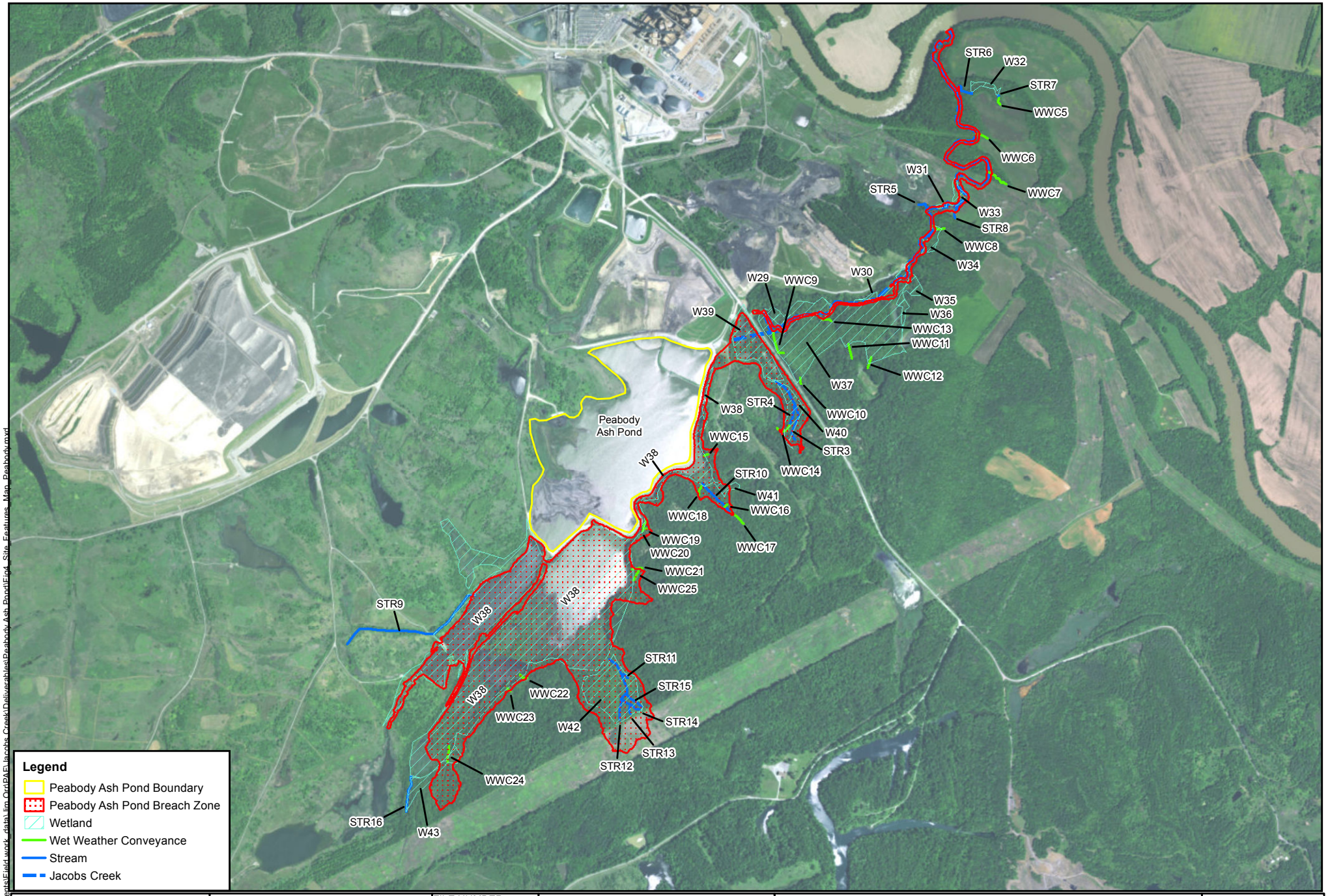
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Franklin, TN 37067

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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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**



C:\Users\edmundsm\Documents\Field work_data\Jim Orr\PAF\Jacobs Creek\Deliverables\Slag Pond Area\Fig4_Site_Features_Map_SlagPond.mxd

Notes

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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**

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:

- ☑ 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: 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:

- [x] Histosol (A1)
- [x] Histic Epipedon (A2)
- [ ] Black Histic (A3)
- [ ] Hydrogen Sulfide (A4)
- [ ] Stratified Layers (A5)
- [ ] 2 cm Muck (A10) **(LRR N)**
- [ ] Depleted Below Dark Surface (A11)
- [x] 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 [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: 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. 1 | **Date:** 9/13/17

Location

South of Gypsum stack landfill

Description:

Wetland 27



Photo No. 2 | **Date:** 9/13/17

Location:

Gypsum stack landfill

Description:

Upland associated with wetlands south of W-27.



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.



AECOM

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:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
15	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.	Date:
16	9/13/17

Location

Gypsum stack landfill

Description:

Landfill toe of slope drainage pathway looking east



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
17	9/13/17

Location

Gypsum stack landfill

Description:

Landfill toe of slope drainage pathway looking west



Photo No.	Date:
18	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. 21 | **Date:** 9/13/17

Location

Gypsum stack landfill

Description:

North end of Pond 7 looking south away from the landfill



Photo No. 22 | **Date:** 9/13/17

Location

Gypsum stack landfill

Description:

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



AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No. 23 | **Date:** 9/13/17

Location

Gypsum stack landfill

Description:

Gyp stack Stilling Pond 2 facing southeast.



Photo No. 24 | **Date:** 9/13/17

Location

Gypsum stack landfill

Description:

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



PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky	60532201

Photo No.	Date:
25	9/13/17

Location

Gypsum stack landfill

Description:

Leachate stream from Gyp Stack facing east.



Photo No.	Date:
26	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.



AECOM

PHOTOGRAPHIC LOG

Client Name:	Site Location: Paradise Fossil Plant, Drakesboro, Kentucky	Project No.
Tennessee Valley Authority		60532201

Photo No. 33	Date: 9/13/17

Location

Gypsum stack landfill

Description:

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



Photo No. 34	Date: 9/13/17

Location

Gypsum stack landfill

Description:

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



AECOM

PHOTOGRAPHIC LOG

Client Name:	**Site Location:** Paradise Fossil Plant, Drakesboro, Kentucky	**Project No.**
Tennessee Valley Authority		60532201

Photo No.	**Date:**
35	9/13/17

Location

Gypsum stack landfill

Description:

WWC-1 looking south, upstream of PUB-1



Photo No.	**Date:**
36	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

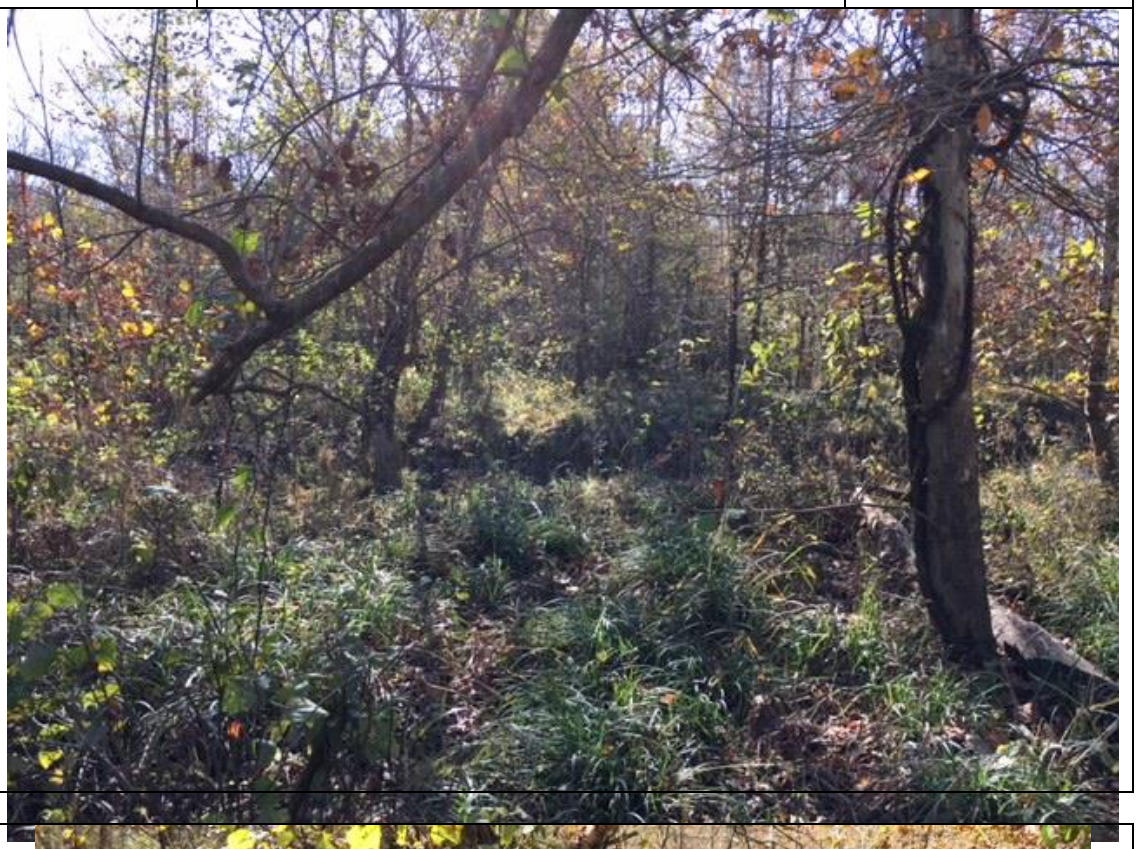


Photo No.	Date:
8	10/26/17

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

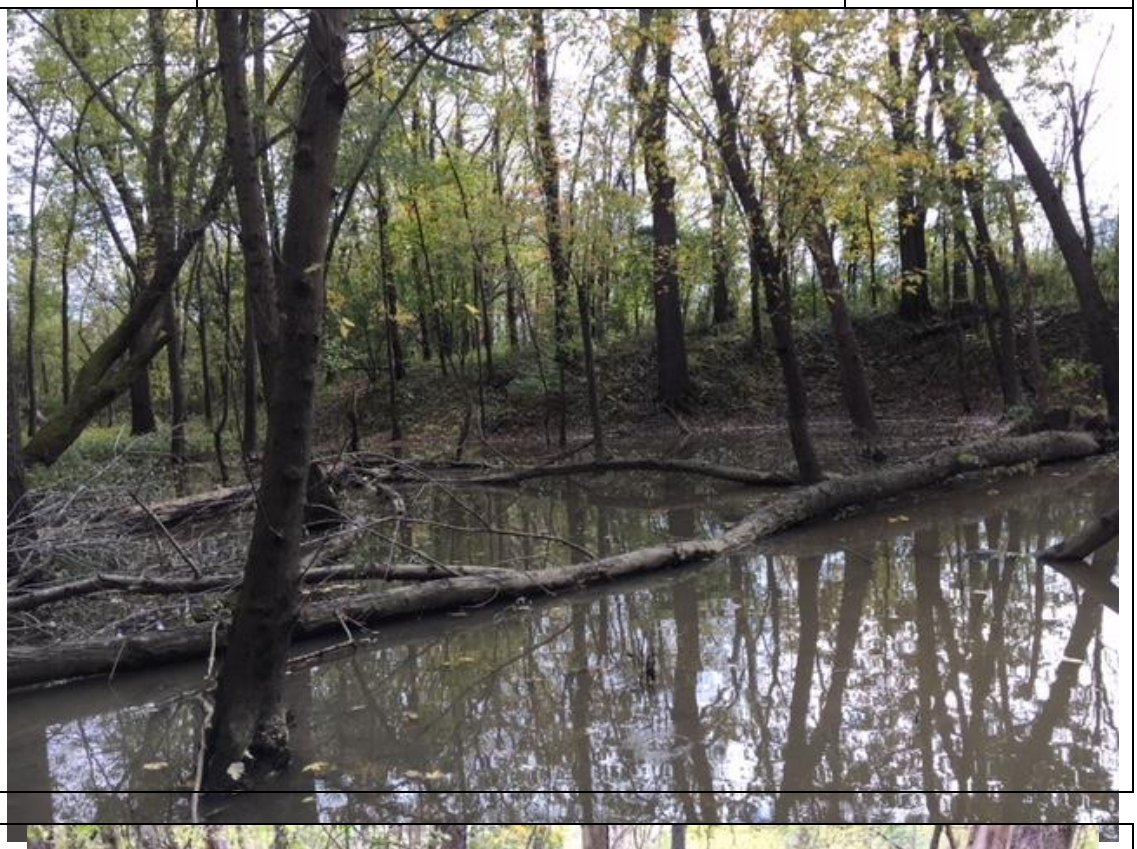


Photo No.	Date:
16	10/26/17

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.



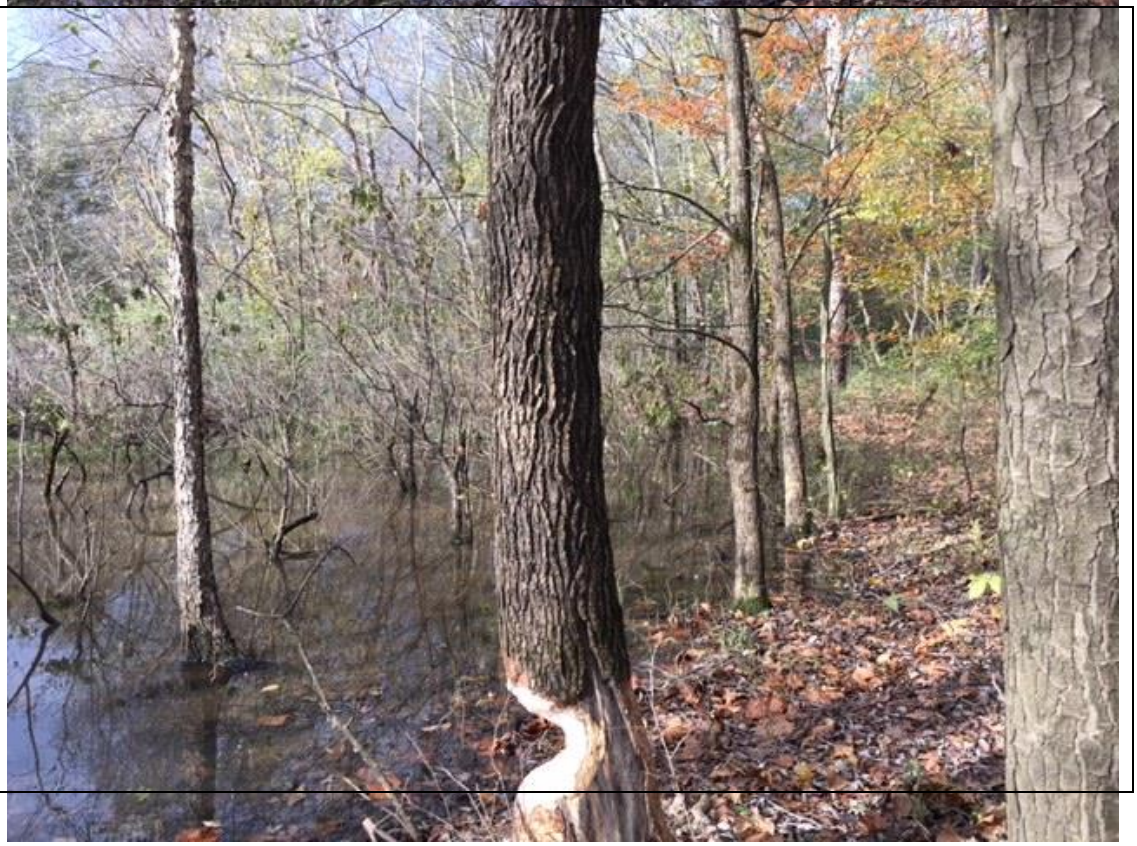
Photo No.	Date:
24	10/26/17

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

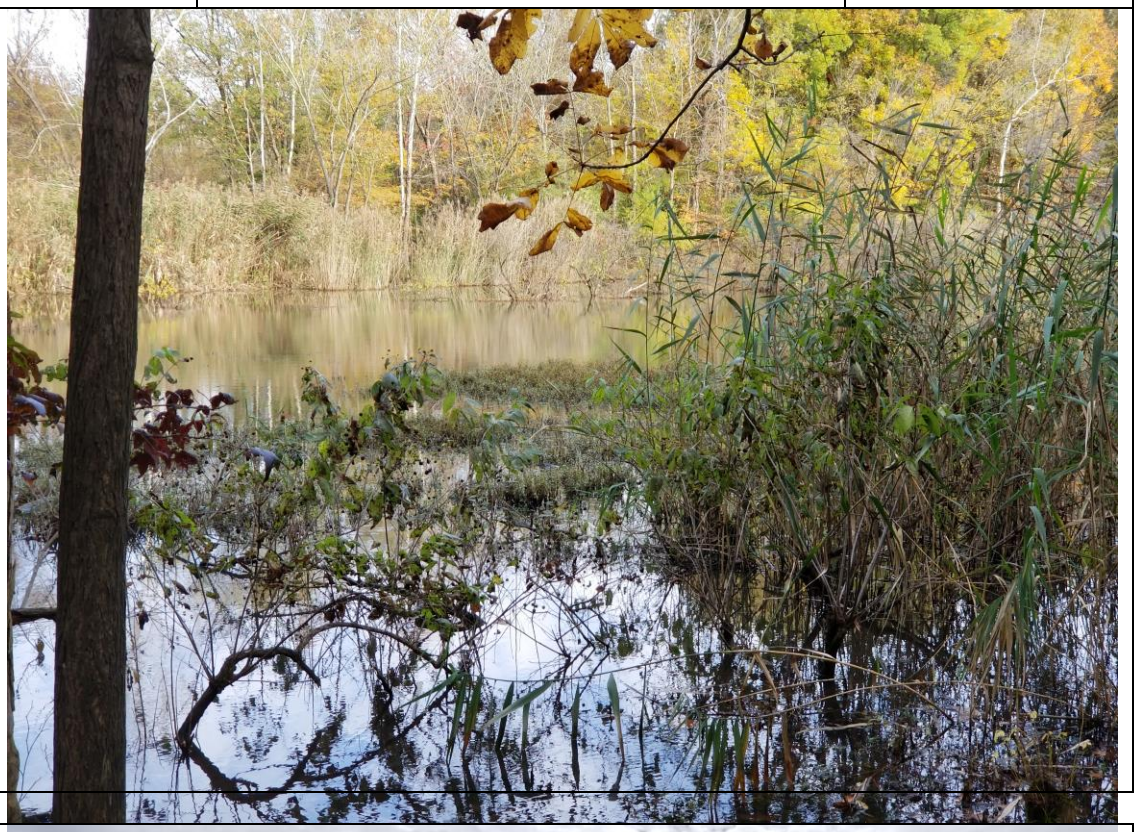


Photo No.	Date:
30	10/26/17

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



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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:	Project No.
Tennessee Valley Authority	Paradise Fossil Plant, Drakesboro, Kentucky, Slag Pond Breach Area	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



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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

KPDES



KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT

AUTHORIZATION TO DISCHARGE UNDER THE
KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT NO.: KY0004201

AGENCY INTEREST NO.: 3239

Pursuant to Authority in KRS 224,

Tennessee Valley Authority
13246 State Route 176
Drakesboro, Kentucky 42337-23451

is authorized to discharge from a facility located at

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

to receiving waters named

Green River

Jacobs Creek

in accordance with effluent limitations, monitoring requirements and other conditions set forth in this permit.

This permit shall become effective on October 1, 2018.

This permit and the authorization to discharge shall expire at midnight, September 30, 2023.

June 14, 2018

Date Signed

Sara J Lindersun

Peter T. Goodmann, Director

Division of Water

THIS KPDES PERMIT CONSISTS OF THE FOLLOWING SECTIONS:

1. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS 5
1.1. Compliance Monitoring Locations (Outfalls) 5
1.2. Effluent Limitations and Monitoring Requirements 7
1.3. Standard Effluent Requirements 22
2. STANDARD CONDITIONS 24
2.1. Duty to Comply 24
2.2. Duty to Reapply 24
2.3. Need to Halt or Reduce Activity Not a Defense 24
2.4. Duty to Mitigate 24
2.5. Proper Operation and Maintenance 24
2.6. Permit Actions 24
2.7. Property Rights 24
2.8. Duty to Provide Information 24
2.9. Inspection and Entry 25
2.10. Monitoring and Records 25
2.11. Signatory Requirement 25
2.12. Reporting Requirements 26
2.13. Bypass 27
2.14. Upset 28
3. BEST MANAGEMENT PRACTICES PLAN (BMPP) REQUIREMENTS 30
3.1. Applicability 30
3.2. Plan 30
3.3. Implementation 30
3.4. General Requirements 30
3.5. Specific Requirements 30
3.6. SPCC Plans 31
3.7. Hazardous Waste Management 31
3.8. Documentation 31
3.9. BMP Plan Modification 31
3.12. Additional BMP Conditions during Dewatering 31
4. WET TESTING REQUIREMENTS 34
4.1. Sampling Requirements 34

4.2. Test Requirements 34
4.3. Serial Dilutions 35
4.4. Controls 35
4.5. Test Methods 35
4.6. Reduction to Single Species Testing 36
4.7. Reporting Requirements 36
4.8. Test Results 36
4.9. Accelerated Testing 36
4.10. WET TRE 37
5. OTHER CONDITIONS 39
5.1. Schedule of Compliance 39
5.2. Other Permits 39
5.3. Continuation of Expiring Permit 39
5.4. Antidegradation 39
5.5. Reopener Clause 40
5.6. Cooling Water Additives, FIFRA, and Mollusk Control 40
5.7. Certified Operators 40
5.8. Outfall Signage 40
5.9 Outfall 005 316(a) 40
5.10 Outfall 010 316(b) Cooling Water Intake Structure 41
5.11 Outfall 103 316(b) Cooling Water Intake Structure 41
5.12 Polychlorinated Biphenyls 41
5.13 Selective Catalytic Reduction Devices or Systems (SCRs) and Selective Non-Catalytic Reduction Devices or Systems (SNCR) 41
5.14 Additional Requirements for Total Recoverable Selenium 42
5.15. Unpermitted Combustion Residual Leachate 42
6.0 MONITORING AND REPORTING REQUIREMENTS 45
6.1.1 KPDES Outfalls 45
6.1.2 Sufficiently Sensitive Analytical Methods 45
6.1.3 Certified Laboratory Requirements 45
6.1.4 Submission of DMRs 45

SECTION 1

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1.1. Compliance Monitoring Locations (Outfalls)

The following table lists the outfalls authorized by this permit, the location and description of each, and the DOW assigned KPDES outfall number:

TABLE 1.

Outfall No.	Outfall Type	Latitude (N)	Longitude (W)	Receiving Water	Description of Outfall
001	External	37°14'47"	86°58'31"	Jacobs Creek	Current - Discharge from Fly Ash Pond Containing: Reclaimed Strip Mine Area Drainage, Bottom Ash Pond, Fly Ash Sluice Water Unit 3, Internal Outfall 006 & 007, Precipitator Wash Water Sump Unit 3, Stormwater from Dry Fly Ash Dredge Cells, FGD Pond (Unit 3 FGD, Asbestos Landfill Settling Pond, Stack Washwater Sump, FGD Drainage Area, and Direct Precipitation) Stormwater from East & West Dredge Ponds, and Direct Precipitation
					Dewatering – No flows other than those currently going to outfall 001 will enter the Ash Pond and some of the current flow will be directed away from the ash pond to the General Plant Wastewater (GPWW) Basin
					Future – Stormwater Runoff
002	External	37°15'49"	86°58'39"	Green River	Current- Discharge from Bottom Ash Pond/General Plant Wastewater Basin Containing: Bottom Ash Sluice Water Unit 3, Boiler Fire side Washwater Unit 3, Economizer Washwater Unit 3, Slag Tanks Units 1, 2, & 3, Ash Slurry Sump Unit 3, Powdex Precoat Wastewater Unit 3, Air Preheater Washwater Sump Unit 3, Ash Pit Sumps Unit 1 & Unit 2, Misc. Equipment Cooling Water, Lab & Powerhouse Floor Drains, Unit 1 & Unit 2 Plant Misc. Waste & Cooling Water, Unit 3 Yard Area Drainage, Unit 3 Boiler Standard Loss, Unit 3 Auxiliary Boiler, Unit 3 Supplemental Cooling Water Pit Sump, Plant Misc. Waste Unit 3, Coal Yard Drainage basins 2 & 3, Misc. Plant Drainage, Sewage Treatment Plant, Limestone Handling & Cooling Tower Area Drainage, Water Treatment System Wastewater, Rail & Truck Coal Unloading Area Drainage, Coal Wash Refuse Disposal Area Drainage, Wooded Area West of Red Water Ditch#3 Drainage, Direct Precipitation, Boiler Chemical Cleaning Wastes, Unit 3 precipitator wash water sump, and FGD wastewater.
					Dewatering- No changes to the flows entering the Ash Pond. The Ash Pond/General Plant Wastewater Basin discharge will contain all the flows mentioned above.

TABLE 1.					
Outfall No.	**Outfall Type**	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
					Future- Discharge from Bottom General Plant Wastewater Basin Containing: Boiler Fire side Washwater Unit 3, Economizer Washwater Unit 3, Slag Tanks Units 1, 2, & 3, Ash Slurry Sump Unit 3, Powdex Precoat Wastewater Unit 3, Air Preheater Washwater Sump Unit 3, Ash Pit Sumps Unit 1 & Unit 2, Misc. Equipment Cooling Water, Lab & Powerhouse Floor Drains, Unit 1 & Unit 2 Plant Misc. Waste & Cooling Water, Unit 3 Yard Area Drainage, Unit 3 Boiler Standard Loss, Unit 3 Auxiliary Boiler, Unit 3 Supplemental Cooling Water Pit Sump, Plant Misc. Waste Unit 3, Coal Yard Drainage basins 2 & 3, Misc. Plant Drainage, Sewage Treatment Plant, Limestone Handling & Cooling Tower Area Drainage, Water Treatment System Wastewater, Rail & Truck Coal Unloading Area Drainage, Coal Wash Refuse Disposal Area Drainage, Wooded Area West of Red Water Ditch#3 Drainage, Direct Precipitation, Boiler Chemical Cleaning Wastes, Unit 3 precipitator wash water sump, and FGD wastewater.
004	Internal	37°15’46”	86°58’40”	Outfall 002	Sanitary Wastewater
005	External	37°15’46”	86°58’35”	Green River	Cooling Water Outfall 021 (Treated FGD Wastewater)
006/007	Internal	37°15’06”	86°59’03”	Outfall 001/002	Chemical Boiler Cleaning from Unit 3 Stormwater
010	External	37°15’34”	86°58’26”	Green River[1]	Plant Intake
011	External	37°16’17”	86°59’03”	Green River	This outfall drains a predominantly vegetated area. The only non-vegetated ground cover consists of a small area of inert construction/demolition debris in the southeast corner and several gravel/dirt roadways.
012	External	37°15’37”	86°58’27”	Green River	This outfall drains a grass-covered area with very little impervious surfaces.
013	External	37°15’29”	86°58’20”	Green River	Except for several paved roadways, several impervious roofs, and a graveled switchyard, this outfall drains a predominately vegetated area. This outfall receives intermittent overflows from the cooling water return channel (Outfall 005).
014	External	37°15’26”	86°58’16”	Green River	This outfall drains an area mostly coal slag with vegetative cover. The outfall area is drained by a series of yard and roadside ditches that converge into a single open ditch which discharges into the Green River at the northeast corner of the drainage area.
015	External	37°14’59”	86°58’02”	Green River	This outfall drains an area of primarily coal slag with vegetative cover and a firearms range.
016	External	37°15’22”	86°58’03”	Jacob’s Creek	This outfall drains an area with vegetated surface cover. Under the vegetation is slag & mine tailings
017	External	37°14’56”	86°58’07”	Jacob’s Creek	This outfall drains an area with surface vegetated cover except for a graveled roadbed.
018	Internal	37°15’12”	86°58’45”	Green River via Outfall 013	Landfill Leachate

TABLE 1.					
Outfall No.	**Outfall Type**	**Latitude (N)**	**Longitude (W)**	**Receiving Water**	**Description of Outfall**
019	External	37°15'29"	86°58'20"	Green River via Outfall 013	Landfill Stormwater Runoff.
020	External	37°15'26"	86°58'16"	Green River via Outfall 014	Landfill Stormwater Runoff.
021	Internal	37°15'29"	86°59'08"	Outfall 002/005	Treated FGD Wastewater
101	External	37˚16'25"	86˚59'05"	Green River	Stormwater and Cooling tower blowdown from outfall 102 associated with the combined cycle facility
102	Internal	37˚16'12"	86˚59'11"	Outfall 102	Cooling Tower Blowdown associated with the combined cycle facility
103	External	37˚16'16"	86˚59'02"	Green River	Plant Intake associated with the combined cycle facility

1.2. Effluent Limitations and Monitoring Requirements

1.1.1. Outfall 001

Outfall 001 will undergo operational changes as the facility transitions from existing conditions of an active ash pond to proposed conditions of a process water basin. To accomplish this, the ash pond will be dewatered and closed. To capture the transition, effluent limitations tables have been developed for three phases. Please note that the permittee shall notify the Division of Water, Surface Water Permits Branch at least 30 days prior to commencement of dewatering operations. The permittee shall also notify the Division of Water, Surface Water Permits Branch at least 30 days prior to when dewatering operations are complete.

Beginning on the effective date and lasting through the term of this permit or commencement of Ash Pond mechanical dewatering, discharges from Outfall 001 shall comply with the following effluent limitations:

TABLE 2.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	2/Month	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	30.0	98.2	N/A	2/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	14.9	19.9	N/A	2/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	2/Month	Grab
Total Recoverable Cadmium[1]	mg/l	N/A	N/A	N/A	0.00076	0.0087	N/A	1/Month	Grab
Total Recoverable Selenium[1]	mg/l	N/A	N/A	N/A	0.005	Report	N/A	1/Month	Grab

TABLE 2.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
Total Recoverable Selenium (Fish Tissue)[1]	mg/kg dry weight	N/A	N/A	N/A	N/A	N/A	8.6	([4])	([4])
Total Recoverable Thallium[1]	mg/l	N/A	N/A	N/A	0.00047	Report	N/A	1/Month	Grab
Ammonia (as mg/l NH_3N)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Chronic WET[2]	TU_C	N/A	N/A	N/A	N/A	N/A	1.00	1/Year	([3])
[1]Effluent limits shall become effective on July 1, 2022 unless the fly ash pond is closed and tier 3 limits are in effect. See Compliance Schedule in Section 5.1 of permit.									
[2]WET – Whole Effluent Toxicity									
[3]Three (3) 24-hour composite samples with one each collected every other day for a period of five (5) days, i.e. days 1, 3, & 5									
[4]Should the monthly average concentration of total recoverable selenium exceed 5.0 µg/l see Section 5.14 of the permit for additional requirements.									
There shall be no discharge of pollutants in fly ash transport water generated on and after July 1, 2019.									

Upon commencement of Ash Pond mechanical dewatering and lasting through the term of this permit or completion of Ash Pond dewatering, discharges from Outfall 001 shall comply with the following effluent limitations:

TABLE 3.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	2/Month	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	30.0	98.2	N/A	2/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	14.9	19.9	N/A	2/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	2/Month	Grab
Total Recoverable Cadmium[1]	mg/l	N/A	N/A	N/A	0.00076	0.0087	N/A	1/Month	Grab
Total Recoverable Selenium[1]	mg/l	N/A	N/A	N/A	0.005	Report	N/A	1/Month	Grab

TABLE 3.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
Total Recoverable Selenium (Fish Tissue)[1]	mg/kg dry weight	N/A	N/A	N/A	N/A	N/A	8.6	([7])	([7])
Total Recoverable Thallium[1]	mg/l	N/A	N/A	N/A	0.00047	Report	N/A	1/Month	Grab
Ammonia (as mg/l NH_3N)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Total Recoverable Antimony[2]	mg/l	N/A	N/A	N/A	0.049	Report	N/A	1/Month	Grab
Total Recoverable Arsenic[2]	mg/l	N/A	N/A	N/A	0.14	0.31	N/A	1/Month	Grab
Total Recoverable Beryllium[2]	mg/l	N/A	N/A	N/A	0.035	Report	N/A	1/Month	Grab
Total Recoverable Chromium[2]	mg/l	N/A	N/A	N/A	0.874	Report	N/A	1/Month	Grab
Total Recoverable Copper[2]	mg/l	N/A	N/A	N/A	0.027	0.047	N/A	1/Month	Grab
Total Recoverable Lead[2]	mg/l	N/A	N/A	N/A	0.017	0.43	N/A	1/Month	Grab
Total Recoverable Mercury[2]	mg/l	N/A	N/A	N/A	0.000046	0.0013	N/A	1/Month	Grab
Total Recoverable Nickel[2]	mg/l	N/A	N/A	N/A	0.15	1.36	N/A	1/Month	Grab
Total Recoverable Silver[2]	mg/l	N/A	N/A	N/A	Report	0.037	N/A	1/Month	Grab
Total Recoverable Zinc[2]	mg/l	N/A	N/A	N/A	0.35	0.35	N/A	1/Month	Grab
Acute WET[3]	TU_A	N/A	N/A	N/A	N/A	N/A	1.00	1/Month[4]	([5])
Chronic WET[3]	TU_C	N/A	N/A	N/A	N/A	N/A	1.00	1/Quarter	([6])
[1]Effluent limits shall become effective on July 1, 2022 unless the fly ash pond is closed and tier 3 limits are in effect. See Compliance Schedule in Section 5.1 of permit.									
[2]The Monthly Average and Daily Maximum concentrations for these pollutants are not effluent limitations, but water quality triggers that, if exceeded for two (2) consecutive months, require permittee action. See the Best Management Practices Plan Section - Additional BMP Conditions Subsection for additional requirements related to these triggers.									
[3]WET – Whole Effluent Toxicity									
[4]The facility is not required to perform an Acute WET test if a Chronic WET test was performed during that month. NODI Code 9 "Conditional Monitoring-Not Required This period" can be used on the DMR for Acute WET during those months.									
[5]Two (2) discrete grab samples shall be collected 12 hours apart									
[6]Three (3) 24-hour composite samples with one each collected every other day for a period of five (5) days, i.e. days 1, 3, & 5									
[7]Should the monthly average concentration of total recoverable selenium exceed 5.0 µg/l see Section 5.14 of the permit for additional requirements.									

TABLE 3.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
There shall be no discharge of pollutants in fly ash transport water generated on and after July 1, 2019.									

Upon completion of Ash Pond dewatering and lasting through the term of this permit, discharges from Outfall 001 shall comply with the following effluent limitations:

TABLE 4.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Month	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	30	60	N/A	1/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	10	15	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab
Total Recoverable Cadmium	mg/l	N/A	N/A	N/A	Report	0.0087	N/A	1/Quarter	Grab
Total Recoverable Selenium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Thallium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
There shall be no discharge of pollutants in fly ash transport water generated on and after July 1, 2019.									

1.1.2. Outfall 002

Outfall 002 will undergo operational changes as the facility transitions from existing conditions of an active ash pond to proposed conditions of a process water basin. To accomplish this, the ash pond will be dewatered and closed. To capture the transition, effluent limitations tables have been developed for three phases. Please note that the permittee shall notify the Division of Water, Surface Water Permits Branch at least 30 days prior to commencement of dewatering operations. The permittee shall also notify the Division of Water, Surface Water Permits Branch at least 30 days prior to when dewatering operations are complete.

Beginning on the effective date and lasting through the term of this permit or commencement of Ash Pond mechanical dewatering, discharges from Outfall 002 shall comply with the following effluent limitations:

TABLE 5.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	2/Month	Instantaneous
Total Suspended Solids[1]	mg/l	N/A	N/A	N/A	30.0	98.0	N/A	2/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	14.7	19.6	N/A	2/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	2/Month	Grab
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Mercury	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Cadmium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Thallium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Chronic WET[2]	TU_C	N/A	N/A	N/A	N/A	N/A	3.28	1/Year	([3])
[1]The limits for Total Suspended Solids shall be applied as net limitations when the Total Suspended Solids concertation 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: $TSS_{(Net)} = TSS_{(002\ Discharge)} - TSS_{(010\ Intake)}$. Net limitations no longer apply once the facility has stopped sending bottom ash transport water to this outfall.									
[2]WET – Whole Effluent Toxicity									
[3]Three (3) 24-hour composite samples with one each collected every other day for a period of five (5) days, i.e. days 1, 3, & 5									
There shall be no discharge of pollutants in bottom ash transport water generated on and after December 1, 2023.									

Upon commencement of Ash Pond mechanical dewatering and lasting through the term of this permit or completion of Ash Pond dewatering, discharges from Outfall 002 shall comply with the following effluent limitations:

TABLE 6.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	2/Month	Instantaneous
Total Suspended Solids[1]	mg/l	N/A	N/A	N/A	30.0	98.0	N/A	2/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	14.7	19.6	N/A	2/Month	Grab

TABLE 6.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	2/Month	Grab
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
Total Recoverable Antimony[2]	mg/l	N/A	N/A	N/A	0.042	Report	N/A	1/Month	Grab
Total Recoverable Arsenic[2]	mg/l	N/A	N/A	N/A	0.306	0.306	N/A	1/Month	Grab
Total Recoverable Beryllium[2]	mg/l	N/A	N/A	N/A	0.030	Report	N/A	1/Month	Grab
Total Recoverable Cadmium[2]	mg/l	N/A	N/A	N/A	0.0011	0.0044	N/A	1/Month	Grab
Total Recoverable Chromium[2]	mg/l	N/A	N/A	N/A	0.750	Report	N/A	1/Month	Grab
Total Recoverable Copper[2]	mg/l	N/A	N/A	N/A	0.027	0.027	N/A	1/Month	Grab
Total Recoverable Lead[2]	mg/l	N/A	N/A	N/A	0.018	0.210	N/A	1/Month	Grab
Total Recoverable Mercury[2]	mg/l	N/A	N/A	N/A	0.000046	0.0013	N/A	1/Month	Grab
Total Recoverable Nickel[2]	mg/l	N/A	N/A	N/A	0.242	0.848	N/A	1/Month	Grab
Total Recoverable Selenium[2]	mg/l	N/A	N/A	N/A	0.015	Report	N/A	1/Month	Grab
Total Recoverable Silver[2]	mg/l	N/A	N/A	N/A	Report	0.015	N/A	1/Month	Grab
Total Recoverable Thallium[2]	mg/l	N/A	N/A	N/A	0.0018	Report	N/A	1/Month	Grab
Total Recoverable Zinc[2]	mg/l	N/A	N/A	N/A	0.217	0.217	N/A	1/Month	Grab
Acute WET[3]	TU_A	N/A	N/A	N/A	N/A	N/A	1.00	1/Month[4]	([5])
Chronic WET[3]	TU_C	N/A	N/A	N/A	N/A	N/A	3.28	1/Quarter	([6])

[1]The limits for Total Suspended Solids shall be applied as net limitations when the Total Suspended Solids concertation 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: $TSS_{(Net)} = TSS_{(002\ Discharge)} - TSS_{(010\ Intake)}$. Net limitations no longer apply once the facility has stopped sending bottom ash transport water to this outfall.

[2]The Monthly Average and Daily Maximum concentrations for these pollutants are not effluent limitations, but water quality triggers that, if exceeded for two (2) consecutive months, require permittee action. See the Best Management Practices Plan Section - Additional BMP Conditions Subsection for additional requirements related to these triggers.

[3]WET – Whole Effluent Toxicity

[4]The facility is not required to perform an Acute WET test if a Chronic WET test was performed during that month. NODI Code 9 "Conditional Monitoring-Not Required This Period" can be used on the DMR for Acute WET during those months.

[5]Two (2) discrete grab samples shall be collected 12 hours apart

[6]Three (3) 24-hour composite samples with one each collected every other day for a period of five (5) days, i.e. days 1, 3, & 5

TABLE 6.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
There shall be no discharge of pollutants in bottom ash transport water generated on and after December 1, 2023.									

Upon completion of Ash Pond dewatering and lasting through the term of this permit, discharges from Outfall 002 shall comply with the following effluent limitations:

TABLE 7.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	2/Month	Instantaneous
Total Suspended Solids[1]	mg/l	N/A	N/A	N/A	30.0	95.5	N/A	2/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	14.4	19.2	N/A	2/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	2/Month	Grab
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Mercury	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Cadmium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Thallium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Chronic WET[2]	TU_C	N/A	N/A	N/A	N/A	N/A	3.28	1/Year	([3])
[1]The limits for Total Suspended Solids shall be applied as net limitations when the Total Suspended Solids concertation 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: $TSS_{(Net)} = TSS_{(002\ Discharge)} - TSS_{(010\ Intake)}$. Net limitations no longer apply once the facility has stopped sending bottom ash transport water to this outfall.									
[2]WET – Whole Effluent Toxicity									
[3]Three (3) 24-hour composite samples with one each collected every other day for a period of five (5) days, i.e. days 1, 3, & 5									
There shall be no discharge of pollutants in bottom ash transport water generated on and after December 1, 2023.									

1.1.3. Outfall 004

Beginning on the effective date and lasting through the term of this permit, discharges from Outfall 004 shall comply with the following effluent limitations:

TABLE 8.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Month	Instantaneous
$CBOD_5$[1]	mg/l	N/A	N/A	N/A	30	45	N/A	1/Month	Grab
E. Coli[2]	#/100 ml	N/A	N/A	N/A	130[3]	240[4]	N/A	1/Month	Grab
[1]$CBOD_5$ – Carbonaceous Biochemical Oxygen Demand, 5-day									
[2]E. Coli – Escherichia Coli Bacteria									
[3]Thirty (30) day Geometric Mean									
[4]Seven (7) day Geometric Mean									

1.1.4. Outfall 005

Beginning on the effective date and lasting through the term of this permit, discharges from Outfall 005 shall comply with the following effluent limitations:

TABLE 9.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	Continuous	Recorder
Discharge Temperature	°F	N/A	N/A	N/A	Report	Report	N/A	1/Day	Grab
Mixed River Temperature	°F	N/A	N/A	N/A	Report	89	N/A	1/Day	Calculated[8]
Instream Temperature Change	°F	N/A	N/A	N/A	Report	10	N/A	1/Day	Calculated[9]
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Week	Grab
Total Recoverable Mercury[1]	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Free Available Chlorine[2]	mg/l	N/A	N/A	N/A	0.2	0.5	N/A	1/Occurrence[3]	Multiple Grab[4]

TABLE 9.									
EFFLUENT LIMITATIONS								**MONITORING REQUIREMENTS**	
Effluent Characteristic	**Units**	**Loadings (lbs./day)**		**Concentrations**				**Frequency**	**Sample Type**
		Monthly Average	**Daily Maximum**	**Minimum**	**Monthly Average**	**Daily Maximum**	**Maximum**		
Total Residual Oxidants[2,5]	mg/l	N/A	N/A	N/A	Report	0.2	N/A	1/Occurrence[3]	Multiple Grab[4]
Oxidant Discharge Time[2]	Min/unit/day	N/A	N/A	N/A	N/A	120	N/A	1/Occurrence[3]	Log
Total Chromium[2]	mg/l	N/A	N/A	N/A	0.2	0.2	N/A	1/Year	Grab
Total Zinc[2]	mg/l	N/A	N/A	N/A	0.212	0.212	N/A	1/Year	Grab
Priority Pollutants[2,6]	No Detectable Amount							1/Year	Calcuated[7]

[1]The monitoring requirements for this parameter is only required if the treated effluent from outfall 021 is ultimately being discharged through this outfall.

[2]Sampling of cooling tower blowdown must be taken at the nearest accessible point prior to discharge to or mixing with the receiving waters or wastestreams from other outfalls. Sampling is only required when the cooling tower blowdown is being discharged via outfall 005

[3]The measurement frequency "Occurrence" means during periods of chlorination or oxidation addition to cooling water, but no more frequent than once per week.

[4]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 the oxidant discharge.

[5]The term Total Residual Oxidants (TRO) means the value obtained by 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 DOW permitting staff before the initial use. TRO monitoring and limits only apply if the applicant chooses to utilize an oxidant other than Chlorine.

[6]Priority Pollutants are those contained in chemicals added for cooling tower maintenance and shall be monitored annually by grab sample or by engineering calculations. The results of the analyses/engineering calculations shall be totaled and reported as a single concentration on the DMR. The laboratory bench sheets/engineering or electronic equivalent calculations showing the results for each pollutant shall be attached to the DMR. The term priority pollutants means the 126 priority pollutants listed in 40 CFR Part 423 Appendix A.

[7]Complicance with the limitations, for the 126 priority pollutants, in paragraph (b)(10) of 40 CFR 423.15 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.

[8]Mixed River Temperature shall be calculated 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 flow not discharged as cooling water

[9]Instream Temperature Change Shall be calculated using the following formula: $\Delta T = T_m - T_i$

TABLE 9.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Neither free available chlorine nor total residual chlorine or oxidants may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available chlorine or total residual chlorine or oxidants at any one time unless the utility can demonstrate to the DOW that the units in a particular location cannot operate at or below this level of chlorination or oxidant addition.									

1.1.5. Outfalls 006/007

Beginning on the effective date and lasting through the term of this permit, discharges from Outfalls 006/007 shall comply with the following effluent limitations:

TABLE 10.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Flow [1]	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Batch	Instantaneous
Total Copper[1]	mg/l	N/A	N/A	N/A	1.0	1.0	N/A	1/Batch	Grab
Total Iron[1]	mg/l	N/A	N/A	N/A	1.0	1.0	N/A	1/Batch	Grab
[1]The monitoring requirements for this outfall only apply when metal-cleaning waste is being discharged through this internal outfall									

1.1.6. Outfall 010

Beginning on the effective date and lasting through the term of this permit, discharges from Outfall 010 shall comply with the following effluent limitations:

TABLE 11.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	2/Month	Instantaneous
Temperature	°F	N/A	N/A	N/A	Report	Report	N/A	2/Month	Grab
Total Suspended Solids	mg/l	N/A	N/A	N/A	Report	Report	N/A	2/Month	Grab

1.1.7. Outfalls 011, 012, 013, 014, 015, 016, and 017

Beginning on the effective date and lasting through the term of this permit, discharges from Outfalls 011, 012, 013, 014, 015, 016, and 017 shall comply with the following effluent limitations:

The stormwater runoff from the areas served by Outfalls 011, 012, 013, 014, 015, 016, and 017 shall be managed using appropriate Best Management Practices (BMPs) to prevent the discharge of pollutants from those areas.

1.1.8. Outfall 018

Beginning on the effective date and lasting through the term of this permit, discharges from Outfall 018 shall comply with the following effluent limitations:

TABLE 12.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Month	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	30.0	100.0	N/A	1/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	15.0	20.0	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Arsenic	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Cadmium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Chromium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Copper	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Lead,	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Mercury	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Nickel	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Silver	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Zinc	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab

1.1.10. Outfalls 019 and 020

Beginning on the effective date and lasting through the term of this permit, discharges from Outfalls 019 and 020 shall comply with the following effluent limitations:

TABLE 13.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Month	Instantaneous
Total Suspended Solids	mg/l	N/A	N/A	N/A	Report	100	N/A	1/Month	Grab
Oil & Grease	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab
Hardness (as mg/l $CaCO_3$)	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Arsenic	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Cadmium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Chromium	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Copper	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Lead,	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Mercury	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Nickel	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Silver	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab
Total Recoverable Zinc	mg/l	N/A	N/A	N/A	Report	Report	N/A	1/Quarter	Grab

1.1.11. Outfall 021

Beginning on December 1, 2023 and lasting through the term of this permit, discharges from Outfall 021 shall comply with the following effluent limitations:

TABLE 14.									
EFFLUENT LIMITATIONS								MONITORING REQUIREMENTS	
Effluent Characteristic	Units	Loadings (lbs./day)		Concentrations				Frequency	Sample Type
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum		
Flow	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Month	Instantaneous
Total Suspended Solids[1]	mg/l	N/A	N/A	N/A	30.0	100.0	N/A	1/Month	Grab
Oil & Grease[1]	mg/l	N/A	N/A	N/A	15.0	20.0	N/A	1/Month	Grab
Total Recoverable Arsenic[2]	mg/l	N/A	N/A	N/A	0.008	0.011	N/A	1/Month	Grab
Total Recoverable Mercury[2]	mg/l	N/A	N/A	N/A	0.000356	0.000788	N/A	1/Month	Grab
Total Recoverable Selenium[2]	mg/l	N/A	N/A	N/A	0.012	0.023	N/A	1/Month	Grab
Nitrate/nitrite as N[2]	mg/l	N/A	N/A	N/A	4.4	17.0	N/A	1/Month	Grab
[1]The monitoring requirements only apply if the treated effluent from this internal outfall is ultimately being discharged through outfall 005. NODI Code 9 “Conditional Monitoring-Not Required This Period” if the treated effluent from this outfall is discharging through the process wastewater basin out outfall 002.									
[2]These limits do not become effective till December 1st, 2023									

1.1.12. Outfall 101

Beginning on the effective date and lasting through the term of this permit, discharges from Outfall 101 shall comply with the following effluent limitations:

TABLE 15.									
Effluent Characteristics	Units	LOADINGS (lbs/day)		EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum	Frequency	Sample Type
Flow, Effluent	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Month	Instantaneous
Temperature	˚F	N/A	N/A	N/A	Report	89	N/A	1/Month	Grab
Total Suspended Solids	mg/l	N/A	N/A	N/A	30	60	N/A	1/Month	Grab
pH	SU	N/A	N/A	6.0	N/A	N/A	9.0	1/Month	Grab

1.1.13. Outfall 102

Beginning on the effective date and lasting through the term of this permit, discharges from Outfall 102 shall comply with the following effluent limitations:

TABLE 16.									
Effluent Characteristics	Units	LOADINGS (lbs/day)		EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum	Frequency	Sample Type
Flow, Effluent	MGD	Report	Report	N/A	N/A	N/A	N/A	1/Month	Instantaneous
Free Available Chlorine	mg/l	N/A	N/A	N/A	0.2	0.5	N/A	1/Occurrence[1]	Continuous Grab[2]
Total Residual Oxidants[3]	mg/l	N/A	N/A	N/A	Report	0.2	N/A	1/Occurrence[1]	Continuous Grab[2]
Oxidant Discharge Time	Minutes/unit/day	N/A	N/A	N/A	N/A	120	N/A	1/Occurrence[1]	Recorder
Total Chromium	mg/l	N/A	N/A	N/A	0.2	0.2	N/A	1/Month	Grab
Total Zinc	mg/l	N/A	N/A	N/A	1.0	1.0	N/A	1/Month	Grab
Priority Pollutants[4]	No Detectable Amount							1/Year	Calcuated[5]
[1]The measurement frequency "Occurrence" means during periods of chlorination or oxidation addition to cooling water, but no more frequent than once per week.									
[2]The sample type 'Continuous Grab' means grab samples collected at the approximate beginning of oxidant discharge and once every fifteen (15) minutes thereafter until the end of the oxidant discharge.									
[3]The term Total Residual Oxidants (TRO) means the value obtained by 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 DOW permitting staff before the initial use. TRO monitoring and limits only apply if the applicant chooses to utilize an oxidant other than Chlorine.									
[4]Priority Pollutants are those contained in chemicals added for cooling tower maintenance and shall be monitored annually by grab sample or by engineering calculations. The results of the analyses/engineering calculations shall be totaled and reported as a single concentration on the DMR. The laboratory bench sheets/engineering or electronic equivalent calculations showing the results for each pollutant shall be attached to the DMR. The term priority pollutants means the 126 priority pollutants listed in 40 CFR Part 423 Appendix A.									
[5]Complicance with the limitations, for the 126 priority pollutants, in paragraph (b)(10) of 40 CFR 423.15 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.									
Neither free available chlorine nor total residual chlorine or oxidants may be discharged from any unit for more than two hours in any one day and not more than one unit in any plant may discharge free available chlorine or total residual chlorine or oxidants at any one time unless the utility can demonstrate to the DOW that the units in a particular location cannot operate at or below this level of chlorination or oxidant addition.									

1.1.14. Outfall 103

Beginning on the effective date and lasting through the term of this permit, discharges from Outfall 103 shall comply with the following effluent limitations:

TABLE 17.									
Influent Characteristics	Units	LOADINGS (lbs/day)		EFFLUENT LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Daily Maximum	Minimum	Monthly Average	Daily Maximum	Maximum	Frequency	Sample Type
Flow, Influent	MGD	Report	Report	N/A	N/A	N/A	N/A	Continuous	Recorder
Cooling Water Intake Velocity	ft/sec	Report	Report	N/A	N/A	N/A	N/A	1/Day	Calculated
[1]Cooling Water Intake Inspection	Fail=1 Pass=0	N/A	N/A	N/A	N/A	N/A	Report[2]	1/Week	Inspection[3]
[1]Weekly monitoring of the cooling water intake system shall be performed, during the period the cooling water intake structure is in operation, to ensure that the design and construction technology required by §125.94 (i.e., intake flow commensurate with closed cycle cooling) is functioning as designed and are being appropriately maintained and operated.									
[2]If the intake flow through the screen is not commensurate with closed cycle cooling a "1" is to be reported. If intake flow is commensurate with closed cycle cooling "0" is to be reported									
[3]This inspection may take the form of either visual inspections or the use of remote monitoring devices.									

1.3. Standard Effluent Requirements

The discharges to Waters of the Commonwealth shall not produce floating solids, visible foam or a visible sheen on the surface of the receiving waters.

SECTION 2

STANDARD CONDITIONS

2. STANDARD CONDITIONS

The following conditions apply to all KPDES permits.

2.1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of KRS Chapter 224 and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. Any person who violates applicable statutes or who fails to perform any duty imposed, or who violates any determination, permit, administrative regulation, or order of the cabinet promulgated pursuant thereto shall be liable for a civil penalty as provided at KRS 224.99.010.

2.2. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for a new permit.

2.3. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

2.4. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

2.5. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

2.6. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

2.7. Property Rights

This permit does not convey any property rights of any sort, or any exclusive privilege.

2.8. Duty to Provide Information

The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Director upon request, copies of records required to be kept by this permit.

2.9. Inspection and Entry

The permittee shall allow the Director, or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

(1) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

(2) Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

(3) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

(4) Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

2.10. Monitoring and Records

(1) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

(2) Except for records of monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five (5) years (or longer as required by 401 KAR 5:065, Section 2(10) [40 CFR 503]), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

(3) Records of monitoring information shall include:

a) The date, exact place, and time of sampling or measurements;
b) The individual(s) who performed the sampling or measurements;
c) The date(s) analyses were performed;
d) The individual(s) who performed the analyses;
e) The analytical techniques or methods used; and
f) The results of such analyses.

(4) Monitoring must be conducted according to test procedures approved under 401 KAR 5:065, Section 2(8) [40 CFR 136] unless another method is required under 401 KAR 5:065, Section 2(9) or (10) [40 CFR subchapters N or O].

(5) KRS 224.99-010 provides that any person who knowingly violates KRS 224.70-110 or other enumerated statutes, or who knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall be guilty of a Class D felony and, upon conviction, shall be punished by a fine of not more than $25,000, or by imprisonment for not more than one (1) year, or both. Each day upon which a violation occurs shall constitute a separate violation.

2.11. Signatory Requirement

(1) All applications, reports, or information submitted to the Director shall be signed and certified pursuant to 401 KAR 5:060, Section 4 [40 CFR 122.22].

(2) KRS 224.99-010 provides that any person who knowingly provides false information in any document filed or required to be maintained under KRS Chapter 224 shall be guilty of a Class D felony and upon conviction thereof, shall be punished by a fine not to exceed twenty-five thousand dollars ($25,000), or by imprisonment, or by fine and imprisonment, for each separate violation. Each day upon which a violation occurs shall constitute a separate violation.

2.12. Reporting Requirements

2.12.1. Planned Changes

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

(1) The alteration or addition to a permitted facility may meet one (1) of the criteria for determining whether a facility is a new source in KRS 224.16-050 [40 CFR 122.29(b)]; or

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under KRS 224.16-050 [40 CFR 122.42(a)(1)].

(3) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

2.12.2. Anticipated Noncompliance

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

2.12.3. Transfers

This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under KRS 224 [CWA; see 40 CFR 122.61; in some cases, modification or revocation and reissuance is mandatory].

2.12.4. Monitoring Reports

Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(1) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices.

(2) If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 401 KAR 5:065, Section 2(8) [40 CFR 136], or another method required for an industry-specific waste stream under 401 KAR 5:065, Section 2(9) or (10) [40 CFR subchapters N or O], the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.

(3) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

2.12.5. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than fourteen (14) days following each schedule date.

2.12.6. Twenty-four-Hour Reporting

(1) The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within twenty-four (24) hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

(2) The following shall be included as information which must be reported within twenty-four (24) hours under this paragraph.

a) Any unanticipated bypass which exceeds any effluent limitation in the permit. (See §122.41(g))
b) Any upset which exceeds any effluent limitation in the permit.
c) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in the permit to be reported within twenty-four (24) hours.

(3) The Director may waive the written report on a case-by-case basis under 40 CFR 122.41 (l), if the oral report has been received within twenty-four (24) hours.

2.12.7. Other Noncompliance

The permittee shall report all instances of noncompliance not reported under Sections 2.12.1, 2.12.4, 2.12.5 and 2.12.6, at the time monitoring reports are submitted. The reports shall contain the information listed in Section 2.12.6.

2.12.8. Other Information

Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

2.13. Bypass

2.13.1. Definitions

(1) Bypass means the intentional diversion of waste streams from any portion of a treatment facility.

(2) Severe property damage means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

2.13.2. Bypass Not Exceeding Limitations

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Section 2.13.3 and 2.13.4.

2.13.3. Notice

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten (10) days before the date of the bypass.

(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in Section 2.12.6.

2.13.4. Prohibition of Bypass

(1) Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:

a) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and
c) The permittee submitted notices as required under Section 2.13.3.

(2) The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three (3) conditions listed above in Section 2.13.4

2.14. Upset

2.14.1. Definition

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

2.14.2. Effect of an Upset

An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Section 2.14.3 are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

2.14.3. Conditions Necessary for a Demonstration of Upset

A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;

(2) The permitted facility was at the time being properly operated; and

(3) The permittee submitted notice of the upset as required in Section 2.12.6; and

(4) The permittee complied with any remedial measures required under Section 2.4.

2.14.4. Burden of Proof

In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

SECTION 3

BEST MANAGEMENT PRACTICES PLAN (BMPP) REQUIREMENTS

3. BEST MANAGEMENT PRACTICES PLAN (BMPP) REQUIREMENTS

The permittee shall develop and implement a Best Management Practices Plan (BMPP) consistent with 401 KAR 5:065, Section 2(4).

3.1. 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 224.1-010(35) and who have operations which could result in (1) the release of a hazardous substance, pollutant, or contaminant, or (2) an environmental emergency, as defined in KRS 224.1-400, 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.

3.2. Plan

The permittee shall develop and implement a BMPP consistent with 401 KAR 5:065, Section 2(4) pursuant to KRS 224.70-110, which prevents or minimizes the potential for the release of "BMP pollutants" from ancillary activities through site runoff; spillage or leaks, sludge or waste disposal; or drainage from raw material storage.

3.3. Implementation

The permittee shall implement the BMPP upon of the commencement of regulated activity. Modifications to the plan as a result of ineffectiveness or plan changes to the facility shall be implemented as soon as possible.

3.4. General Requirements

The BMPP shall:

(1) Be documented in narrative form, and shall include any necessary plot plans, drawings, or maps.

(2) Establish specific objectives for the control of toxic and hazardous pollutants.

   a. 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.

   b. 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.

(3) Establish specific BMPs to meet the objectives identified under paragraph b of this section, addressing each component or system capable of causing a release of "BMP pollutants".

(4) Include any special conditions established in part b of this section.

(5) Be reviewed by engineering staff and the site manager.

3.5. 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:

(1) BMP Committee
(2) Reporting of BMP Incidents
(3) Risk Identification and Assessment
(4) Employee Training
(5) Inspections and Records
(6) Preventive Maintenance
(7) Good Housekeeping
(8) Materials Compatibility
(9) Security
(10) Materials Inventory

3.6. 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.

3.7. Hazardous Waste Management

The permittee shall assure the proper management of solids 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.

3.8. Documentation

The permittee shall maintain a copy of the BMPP at the facility and shall make the plan available upon request to EEC personnel.

3.9. BMP Plan Modification

The permittee shall modify the BMPP whenever there is a change in the facility or change in the operation of the facility that materially increases the potential for the release of "BMP pollutants".

3.10. Modification for Ineffectiveness

The BMPs and the BMPP shall be reviewed and appropriate modifications implemented to utilize other practicable measures if any of the following events occur:

(1) As a result of either a fixed or episodic event-driven evaluation, the permittee determines the selected BMPs are not achieving the established performance benchmarks;

(2) As a result of an evaluation or inspection by Cabinet personnel; or

(3) A release of any petroleum-based product, toxic or hazardous substance.

3.11. Periodically Discharged Wastewater 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.

3.12. Additional BMP Conditions during Dewatering

3.12.1. BMP Evaluation Triggers

Water Quality Trigger: The monthly average and daily maximum discharge concentrations for the listed metals in tables 3 and 6 are triggers that once exceeded for two (2) consecutive months requires the permittee to initiate an evaluation of the currently employed BMP's related to dewatering.

WET Trigger: The permittee shall review the BMPs currently employed, related to dewatering, when the findings of a Toxicity Reduction Evaluation (TRE) indicates that one or more of the pollutants monitored was the toxicant.

3.12.2. Evaluation of BMPs

The permittee shall notify DOW within five (5) days that a BMP evaluation trigger has occurred and within forty five (45) days shall complete a BMP evaluation.

At a minimum, the findings of this evaluation shall include:

1) A list of known, practicable control measures;
2) The order of implementing identified control measures;
3) Monitoring plans and schedules to support evaluating the effectiveness of each control measure;
4) A description of decision-making criteria and timelines for evaluating whether a particular measure has been effective and whether additional or different measures are required;
5) Identification of a process for revising the BMP Plan (BMPP) should data obtained from monitoring the effectiveness of particular control measures warrant such revisions; and
6) Any proposed changes to the BMPP shall be implemented within 90 days of the finalization of evaluation.

SECTION 4

WET TESTING REQUIREMENTS

4. WET TESTING REQUIREMENTS

The permittee shall initiate, within thirty (30) days of the effective date of this permit, or continue the series of tests described below to evaluate wastewater toxicity of the discharge from Outfall 001, 002, & 101.

4.1. Sampling Requirements

Acute- Outfalls 001 & 002 during Dewatering

Tests shall be conducted on each of two grab samples collected over the period of discharge,(i.e., discrete sample #1 taken at commencement of discharge, sample #2 taken approximately 12 hours later, sooner if discharge is expected to cease). The elapsed time between the collection of each grab sample and the initiation of each test shall not exceed 36 hours.

Chronic- Outfalls 001 & 002

Tests shall be conducted on a minimum of three (3) 24-hour composite samples shall be collected at a frequency of one (1) 24-hour composite every other day. For example, the first sample would be used for test initiation on 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. Each 24-hour composite shall be collected using a refrigerated automatic sampler. Each 24-hour composite sample shall consist of not less than twenty-four (24) discrete aliquots of effluent. Aliquots shall be of equal volume and time-proportional unless effluent flow is expected to vary by more than 10% from one hour to another or by 50% over the 24-hour collection period (as predicted from historical trends, significant rainfall events, etc.). With anticipated effluent flow variation of greater than 10% per hour or 50% overall, the frequency, and volume of each aliquot shall be flow-proportional. 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.

Samples shall be iced and maintained at not greater than 6 ^{o}C during collection, storage, transport and until used in the test by the laboratory.

4.2. Test Requirements

Acute- Outfalls 001 & 002 during Dewatering

The Acute WET test requirements consists of two 48-hour static non-renewal toxicity tests with water flea (Ceriodaphnia dubia, Daphnia magna, or Daphnia pulex) and two 48-hour static non-renewal toxicity tests with fathead minnow (Pimephales promelas) performed on discrete grab samples of 100% effluent (1.00 TU_A) at the frequency specified. Testing of each sample shall begin within 36 hours of the collection of that sample.

Chronic- Outfall 001

The Chronic WET test requirements consists of 1 short-term static-renewal water flea (Ceriodaphnia dubia) life-cycle test and 1 short-term static-renewal fathead minnow (Pimephales promelas) growth test on 100% effluent (1.00 TU_C) at the frequency specified. The test shall begin within 36 hours of the collection of the day 1 sample. The test shall be renewed daily using: samples collected on days 1, 3; and 5 in accordance with test method specified in the Test Methods Section below.

Chronic- Outfall 002

The Chronic WET test requirements consists of 1 short-term static-renewal water flea (Ceriodaphnia dubia) life-cycle test and 1 short-term static-renewal fathead minnow (Pimephales promelas) growth test on 30.5% effluent (3.28 TU_C) at the frequency specified. The test shall begin within 36 hours of the collection of the

day 1 sample. The test shall be renewed daily using: samples collected on days 1, 3; and 5 in accordance with test method specified in the Test Methods Section below.

4.3. Serial Dilutions

Effluent concentrations for the tests must include the percent effluent required by the permit and at least four additional effluent concentrations.

For a required percent effluent of 100%, test concentrations shall be 20%, 40%, 60%, 80% and 100%.

For a required percent effluent less than 100% but greater than or equal to 75%, the test concentrations shall include the required percent effluent, two (2) concentrations below that are based on a 0.5 dilution factor, and two (2) concentrations above: one (1) at mid-point between 100% and the required percent effluent, and one (1) at 100% effluent.

For a required percent effluent less than 75%, test concentrations shall include the required percent effluent, two (2) concentrations below on a 0.5 dilution factor, and two (2) concentrations above the required percent effluent based on a 0.5 dilution factor, if possible; otherwise, one (1) at mid-point between 100% and the required percent effluent, and one (1) at 100% effluent.

Selection of different effluent concentrations must be approved by DOW prior to testing. Controls shall be conducted concurrently with effluent testing using synthetic water.

4.4. Controls

Control tests shall be conducted concurrent with effluent testing using synthetic water. The analysis will be deemed reasonable and good only if the minimum control requirements are met.

Any test that does not meet the control acceptability criteria shall be repeated as soon as practicable within the monitoring period.

Within 30 days prior to initiating an effluent toxicity test, a reference toxicant test must be completed for the method used; alternatively, the reference toxicant test may be run concurrent with the effluent toxicity test.

Acute- Outfalls 001 & 002 during Dewatering

Control survival is 90% or greater in test organisms held in synthetic water.

Chronic- Outfalls 001 & 002

For the Ceriodaphnia test: at least 80% survival of all control organisms and an average of fifteen (15) or more young per surviving female in the control solutions; and 60% of surviving control females must produce three broods.

For the fathead minnow test: at least 80% survival in controls and the average dry weight per surviving organism in control chambers equals or exceeds 0.25 mg.

4.5. Test Methods

Acute- Outfalls 001 & 002 during Dewatering

All test organisms, procedures, and quality assurance criteria used shall be in accordance with Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, EPA-821-R-02-012 (5th edition), the most recently published edition of this publication, or as approved in advance by DOW.

Chronic- Outfalls 001 & 002

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 (4th Edition), EPA-821-R-02-013, the most recent edition of this publication, or as approved in advance by DOW.

4.6. Reduction to Single Species Testing

After at least six (6) consecutive passing toxicity tests using both, the water flea and the fathead minnow, a request for testing with only the most sensitive species may be submitted to DOW. Upon approval, the most sensitive species may be considered as representative and all subsequent compliance tests may be conducted using only that species unless directed at any time by DOW to change or revert to both.

4.7. Reporting Requirements

Results of all toxicity tests conducted with any species shall be reported according to the most recent format provided by DOW (See the Section for Submission of DMRs of this permit). Notification of failed test shall be made to DOW within five days of test completion. Test reports shall be submitted to DOW within thirty (30) days of completion. A control chart including the most recent reference toxicant test endpoints for the effluent test method (minimum of 5, up to 20 if available) shall be part of the report.

4.8. Test Results

If noncompliance occurs in an initial test, the permittee shall repeat the test using new samples. Results of this second round of testing will be used to evaluate the persistence of the toxic event and the possible need for a Toxicity Reduction Evaluation (TRE).

Acute- Outfalls 001 & 002 during Dewatering

Noncompliance is demonstrated if the LC_{50} is less than 100 % effluent. If noncompliance occurs in an initial test, the permittee shall repeat the test using new grab samples collected approximately twelve (12) hours apart. Sampling must be initiated within ten (10) days of completing the failed test. The second round of testing shall include both species unless approved for only the most sensitive species by DOW.

Chronic- Outfall 001

Noncompliance with the toxicity limit is demonstrated if the IC_{25} (inhibition concentration) for reproduction or growth is less than 100 % effluent. If noncompliance occurs in an initial test, the permittee must repeat the test using a new set of three (3) composite samples. Sampling must be initiated within fifteen (15) days of completing the failed test. The second round of testing shall include both species unless approved for only the most sensitive species by DOW.

Chronic- Outfall 002

Noncompliance with the toxicity limit is demonstrated if the IC_{25} (inhibition concentration) for reproduction or growth is less than 30.5 % effluent. If noncompliance occurs in an initial test, the permittee must repeat the test using a new set of three (3) composite samples. Sampling must be initiated within fifteen (15) days of completing the failed test. The second round of testing shall include both species unless approved for only the most sensitive species by DOW.

4.9. Accelerated Testing

If the second round of testing also demonstrates noncompliance, the permittee will be required to perform accelerated testing as specified in the following paragraphs.

Complete four (4) additional rounds of testing to evaluate the frequency and degree of toxicity within sixty (60) days of completing the second failed round of testing. Results of the initial and second rounds

of testing specified above plus the four (4) additional rounds of testing will be used in deciding if a TRE shall be required.

If results from any two (2) of six (6) rounds of testing show a significant noncompliance with the Toxicity limit, i.e., ≥1.2 times the TU, or results from any four of the six tests show toxicity as defined above, a TRE will be required.

The permittee shall provide written notification to DOW within five (5) days of completing the accelerated testing, stating that: (1) toxicity persisted and that a TRE will be initiated; or (2) that toxicity did not persist and normal testing will resume.

Should toxicity prove not to be persistent during the accelerated testing period, but reoccur within twelve (12) months of the initial failure at a level ≥ 1.2 times the TU, then a TRE shall be required.

4.10. WET TRE

Having determined that a TRE is required, the permittee shall initiate and/or continue at least monthly testing with both species until such time as a specific TRE plan is approved by DOW. A TRE plan shall be developed by the permittee and submitted to DOW within thirty (30) days of determining a TRE is required. The plan shall be developed in accordance with the most recent Environmental Protection Agency (EPA) and DOW guidance. Questions regarding this process may be submitted to DOW.

The TRE plan shall include Toxic Identification Evaluation (TIE) procedures, treatability studies, and evaluations of: chemical usage including changes in types, handling and suppliers; operational and process procedures; housekeeping and maintenance activities; and raw materials. The TRE plan will establish an implementation schedule to begin immediately upon approval by DOW, to have duration of at least six (6) months, and not to exceed twenty-four (24) months. The implementation schedule shall include quarterly progress reports being submitted to DOW, due the last day of the month following each calendar quarter.

Upon completion of the TRE, the permittee shall submit a final report detailing the findings of the TRE and actions taken or to be taken to prevent the reoccurrence of toxicity. This final report shall include: the toxicant(s), if any are identified; treatment options; operational changes; and the proposed resolutions including an implementation schedule not to exceed one-hundred-eighty (180) days.

Should the permittee determine the toxicant(s) and/or a workable treatment prior to the planned conclusion of the TRE, the permittee will notify DOW within five (5) days of making that determination and take appropriate actions to implement the solution within one-hundred-eighty (180) days of that notification.

SECTION 5

OTHER CONDITIONS

5. OTHER CONDITIONS

5.1. Schedule of Compliance

The permittee shall attain compliance with all requirements of this permit on the effective date of this permit unless otherwise stated.

5.1.1. Outfall 001

The permittee shall perform closure of the fly ash pond and eliminate discharge of legacy wastewater from outfall 001 in order to attain compliance for total recoverable: Cadmium, Selenium, and Thallium. The permittee shall attain closure not later than the dates developed in accordance with the following schedule.

Milestone	Compliance Date
The permittee shall install a dry fly ash handling system for the elimination of fly ash sluicing and redirect FGD wastewater to new Process Water Basin or Cooling Water Outfall 005.	July 1, 2019
The permittee shall submit to DOW Surface Water Permits Branch a detailed plan for closure of the fly ash pond and elimination of legacy wastewater discharged at outfall 001	July 1, 2020
The permittee shall submit to DOW Surface Water Permits Branch a status report on the pond closure and the discharge concentration for cadmium, selenium and thallium.	July 1, 2021
The permittee shall have achieved closure of the fly ash pond and elimination of legacy wastewater discharged through outfall 001.	As soon as possible, but not later than July 1, 2022

5.2. Other Permits

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.

5.3. Continuation of Expiring Permit

This permit shall be continued in effect and enforceable after the expiration date of the permit provided the permittee submits a timely and complete application in accordance with 401 KAR 5:060, Section 2(4).

5.4. Antidegradation

For those discharges subject to the provisions of 401 KAR 10:030 Section, 1(3)(b)5, the permittee shall install, operate, and maintain wastewater treatment facilities consistent with those identified in the SDAA submitted with the KPDES permit application.

5.5. Reopener Clause

This permit shall be modified, or alternatively revoked and reissued, to comply with any applicable effluent standard or limitation issued or approved in accordance with 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.

5.6. 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.

5.7. Certified Operators

The wastewater treatment plant shall be under the primary responsibility of Class I Wastewater Treatment Plant Certified Operator or higher.

5.8. Outfall Signage

The KPDES permit establishes monitoring points, effluent limitations, and other conditions to address discharges from the permitted facility. In an effort to better document and clarify these locations the permittee should place and maintain a permanent marker at each of the monitoring locations.

5.9 Outfall 005 316(a)

Section 316(a) of the Clean Water Act (CWA) provides for the establishment of an alternate thermal discharge effluent limitation upon the successful demonstration that a more stringent limitation is not required to assure the protection and propagation of a balanced, indigenous community of shellfish, fish, and wildlife in and on the receiving water. Section 5 of 401 KAR 5:080 cites 40 CFR 125 Subpart H, which is the criteria for determining alternative effluent limitations under Section 316(a) of the CWA. Section 4(1)(d)3 of 401 KAR 10:031 states that a successful demonstration under CWA Section 316(a) constitutes compliance with the thermal water quality criteria.

TVA requests continuation of the current alternative thermal limit of 89°F as a calculated, downstream, mixed-river temperature. The submitted report discusses the results of shoreline and river bottom habitat/substrate characterization, reservoir fish assemblage and benthic index scores, and water quality data collected upstream and downstream of the plant with appropriate comparisons to historical data which demonstrate the current limit is protective of the aquatic environment and a balanced, indigenous population is being maintained in the context of the Clean Water Act Section 316(a). Please note that at the time this study was done the facility was operating two once through cooling units. With the shutdown of their two once through cooling units and the estimated maximum blowdown discharge rate is 28.8 million gallons per day which is significantly less than the previous once through cooling water flow rate of 305.7 million gallons per day, and the thermal load to the Green River has been greatly reduced.

In conclusion, TVA requests the continuation of the mixed instream temperature limit opposed to the end of pipe temperature limitation. DOW considers the technical report a successful demonstration that a more stringent limitation is not required, and the established alternate thermal limitation is continued. The permittee shall consult with the DOW Surface Water Permits Branch for guidance concerning future 316(a) demonstrations at least 1.5 years prior to the expiration date of the KPDES permit.

5.10 Outfall 010 316(b) Cooling Water Intake Structure

The permittee shall use this permitting cycle to gather the application materials required within 40 CFR 122.21(r) necessary to establish impingement mortality and entrainment BTA requirements as applicable under 40 CFR 125.94(c) and (d). This information shall be included with the next KPDES permit renewal application for this facility, unless an alternate schedule for the submission of the information required is granted.

5.11 Outfall 103 316(b) Cooling Water Intake Structure

The monitoring requirements for new units at existing facilities under 40 CFR 125.96(d) and (e) for flow, velocity, and visual or remote inspections have been established at outfall 003.

An annual certification statement signed by the responsible corporate officer shall be submitted to the Division starting following year of the effective date of this permit containing the following information.

(1) If the information contained in the previous year's annual certification is still pertinent, you may simply state as such in a letter to the Division

(2) If you have substantially modified operation of any unit at your facility that impacts cooling water withdrawals or operation of your cooling water intake structures, you must provide a summary of those changes in the report. In addition you must submit revisions revised information under 40 CFR 122.21(r) with the next permit application.

Records of all submissions that are part of the permit application and reporting requirements must be retained until the subsequent permit is issued to document compliance.

Nothing in this permit authorizes take for the purpose of a facility's compliance with the Endangered Species Act. Refer to 40 CFR 125.98(b)(1) and (2).

5.12 Polychlorinated Biphenyls

Pursuant to the requirements of 40 CFR Part 423.12(b) (2), 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 section.

5.13 Selective Catalytic Reduction Devices or Systems (SCRs) and Selective Non-Catalytic Reduction Devices or Systems (SNCR)

In response to Clean Air Act amendments and recent EPA rules, 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 is not known. Therefore, should it become necessary to install these devices, the permittee shall develop and implement an Ammonia Monitoring Plan. If such a plan already exists, then the plan should be appropriately modified during each installation of additional SCR or SNCR devices or systems.

5.14 Additional Requirements for Total Recoverable Selenium

The monthly average discharge concentration for total recoverable selenium of 5.0 µg/l is a trigger that once exceeded, requires the permittee to collect and analyze fish tissue for selenium residue.

5.14.1.1 Tissue Collection and Analysis

The following requirements apply:

(1) Collection and analysis shall be performed within the calendar month following the calendar month the 5.0 µg/l monthly average trigger was exceeded;
(2) Fish tissue collection and analysis shall be performed in accordance with the DOW protocols specified in "Methods for the Collection of Selenium Residue in Fish Tissue Used to Determine KPDES Permit Compliance" **http://water.ky.gov/Pages/SurfaceWaterSOP.aspx**;
(3) Results of the analysis shall be reported as Total Recoverable Selenium (Fish Tissue) on the Discharge Monitoring Report (DMR) for the month during which the analysis were performed.

5.14.1.2 Results of Analysis

The results of the fish tissue shall be interpreted as follows:

(1) less than or equal to 8.6 mg/Kg dry weight selenium residue there is no permit violation;
(2) greater than 8.6 mg/Kg dry weight selenium residue there is a permit violation; and
(3) unable to obtain fish tissue, the 5.0 µg/l trigger becomes the effluent limitation and there is a permit violation

5.15. Unpermitted Combustion Residual Leachate

Pursuant to 40 CFR 423.11(r), the term combustion residual leachate ("leachate") means "leachate from landfills or surface impoundments containing combustion residuals. Leachate is composed of liquid, including any suspended or dissolved constituents in the liquid, that has percolated through waste or other materials emplaced in a landfill, or that passes through the surface impoundment's containment structure (*e.g.,* bottom, dikes, berms). Combustion residual leachate includes seepage and/or leakage from a combustion residual landfill or impoundment unit. Combustion residual leachate includes wastewater from landfills and surface impoundments located on non-adjoining property when under the operational control of the permitted facility."

This permit authorizes the discharge of leachate from outfall 018. For newly discovered leachate seeps from a CCR surface impoundment or a CCR landfill, as defined at 40 CFR 257.53, to the surface that discharge or have a potential to discharge to a water of the commonwealth other than through outfall 018, the permittee shall develop and implement a plan to address such surface seeps. The plan shall be included as part of the on-site BMP Plan and shall address, at a minimum, (1) scheduled inspections for identifying surface leachate seeps, (2) maintenance of CCR landfills and/or impoundments to minimize the potential for surface leachate seeps, and (3) corrective measures that will be implemented upon the discovery of a surface leachate seep that is not being controlled by a permitted outfall authorized for discharge of leachate. The permittee shall notify the DOW Surface Water Permits Branch and the appropriate DOW Field Office of planned corrective measures for any identified surface seeps of leachate as soon as feasible after discovery of such a leachate seep, but no later than ten (10) days after the discovery. Such corrective measures may include: (1) plans to reduce or eliminate the leachate seep to the surface; (2) actions to route the surface leachate seep (via a conveyance designed to contain the flow or eliminate the possibility of infiltration) to an outfall permitted to discharge leachate; and (3) combinations of actions to eliminate or, if elimination is not feasible, reduce and control a surface leachate seep and ensure any discharge to a receiving stream is authorized by the permit. Please note that this does not exempt the permittee from 24-hour reporting Section 2.12 of the permit.

SECTION 6

MONITORING AND REPORTING REQUIREMENTS

6.0 MONITORING AND REPORTING REQUIREMENTS

6.1.1 KPDES Outfalls

Discharge samples and measurements shall be collected at the compliance point for each KPDES Outfall identified in this permit. Each sample shall be representative of the volume and nature of the monitored discharge.

6.1.2 Sufficiently Sensitive Analytical Methods

Analytical methods utilized to demonstrate compliance with the effluent limitations established in this permit shall be sufficiently sensitive to detect pollutant levels at or below the required effluent limit, i.e. the Method Minimum Level shall be at or below the effluent limit. In the instance where an EPA-approved method does not exist that has a Method Minimum Level at or below the established effluent limitation, the permittee shall:

(1) Use the method specified in the permit; or

(2) The EPA-approved method with an ML that is nearest to the established effluent limit.

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

6.1.3 Certified Laboratory Requirements

All laboratory analyses and tests required to demonstrate compliance with the conditions of this permit shall be performed by EEC certified general wastewater laboratories.

6.1.4 Submission of DMRs

The completed DMR for each monitoring period must be entered into the DOW approved electronic system no later than midnight on the 28th day of the month following the monitoring period for which monitoring results were obtained.

For more information regarding electronic submittal of DMRs, please visit the Division's website at: http://water.ky.gov/permitting/Pages/netDMRInformation.aspx or contact the DMR Coordinator at (502) 564-3410.

MATTHEW G. BEVIN
GOVERNOR

CHARLES G. SNAVELY
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

ANTHONY R. HATTON
COMMISSIONER

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601

June 14, 2018

Mr. Terry Cheek
Tennessee Valley Authority
1101 Market Street, BR 4A
Chattanooga, TN 37402-2801

Re: KPDES Final Permit Response to Comments
KPDES No.: KY0004201
TVA Paradise
AI ID: 3239
Muhlenberg County, Kentucky

Dear Mr. Cheek:

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 [40 CFR 124.17]. The comments have been briefly described below and our responses to those comments follow:

Comment 1:

The facility has requested the reporting units in the permit be revised to specify consistent units.

Response 1:

The metals in both the fact sheet and permit have been revised so that they all are required to be reported as mg/l.

Comment 2:

The facility has requested updating the facility description in order to make it more clear on what is contributing to each outfall.

Response 2:

The discerption for outfalls 001, 005, 013, 101, 102, and 103 have been updated.

Comment 3:

The facility has pointed out a typographical error on the permit tables 3 and 4 for outfall 001.

Response 3:

This typographical error has been corrected in both the permit and fact sheet.

Comment 4:

The facility has requested the Outfall 005 footnotes for mixed river temperature and instream temperature change be made consistent with the current KPDES permit.

Response 4:

The footnotes for Outfall 005 have been updated in both the fact sheet and permit for this renewal to be consistent with the current KPDES permit.

Comment 5:

Outfall 006 is the older of two metal-cleaning waste treatment ponds and has not received process wastewater in several years. We request the permit allow for discharges consisting of accumulated stormwater only to occur without monitoring.

Response 5:

This is an internal outfall and the ELG monitoring requirements are only applicable when metal cleaning waste is being discharged through this outfall. The pollutants associated with stormwater would only apply at the final outfall. Therefore, the permit and fact sheet have been updated to reflect that the monitoring requirements for Outfalls 006/007 only apply when metal cleaning wastes are being discharged through this internal outfall.

Comment 6:

The facility has requested that the first milestone date for outfall 001 compliance schedule be revised to reflect that the FGD wastewater could be redirected to the new process water basin or cooling water.

Response 6:

The compliance schedule milestone has been updated to reflect that the fact that FGD wastewater could be redirected to either Outfall 002 or Outfall 005.

Comment 7:

The facility has requested adding biological or biological alternative treatment to the treatment type in the fact sheet for Outfall 021 since this will likely be required for compliance with the wet FGD limitations that are proposed.

Response 7:

The treatment type description for Outfall 021 has been updated.

Comment 8:

There is some inconstancy with the no discharge of pollutants in fly ash transport applicability date stated in the fact sheet, compliance schedule, and permit. The conversion to dry handling is tied to the unit outage schedules which are not set in stone. Due to the uncertainty of the schedule, we request the July 1, 2019 date be specified in the permit

Response 8:

The July 1, 2019 is the date required to convert to a dry handling system specified in the permit compliance schedule for outfall 001. This date is earlier than the listed compliance date of December 1, 2023 in the permit effluent limitations and monitoring requirements section for outfall 001. Therefore, the permit and fact sheet have been updated to reflect show that the compliance date for no discharge of pollutants in fly ash transport is July 1, 2019.

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 Energy and Environment Cabinet, Office of Administrative Hearings, 35-36 Fountain Place, Frankfort, Kentucky 40601 and the Commonwealth of Kentucky, Energy and Environment Cabinet, Division of Water, 200 Fair Oaks Lane, 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 the Surface Water Permits Branch, at (502) 564-3410 or **SWPBSupport@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,

Sara J Anderson

Peter T. Goodmann, Director

Division of Water

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

						# of Occurrences				
County	**Taxonomic Group**	**Scientific name**	**Common name**	**Statuses**	**Ranks**	**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**