

COAL COMBUSTION RESIDUALS (CCR) LOCATION RESTRICTIONS – §257.64 UNSTABLE AREAS

CHOCTAW GENERATION LIMITED PARTNERSHIP, L.L.L.P.
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OCTOBER 15, 2018



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1.0 INTRODUCTION

1.1 SITE DESCRIPTION AND REGULATORY APPLICABILITY

The Choctaw Generation Limited Partnership, LLLP – Red Hills Operations (Red Hills) is located near the City of Ackerman in Choctaw County, Mississippi. Red Hills is in north central Mississippi on a 170-acre site. Red Hills is bounded on the south by Pensacola Road, and is about ½ mile west of US Highway 9. Figure 1 shows the location of the site. Red Hills operates a single unit electrical generation facility designed to generate electricity for dispatch to the Tennessee Valley Authority (TVA) electrical system. The primary boiler fuel is lignite coal. The lignite coal is acquired from the adjacent mine. As a result of combusting lignite coal, ash is created and must be disposed or re-purposed. Red Hills owns and operates an existing Ash Management Unit (AMU) landfill for the placement and disposal of ash. The AMU (or CCR unit) is located in the northeastern portion of the property and consists of three (3) cells, encompassing approximately 90 acres of Red Hills' site. The property and AMU are shown in Figure 2.

The site is currently regulated by the Mississippi Department of Environmental Quality (MDEQ) Solid Waste Regulations and Solid Waste Permit No. SW0100040462. The original MDEQ Solid Waste Permit was issued August 25, 1998, last re-issued on April 9, 2010, and last modified on February 28, 2013. The site is now also required to comply with the requirements of 40 CFR Part 257, Subpart D – Standards for the Disposal of Coal Combustion Residuals (CCR) in Landfills and Surface Impoundments. As an existing CCR landfill, the site is required to complete the Location Restrictions – Unstable Areas assessment (§257.64) by October 17, 2018. In accordance with the requirements, an existing CCR landfill unit must not be located in an unstable area unless the owner or operator demonstrates that recognized and generally accepted good engineering practices have been incorporated into the design of the CCR unit to ensure that the integrity of the structural components of the CCR unit will not be disrupted. As part of the assessment, all of the following factors must be considered when determining whether an area is unstable:

- ❑ On-site or local soil conditions that may result in significant differential settling;
- ❑ On-site or local geologic or geomorphologic features; and
- ❑ On-site or local human-made features or events (both surface and subsurface).

The EPA defines an unstable area as a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of the structural components responsible for preventing releases from a CCR unit. This report presents a review of the existing CCR landfill with respect to the above factors and any identified unstable areas. This review is based on the previous work completed as part of the original AMU design and subsequent modifications to AMU Cells 1, 2, and 3. The assessment includes a review of the site geology and hydrogeology investigations, soil conditions, liner design, and human-made conditions.

The original geotechnical investigations were performed by Geoscience Engineers in 1997, and the AMU design and solid waste application was originally prepared by Malcolm Pirnie in March 1998. Soil borings completed by Phillips Coal Company in the 1970's were also used to interpret and characterize the site geology and hydrogeology. Subsequent modifications were prepared by Aquaterra (now Terracon in Jackson, MS) and R.W Harden & Associates (Austin, TX) between 2000-2003. In accordance with the Nonhazardous Solid Waste Management Regulations 11 Miss. Admin. Code Pt. 4 Ch. 1 (and 40 CFR 258.15), siting criteria was a part of the MDEQ Solid Waste Permitting process and included an analysis, investigation, and research of floodplains, wetlands, fault areas, Seismic impact zones, unstable areas, hydrocarbon wells and water wells, public water supplies, surface water, and site geology and hydrogeology. This original permitting process included an analysis of the same unstable area factors listed in the CCR requirements (§257.64) used to determine whether an area is unstable. This report presents an evaluation of the previous investigations and assessments and is intended to satisfy the requirements for the CCR Unstable Areas assessment.

1.2 PROFESSIONAL ENGINEER CERTIFICATION

The undersigned Registered Professional Engineer is familiar with the requirements of 40 CFR Part 257, Subpart D and certifies that the Unstable Areas assessment was prepared under his/her direct supervision, in accordance with the requirements of 40 CFR 257.64. The undersigned Registered Professional Engineer certifies that our review of the existing information on the CCR unit (landfill) complies with the intent of the location restriction as defined in the CCR regulations. All information and statements provided in this report (including attachments), based on information and belief formed after reasonable inquiry, are true, accurate, and complete.



10/15/2018

Brian S. Ketchum, PE
Registration Number: 13372
State of Mississippi

Date

(Seal)



2.0 UNSTABLE AREAS ASSESSMENT

The location restrictions of the CCR rule requirements were established to ensure CCR landfills are not located in unstable areas. As part of the assessment, the following factors should be considered when determining whether an area is unstable:

- ❑ On-site or local soil conditions that may result in significant differential settling;
- ❑ On-site or local geologic or geomorphologic features; and
- ❑ On-site or local human-made features or events (both surface and subsurface).

A summary of these are provided below.

2.1 ON-SITE SOIL CONDITIONS

The area where the AMU is located comprises approximately 90 acres and sloped to the northwest. The property contained indigenous trees and grasses and was primarily being used as farmland or to grow timber. The surface was filled with ravines that directed storm water from the area above to the northwest.

Site soil condition information was reviewed to characterize the site and to demonstrate that no natural unstable areas, including areas that have poor soils for foundations, areas susceptible to mass movements, and karst terrains, are present at the site. In order to characterize and evaluate the site soil and groundwater conditions, geotechnical investigations were performed by Geoscience Engineers in 1997, and Malcolm Pirnie used these borings and the resulting data, along with historical soil borings completed by Phillips Coal Company in the 1970's, to interpret and characterize the site geology and hydrogeology.

The site is underlain by a complex mixture of clays, silts, silty sands, and lignite of the Wilcox formation. The clays are typically thicker and more continuous than the silts and lignites, are gray in color, and are stiff to blocky in texture. Lignite seams run throughout, and the formation also exhibits substantial layering of fine-grained sands and silts. In general, surficial deposits, characterized as weathered Wilcox deposits, were present to about 5 to 20 feet. These soils were variable in composition and ranged from soft to stiff clays (USCS Classification CH) to medium dense fine sands (SP). The soil borings indicated that the more predominant soil type within this deposit is fine grained and either lean (CL) clays or high plasticity (CH) clays, but significant sandy deposits were present.

Although the soil borings indicated that the upper Wilcox deposits were variable in composition and strength, excavations completed during the 2003 geological investigation stated these deposits would provide a more uniform, natural clay base for the ash management facility and that excavations on the order of 3(H):1(V) or flatter would be stable. In addition, no natural unstable features were identified including areas of landslide, avalanche, debris slides and flows, block sliding, rock fall and karst terrain.

2.2 ON-SITE GEOLOGIC CONDITIONS

The Wilcox formation that underlies the surficial deposits is more uniform. This formation can be described as stiff to hard gray and dark gray clay (CH) with numerous lignite layers, silt layers and sand layers. The clays are typically thicker and more continuous than the silts and sands. Sandstone layering on the order of 6 to 12 inches was also infrequently observed. Lignite layering routinely ranged from 6 inches to 2 feet thick. Silt and sand layering ranged from as thin as 1/8-inch thick to layers as thick as 15 feet.

In accordance with the geological investigation, conditions were considered to be very favorable for the construction of an ash management facility capable of containing and separating the stored ash from the groundwater resources of the area. The Wilcox formation that is generally present here is a stable formation that is marginally compressible, and the predominant clay deposits provide an excellent source of low permeability clay for the landfill liner. The sand layers present and the isolated areas of lignite, silt and sand seams were addressed in the AMU cell design to provide the degree of isolation required.

Data indicates that there are two groundwater zones – the shallow or upper zone consisting of a non-continuous perched water table zone, and the deeper water zone well below the base of the AMU. Potentiometric maps from previous groundwater monitoring events show that the groundwater flow direction in the shallow water table zone is to the northwest, which correlates with the regional groundwater flow direction. In addition, the site is located sufficiently above the uppermost aquifer (§257.60), is not currently located in a wetland (§257.61), is not within 200 feet of a fault area (§257.62), and is not within a seismic impact zone (§257.63).

2.3 ON-SITE OR LOCAL HUMAN-MADE FEATURES OR EVENTS

The site was located within an undeveloped area of Choctaw County (MS) off of Highway 9 near Ackerman, Mississippi. The site is bounded to the south by Pensacola Road and to the west by Highway 9, and can accessed from Pensacola Road. The Red Hills property is fenced and gated to prevent access by unauthorized personnel.

Prior to construction of the Red Hills Power Plant and CCR Landfill, the site was primarily undeveloped timberland or farms. Human-made features included some fencing and unpaved roads. No human-made conditions were believed to exist at the site that would create an unstable condition.

2.4 AMU (CCR) LANDFILL DESIGN

The AMU totals approximately 90 acres and is subdivided into three (3) cells. All three (3) cells have been constructed and have been receiving ash. Each cell includes liner and leachate collection systems. The designs utilize the natural topography and existing soil conditions for the individual cells. The site was

originally permitted with a five (5) cell design, which was to utilize an 18-inch thick, recompacted clay liner. However, prior to the construction of Cell No.1 in the 1999 timeframe, the designers requested MDEQ approval for an alternate liner system consisting of HDPE flexible membrane and a geosynthetic clay liner instead of recompacted clay. The change was requested because of a concern upon the start of construction that insufficient clays were present to construct the clay liner. MDEQ approved the alternative liner request, and Cell No. 1 was constructed using this alternative synthetic liner system. Cell No. 1 also included a 12-inch granular drainage layer over the entire cell floor, and a leachate collection system that routes leachate to the AMU leachate and storm water collection basin. During Cell No. 1 construction, observations of excavations confirmed that adequate clay materials were present to provide a recompacted clay liner. As a result, Cell No. 2 was redesigned to include an 18-inch recompacted clay liner in accordance with the originally permitted design. MDEQ approved the Cell No. 2 design in March 2002. Upon presenting the characteristics of circulating fluidized bed (CFB) lignite ash and the approved beneficial uses of this ash in other states, Red Hills modified the cell design again in 2003 prior to the construction of Cell No. 3. This modified design included using an in-situ clay liner where the bottom surface of the cell would be scarified (in-situ) and used as a 12-inch clay liner. The proposed alternative cell design for Cell No. 3 was approved by MDEQ in 2003. All three (3) cells will be brought to an elevation of 580 feet above mean sea level (msl) before raising the cells to the final original permitted elevation of 640 feet msl.

The AMU cells were designed and permitted by MDEQ to comply with Mississippi Nonhazardous Solid Waste Management Regulations 11 Miss. Admin. Code Pt. 4 Ch. 1 and 40 CFR §258.15 (Unstable Areas), which regulates the design of solid waste landfills. The permittee did this by performing adequate subsurface investigations and evaluations (previously noted) of the area, submitting a complete solid waste permit application, and working with MDEQ during the permitting process. During construction of the landfill, adequate quality assurance and quality control procedures were followed in accordance with plans approved by MDEQ. The wetted ash has cement-like properties and has since been approved by MDEQ for beneficial use for road stabilization on site and at the adjacent mine. In addition, the site conducts routine inspections and maintenance, as required by the Solid Waste Permit and the Storm Water Permit, to inspect and repair the AMU as needed to address erosion or other structural issues.

3.0 CONCLUSION

The results of this assessment, and review of previous investigations and permitting, indicate that the site was suitable for the CCR Landfill and that the AMU is not located in an unstable area. The CCR Landfill appears to have been constructed on existing site soils that have been properly characterized and prepared with an adequate design for the ash characteristics.

Based on the conclusions of multiple subsurface investigations performed on the site and in the area and a review of the MDEQ Solid Waste Permit application and landfill design, no unstable areas were identified at the Red Hills AMU site. The facility has met the requirements outlined in §257.64 by meeting the requirements of 11 Miss. Admin. Code Pt. 4 Ch. 1 (and 40 CFR §258.15).

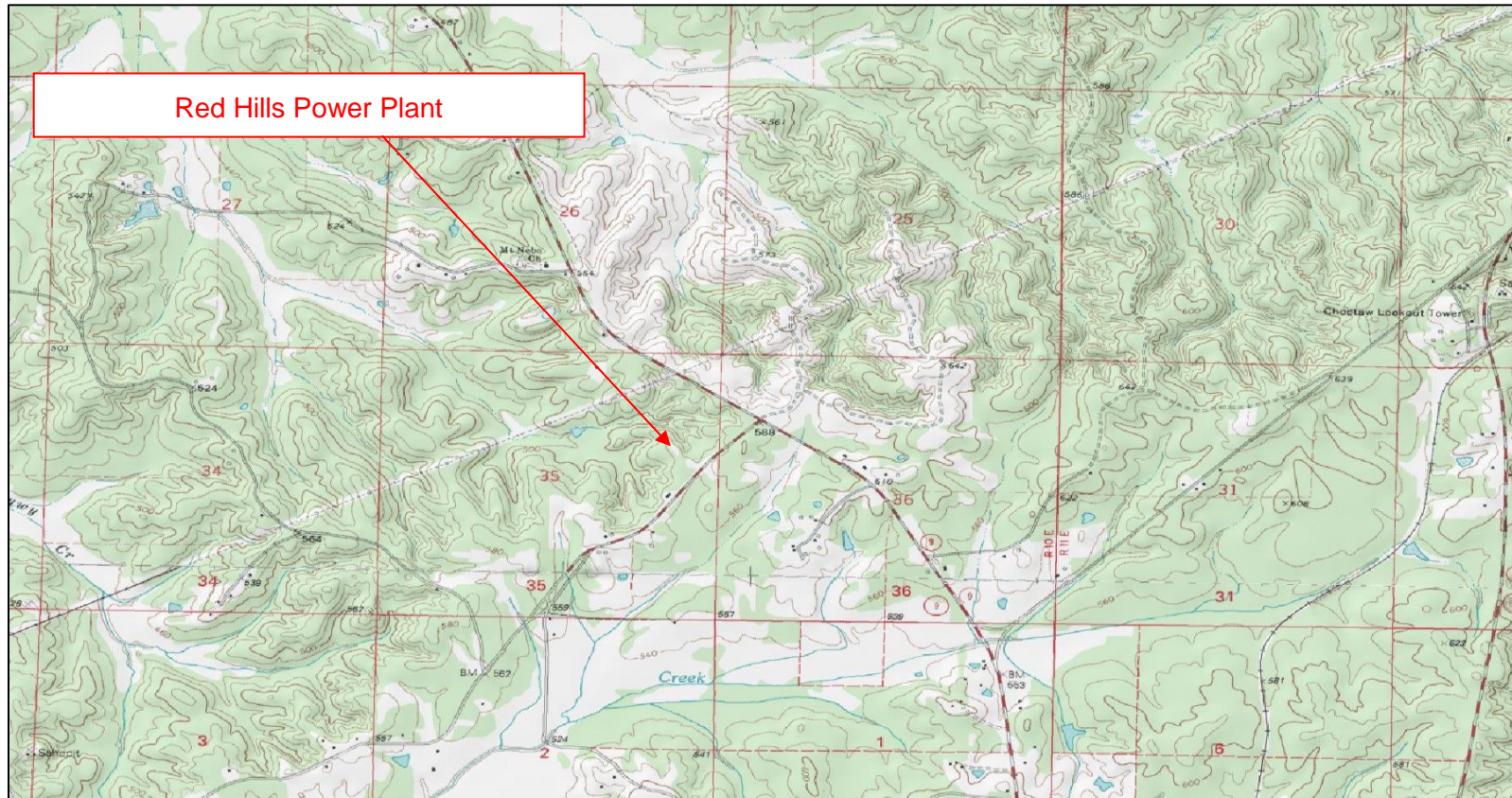
Red Hills must place this assessment documenting that the CCR unit is in compliance with the requirements under §257.64 into the facility's operating records per §257.105(e). In accordance with §257.106(e), the state director must be notified at the following address within 30 days of placing the assessment in the operating record:

Waste Division
Mississippi Department of Environmental Quality
515 East Amite Street
Jackson, MS 39201

Finally, in accordance with §257.107(e), this assessment must be made available on the site's publicly accessible internet website within 30 days of placing the assessment in the operating record.

FIGURE 1

SITE LOCATION MAP



Legend:

Source:
Digital-Topo-maps.com

Drawn By: JTB

Date: 8/11/2016

Checked By: BSK

Scale: 1:24,000

Project No.:

Drawing No: N/A

Red Hills Power Plant
2391 Pensacola Road
Ackerman, Mississippi



P.O. Box 356
Sherman, Mississippi 38869
(662) 840-5945

Figure 1: Site Location Map

FIGURE 2

FACILITY DIAGRAM



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Red Hills Power Company
 2391 Pensacola Road
 Ackerman, Mississippi

Facility Diagram

Figure 2

Project No.:

Legend:
 Monitoring Well  MW-14
 E=591.34

Scale: 1" = 300'

Drawn By: JTB

Date: 8/27/2018