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April 4, 2018

Tennessee Valley Authority
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**Engineer's Certification of Wetlands Demonstration
New CCR Landfill
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 New CCR Landfill is in compliance with the Wetlands location requirements specified in the Final CCR Rule at 40 CFR §257.61. Presented below is the project background, summary of findings, limitations and certification.

2.0 BACKGROUND

As required by 40 CFR §257.61 of the EPA Final CCR Rule, the owner or operator of a new landfill 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 § 257.64(d)(2), the owner or operator of a new CCR landfill must complete the wetlands location demonstration no later than the date of the initial receipt of CCR in the new CCR landfill.

3.0 SUMMARY OF FINDINGS

In accordance with §257.61(a), the proposed landfill area complies with all required state and federal programs, including the Clean Water Act (CWA) and Kentucky Pollutant Discharge Elimination System (KPDES). Moreover, in combination of field surveys and delineations performed, no known threatened and endangered (T&E) species have been noted within the site. The footprint of the site was chosen in order to minimize impacts to wetlands. Mitigation measures as determined in consultation with the USACE will be implemented.

According to County Report of Endangered, Threatened, Proposed & Candidate Species in Muhlenberg County, Kentucky, there are no known aquatic and/or marine mammals present within Muhlenberg County that are listed in the Marine Mammal Protection Act. The wetland study determined the wetland soils do not pose erosion stability or migration concern, and landfill construction and operation are not expected to result in any substantial impacts to populations of wildlife species. The proposed landfill is not anticipated to have significant effects on the surrounding environment from a catastrophic release, based on the factors of safety demonstrated in the geotechnical evaluation of the proposed unit.



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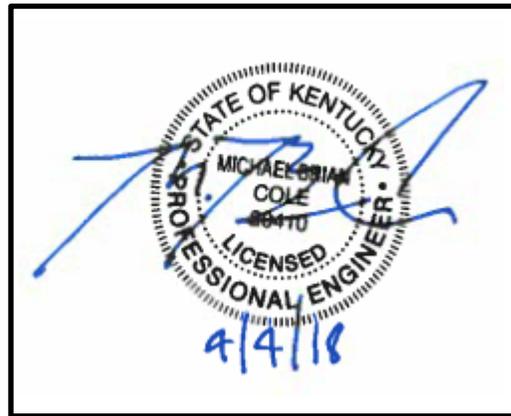
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4.0 CERTIFICATION

I, Michael Brian Cole, being a Registered Professional Engineer in good standing in the State of Kentucky, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering and that the information contained herein is accurate as of the date of my signature below. I certify, for the above-referenced CCR Unit, that Wetlands Demonstration for CCR dated April 4, 2018 meets the requirements of 40 CFR § 257.61(a).

M. Brian Cole
Printed Name

4/4/18
Date



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ATTACHMENTS: Wetlands Demonstration for CCR - New CCR Landfill

COAL COMBUSTION PRODUCT DISPOSAL PROGRAM

**TENNESSEE VALLEY AUTHORITY – PARADISE FOSSIL PLANT
NEW CCR LANDFILL
DRAKESBORO, KENTUCKY**

**WETLANDS DEMONSTRATION FOR
COAL COMBUSTION RESIDUALS (CCR)
NEW CCR LANDFILL**

Prepared for



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

April 4, 2018 – Rev 0

Prepared by
AECOM



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1.0 INTRODUCTION

1.1 OBJECTIVE

The purpose of this demonstration is to document compliance with 40 CFR §257.61 of the Environmental Protection Agency Final Coal Combustion Residual (CCR) 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 new proposed CCR landfill at the Tennessee Valley Authority (TVA) Paradise Fossil Plant (PAF).

1.2 RULE REQUIREMENTS

According to 40 CFR §257.61(a) of the EPA Final CCR Rule, any new CCR landfills, existing, and new CCR surface impoundments, and all lateral expansions of CCR units must not be located in wetlands, as defined in 40 CFR §232.2, unless the owner or operator demonstrates by the dates specified in 40 CFR §257.61(c) that the CCR unit meets the requirements of paragraphs 40 CFR §257.61(a)(1) through (a)(5). The written demonstration must include, at a minimum, the information specified in paragraphs (a)(1) through (5) of this section.

- (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.
- (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; and
 - (iv) A violation of any requirement under the Marine Protection, Research, and Sanctuaries Act of 1972 of the protection of a marine sanctuary.
- (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;
 - (iii) The volume and chemical nature of the CCR;
 - (iv) Impacts on fish, wildlife, and other aquatic resources and their habitat from release of CCR;
 - (v) The potential effects of catastrophic release of CCR to the wetland and the resulting impacts on the environment; and
 - (vi) Any additional factors, as necessary, to demonstrate that ecological resources in the wetland are sufficiently protected.
- (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 (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 impacts through all appropriate and reasonable compensatory mitigation actions. (e.g., restoration of existing degraded wetlands or creation of man-made wetlands).

- (5) Sufficient information is available to make a reasonable determination with respect to paragraphs (a)(1) through (4).

1.3 SITE BACKGROUND

TVA owns and operates the PAF which is located at 13246 KY 176 near Drakesboro in Muhlenberg County, Kentucky. The plant is located along the southwestern side of the Green River along State Route 176, and Riverside Road borders the proposed site to the west. The proposed new CCR landfill is approximately 80 acres and is located near the southeast corner of the power plant.

As part of a comprehensive disposal plan, when constructed, the CCR disposal facility will provide long-term disposal capacity for dry CCR materials (fly ash, boiler slag, and gypsum) produced by TVA's PAF. The new CCR facility will provide approximately 34 years of disposal capacity based on current energy production and coal consumption rates estimated by TVA. (See **Figure 1**)

The total fill area encompassed by the limits of waste placement is 80 acres. The disposal facility will be developed in eight construction cells, denoted as Cells 1A, 1B, 2A, 2B, 3A, 3B, 4A and 4B. The total construction disturbance area for the project is estimated to be approximately 120 acres.



Figure 1: PAF Landfill Site Location

1.4 SITE HISTORY

PAF is located in western Kentucky, approximately six miles northeast of Drakesboro in Muhlenberg County, and is situated along the west bank of the Green River. The plant has been in operation since the early 1960s, and currently consists of one coal-fired electric generating unit, producing a net 400,000 cubic yards of CCR for landfill disposal per year after accounting for beneficial use of boiler slag. Units 1 and 2 were retired in 2017.

Much of the plant property and adjacent parcels has been mined using deep and surface methods from the 1960s through the 1980s. Some of the large surface impoundments located on PAF are relics of mining operations. The mining activity complicates many of the potential landfill sites around the plant.

CCR generated by the operating units at PAF is currently managed by sluicing it to the Gypsum Stack, Peabody Pond, and boiler slag impoundments.

The Site and surrounding property are underlain by coal rich Pennsylvanian age bedrock formations. Extensive underground and strip mining operations across the area occurred between the 1960s through the 1980s, which significantly altered the topography and geology within the vicinity of the plant. As such, large areas of the property are underlain by thick mine spoil deposits consisting of a heterogeneous mix of excavated soil, coal, shale, and sandstone bedrock materials. Historical mining maps indicate relict room and pillar structures across the Site from mining of Kentucky Coal Seam #9.



Depth to bedrock is reportedly variable and may be a few feet to approximately 100 feet below ground surface. Average depth to bedrock, as determined from previous geotechnical investigations is reportedly 50 feet. Depth to ground water in the residual soils would likely be coincident with the soil bedrock interface. Groundwater content within the bedrock units would be dependent on secondary porosity features. Depth to Seam #9 in the area is on the order of 100 to 175 feet.

The proposed landfill has been designed to contain a volume of 13.6 million cubic yards of CCR. The landfill will occupy 80 acres on the site south of the cooling towers, east of Riverside Road, and north of Jacobs Creek. The landfill will be constructed and filled in stages.

2.0 ASSESSMENT OF SITE WETLANDS

2.1 LOCATION AND CONDITION OF WETLANDS

Wetlands identified on National Wetland Inventory (NWI) maps within the area of various upcoming projects at the plant included a total of 91.8 acres of freshwater ponds and lakes (including man-made impoundments) and 13.22 acres of forested wetlands. The majority of the acreage was associated with the ash impoundments. A wetlands delineation identified a total of 1.9 acres of jurisdictional and non-jurisdictional wetlands within the proposed landfill impact area. A summary of the jurisdictional wetlands is provided in **Table 1**. Land use/land cover data shows that wetlands comprise less than 3 percent of the land use within the PAF reservation and less than 5 percent (4,564 acres of emergent herbaceous and woody wetlands) of the lands within the surrounding 5-mile radius. Field delineation efforts to describe the present state of the jurisdictional wetlands within the proposed landfill impact area are discussed below.

Table 1: Jurisdictional Wetlands within the Limits of Disturbance

Site Number	Wetland Type	Impact Type	Impact Area
W-2	Palustrine emergent / Palustrine forested	Fill	0.59
W-11	Palustrine emergent	Fill	0.50
W-14	Palustrine emergent	Fill	0.21
W-15	Palustrine emergent	Fill	0.19
		Total:	1.49

2.2 IMPACTS

As shown in **Table 1**, a total of 1.49 acres of jurisdictional wetlands were identified within the proposed limits of disturbance for the new CCR landfill project. A 404 permit from the US Army Corps of Engineers (USACE) is pending. Wetlands are shown in **Figure 2**.

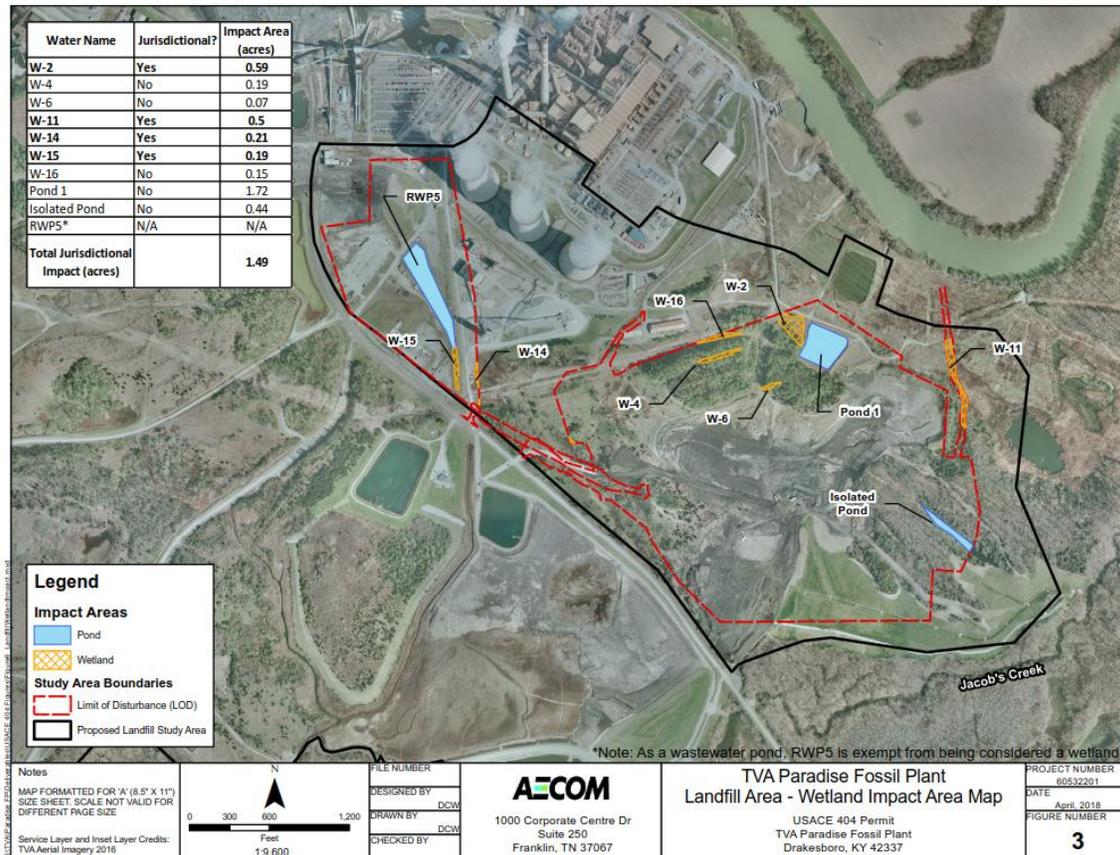


Figure 2: Environmental Features Proposed Landfill

2.2.1 40 CFR §257.61(A)(1) – LOCATION ALTERNATIVES

Per Rule 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 footprint of the site was chosen in order to minimize impacts to wetlands. Construction, operation, and maintenance of the proposed landfill would impact a total of approximately 1.49 acres of jurisdictional wetlands (approximately 0.9 acres of Palustrine emergent wetlands and approximately 0.59 acres of Palustrine emergent / Palustrine forested wetlands). However, effects of impacts to these areas are minor and would be mitigated by appropriate compensation in accordance with pending requirements of the permit to be issued by USACE. Potential indirect impacts resulting from construction activities could include erosion and sedimentation from storm water runoff during construction into offsite or nearby wetlands; but Best Management Practices (BMPs) will be implemented to minimize this potential.



2.2.2 40 CFR §257.61(A)(2) – CONSTRUCTION AND OPERATION

(i) Applicable Water Quality Standards

In accordance with the EPA CCR Rule, all applicable units 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 and the proposed landfill design, the proposed landfill will comply with all required state and federal programs, including the Clean Water Act (CWA) and Kentucky Pollutant Discharge Elimination System (KPDES).

(ii) Applicable Effluent Limitations

TVA is required under KPDES Permit No. KY0004201 to meet pH, total suspended solids, oil and grease, and chronic whole effluent toxicity limits prior to discharge. The KPDES permit also requires monitoring for a series of total recoverable metals including antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc (KPDES 2004).

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 include weekly and annual landfill inspections, as required by 40 CFR §257.84. In addition, informal inspections may be performed by operations and maintenance personnel.

(iii) Endangered Species

In accordance with 40 CFR §257.61(a)(2)(iii), the owner or operator must ensure that the new landfill 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. According to the Kentucky State Nature Preserves Commission (KSNPC), 61 species of conservation concern (including vascular plants) occur in Muhlenberg County (KSNPC 2016). A review of the TVA Regional Natural Heritage database indicated that no state-listed or federally listed plant species or associated designated critical habitat are known to occur on or within 5 miles of PAF. Review of the USFWS Information for Planning and Conservation (IPaC) website identified one additional federally listed species, the northern long-eared bat (*Myotis septentrionalis*), that could potentially occur in the area.

PAF began operation in the 1950s, prior to the establishment of the Endangered Species Act of 1973. In combination of field surveys and delineations performed, no known threatened and endangered (T&E) species have been noted within the PAF site and therefore are not jeopardized by the proposed landfill.

(iv) Marine Protection Act

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 County Report of 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. Additionally, based on the definition of “marine” as set forth in 15 CFR § 922.3, the proposed landfill site does not include any marine sanctuaries and therefore this requirement is not applicable.

2.2.3 40 CFR §257.61(A)(3) – POTENTIAL FOR SIGNIFICANT DEGRADATION

(i) Erosion Stability and Migration Potential of Wetland Soils

The wetland study determined the wetland soils, and muds and deposits used to support the proposed landfill do not pose an erosion stability or migration concern.

(ii) Erosion Stability and Migration Potential of Dredge/Fill

No dredging is proposed in conjunction with the new CCR landfill at Paradise Fossil Plant.

(iii) CCR Volume and Chemical Nature

The landfill is designed to accommodate about 15 million cubic yards of CCR (fly ash, bottom ash, and gypsum). Previous chemical testing of this CCR material has been conducted. The landfill includes a bottom liner system which is designed to contain CCR and leachate.

(iv) Fish and Wildlife Impacts

Following the construction phase and during operation of the landfill, wildlife use of the proposed landfill would be limited; however, some scattered herbaceous areas could develop and could be used by grassland species or species adapted to disturbed areas. The proposed project is not expected to result in any substantial impacts to populations of wildlife species.

(v) Environmental Impacts

Based on the Geotechnical Site Evaluation, Proposed CCR Landfill, performed by AECOM in 2017 shows no erosion or migration potential. The Safety Factor Assessment results are greater than or equal to the required safety factors indicating the proposed landfill is structurally safe.

The factor of safety for the post-earthquake slope stability condition was 1.81 for the cross-sections analyzed. This factor of safety is well above the target value of 1.20, and indicates the landfill will be stable in the event of the design earthquake.

(vi) Additional Factors

This CCR unit 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.

2.2.4 40 CFR §257.61(A)(4) – WETLAND MITIGATION

A 404 permit from USACE is pending, and will be secured prior to commencing construction of the landfill liner. A copy of the water quality certification from the Kentucky Division of Water can be found in the reference section.



3.0 CONCLUSIONS

The purpose of this report is to document that the requirements in 40 Code of Federal Regulations (CFR) §257.61(a) have been met to support certification for the new CCR landfill unit at TVA Paradise Fossil Plant prior to placement of CCR. These regulations require the owner or operator to obtain certification from a qualified professional engineer stating that the demonstration meets the specified wetlands requirements of the CCR Rule prior to placing CCR in the landfill.

In accordance with §257.61(a) the proposed landfill area complies with all required state and federal programs, including the Clean Water Act (CWA), and Kentucky Pollutant Discharge Elimination System (KPDES). Moreover, in combination of field surveys and delineations performed, no known threatened and endangered (T&E) species have been noted within the site. Also, according to County Report of Endangered, Threatened, Proposed & Candidate Species in Muhlenberg County, Kentucky, there are no known aquatic and/or marine mammals present within Muhlenberg County that are listed in the Marine Mammal Protection Act. The wetland study determined the wetland soils do not pose erosion stability or migration concern and landfill construction and operation are not expected to result in any substantial impacts to populations of wildlife species. The proposed landfill is not anticipated to have significant effects on the surrounding environment from a catastrophic release, based on stability analyses. The footprint of the site was chosen in order to minimize impacts to wetlands. Mitigation measures as determined in consultation with the USACE will be implemented.

Based on this assessment, the proposed new landfill located at PAF meets the requirements of § 257.61 of the EPA Final CCR Rule.



4.0 REFERENCES

- Tennessee Valley Authority (2017). Paradise CCR Management Operations Environmental Assessment, Muhlenberg County, Kentucky.
- AECOM (2017). Hydrogeologic Characterization Report Proposed CCR Landfill Siting Study, Prepared for Tennessee Valley Authority.
- AECOM (2017). Geotechnical Site Evaluation Proposed CCR Landfill, Prepared for Tennessee Valley Authority.
- EPA (2015) Final Coal Combustion Residuals (CCR) Rules: Federal Register/ Vol. 80/ No. 74 /Part II. Hazardous and Solid Waste Management System; Disposal of Coal
- U.S. Department of the Interior, Fish and Wildlife Service (2016c). National Wetlands Inventory Web site., Washington, D.C. Retrieved from <http://www.fws.gov/wetlands>
- Water Quality Certification # 2017-052-2, TVA Tennessee Valley Authority (TVA) – Paradise; AI No.: 127687; Activity ID: APE20170001; USACE ID No.: LRL-2017-104; Wetlands of the Green River Basin; Muhlenberg County, Kentucky.
- Report of Endangered, Threatened, and Special Concern Plants, Animals, and Natural Communities for Muhlenberg County, Kentucky, Kentucky State Nature Preserves Commission, Data current as of January 2016.