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5438 Wade Park Boulevard
Suite 200
Raleigh, NC 27607

September 10, 2021

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

Subject: Engineer's Certification of Fault Areas Location Restriction Demonstration
North Rail Loop Landfill Cell 2
Tennessee Valley Authority Gallatin Fossil Plant
Gallatin, Tennessee

1.0 PURPOSE

The purpose of this document is to certify that the Tennessee Valley Authority (TVA) Gallatin Fossil Plant (GAF) North Rail Loop (NRL) Landfill Cell 2 is in compliance with the fault areas location restriction requirements specified in 40 CFR § 257.62 of the United States Environmental Protection Agency (USEPA) Coal Combustion Residuals Rule (CCR Rule). Cell 2 is defined by the CCR Rule as a lateral expansion of the existing NRL Landfill (Cell 1). Presented below is the background, summary of findings, and certification.

2.0 BACKGROUND

In accordance with 40 CFR § 257.62(a), all new and existing CCR impoundments, new CCR landfills, and lateral expansions of units must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has exhibited displacement in the Holocene period (i.e., within the last 11,700 years) unless the owner or operator demonstrates that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit such that an alternative setback distance of less than 200 feet will prevent damage to the structural integrity of the CCR unit.

3.0 SUMMARY OF FINDINGS

A Location Restriction Demonstration (Demonstration) has been prepared and is provided in **Attachment A**. The Demonstration shows that the NRL Landfill Cell 2 meets the requirements set forth in 40 CFR § 257.62(a).

4.0 CERTIFICATION

I, David E. Skeggs, being a Professional Engineer in good standing in the State of Tennessee, 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; that the information contained herein is accurate as of the date of my signature below; and that the North Rail Loop Landfill Cell 2 meets the requirements of 40 CFR § 257.62(a).

SIGNATURE: _____ **DATE:** September 10, 2021

David E. Skeggs, PE

ADDRESS: 5438 Wade Park Boulevard
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TELEPHONE: 919-461-1100

ATTACHMENTS: A – Fault Areas Location Restriction Demonstration

Attachment A
Fault Areas Location Restriction Demonstration

TVA GALLATIN FOSSIL PLANT – SUMNER COUNTY, TENNESSEE

FAULT AREAS
LOCATION RESTRICTION DEMONSTRATION
40 CFR § 257.62
NORTH RAIL LOOP
LANDFILL CELL 2

Prepared for

Tennessee Valley Authority
1101 Market St.
Chattanooga, TN 37402-2801

Revision 0
September 10, 2021

Prepared by

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FIGURES

1.0 INTRODUCTION

1.1 OBJECTIVE

This Location Restriction Demonstration (Demonstration) has been prepared for the North Rail Loop (NRL) Landfill Cell 2, which is a lateral expansion of the existing NRL Coal Combustion Residuals (CCR) Landfill (Cell 1), located at the Tennessee Valley Authority's (TVA) Gallatin Fossil Plant (GAF) in Sumner County, Tennessee.

The purpose of this Demonstration is to document compliance with the fault areas location restriction requirements set forth in 40 CFR § 257.62 of the United States Environmental Protection Agency (USEPA) CCR Rule.

1.2 CCR RULE REQUIREMENTS – 40 CFR § 257.62

§ 257.62 Fault areas

(a) New CCR landfills, existing and new CCR surface impoundments, and all lateral expansions of CCR units must not be located within 60 meters (200 feet) of the outermost damage zone of a fault that has had displacement in Holocene time unless the owner or operator demonstrates by the dates specified in paragraph (c) of this section that an alternative setback distance of less than 60 meters (200 feet) will prevent damage to the structural integrity of the CCR unit.

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

(c) The owner or operator of the CCR unit must complete the demonstration required by paragraph (a) of this section by the date specified in either paragraph (c)(1) or (2) of this section.

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

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

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

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

> *(5) An owner or operator of a new CCR landfill, new CCR surface impoundment, or any lateral expansion of a CCR unit who fails to make the demonstration showing compliance with the requirements of paragraph (a) of this section is prohibited from placing CCR in the CCR unit.*
>
> *(d) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(e), the notification requirements specified in § 257.106(e), and the Internet requirements specified in § 257.107(e).*

As required by 40 CFR § 257.62(a), TVA must demonstrate that the NRL Landfill Cell 2 is not located within 200-feet (ft) of a fault that has exhibited displacement in Holocene time (i.e., within the last 11,700 years). This demonstration must be made prior to receiving any CCR in the NRL Landfill Cell 2 per 40 CFR § 257.62(c)(2).

1.3 METHODOLOGY

The United States Geological Survey (USGS) maintains a database (USGS, 2018) which contains information on faults and associated folds in the United States that are believed to be sources of earthquakes with magnitudes greater than six that occurred during the Quaternary period (i.e., the past 1,600,000 years, including Holocene Epoch). This demonstration is made by reviewing the interactive fault map provided by USGS and identifying faults, if any, within 200-ft of the CCR unit.

1.4 SITE BACKGROUND

The NRL Landfill is located on land currently owned by TVA at GAF. GAF is located at 1499 Steam Plant Road in Sumner County, on the north bank of the Cumberland River, approximately four miles southeast of the juncture of U.S. Route 31E and Tennessee State Route 109 in Gallatin. The NRL site for the disposal facility (**Figure 1**) is located within the GAF reservation, just north of the GAF plant and west of Steam Plant Road. Existing ground surface elevation across the disposal site ranges from approximately 470-ft to 580-ft National Geodetic Vertical Datum of 1929 (NGVD29).

2.0 GEOLOGY AND FAULTING

2.1 REGIONAL AND SITE GEOLOGY

Middle Tennessee, where GAF is located, is occupied by the Nashville Dome, which is a large anticlinal structure with a northeast-southwest trending axis that occurs on the south end of the Cincinnati Arch. Bedrock of the Nashville Dome nearest the surface generally consists of Ordovician limestones, dolomites, and shales, while the surrounding Highland Rim region generally consists of younger (less eroded) Silurian, Devonian, and Mississippian limestones, cherts, shales, and sandstones. These sedimentary rocks are underlain by approximately 2,500-ft of Cambrian sedimentary rocks and a Precambrian igneous and metamorphic basement complex (Wilson, 1991). Regional dips for bedrock surrounding the study area are

approximately 15- to 25-ft per mile (less than one degree) to the northwest (Wilson, 1991). The published regional geologic map for the Odom's Bend area is provided in **Figure 2**.

A geologic map of the NRL Landfill area prepared as part of the NRL Landfill Hydrogeologic Evaluation Report (HER) (URS, 2013) is provided in **Figure 3**. The map was created primarily from field collected data, including drilling, borehole geophysical logging, Electrical Resistivity Imaging (ERI) and seismic refraction surveys, and geologic mapping of rock outcroppings. It also takes into account information obtained from published maps and other literature sources. The bedrock stratigraphy in the area of study is, from youngest to oldest and in the order that the units are encountered from the surface:

Nashville Group	Bigby-Cannon Limestone – comprises the *Bigby* facies (0- to 10-ft thick), the *Cannon* facies (40- to 80-ft thick), and the *dove-colored* facies (10- to 20-ft thick).
	Hermitage Formation – comprises the *silty nodular* facies (0- to 5-ft thick), the *granular phosphatic* facies (10- to 20-ft thick), and the *laminated argillaceous* facies (40- to 60-ft thick).
Stones River Group	Carters Limestone – comprises the *Upper Carters* (10- to 20-ft thick), the *T-3 bentonite* deposit (6- to 12-inches), and the *Lower Carters* (60- to 70-ft thick).
	Lebanon Limestone – consists of a single facies, approximately 80- to 120-ft thick.

These strata are separated by erosional unconformities. The most recognizable geologic contacts occurring in this sequence are the Hermitage/Carters contact and the Upper/Lower Carters contact. A graphical depiction of the stratigraphic column was prepared as part of the HER (URS, 2013) and is provided herein in **Figure 4**. A detailed discussion of the regional and site-specific geology can be found in the HER (URS, 2013).

2.2 FAULTING

Upon review of the USGS interactive fault map, there are no known faults of Holocene age located within Tennessee. A figure showing the location of Quaternary/Holocene faults in Tennessee is provided in **Figure 5**.

3.0 CONCLUSIONS

As noted in **Section 2.2**, there are no known faults of Holocene age within the State of Tennessee. Therefore, based on this review, the NRL Landfill Cell 2 is located more than 200-ft from a Holocene fault and the requirements of 40 CFR § 257.62(a) are met.

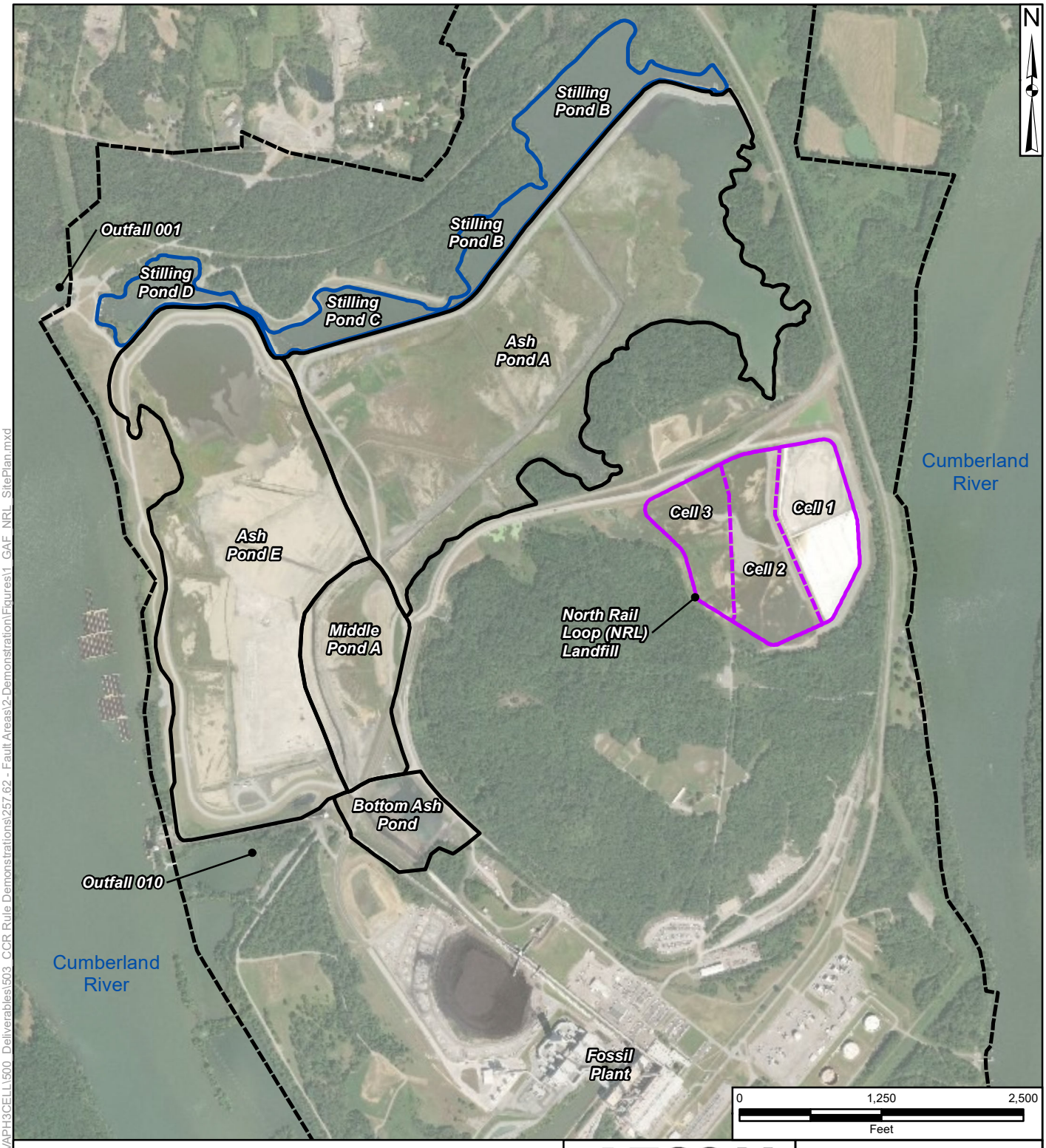
4.0 REFERENCES

URS (2013), *TVA Gallatin Fossil Plant, Part II Permit Application, CCP Disposal Facility – North Rail Loop, Hydrogeologic Evaluation*, January 2013

United States Geological Survey (2018), *Quaternary Fault and Fold Database – Interactive Fault Map*, accessed via: http://earthquake.usgs.gov/hazards/qfaults

Wilson Jr., C.W., (1991). *The Geology of Nashville, Tennessee. TDEC, Division of Geology, Bulletin 52, Second Edition.*

FIGURES



LEGEND

- CCR Management Units
- North Rail Loop (NRL) Landfill
- Stilling Ponds
- TVA Gallatin Fossil Plant Property Boundary

NOTE: Aerial image dated February 2017

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Figure 1

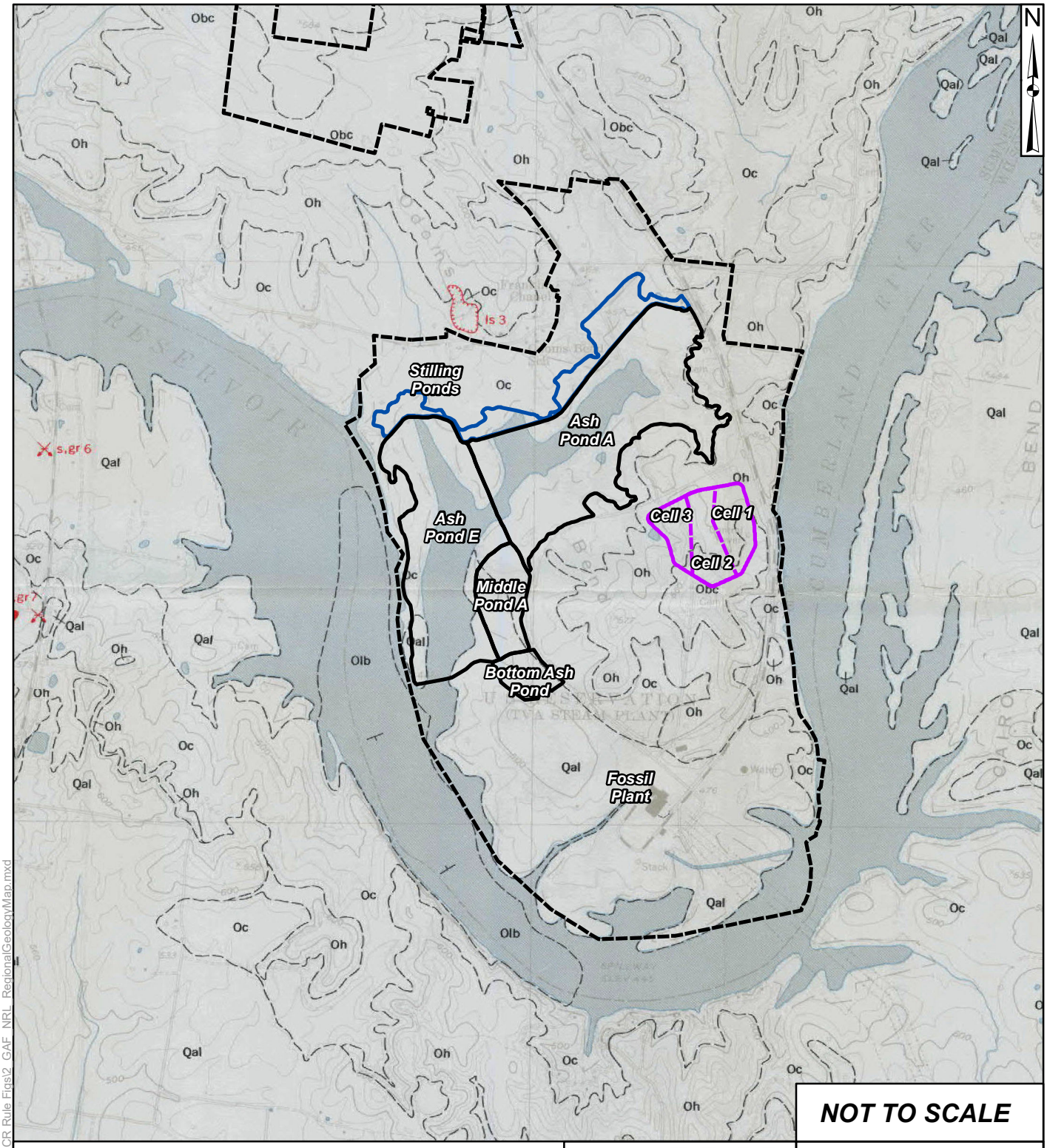
SITE LOCATION MAP

DRAWN BY:	REVIEWED BY:	APPROVED BY:	REVISION NUMBER:
J.COLLEY	D.SKEGGS	-	REV. 0

GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY

DATE:	DEPT:
MAR 2020	FOSSIL AND HYDRO ENGINEERING

Document Path: Q:\DCS\Projects\ENV\60570642_TVAPH3CELL\500_Deliverables\503_CCR Rule Demonstrations\257.62 - Fault Areas\2-Demonstration\Figures\1_GAF_NRL_SitePlan.mxd



NOT TO SCALE

LEGEND

- CCR Management Units
- North Rail Loop (NRL) Landfill
- Stilling Ponds
- TVA Gallatin Fossil Plant Property Boundary (Approximate)

- Contact, dashed where approximate
- Strike and dip of beds
- Active quarry or pit
- Abandoned quarry
- Abandoned quarry
- Abandoned pit
- Map numbers refer to descriptions in Mineral Resources Summary
- gr Gravel
- ls Limestone
- s Sand

- Qal — Alluvial Deposits
- Ocy — Catheys Formation
- Obc — Bigby-Cannon Limestone
- Oh — Hermitage Formation
- Oc — Carters Limestone
- Olb — Lebanon Limestone

NOTE: Laguardo Quadrangle Geologic Map from the State of Tennessee Department of Conservation Division of Geology dated 1964.

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Figure 2

REGIONAL GEOLOGIC MAP

DRAWN BY:	REVIEWED BY:	APPROVED BY:	REVISION NUMBER:
J.COLLEY	D.SKEGGS	-	REV. 0

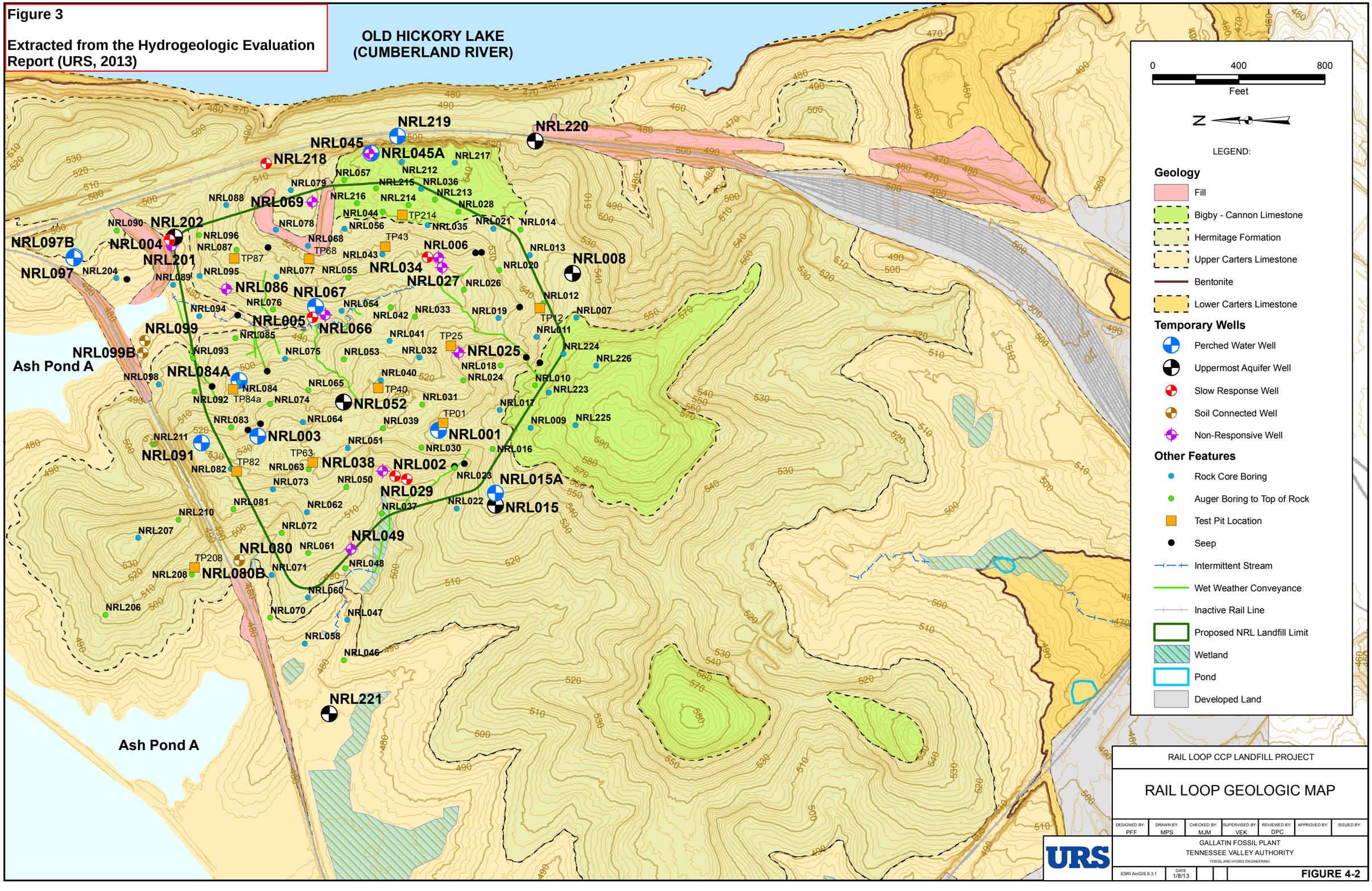
GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY

DATE:	DEPT:
JULY 2020	FOSSIL AND HYDRO ENGINEERING

Document Path: C:\Users\josh.colley\Desktop\NRL CCR Rule Figs\2_GAF_NRL_RegionalGeologyMap.mxd

Figure 3

Extracted from the Hydrogeologic Evaluation Report (URS, 2013)



RAIL LOOP CCP LANDFILL PROJECT

RAIL LOOP GEOLOGIC MAP

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:
PFF	MPS	MJM	VEK	DPC		

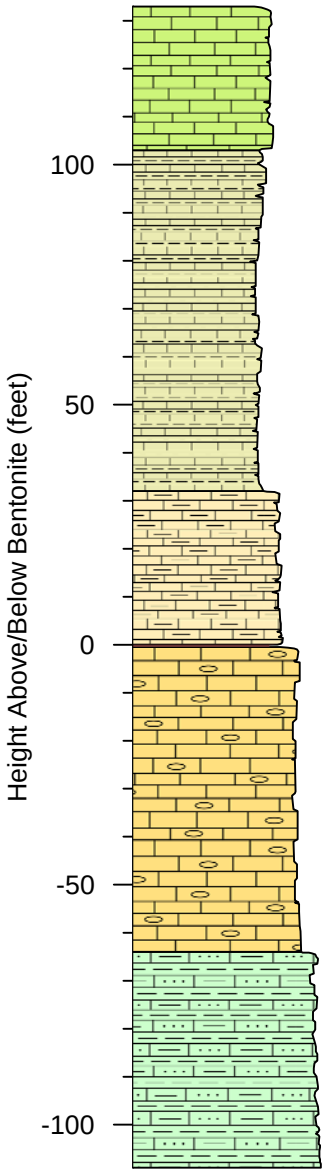
URS

GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

ESRI ArcGIS 9.3.1	DATE 1/8/13			FIGURE 4-2

Figure 4

Extracted from the Hydrogeologic Evaluation Report (URS, 2013)



Bigby-Cannon Limestone

Medium to dark gray, microcrystalline to medium-grained, fossiliferous limestone, with shaly and fossil-hash beds.

Hermitage Formation

Medium to dark gray, slightly fossiliferous, very fine-grained argillaceous limestone and calcareous shale, laminated to thinly bedded.

Upper Carters Limestone

Gray to dark gray microcrystalline to medium-grained, fossiliferous limestone, with shale laminations and trace fossils.

Bentonite

Light gray to bluish-gray, fat clay; volcanic ash.
Regionally identified as the T3 bentonite.

Lower Carters Limestone

Light gray and yellowish brown, fossiliferous, medium-grained limestone, with shale laminations, chert nodules and chert lenses, trace fossils, and stylolites.

Lebanon Limestone

Medium gray to olive gray, very fine to medium-grained, fossiliferous limestone, with thin shaly beds.

RAIL LOOP CCP LANDFILL PROJECT

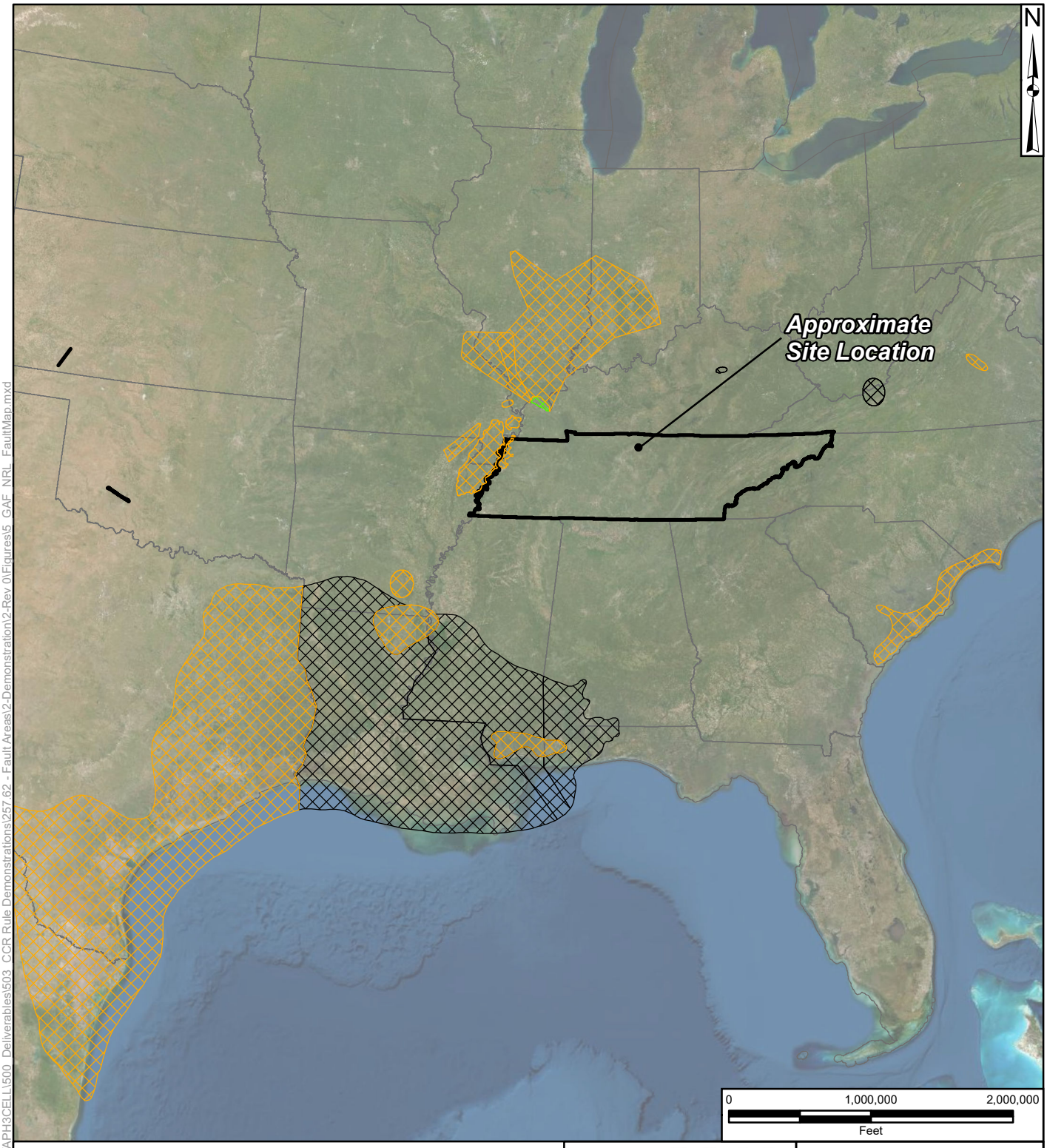
STRATIGRAPHIC COLUMN

DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	ISSUED BY:	APPROVED BY:
JRW	JRW	PFF	VEK			

URS

GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

Golden Grapher	DATE 11/08/2012			FIGURE 4-4



LEGEND

- Undifferentiated Quaternary (< 15,000 years)
- Middle and Late Quaternary (< 750,000 years)
- Late Quaternary (< 130,000 years)
- Latest Quaternary (< 15,000 years)
- Historic (<150 years)
- Quaternary Faults
- State Boundary

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Figure 5

FAULT LOCATION MAP
(AFTER USGS, 2018)

DRAWN BY:	REVIEWED BY:	APPROVED BY:	REVISION NUMBER:
J.COLLEY	D.SKEGGS	-	REV. 0

GALLATIN FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY

DATE:	DEPT:
JAN 2020	FOSSIL AND HYDRO ENGINEERING

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