Stantec Consulting Services Inc.
3052 Beaumont Centre Circle, Lexington KY 40513

October 12, 2018
File: rpt_005_let_175567307
Revision 0

Tennessee Valley Authority
1101 Market Street
Chattanooga, Tennessee 37402

RE: Wetlands
Stilling Pond (including Retention Pond)
EPA Final Coal Combustion Residuals (CCR) Rule
TVA Cumberland Fossil Plant
Cumberland City, Tennessee

1.0 PURPOSE

As described in 40 CFR § 257.61(a), an owner or operator of an existing CCR surface impoundment is required to demonstrate that the unit is not located in wetlands unless the unit meets certain requirements. This letter documents Stantec's certification that the Stilling Pond (including Retention Pond) at the TVA Cumberland Fossil Plant (CUF) complies with the location restrictions for wetlands in the EPA Final CCR Rule at 40 CFR § 257.61(a).

2.0 SUMMARY OF FINDINGS

The attached demonstration documents that the Stilling Pond (including Retention Pond) meets the requirements set forth in 40 CFR § 257.61(a).

3.0 QUALIFIED PROFESSIONAL ENGINEER CERTIFICATION

I, Stephen H. Bickel, being a Professional Engineer in good standing in the State of Tennessee, do hereby certify, to the best of my knowledge, information, and belief:

1. that the information contained in this certification is prepared in accordance with the accepted practice of engineering;

2. that the information contained herein is accurate as of the date of my signature below; and

3. that the TVA Cumberland Stilling Pond (including Retention Pond) meets the requirements specified in 40 CFR § 257.61(a).

RE: **Wetlands**
Stilling Pond (including Retention Pond)
EPA Final Coal Combustion Residuals (CCR) Rule
TVA Cumberland Fossil Plant
Cumberland City, Tennessee

SIGNATURE _____ DATE 10/12/2018

ADDRESS: Stantec Consulting Services Inc.
10509 Timberwood Circle Suite 100
Louisville, Kentucky 40223

TELEPHONE: (502) 212-5075

ATTACHMENTS: Wetlands Location Demonstration Report

Wetland Demonstration

Stilling Pond (including Retention Pond)
Cumberland Fossil Plant
Cumberland City, Stewart County, Tennessee

Prepared for:
Tennessee Valley Authority

Prepared by:
Stantec Consulting Services, Inc.

October 12, 2018
Revision 0

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APPENDIX B TVA DOCUMENTATION

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List of Acronyms

ARAP – Aquatic Resources Alteration Permit
CCR – coal combustion residuals
CUF – Cumberland Fossil Plant
CWA – Clean Water Act
DMR – Discharge Monitoring Report
EAP – Emergency Action Plan
ECHO – Enforcement and Compliance History Online
EPA – US Environmental Protection Agency
ESA – Endangered Species Act
FAC – Facultative Plants
FACU – Facultative Upland Plants
FACW – Facultative Wetland Plants
FEMA – Federal Emergency Management Agency
IPaC – Information for Planning and Consultation
MGD – million gallons per day
NPDES – National Pollutant Discharge Elimination System
NRCS – Natural Resource Conservation Service
NWI – National Wetlands Inventory
OBL- Obligate Wetland Plants
OHW – Ordinary High Water
RCP – reinforced concrete pipe
RCRA – Resource Conservation and Recovery Act
SSURGO – Soil Survey Geographic Database
TDEC – Tennessee Division of Environment and Conservation
TPY – tons per year
TVA – Tennessee Valley Authority
USCS – Unified Soil Classification System
UPL – Upland Plants
USACE – US Army Corps of Engineers
USDA – United States Department of Agriculture
USFWS – US Fish and Wildlife Service
USGS – US Geological Survey

1.0 BACKGROUND

1.1 PURPOSE

On April 17, 2015, EPA published the "Disposal of Coal Combustion Residuals (CCR) from Electric Utilities" final rule in the Federal Register. The Tennessee Valley Authority (TVA) contracted Stantec Consulting Services Inc. (Stantec) to evaluate the Stilling Pond (including Retention Pond) at the Cumberland Fossil Plant (CUF) regarding the requirements for the Wetlands Location Restriction as required by the EPA Final CCR Rule, 40 C.F.R. §257.61.

1.2 OUTLINE OF RULE REQUIREMENTS

Section 257.61(a) of the EPA Final CCR Rule states that new landfills, existing and new surface impoundments, and lateral expansions of CCR units must not be located in wetlands unless the owner/operator can demonstrate that the CCR unit meets the requirements of § 257.61(a)(1) through (a)(5). For the purpose of this report, the existing CCR surface impoundment being assessed at SHF is referred to as the "CCR Unit" or "Ash Pond 2". The wetlands location restriction does not apply to existing CCR landfills.

Wetlands are defined under Section 404 of the Clean Water Act (CWA) as:

> *Areas that are inundated or saturated by surface or ground water 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.*

For purposes of existing CCR surface impoundments, the most reasonable interpretation of "located in wetlands" means adjacent to wetlands.

- *Adjacent wetlands include those that could be inundated by a breach of the CCR Unit.*
- *The definition of a wetland in 40 C.F.R. §232.2 includes both jurisdictional and non-jurisdictional wetlands.*

If the CCR Unit contributes to significant degradation of wetlands, the facility can comply with the location criterion by compensatory steps that must be taken to achieve no net loss of wetlands. The demonstration should evaluate and address the following items to determine impacts for existing impoundments:

i. Applicable Water Quality Standards

ii. Clean Water Act

iii. Endangered Species Act

iv. Marine Protection Act

v. Erosion, Stability, and Migration Potential

vi. CCR Volume and Chemical Nature

vii. Wildlife Impacts

viii. Potential Effects from Catastrophic Release

ix. Additional factors, as necessary

1.3 SITE DESCRIPTION

CUF is located in Cumberland City, Stewart County, Tennessee. The facility lies on the south bank of the Cumberland River, near mile mark 103, and is about 22 miles southwest of Clarksville, Tennessee. Figure 1 shows an overview map of CUF including its facilities and CCR disposal areas.

Construction of CUF commenced in 1968, the active ash disposal area was constructed in 1969, and the facility began operations in 1973. Wells Creek was relocated to construct what was initially named Disposal Area 1. Consequently, current portions of the Ash Stilling Pond (including Retention Pond) and Dry Ash Stack are sited over the original location of Wells Creek. The footprint of Disposal Area 1 now resides within the perimeter dikes that include the current Ash Stilling Pond (including Retention Pond), Dry Ash Stack, and Gypsum Storage Area. Note that, historically, the Retention Pond has also been referred to as the Main Ash Pond, and some documents reviewed as part of this analysis also use this naming convention. The Separation Dike (partially separating the Ash Stilling Pond and Retention Pond) was constructed of ash in 1977. In 1979, the dikes around the Ash Stilling Pond (including Retention Pond) were built to an elevation of 395 feet with clay. Current configuration was completed when the Dry Ash Stack Divider Dike (between the Retention Pond and Dry Ash Stack) was constructed throughout 1995-1996 (Stantec 2015). The CCR Unit encompasses an area of 54.6 acres.

Historically, the CCR Unit received sluice water from the Bottom Ash Pond. The CCR Unit no longer directly receives CCR materials, but two 72-inch concrete inlet pipes discharge process water from the Bottom Ash Pond to the Retention Pond. Water discharges under a skimmer in the northern-most point of the Retention Pond into the Ash Stilling Pond. Treatment of CCR-containing-effluent occurs over the Ash Stilling

Pond, where ash and other solids remain. Discharge from the Ash Stilling Pond flows to Outfall IMP 001 (EPA ID TN3640015415) into the Condensing Cooling Water Discharge Channel, which empties into the Cumberland River (Lake Barkley). An average of 21.73 million gallons per day (MGD) are discharged to surface water from this outfall (TVA 2016). Outfall IMP 001 consists of four 48-inch reinforced concrete pipe (RCP) riser pipe/weirs, which discharge through four 36-inch RCP sections (Stantec 2015). These outfalls, and others, are managed in accordance with the National Pollutant Discharge Elimination System (NPDES) Permit No. TN0005789 issued by the Tennessee Department of Environment and Conservation (TDEC), Division of Water Resources.

WETLAND DEMONSTRATION – CUF STILLING POND (INCLUDING RETENTION POND)

Background
October 12, 2018

Figure 1. Site Overview

Figure No.
1
DRAFT

Title
Site Map

Client/Project
Tennessee Valley Authority
Cumberland Fossil Plant

Project Location
Stewart County, Tennessee

175566329
Prepared by MW on 2018-04-24
Technical Review by JG on 2018-04-24

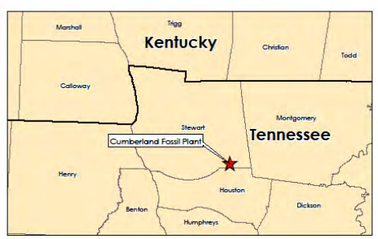
0 300 600 900 1,200 Feet
1:3,600 (At original document size of 22x34)

Legend

CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1927 StatePlane Tennessee FIPS 4100
2. Imagery Provided by Tuck Mapping (c. 2017) and ESRI Basemap (NAIP c .2016)



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1.4 DATA SOURCES

This section summarizes available data used to assess conditions at the site of the CCR Unit and determine the likelihood of the unit being sited adjacent to a wetland. TVA has provided wetland delineations. Maps showing the available spatial data for the site inundation area are included in Appendix A.

1.4.1 Issued Permits

The CCR disposal facilities at CUF are currently operated under NPDES Permit TN0005789 (TVA 2016b) and TDEC, Division of Solid Waste Management Class II Landfill Permit No. IDL81-0000086. TDEC Dataviewer (2018) was used to identify all currently held permits for CUF and are summarized in Table 1.

Table 1. Summary of Identified Permits

Permit Type and Issuing Agency	Permit Number	Date Issued	Unit(s) or Actions Permitted
TDEC NPDES	TN0005789	January 1, 2008	Authorized to discharge into Cumberland River at Cumberland River Mile 103 the following wastewaters: ash transport water, treated chemical and nonchemical metal cleaning wastewaters, coal pile runoff, low volume wastes, and storm water runoff through Outfall IMP 001, once through condenser cooling water, miscellaneous equipment cooling and lubricating water, and storm water through Outfall 002, intake screen backwash water through Outfall 004, and chemical and nonchemical metal cleaning wastewaters through Outfall 007; operation of Cooling Water Intake Structure
TDEC Aquatic Resource Alteration Permit (ARAP)	NRS17.221	July 27, 2017	Bank Stabilization of Wells Creek and eliminate intermittent flow through the bank with a clay lined, reverse grade filter
TDEC ARAP	NRS15.241	August 18 2015	Mooring Cell Restoration Project at Barkley Lake

Permit Type and Issuing Agency	Permit Number	Date Issued	Unit(s) or Actions Permitted
TDEC ARAP	NRS13.088	May 31, 2013	Bank Stabilization - Fly Ash and Gypsum Barge Loading Areas Dredging Project at Barkley Reservoir
TDEC ARAP	NRS12.241	March 12, 2013	Dredging Project and Maintenance Activities at Cumberland River - Fly Ash and Gypsum Barge Loading Areas
TDEC NPDES Stormwater Multi-Sector Permit	TNR05133	April 15, 2015	Authorized to discharge stormwater associated with industrial activity at Outfalls F01, F02, F05, 008, F11, and F12 into the Cumberland River
TDEC Construction General Permit	TNR191532	January 25, 2016	Construction of a bypass route for ash trucks to reduce congestion at the main gate
TDEC Construction General Permit	TNR191665	July 26, 2017	Construction of a bypass route for ash trucks to reduce congestion at the main gate
Class II Landfill, TDEC, Division of Solid Waste Management	IDL81-0000086	September 18, 1996	Authorized to dispose of ash from the combustion of coal, gypsum from the scrubbing of Sulphur dioxide emissions, and gypsum from the refining of zinc
Title V-Major Source Operating Permit, Tennessee Air Pollution Control Division	562460	June 25, 2015	Required of facilities with potential to emit 20 tons per year (TPY) of any hazardous air pollutant (HAP), 25 TPY of any combination of HAPs, or 100 TPY of any regulated air pollutant

1.4.2 TVA Documentation

In the development of this document, Stantec has reviewed reports, data, tables, plans, maps, etc. that have been provided by TVA or prepared by Stantec regarding the Cumberland Facility, and especially pertaining to the CCR Unit. Relevant resources are cited within the document and summarized in Appendix B.

1.4.3 Publicly Available Data

Data available to the public was collected and reviewed for information pertaining to site conditions at the CUF facility. Available data included the following:

- National Wetlands Inventory (NWI) maps produced by the United States Fish and Wildlife Service (USFWS) (USFWS 2015a) were created in this area using photointerpretation of imagery from 1983. Spatial data showing the location and extent of mapped wetlands was reviewed for the area surrounding the CUF plant.

- Cumberland River Navigation Charts from the US Army Corps of Engineers (USACE 2013) show the ordinary high water (OHW) mark and pool elevations for the project site. Near Cumberland River Mile 103, the OHW elevation is 381.0 ft. The pool elevation is 359.0 ft.

- Natural Resources Conservation Service (NRCS) (USDA-NRCS 2017) soil survey data provides information on hydric soils adjacent to the CCR Unit.

- Federal Emergency Management Agency (FEMA) (FEMA 2010) floodplain information was reviewed to determine the annual percentage chance flood area in which the CCR Unit and surrounding areas fall.

- U.S. Geological Survey (USGS) Topographic Quadrangles were reviewed for surface water features and relevant structures (2016).

- Historic Topographic Maps (USGS 1965, 1983) were reviewed and provided supporting information for wetland conclusions.

- Historic Aerial Maps (1977, 1987, 1999, 2099, and 2011, Stantec 2016a) were reviewed and provide supporting information for wetland conclusions.

- The EPA's Enforcement and Compliance History Online (ECHO) (USEPA 2018) database was consulted to provide background information regarding water quality discharge compliance with issued NPDES permits.

- Section 303(d) CWA Report (TDEC 2017) provides an assessment of water quality of surface waters in the State. Waters receiving discharge from the CUF are impaired for industrial thermal discharges based on this report.

- USFWS's website (Information for Planning and Conservation (IPAC) data and county lists) was accessed to determine federally threatened and endangered species that may be impacted by the CCR Unit (USFWS 2015b). The lists provided by this information are not considered official USFWS correspondence for Endangered Species Act (ESA) consultation purposes. Additional coordination with USFWS, outside the scope of this document, would be required to obtain official lists of species that may be impacted by the CCR Unit.

2.0 ASSESSMENT OF SITE WETLANDS

Areas on and adjacent to CUF were first assessed for the presence of wetlands by desktop review, using aerial photography, USFWS National Wetland Inventory (USFWS 2015a), publicly available geospatial data (USDA-NRCS 2017), and FEMA floodplain data (2011). Confirmation of remote findings was conducted during onsite reconnaissance.

The 1987 USACE Delineation Manual defines wetlands as areas exhibiting the following general environmental characteristics: 1. Hydric soils; 2. Wetland Hydrology; and 3. Hydrophytic Vegetation.

Initially, Stantec reviewed available data for the presence or absence of wetlands adjacent to the CCR Unit. No information was discovered during the review to suggest that wetlands have been delineated within the area adjacent to the Unit. In the absence of on-site delineations, the desktop analysis used other historic and current data to determine the potential for wetlands. After desktop analysis, a site reconnaissance (Stantec 2017a) was conducted to help determine if wetland indicators were in fact located within the study area as suggested by the desktop analysis. The data review and subsequent site reconnaissance indicated the likely presence of wetlands adjacent to the CCR Unit**.** The evidence supporting the presence and estimated extent of wetlands is outlined in the following sections. It should be noted that the Breach Inundation Analysis (Stantec 2017c) was performed after the site reconnaissance; therefore, the entirety of the potential release area was not assessed in the field.

2.1 LOCATION AND CONDITION OF WETLANDS

2.1.1 Desktop Assessment

For a preliminary assessment of existing wetlands that could potentially be inundated by a breach of the CCR Unit, the potential breach inundation area associated with the Unit was investigated. These wetlands were identified through review of NWI data and the presence of wetland indicators were confirmed through site reconnaissance. The wetlands described do not include obvious non-wetland waterbodies identified in NWI data such as the ash impoundment itself, other engineered impoundments on site, or the impounded Cumberland River (variously identified as *Lake* or *Freshwater Pond).*

A review of current aerial photography clearly shows existing open water to the southwest of CUF, likely associated with Wells Creek. Backwater areas with open water as well as visible algal blooms occur directly to the south of CUF. A review of publicly available geospatial data provides supporting data for this wetland identification. Hydric Melvin silt loam soils (18.77 acres) were identified within the potential breach inundation area from the NRCS soil survey (USDA-NRCS 2017).

While this alone does not indicate the presence of wetlands, it does indicate that the hydrology for development of wetlands may exist in areas surrounding the Stilling Pond (including Retention Pond).

The CCR Unit is not within a mapped FEMA floodplain (FEMA 2010). Areas immediately adjacent to the Cumberland River and Wells Creek are included in the 1% annual chance floodplain which indicates that hydrology may be sufficient to support wetlands. In the unlikely event of an accidental breach, the potential breach inundation zone would also include some of these areas, thereby possibly affecting wetlands (Stantec 2017c).

NWI wetlands were examined to determine the proximity of potential wetlands to the current CCR Unit. See Figure 2 below for all mapped NWI wetlands within the Potential Inundation Area as defined by the breach analysis (Appendix A).

Total NWI identified wetlands within the potential breach inundation area encompassed roughly 50 acres, roughly 16% of the potential inundation area, as defined in the sunny day breach analysis (Appendix A). Hydric soils were identified using the Soil Survey Geographic Database (SSURGO) soils downloader and encompassed 18.77 acres of the area adjacent to Ash Stilling Pond (2016).

Potential wetlands within the breach inundation area as defined within the TVA Cumberland Fossil Plant Main Ash and Ash Stilling Pond Breach Analysis for Wetland Determination memo (Stantec 2017c) are shown in Figure 2 below and are described in the following bulleted list.

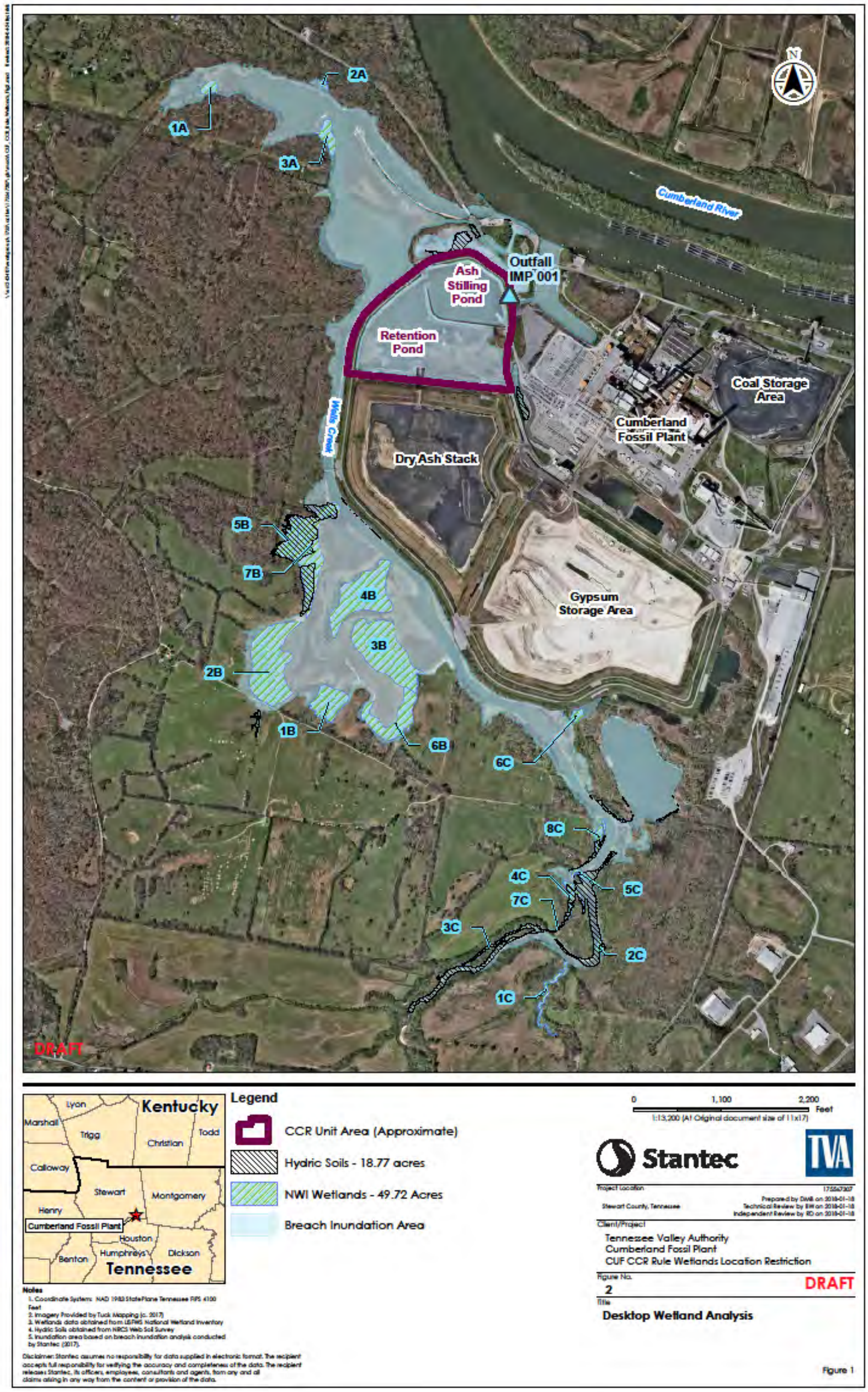
CUF contains 18 NWI documented wetlands totaling roughly 50 acres. Due to the small size of the majority of these wetlands, the project site was broken into 3 larger areas (A, B, and C) and the wetlands were categorized as sub wetlands. Area A is the northern half of the inundation area. Area B consist of the wetlands adjacent to the dry stack area and the gypsum storage area. Area C contains the wetlands below the gypsum storage area. The breakdown of these areas and wetlands is as follows.

- Area A: contains three small sub wetlands identified from NWI data, for a total of 2.06 acres. Wetland 1a consist of .67 acres of Freshwater Emergent Wetland. Wetlands 2a and 3a are Freshwater Forested/Shrub Wetlands. The acreage for these wetlands are 0.19 acres and 1.20 acres, respectively.

- Area B: contains seven sub wetlands identified from NWI data. Wetlands 1b-5b consist of 32.56 acres of Freshwater Forested/Shrub Wetland. Wetland 6b consist of 4.16 acres of Freshwater Forested/Shrub Wetland and Wetland 7b consist of 7.25 acres of Freshwater Forested/Shrub Wetland.

- Area C: contains eight small sub wetlands identified from the NWI data, for a total of 4.16 acres. Wetland 1c-3c are Freshwater Forested/Shrub Wetlands and consist of 1.76 acres. Wetlands 4c-5c are Freshwater Forested/Shrub Wetlands and consist of 1.20 acres. Wetlands 6c, 7c, and 8c are Freshwater Forested/Shrub Wetlands. The acreage for these wetlands are 0.47 acres, 0.08 acres, and 0.65 acres, respectively.

Figure 2. CCR Wetlands Demonstration Desktop Assessment



2.1.2 Field Reconnaissance

A preliminary site assessment of the potential wetlands in a quarter mile buffer surrounding the CCR Unit was conducted by Stantec staff on August 15, 2017 to identify if indicators of wetlands are present adjacent to the CCR Unit (Stantec 2017a). Potential wetland areas are identified on Figure 3 below. This investigation did not include a formal wetland delineation.

Observed indicators of hydrology, in accordance with the USACE Eastern Mountains and Piedmont Supplement (USACE 2012) to the 1987 Wetland Delineation Manual (USACE 1987), include saturation, drift deposits, drainage patterns, surface water, and algal mats. According to the field reconnaissance summary memo composed to TVA on October 13, 2017 (Stantec 2017a), saturated conditions and standing water were encountered at some locations within the study area. Drift deposits were observed on the narrow peninsula that juts into Wells Creek north of the equipment/staging yard. Observed soils in much of the project area were homogenous in color with brown or red matrices, were well drained due to a high gravel content, and would not be considered hydric soils. The water table was not encountered within the upper 6" at any observed location.

The National Wetland Plant List published by the USACE in partnership with other federal agencies classifies vegetation species based on how likely each plant is to be found in a wetland environment within a particular region. The classification system ranges from upland (UPL) to obligate wetland (OBL) with three facultative categories in between ranging from facultative upland (FACU) to facultative (FAC) to facultative wetland (FACW).

Much of the study area was upland in nature, with species such as *Lespedeza* spp., winged elm (*Ulmus alata* - FACU), boxelder (*Acer negundo* - FAC), white ash (*Fraxinus americana* - FACU), Johnsongrass (*Sorghum halepense* - FACU), late boneset (*Eupatorium serotinum* - FAC), American pokeweed (*Phytolacca americana* - FACU), common hackberry (*Celtis occidentalis* - FACU), and persimmon (*Diospryros virginiana* - FAC) dominating. Areas exhibiting wetland characteristics were dominated with primarily facultative vegetation that would require reliance on other wetland indicators to determine wetland status. Species observed in these areas include Japanese stiltgrass (*Microstegium vimineum* - FAC), cattail (*Typha latifolia* - OBL), Canadian woodnettle (*Laportea canadensis* - FAC), gray dogwood (*Cornus racemosa* - FAC), boxelder (FAC), silver maple (*Acer saccharinum* - FAC), winterberry holly (*Ilex decidua* - FACW), black willow (*Salix nigra* - OBL), and American elm (*Ulmus americana* - FACW).

The presence of wetland indicators observed during field reconnaissance suggests that wetlands likely exist in areas that would be impacted by a breach of the CCR Unit. Thus, the requirements of § 257.61(a)(1) through (a)(5) of the EPA Final CCR Rule must be addressed.

Figure 3. CCR Wetland Location Restriction Field Reconnaissance Study Area

Figure No. 3

DRAFT

Title

CCR Wetland Location Restriction Field Reconnaissance Study Area

Client/Project

Tennessee Valley Authority
Cumberland Fossil Plant

Project Location
Stewart County, Tennessee

175566329
Prepared by MW on 2018-04-24
Technical Review by JG on 2018-04-24

0 300 600 900 1,200 Feet
1:3,600 (At original document size of 22x34)

Legend

CCR Rule Wetlands Study Area (198.2 Acres)

CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1927 StatePlane Tennessee FIPS 4100
2. Imagery Provided by Tuck Mapping (c. 2017) and ESRI Basemap (NAIP c .2016)

Stantec

TVA

3.0 IMPACTS

The following section summarizes the requirements of the EPA Final CCR Rule regarding the wetlands demonstration for the Stilling Pond (including Retention Pond) at CUF.

As part of the wetland location restriction, the operator must show that the operation of the CCR Unit does not violate applicable laws or standards, as well as ensure that the unit does not cause or contribute to significant wetland degradation. A qualified, independent professional engineer must be able to verify these location restrictions. To evaluate potential impacts of the CCR Unit on wetlands, each of the following subsections was considered for the identified wetlands.

3.1 §257.61(a)(1) LOCATION ALTERNATIVES

(a) 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 § 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 (5) of this section. (1) Where applicable under section 404 of the Clean Water Act or applicable state wetlands laws, a clear and objective rebuttal of the presumption that an alternative to the CCR unit is reasonably available that does not involve wetlands.

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

3.2 §257.61(a)(2)(i) APPLICABLE WATER QUALITY STANDARDS AND EFFLUENT LIMITATIONS

(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.

The EPA Final CCR Rule states that the operation of the CCR Unit must not violate applicable state or federal water quality standards. The issued permits for the pond discharge require regular discharge monitoring reports (DMRs).

As part of this analysis, a subset of the DMRs was reviewed for compliance with the issued NPDES permit and it was determined that discharges from Outfall 001are currently within the acceptable limits of the permit.

3.2.1 Tennessee Water Quality Standards

Surface water quality in the State of Tennessee is regulated, in part by Rule 0400-40-03, General Water Quality Criteria. These standards set the surface water quality criterion and list the maximum allowable concentrations for specific pollutants. These regulations will supersede the federal standards where more stringent. Tennessee also has an antidegradation policy (0400-40-03-.06) for surface waters of exceptional quality (i.e., categorized as an outstanding national resource water, Exceptional Tennessee Waters). At CUF, water from the CCR Unit is discharged to the Cumberland River (Lake Barkley) via the Condensing Cooling Water Discharge Channel and four 48-inch reinforced concrete riser pipes/weirs discharge through four 36-inch reinforced concrete pipe sections. These outfalls, as well as others, are managed in accordance with the NPDES Permit No. TN0005789 (TVA 2016b) issued by TDEC, Division of Water Resources.

Groundwater sampling is being performed in accordance with and meets the performance standard in the EPA Final CCR Rule (AECOM 2017). Data and results of this sampling will be addressed in separate reports.

3.2.2 Clean Water Act

Section 307 of the Clean Water Act, entitled Toxic and Pretreatment Effluent Standards, states that toxic pollutants named by the EPA (126 pollutants total) shall be subject to effluent limitations based on the application of best available technology for point sources. Other federal laws may be applicable to maintaining water quality standards. These include Sections 401, 402, and 404 of the CWA. In addition, the operation of the CCR Unit must not violate applicable toxic effluent standard or prohibition under Section 307 of the CWA (U.S. Congress 1972b).

Based on Tennessee's 303(d) list (TDEC 2017), the adjacent Wells Creek is not impaired for any listed pollutants at this time; however, the Cumberland River, where the CCR Unit discharges, is listed as 303(d) impaired for temperature caused by industrial thermal discharges released upstream of CUF. Suspected sources of impairments to the watershed include inappropriate waste disposal and industrial point source discharge (TDEC 2017).

One Tennessee NPDES discharge permit issued in accordance with Section 402 of the CWA has been identified as being associated with CUF (TN0005789). This permit authorizes CUF to discharge ash transport water, treated chemical and nonchemical metal cleaning wastewaters, coal pile runoff, low volume wastes, and stormwater runoff through Outfall IMP 001.

Water quality of the outfall discharge is regularly tested to ensure compliance with the NPDES permit. A subset of DMR data collected during the past decade was reviewed, and it was determined that DMR data was within the permitted limits of their current TDEC issued permit.

According to the EPA's Enforcement and Compliance History Online Database (USEPA 2018), there were no compliance violations listed for CUF Outfall IMP 001. Available compliance information was from July 2014 to July 2017. Discharge Monitoring Reports were not available for review to determine if outfall water samples remained within the permitted limits of their current NPDES issued permit.

Based on available information, it appears that CCR Unit Outfall IMP 001 is in compliance with the current NPDES permit.

3.3 §257.61(a)(2)(iii) ENDANGERED SPECIES ACT

(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

The operation of the CCR Unit must not jeopardize the continued existence of endangered or threatened species or critical habitats, as protected under the Endangered Species Act of 1973. The following species are identified by USFWS as threatened or endangered and have potential to occur in or adjacent to (within a 5-mile radius) the CUF CCR Unit.

- 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.
- Gray Bat (*Myotis grisescens*) – Endangered
- Indiana Bat (*Myotis sodalis*) – Endangered
- Northern Long-Eared Bat (*Myotis septentrionalis*) – Threatened
- Price's Potato-bean (*Apios priceana*) – Threatened
- Short's Bladderpod (*Physaria globosa*) – Endangered

In addition to the species listed within a 5-mile radius of CUF, the following species have been known to occur in the Cumberland River within Houston, Montgomery, or Stewart Counties, Tennessee:

- Pink Mucket (*Lampsilis abrupta*) – Endangered

- Slabside Pearlymussel (*Pleuronaia dolabelloides*) – Endangered
- Ring Pink (*Obovaria retusa*) – Endangered
- Orangefoot Pimpleback (*Plethobasus cooperianus*) – Endangered
- Rough Pigtoe (*Pleurobema plenum*) – Endangered
- Rabbitsfoot (*Quadrula c. cylindrica*) – Threatened
- Tan Riffleshell (*Epioblasma florentina walkeri*) – Endangered, thought to be extirpated from this portion of the Cumberland River.
- Clubshell (*Pleurobema clava*) - Endangered, thought to be extirpated from this portion of the Cumberland River.
- Golden Eagle (*Anquila chrysaetos*) - while not currently listed as threatened or endangered, the Golden Eagle is protected under the Bald and Golden Eagle Protection Act. No designated critical habitat is located in the vicinity of the CCR Unit.

Bald Eagles and Golden Eagles have been observed nesting within 1 mile and 6 miles, respectively of the CUF CCR Unit. Both Bald Eagles and Golden Eagles have been periodically seen flying over CUF properties for hunting or foraging, however, no nesting areas have ever been observed within the CCR Unit (Appendix C). TVA Environmental Compliance and Operations has determined that, "No impacts to these species occur from operation of the CUF CCR Unit." (Appendix C).

The Indiana bat and Northern Long-eared bat are known for roosting in trees and foraging along riparian areas and uplands within the summer months. Gray bats are primarily cave-dwelling bats year-round and forage over open water and riparian areas. According to the TVA Certification of Compliance with the Endangered Species Act (Appendix C), CUF is located within 10 miles of Bellamy Cave, located in Montgomery County, TN, that is an important winter hibernaculum for all three species of bats.

According to a TVA 401 water quality permit application (NRS13.088) (TVA 2013), suitable foraging habitat for listed bat species exists adjacent to CUF along the Cumberland River, however, no suitable roosting or foraging habitat is present within the CUF CCR Unit. The terrestrial habitat on the CUF site has been converted from forested areas to primarily developed as industrial land use, maintained fields, or small patches of trees. In the past, acoustic monitoring has identified the presence of all three bat species throughout Cumberland Fossil Plant, although no threatened or endangered bats have been captured during mist netting efforts.

As stated in Appendix C, "Lack of suitable roosting habitat within the CUF CCR Unit for these three species ensures that these species are not present within the CUF CCR Unit.

Potential foraging habitat within the CUF CCR Unit is of extremely poor quality as the CUF CCR Unit does not support a diverse aquatic insect community." With the lack of suitable roosting or foraging habitat within the CUF CCR Unit, impacts to threatened or endangered bats are not anticipated.

Biological monitoring was performed in the Cumberland River adjacent to CUF (TVA 2016a), which examined ecological health of both fish and macroinvertebrate populations. The study did not reveal the presence of sensitive, threatened, or endangered species.

Aquatic and limited terrestrial surveys were conducted by boat and reported in "Evaluating the Presence and Maintenance of a Balanced Indigenous Population of Fish and Wildlife in the Cumberland River Downstream of TVA's Cumberland Fossil Plant". No federally listed species were sampled or observed during any sampling events. The blue sucker, a state listed fish species was collected at both upstream and downstream sites in spring 2015 and upstream in autumn 2016 (TVA 2017b). No federal or state listed mussels were found adjacent to CUF in a 2011 study by Third Rock Consultants, and substrate sampled from the Cumberland River during this time was described as "sub-optimal" for mussel species due to the prevalence of clay substrate overlain by 1-6 inches of silt.

Aquatic species existing within the Cumberland River, including freshwater mussels, would be impacted by a catastrophic release of CCR; however, no aquatic species or their Critical Habitat are currently listed near the CCR outfall location. Tennessee Water Quality Criteria, as outlined in T.C.A. Rule 0400-40-03 Section 3, seek to protect aquatic life in warm water aquatic habitats. Parameters and associated criteria are set for the protection of productive warm water aquatic communities, fowl, animal wildlife, arboreous growth, agricultural, and industrial uses. The CUF NPDES permit follows these parameters, with certain exceptions as granted by law, under the discharge permit.

Two federally listed plants, Short's Bladderpod and Price's Potato-bean are known to potentially occur within a 5-mile radius of the CCR Unit at CUF. Critical habitat is not designated for Price's Potato-bean, and Short's Bladderpod critical habitat is not located within a 5-mile radius of CUF. No suitable habitat for either species is present at the CUF CCR Unit, therefore, no impacts to federally endangered plants are anticipated.

TVA Environmental Compliance and Operations has determined that the current operation of the CUF Stilling Pond (including Retention Pond) would have no direct, indirect, or cumulative effects on federally listed species, and therefore is not likely to jeopardize the existence of listed species or result in the destruction or adverse modification of designated critical habitat (Appendix C).

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

3.5 §257.61(a)(3)(i&ii) EROSION, STABILITY, AND MIGRATION POTENTIAL

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

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

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

A desktop review of CUF historical records was performed and seeps. A seep was discovered in 1974, along the northern dike crossing of the pre-construction Wells Creek alignment, which is currently the western perimeter of the CCR Unit (TVA 1974). A clay seal, 30-40 feet wide, was placed on the inside of the dike as a repair measure, and the slope was riprapped for wave protection. Seeps near this same location have been intermittent since the repair and have been described as "wet areas of interest" during subsequent inspections; no seeps had been identified during most recent inspections (TriAD 2016, Stantec 2017b).

Based on the 2015 Formal (5 year) Inspection Report (Stantec 2015), "Improvements have been constructed to bring the Ash Pond, Dry Ash Stack and Gypsum Storage Area into compliance with accepted slope stability, seepage, and hydrologic/hydraulic design criteria.

These projects included Work Plan 2 – Gypsum Stack Outflow Piping Improvements, Work Plan 5 – Gypsum Storage Area Slope Repair, Work Plan 7 – Ash Stilling Pond Spillway Improvement, Work Plan 11 – Dry Fly Ash Stack and Gypsum Storage Area Grading and Drainage Improvements, the Gypsum Storage Area FML-Lined Gypsum Settling Channels, and the Dry Ash Stack and Gypsum Storage Area Seepage Improvements Project. As such, the Ash Pond, Dry Ash Stack and Gypsum Storage Area meet accepted design criteria and practices."

After reviewing the 2017 Intermediate Inspection Report (Stantec 2017b), contucted September 20, 2017, no known critical deficiencies or potential structural weaknesses currently exist around the CCR Unit. The following are current site conditions and recommendations of the CCR Unit noted in the inspection report as well as maintenance performed since the last intermediate inspection.

- A good stand of grass is generally maintained on the slopes of the perimeter dikes.
- Adequate freeboard was observed at the Ash Stilling and Retention Ponds and Bottom Ash Pond.
- Various maintenance activities at the facilities have been performed since the previous annual inspection, including repairing erosion and depression features.
- No slope instabilities were observed during this inspection.
- Evidence of sinkholes or depressions was not observed.
- Outlet structures and drainage pipes were generally in good condition.
- Separation of a joint in the southernmost spillway riser pipe at the Ash Stilling Pond has been documented previously (2016 Intermediate Inspection Item No. 1 [Maximo Work Order 117862628]). Flow was noted entering the pipe from this joint separation during this inspection. TVA is currently developing plans to repair the riser pipe.

No significant maintenance and construction activities have been performed in the areas immediately surrounding the CCR Unit since the last (2016) intermediate inspection, nor were there recommendations made for non-routine maintenance.

Based on the FY2017 Intermediate Inspection Report, no critical concerns were noted, and areas of interest will be monitored and addressed as needed.

According to the FY2017 Intermediate Inspection of CCR Facilities at TVA CUF facility:

> *There are 28 piezometers and three slope inclinometers currently being monitored at the Ash Stilling Pond. There were no exceedances of threshold, action, or notification*

levels at the piezometers and no significant movement was observed in the slope inclinometer readings.

Additionally, the USEPA issued a report assessing CCR impoundment dikes at CUF (Dewberry 2013), during which all impoundments received a "Satisfactory" rating for continued safe and reliable operation. A summary of the report's structural findings is below:

TVA will continue to monitor the perimeter dikes of the CCR Unit as part of the operations and maintenance plan to proactively address future erosion and stability issues that may occur. With rigorous stability inspections and maintenance, it is unlikely that wetlands are being impacted because of erosion and soil migration. It is unlikely that the CCR Unit is contributing to significant degradation of wetlands due to erosion, instability, or migration of soils, muds, or deposits from or used to support the CCR Unit.

3.6 §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

Ecological resources in wetlands must be sufficiently protected, including consideration of the volume and chemistry of the CCR managed in the unit.

During the 2017 Intermediate Inspection of CUF CCR Facilities (Stantec 2017b), CCR in the Ash Stilling Pond was typically encountered between 347 and 382 feet elevation and extended to a maximum depth of 29 feet below the lowest top of dike elevation. The sluice waters that exit the Bottom Ash Pond flow to the Retention and Ash Stilling Ponds and ultimately discharge through an NPDES permitted outlet (Outfall IMP 001) to the Cumberland River. The Ash Stilling Pond (including Retention Pond) currently impounds 819,000 cubic yards of water, with 1,077,000 cubic yards of storage remaining. Approximately 21.7 MGD of water are discharged into the CUF discharge channel and the Cumberland River. Classification testing performed on selected fly ash samples in 2010 resulted in a Unified Soil Classification System (USCS) classification of ML with a textural description of silt. The ash materials are gray brown in color and moisture content described as moist (Stantec 2010b).

In 2016, TVA collected analytical data for bottom ash and fly ash from both the Bottom Ash Pond and from the CCR Unit. Samples were analyzed for physical and inorganic constituents using a variety of methods.

The volume and chemical nature of CCR is not likely to cause or contribute to significant degradation of wetlands because no evidence of the CCR Unit discharging directly to a wetland at any point was found in the available information, nor were discharges observed during the field reconnaissance.

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 §257.61(a)(3)(iv), the design and operation of the CCR Unit must not cause or contribute to significant degradation of wetlands by addressing impacts on fish, wildlife, and other aquatic resources and their habitat from routine release of CCR.

In a TVA Supplemental Report entitled *Evaluating the Presence and Maintenance of a Balanced Indigenous Population of Fish and Wildlife in the Cumberland River Downstream of TVA's Cumberland Fossil Plant* (TVA 2017b), the fish community at CUF was evaluated in response to thermal impacts associated with 316(b) regulations of CUF and a 303(b) listing downstream of CUF in 2008. In 2007, flow rates along 430 miles of the Cumberland River, concluding at Lake Barkley, just downstream of CUF, were drastically reduced during repair of the Wolf Creek Dam in Russell County, Kentucky, contributing to the thermal impairment. The study noted above evaluated fish and macroinvertebrate communities in terms of whether a balanced indigenous population exists. These data were compared to the results of data collected in 2005, prior to the flow rate reduction, and in 2007, shortly after the flow rate reduction. The report concluded that the Cumberland River, downstream of CUF, has seen positive trends while recovering from low flow rates and thermal discharge impairment. Improvements in both the health of the fish and macro invertebrate communities were observed, including an increase in number of overall species and a reduction in the number of pollution-tolerant taxa. Current conditions present in the river are described as:

> *1. The population is typically characterized by diversity at all trophic levels,*
>
> *2. The population has the capacity to sustain itself through cyclic seasonal changes,*
>
> *3. The necessary food chain species are present,*
>
> *4. Pollution-tolerant species are not dominant, and*
>
> *5. Indigenous species are appropriately represented.*

During 2015, wildlife was sited along transects parallel to the Cumberland River shoreline and CUF. In addition to many birds, map turtles, painted turtles, a yellow mud turtle, gray tree frogs, banded water snakes, fox squirrels, eastern gray squirrels, a common groundhog, and a white tail deer were observed (TVA 2017b).

In general, the routine stability inspections and maintenance of the CCR Unit are intended to minimize the likelihood of an accidental release, thereby minimizing risk to wildlife and aquatic habitats. No discharges of CCR to wetlands have been discovered, therefore, it is unlikely that the CCR Unit is impacting fish, wildlife, or other aquatic resources as a result of routine CCR releases.

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 CCR Rule requires that the CCR unit will not cause or contribute to significant degradation of wetlands and the environment due to the potential effects from a catastrophic release of CCR. A breach analysis to determine the extents of a catastrophic release was conducted. In the unlikely but hypothetical event of a catastrophic release, the potential inundation area identified in the Breach Analysis (Appendix A) and wetlands therein could be flooded in water and CCR material. Additionally, CCR material could be carried downstream in the Cumberland River. Trees and other vegetation as well as any existing wildlife in the area inundated by the breach would be impacted. Approximately 49.7 acres of NWI wetlands are located within the 317-acre potential breach inundation zone.

While there are potential wetlands within the footprint of the breach extents that would likely be affected by a catastrophic release, there is little to no risk of a catastrophic failure. Thus, the threat to wetlands from such a release is minimal. The likelihood of a release is minimal for the following reasons.

The CUF inflow design flood control system plan was analyzed by Stantec for TVA (2016c) and found to adequately manage flow into and from the CCR Unit during the 1,000-year inflow design flood, with a water surface elevation of 385.1 feet; the lowest embankment elevation being 394.7 feet. The plan and results show that the impoundment meets the requirements set for in 40 CFR 257.82 (a&b).

Stantec conducted a structural stability assessment based on the sudden drawdown for the Ash Stilling Pond (including Retention Pond) perimeter dike (2016e). Results showed calculated factors of safety for eight critical cross sections ranged from 1.7 to 7.2 (median 2.5) when the recommended factors of safety are 1.1, as required by the EPA. In a seismic safety factor assessment for the Ash Stilling Pond (including Retention Pond) conducted by Geocomp (2016), an evaluation was conducted for seismic loading in regard to both the seismic FOS as well as liquefaction factor for safety. The seismic FOS (pseudo-static stability) was found to be 1.10, exceeding the EPA's required FOS of 1.0 for the EPA Final CCR Rule. The Liquefaction factor of safety (post-earthquake stability) was 1.22, exceeding the EPA's required FOS of 1.2.

Stantec assessed the static safety factor of the Ash Stilling Pond (including Retention Pond) regarding long-term, maximum storage pool loading condition as well as maximum surcharge pool loading condition at critical cross sections (2016d). Long-term maximum storage FOS was 2.16 at cross section P-P' and 1.98 at cross section Q-Q', exceeding EPA's CCR required FOS of 1.50. The maximum surcharge pool loading FOS was 1.89 at cross section P-P' and 1.74 at cross section Q-Q', exceeding EPA's required FOS of 1.40.

An update to the Hazard Potential Classification Assessment for the Ash Stilling Pond (including Retention Pond) at CUF was performed by Stantec in 2016 (2016b) as required per EPA Final CCR Rule. Based on the applicable hazard classifications, the Ash Stilling Pond (including Retention Pond) is classified as a "significant hazard potential" CCR surface impoundment, which is defined below:

> *Significant hazard potential CCR surface impoundment means a diked surface impoundment where failure or mis-operation results in no probable loss of human life, but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns.*

TVA has issued an Emergency Action Plan (EAP) in the event of a catastrophic failure of the CCR Unit (TVA 2017a). 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."

3.9 §257.61(a)(4) WETLAND MITIGATION

(4) To the extent required under section 404 of the Clean Water Act or applicable state 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 wetland impacts through all appropriate and reasonable compensatory mitigation actions (e.g., restoration of existing degraded wetlands or creation of man-made wetlands)

Because Section 404 of the CWA and state wetlands laws were not found to be violated due to the day-to-day operation of the CCR Unit, and because the unit was built prior to the implementation of regulations governing fill in wetlands, no known net loss of wetlands is occurring and therefore it is anticipated that no mitigation would be required as per the wetlands subclause of the EPA Final CCR Rule.

4.0 CONCLUSION

Based on this assessment, the Stilling Pond (including Retention Pond) at CUF meets the requirements of §257.61 of the EPA Final CCR Rule for wetlands location restriction.

5.0 REFERENCES

AECOM. 2017. Groundwater Monitoring System Stilling Pond (including Retention Pond) TVA Cumberland Fossil Plant Cumberland City, Tennessee. Prepared for Tennessee Valley Authority, Chattanooga, Tennessee, October 16, 2017.

Dewberry Consultants, LLC. 2013. Coal Combustion Residue Impoundment Round 11 - Dam Assessment Report Cumberland Fossil Plant Dry Ash Storage/Ash Pond TVA Cumberland City, Tennessee. Prepared United States Environmental Protection Agency, Office of Resource Conservation and Recovery.

Federal Emergency Management Agency. 2010. National Flood Hazard Layer, Stewart County, Tennessee, Map Number 47161C0320C. Available at: http://fema.gov/.

Geocomp. 2016. Initial Seismic Safety Factor Assessment - EPA Final CCR Rule, Cumberland Fossil Plant Stilling Pond (including Retention Pond), Cumberland City, Tennessee. Prepared for TVA, October 16, 2016.

Stantec. 2017a. CUF Dry Ash Stack Stilling Pond CCR Rule, Wetlands Demonstration - Initial Site Conditions Field Reconnaissance. Memo to TVA, October 13, 2017.

Stantec. 2017b. FY2017 Intermediate Inspection of CCR Facilities, Cumberland Fossil Plant Cumberland City, Stewart County, Tennessee. Memo to TVA. December 15, 2017.

Stantec. 2017c. TVA Cumberland Fossil Plant Ash Stilling Pond – Breach Inundation Analysis for Wetland Determination. Memo to Michelle Meehan. November 14, 2017.

Stantec. 2016a History of Construction Cumberland Fossil Plant Bottom Ash Pond Stewart County, Tennessee. Prepared for TVA, October 12, 2016.

Stantec. 2016b. Initial Hazard Potential Classification Assessment Cumberland Fossil Plant – Stilling Pond Cumberland City, Tennessee. Prepared for TVA, October 5, 2016.

Stantec. 2016c. Initial Inflow Design Flood Control System Plan, Stilling Pond, EPA Final CCR Rule, TVA Cumberland Fossil Plant, Cumberland City, Tennessee. Prepared for TVA, October 6, 2016.

Stantec. 2016d. Initial Safety Factor Assessment Stilling Pond (including Retention Pond), TVA Cumberland Fossil Plant, Stewart County, Tennessee. Memo to TVA, October 6, 2016.

Stantec. 2016e. Initial Structural Stability Assessment for CUF Stilling Pond (including Retention Pond). Memo to TVA, October 12, 2016.

Stantec. 2015. 2015 Formal (5 Year) Inspection of CCR Facilities and Ponds. Cumberland Fossil Plant, Cumberland City, Stewart County, Tennessee. Prepared for TVA, April 29, 2015.

Stantec. 2014. 2013 Intermediate (Annual) Inspection of CCP Facilities and Ponds. Cumberland Fossil Plant, Cumberland City, Stewart County, Tennessee. Prepared for TVA, January 10, 2014.

Stantec. 2011a. Can Run Special Waste Landfill Biological Assessment. Prepared for Louisville Gas and Electric Company, Louisville, Kentucky, May 3, 2011.

Stantec. 2010a. 2010 Annual Inspection of Waste Disposal Areas. Cumberland Fossil Plant, Cumberland City, Stewart County, Tennessee. Prepared for TVA, June 28, 2010.

Stantec. 2010b. Report of Geotechnical Exploration and Slope Stability Evaluation Ash Pond Cumberland Fossil Plant Stewart County, Tennessee Prepared for TVA, March 2010.

Tennessee Department of Environment and Conservation (TDEC). 2018. TDEC Dataviewers. Available online at: https://www.tn.gov/environment/about-tdec/tdec-dataviewers.html.

TDEC. 2017. DRAFT 2018 List of Impaired and Threatened Waters in Tennessee. Accessed February 14, 2018 via https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-quality-reports---publications.html

Tennessee Valley Authority (TVA). 2017a. Emergency Action Plan (EAP) Stilling Pond (including Retention Pond, EPA Final CCR Rule, TVA Cumberland Fossil Plant, Cumberland City, Tennessee. Prepared April 17, 2017.

TVA. 2017b. Evaluating the Presence and Maintenance of a Balanced Indigenous Population of Fish and Wildlife in the Cumberland River Downstream of TVA's Cumberland Fossil Plant. Supplemental Report. Cumberland City, Stewart County, Tennessee. May, 2017.

TVA. 2017c. FY2017 Intermediate Inspection of CCR Facilities Cumberland Fossil Plant, Cumberland City, Tennessee. Prepared December 15, 2017.

TVA. 2017d. Wetlands Location Restriction Demonstration for Existing Coal Combustion Residuals (CCR) Surface Impoundments. TVA-CCR Rule Template CCR Rule Core Team. Rev. 1.

TVA. 2016a. Biological Monitoring of the Cumberland River near Cumberland Fossil Plant Discharge during 2015. River and Reservoir Compliance Monitoring connected with NPDES Permit Number TN0005789. Conducted in 2015.

TVA. 2016b. Cumberland Fossil Plant NPDES Permit No. TN0005789 Updated Permit Renewal Application. Submitted August, 1, 2016. Obtained via the Tennessee Department of Environment and Conservation, Water Resources Division.

TVA. 2015. Cumberland Fossil Plant Integrated Pollution Prevention (IPP) Plan and Spill Response Plan. Effective November 9, 2015.

TVA. 2013. Tennessee Department of Environment and Conservation Division of Water Pollution Control Application for Aquatic Resource Alteration Permit. Permit No. NRS13.088. Received May 09, 2013.

TVA. 1974. Cumberland Steam Plant Annual Ash Disposal Area Inspection. Conducted September 30, 1974.

Third Rock Consultants, LLC. 2011. Evaluation of Freshwater Mussels - Cumberland River near Cumberland Fossil Plant, Stewart County, TN. Prepared for TVA.

TriAD Environmental Consultants. 2016. Initial Annual (Intermediate) Inspection Cumberland Fossil Plant, CCR Units. Prepared for TVA.

United States Army Corps of Engineers (USACE). 2013. Cumberland River navigation charts: Smithland, Kentucky to Celina, Tennessee. Accessed January 31, 2018 at: http://cdm16021.contentdm.oclc.org/cdm/ref/collection/p16021coll10/id/158.

USACE. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (Version 2.0). U.S. Army Engineer Research and Development Center, Vicksburg, VA.

USACE. 1987. Corps of Engineers Wetland Delineation Manual. Wetlands Research Program Technical Report Y-87-1. U.S. Army Engineer Research and Development Center, Vicksburg, VA.

United States Congress. 1973. Endangered Species Act of 1973. 16 U.S.C. § 1531 et seq. http://www2.epa.gov/laws-regulations/summary-endangered-species-act.

United States Congress. 1972a. Clean Water Act of 1972. 33 U.S.C § 1251 et seq. http://www2.epa.gov/laws-regulations/summary-clean-water-act.

United States Congress. 1972b. Clean Water Act of 1972. 33 U.S.C § 1317 (a)(1). http://www2.epa.gov/eg/toxic-and-priority-pollutants-under-clean-water-act.

United States Department of Agriculture (USDA) (USDA-NRCS). 2017. Web Soil Survey. Soil Data Explorer, Soil Reports, Land Classifications, Prime and other Important Farmlands. https://websoilsurvey.sc.egov.usda.gov.

United States Environmental Protection Agency (USEPA). Enforcement and Compliance History Online (ECHO). 2018. https://echo.epa.gov/detailed-facility-report?fid=110000493127.

USEPA. 2013. STORET Data Warehouse. http://www3.epa.gov/storet/dw_home.html. Last update on September 20, 2013.

USFWS. 2017. Environmental Conservation Online System - USFWS Threatened & Endangered Species Active Critical Habitat Report. https://ecos.fws.gov/ecp/report/table/critical-habitat.html. Accessed January 30, 2018.

United States Fish and Wildlife Service (USFWS). 2015a. National Wetlands Inventory. Washington (D.C.) United States Department of the Interior, Fish and Wildlife Service. Available online at: http://www.fws.gov/wetlands/.

USFWS. 2015b. Threatened or Endangered Species by County Report. Washington (D.C.) United States Department of the Interior, Fish and Wildlife Service. https://ecos.fws.gov/ipac/location/APMI753XEBEBNIBX2YMALRQJ4I/resources.

USFWS. 2011. Correspondence with Louisville Gas & Electric Company: Cane Run Biological Assessment – Letter of Concurrence. To: Mr. Paul Puckett, From Mr. Virgil Lee Andrews. Dated June 1, 2011.

United States Geological Survey (USGS). 1965. Cumberland City, Tennessee 7.5' Series Quadrangle. Historical Map Archives of the National Mapping Division Reference Collection. Reston (VA). U.S. Department of the Interior, Earth Science Information Center. http://historicalmaps.arcgis.com/usgs/

USGS. 1983. Cumberland City, Tennessee 7.5' Series Quadrangle; 1965 map photo-revised. Historical Map Archives of the National Mapping Division Reference Collection. Reston (VA). U.S. Department of the Interior, Earth Science Information Center. http://historicalmaps.arcgis.com/usgs/

USGS. 2016. Cumberland City, Tennessee 7.5' Series Quadrangle. U.S. Department of the Interior. Reston, Virginia.

APPENDIX A
TVA CUMBERLAND FOSSIL PLANT ASH POND 2 BEACH ANALYSIS FOR WETLAND DETERMINATIONS

Stantec

Memo

To:	Michelle Meehan Stantec 3052 Beaumont Centre Circle Lexington, KY 40513	From:	Jillian Richardson Stantec 11687 Lebanon Road Cincinnati, OH 45242
File:	CUF_2DBreach_Memo.docx	Date:	November 14, 2017

Reference: TVA Cumberland Fossil Plant Ash Stilling Pond – Breach Inundation Analysis for Wetland Determination

Stantec has been requested to perform a detailed analysis using recently processed topographic data to determine the limit of impact caused by a "Sunny Day" breach of the Ash Stilling Pond dike at the Cumberland Fossil Plant. The following memo summarizes the analysis, methodologies, and modeling results.

BACKGROUND

The Cumberland Fossil Plant is located at the confluence of Wells Creek and the Cumberland River in Stewart County, Tennessee. The plant is located on the southern bank of the Cumberland River, approximately 60 miles northwest of Nashville. The Ash Pond has a footprint of approximately 50 acres with a dike crest elevation of approximately 394.0 feet.

Stantec previously performed a breach analysis of the Ash Pond at the Cumberland Fossil plant in 2010 (Reference 1) under a separate scope. The previous analysis included a review of potential breach scenarios and their impact on non-Tennessee Valley Authority (TVA) property. Impacts of a breach along the western dike of the Ash and Stilling Ponds were considered at that time. The water surface elevation at the time of this study was set to be equal to the top of the embankment, or 394.0 feet.

As-built record drawings dated May 2012 show an emergency spillway was constructed on the north side of the ash pond at an elevation of 386.0 feet. This construction took place after the 2010 study was completed.

In addition, Stantec performed a similar breach analysis in 2013 (Reference 2). This study included hydrologic model updates as part of the Ash Pond spillway structure improvement project. The spillway improvement project included constructing an emergency spillway capable of passing the 6-hour "Probable Maximum Precipitation (PMP) Event", lowering the crown of the principal spillway risers, constructing a siphoning system and lowering the permanent pool elevation of the pond to an elevation of 378.2 feet. Impacts of a breach along the eastern dike of the Ash and Stilling Ponds were considered at that time.

BREACH ANALYSIS

A series of breach analyses were performed for "Sunny Day" failure scenarios. The "Sunny Day" breach consists of a piping failure that is assumed to occur during normal operational flows. The impoundment water surface elevation is assumed to be at the top of the lowest non-clogging

spillway. In this case, the impoundment water surface elevation at the time of the breach was set to be equal to the emergency spillway elevation of 386.0 feet (Reference 3).

BREACH LOCATIONS

Five breach locations were considered. Two breaches were performed along the western dike of the Ash Pond toward Wells Creek. One breach was performed in the northern dike of the Ash Pond toward Cumberland City Road. Two breaches were performed along the eastern dike of the Ash Pond toward the Main Plant and Discharge Channel. A "Sunny Day" scenario was modeled for the Ash Pond at each of the five locations. Table 1 summarizes the centerline stations, breach elevations, breach height, and reservoir volumes at the time of failure. The breach elevations were established from existing topography (Reference 4 and 5) and the volumes were calculated based on the stage-storage of the Ash Pond derived from recent hydrographic contour data (175657149_01_gsxxx_eg01_current .dwg) and CAD drawings of the terrain when the Ash Pond was originally designed (175657149_26_hsmap_eg01_current.dwg). An assumption was made that 35% of the ash volume would leave with the water during a breach. Volume calculations can be found in Stage-Storage_v2.xlsx spreadsheet.

Table 1 - Summary of "Sunny Day" Scenarios

Scenario	Station	Breach Elevation (ft)	Breach Height (ft)	Volume (ac-ft)
1	63	355.00	31.00	975.4
2	1345	354.75	31.25	979.7
3	2490	380.50	5.50	231.4
4	3028	382.50	3.50	150.3
5	4046	377.00	9.00	365.7

ESTIMATION OF DAM BREACH PARAMETERS

Stantec used equations from Froehlich, 2008 (Reference 6) to obtain breach parameters. Table 2 summarizes the breach parameters estimated for this analysis. These values are based on the assumed failure conditions, height of breach, and impoundment water volume of the breach. Estimates for breach parameters for the "Sunny Day" Scenarios are summarized in Table 2. 'B_{av}' is the average width of a breach failure and 't_f' is the time to failure of the breach. The empirical calculations that served as the basis for the breach parameters estimation are included in the spreadsheet, "Breach Parameter Calculations.xlsx" and can be found on the Cincinnati Server: \\US1268-F01\SHARED_PROJECTS\1755\175567307_CUF_2Dbreach\Hydraulics.

Table 2 - Summary of Dam Breach Parameter Estimates

Scenario	Average Breach Width B_{av} (ft)	Breach Formation Time t_f (hours)
1	93.0	0.5
2	93.8	0.5
3	50.4	0.5
4	43.1	0.5
5	59.5	0.5

HYDRAULIC MODEL DEVELOPMENT

For determining the breach inundation extents, Stantec used HEC-RAS Version 5.0.3, a two-dimensional hydraulic modeling software capable of performing unsteady flow routing. Hydraulic model input includes breach development parameters, topographic information, and Manning's roughness values to represent the ground surface. Manning's roughness values were selected based on aerial imagery in the vicinity of the Cumberland facility. Table 3 summarizes the Manning's roughness values used to represent land use types. Normal depth with a slope of 0.01 was used for the downstream boundary condition along the river.

Table 3 - Land Use Types for HEC-RAS Grid

Land Use Type	Manning's Value (n)
Trees	0.08
Shrubs	0.06
Grass	0.03
Impervious	0.015

RESULTS AND INUNDATION MAPPING

Inundation limits for each of the five breach scenarios were mapped to determine the potential impacts on wetlands located outside of the Ash Pond. The inundation limits were established using the hydraulic model outputs from HEC-RAS. Figure 1 shows the inundation extents of the five breach scenarios that were merged to create a composite or worst-case inundation map.

REFERENCES

1. Stantec (2010). Cumberland Fossil Plant – Dam Breach Analysis and Inundation Mapping. Stantec Consulting Services Inc.

2. Stantec (2013). Cumberland Fossil Plant – Dam Breach Analysis and Inundation Mapping, Addendum No. 1. Stantec Consulting Services Inc.

3. Stantec (2012). TVA Cumberland Fossil Plant – Spillway Replacement Project Details – Emergency Spillway Work Plan 7 (CUF-110311-WP-7), 10W286-12 (5/4/2012 – Rev 2)

Reference: TVA Cumberland Fossil Plant Ash Stilling Pond

4. TVA CUF 2017 Processed LiDAR data – "*175657150_01_east_eg01_current.xml*" and "*175657150_01_west_eg01_current.xml*"

5. United States Department of Agriculture (NRCS) - LiDAR Elevation Dataset – Bare Earth Digital Elevation Model (DEM). 2 Meter Stewart County, TN https://gdg.sc.egov.usda.gov/Catalog/ProductDescription/LIDAR.html 11/9/2017.

6. Froehlich, D.C. (2008). "Embankment Dam Breach Parameters and Their Uncertainties." Journal of Hydraulic Engineering, ASCE,

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Attachment: Fig_1_CUF_AshPond_breach_wetland.pdf

c. David Hayson, Nick Mueller, Michelle Meehan, Brad Allgeier, Stantec

file: \\US1268-F01\SHARED_PROJECTS\1755\175567307_CUF_2Dbreach\Hydraulics

Figure No.
1

DRAFT

Title

Breach Inundation Extents
Ash Stilling Pond - Cumberland Fossil Plant

Client/Project

Tennessee Valley Authority (TVA)
Cumberland Fossil Plant

Project Location
Cumberland City
Stewart County, Tennessee

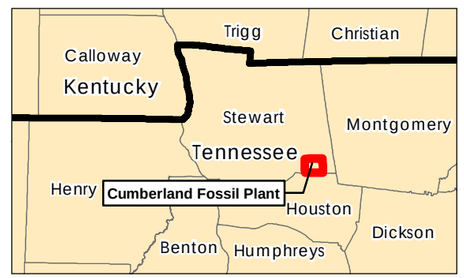
175567307
Prepared by DTH on 2017-11-16
Technical Review by NM on 2017-11-16

0 1,500 3,000 Feet

1:15,526 (At original document size of 11x17)

Legend

- Breach_Locations
- Dam Crest
- Sunny Day Breach Extents



Notes

1. Coordinate System: NAD 1927 StatePlane Tennessee FIPS 4100
2. Service Layer Credits:

Stantec

TVA

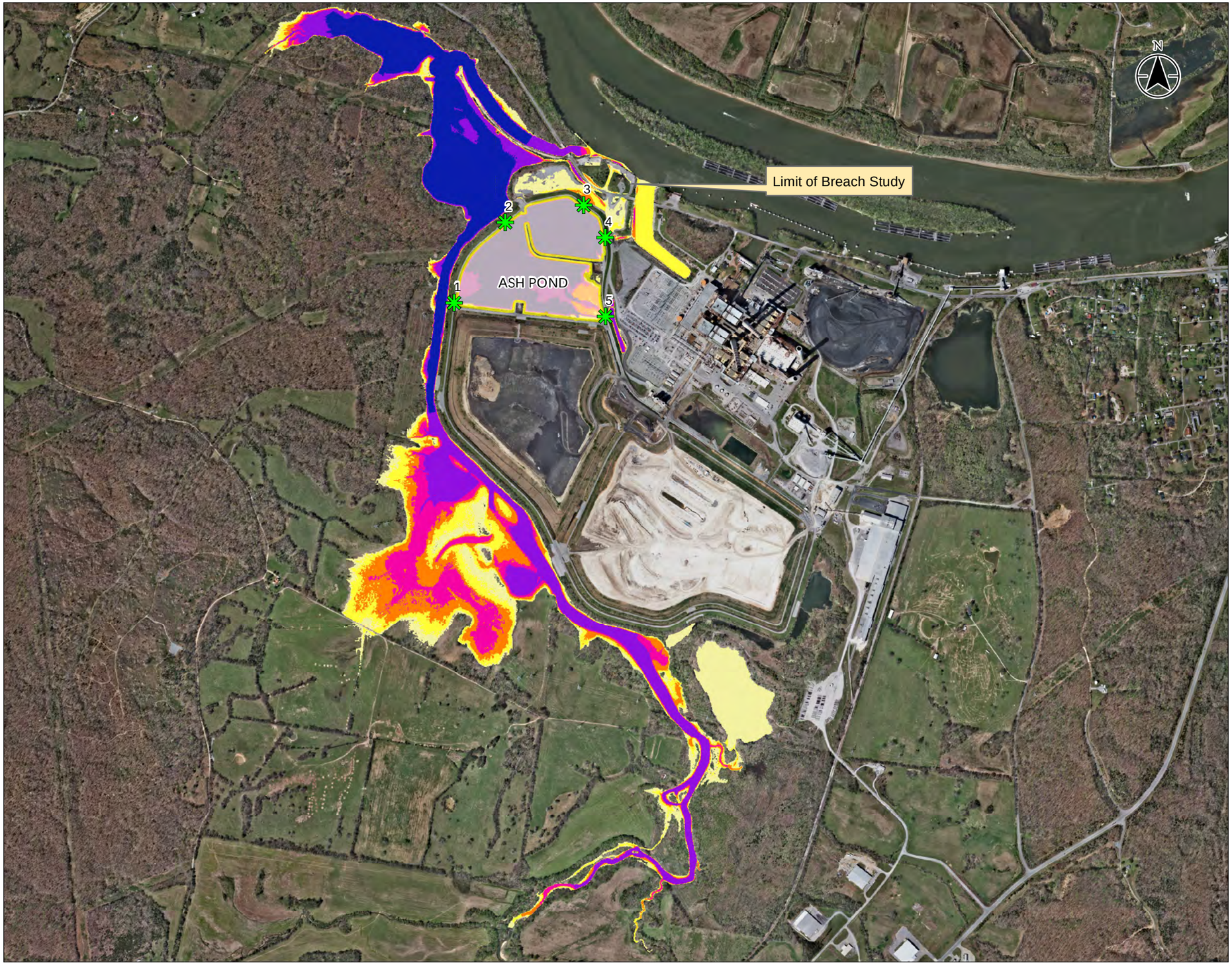


Figure No.
2

DRAFT

Title

Breach Depth Figure
Ash Stilling Pond - Cumberland Fossil Plant

Client/Project

Tennessee Valley Authority (TVA)
Cumberland Fossil Plant

Project Location
Cumberland City
Stewart County, Tennessee

175567307
Prepared by DTH on 2017-11-16
Technical Review by NM on 2017-11-16

0 1,500 3,000 Feet

1:15,526 (At original document size of 11x17)

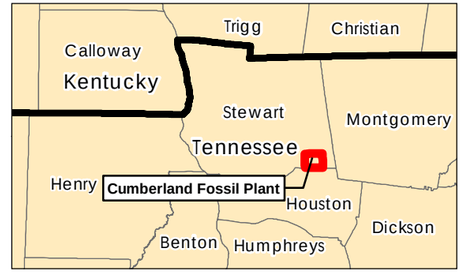
Legend

- Breach_Locations
- Dam Crest

Depth Raster

Feet

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 8
- > 8



Notes

1. Coordinate System: NAD 1927 StatePlane Tennessee FIPS 4100
2. Service Layer Credits:

Stantec

TVA

APPENDIX B
TVA DOCUMENTATION

Summary of TVA provided documentation reviewed and used to compile CUF wetland demonstration

- TVA Cumberland Fossil Plant Ash Stilling Pond - Breach Inundation Analysis for Wetland Determination (Stantec 2017c). This memo documents modeling methodology and the data used to generate breach extents for the Ash Stilling Pond at Cumberland Fossil Plant.

- CCR Unit Emergency Action Plan (TVA 2017a) provides information on potential breach pathways along the perimeter of the Ash Stilling Pond and Retention Pond in the case of an emergency.

- 2015 Formal (5 Year) Inspection of CCR Facilities and Ponds (Stantec) and FY2017 Intermediate Inspection of CCR Facilities (TVA 2017c) were used as a source of current information regarding the site operations.

- Initial Hazard Potential Classification Assessment Cumberland Fossil Plant – Ash Stilling Pond (Stantec 2016a) provided supporting information of potential impacts should a catastrophic release occur.

- Cumberland Fossil Plant Integrated Pollution Prevention (IPP) Plan and Spill Response Plan (TVA 2015).

- NPDES Permit No. TN0005789- Updated Permit Renewal Application (TVA 2016b) provides information on permitted discharges from the CCR Unit, which are released via Outfall IMP 001, as well as permitted discharges released at Outfalls 002, 004, and 007. Wastewaters permitted for release at Outfall IMP 001 include ash transport water, treated chemical and nonchemical metal cleaning wastewaters, coal pile runoff, low volume wastes, and storm water runoff. Through this NPDES Permit, TVA is required to meet pH, total suspended solids, oil and grease, copper, iron, and chronic whole effluent toxicity limits on Outfall IMP 001 discharges.

- Inflow Design Flood Control System Plan for CUF Ash Stilling Pond (including Retention Pond) (Stantec 2016c) provides information on how the inflow flood control system has been designed and constructed to manage the design storm required by its hazard classification (significant hazard potential). Therefore, the 1,000-year flood event was the design control baseline criteria.

- Initial Structural Stability Assessment for CUF Ash Stilling Pond (including Retention Pond) (Stantec 2016e) shows that CUF CCR impoundments meet the structural stability requirements set forth in 40 CFR 257.73(d)1-2.

- Demonstration Document for Seismic Factor of Safety and Liquefaction Factor of Safety for TVA Cumberland Fossil Plant, Ash Stilling Pond (including Retention Pond) and Bottom Ash Pond (Geocomp 2016) confirms that the seismic and liquefaction factors of safety both exceed EPA required values.

- Initial Static Safety Factor Assessment for CUF Ash Stilling Pond (including Retention Pond) (Stantec 2016d) confirms that the initial static safety factors exceed EPA required values.

- Initial Hazard Potential Classification Assessment for CUF Ash Stilling Pond (including retention pond) (Stantec 2016b) classifies the Ash Stilling Pond with a "significant" hazard classification because a failure or mis-operation could cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns.

APPENDIX C
CERTIFICATION OF CUMBERLAND FOSSIL PLANT CCR UNITS OPERATIONS COMPLIANCE WITH THE ENDANGERED SPECIES ACT

Certification of Cumberland Fossil Plant CCR Unit Operation compliance with the Endangered Species Act – 09/28/2018

The operation of the Cumberland Fossil Plant (CUF) CCR Unit must not jeopardize the continued existence of endangered or threatened species or critical habitats, as protected under the Endangered Species Act of 1973 (ESA). The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered in the United States or elsewhere. The ESA outlines procedures for federal agencies to follow when taking actions that may affect federally listed species or their designated critical habitat.

TVA has examined information contained in the State of Tennessee Natural Heritage Program database, the TVA Regional Natural Heritage database, and the U.S. Fish and Wildlife Service on-line Information for Planning and Consultation (iPaC) database to determine which federally listed species and/or designated critical habitats are potentially present on or adjacent to (within a 5-mile radius) the CUF CCR Unit.

Six federally listed endangered freshwater mussel species; Pink Mucket (*Lampsilis abrupta*), Slabside Pearlymussel (*Lexingtonia dolabelloides*), Ring Pink (*Obovaria retusa*), Orange-foot Pimpleback (*Plethobasus cooperianus*), Rough Pigtoe (*Pleurobema plenum*), and one federally listed threatened freshwater mussel species; Rabbitsfoot (*Quadrula c. cylindrica*) are known to occur in the Cumberland River within Houston, Montgomery, and Stewart counties, TN. Two additional federally listed endangered freshwater mussel species; Tan Riffleshell (*Epioblasma f. walkeri*) and Clubshell (*Pleurobema clava*), are historically reported from the area, but are assumed to be extirpated from this portion of the Cumberland River system. Two federally listed plant species; Price's Potato-bean and Short's Bladderpod are know to occur in these counties. However, no suitable habitat for either species is present on or adjacent to (within a 5-mile radius) the CUF CCR Unit. No federally designated critical habitat for any of these species is present within a 5-mile radius of CUF.

Suitable habitat for federally listed aquatic species does not occur within the CUF CCR area; therefore, direct, indirect, or cumulative impacts to state- or federally listed threatened and endangered aquatic species do not occur. Because the CUF CCR Unit does not include any freshwater stream habitat, these species do not occur on-site. All water discharges are through the permitted outfall and would meet existing TDEC permit requirements. Because TDEC requirements are protective of aquatic life (including federally listed species) in receiving waters, effects to federally listed freshwater mussel species near CUF are avoided.

Bald Eagle (*Haliaeetus leucocephalus*) and Golden Eagle (*Aquila chrysaetos*) while not currently listed under the ESA, are protected under the Bald and Golden Eagle Protection Act. Bald eagles have been observed nesting within one mile of the CUF CCR Unit, but have not been observed using areas within or adjacent to the CUF CCR Unit for nesting, feeding or roosting. One Golden Eagle has been reported roosting within 6 miles of CUF. Bald Eagles and Golden Eagles may occasionally be seen flying over or utilizing nearby open areas as hunting grounds. No nesting activity by either species has been observed in the project area. No impacts to these species occur from operation of the CUF CCR Unit.

Two bat species federally listed as endangered; Gray Bat (*Myotis grisescens*), and Indiana Bat (*Myotis sodalis*) and one bat species federally listed as Threatened; Northern long-eared bat (*Myotis septentrionalis*) are known or assumed to be present in Houston, Montgomery, and Stewart counties, TN. Two of these species (Indiana bat and Northern Long-eared Bat) roost in trees and forage in upland and riparian areas during the summer. Gray Bats roost in caves year-round and forage over open water and in

riparian areas along the Cumberland River. CUF is within 10 miles of an important winter hibernaculum cave (Bellamy Cave), used by all three species.

The terrestrial habitat on the CUF site has been largely converted from forest and agricultural use, and is currently maintained as developed industrial land or mowed fields except for small forested areas. There are no records of caves within 5 miles of the CUF CCR Unit. No suitable roosting habitat for forest-dwelling bats exists within the CUF CCR Unit. However, high quality roosting and foraging habitat for the two forest-dwelling bat species, and foraging habitat for gray bat exists immediately adjacent to the CUF plant site in streams and wetlands and along the Cumberland River. Lack of suitable roosting habitat within the CUF CCR Unit for these three species ensures that these species are not present within the CUF CCR Unit. Potential foraging habitat within the CUF CCR Unit is of extremely poor quality as the CUF CCR Unit does not support a diverse aquatic insect community. While acoustic monitoring has detected the presence of all three bat species on the larger CUF plant site, none have been captured during mist-netting efforts, and none of the three federally listed bat species has been documented using the CUF CCR Unit for roosting or foraging purposes. Therefore, no impacts to threatened and endangered bats result from operation of the CUF CCR Unit.

TVA Environmental Compliance and Operations has determined that the current operation of the CUF CCR Unit would have no direct, indirect or cumulative effects on federally listed species, and therefore is not likely to jeopardize the existence of listed species.

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