



solutions and action

**Wisconsin Power and Light Company**

Columbia Energy Center  
CCR Surface Impoundment Annual Inspection Report  
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**Hard Hat Services**

ph: 877-630-7428  
hardhatinc.com  
932 N. Wright St., Suite 160  
Naperville, IL 60563

## Executive Summary

This annual inspection report has been prepared in accordance with the requirements of the United States Environmental Protection Agency published Final Rule for Hazardous and Solid Waste Management System - Disposal of Coal Combustion Residual (CCR) from Electric Utilities (40 CFR Parts 257 and 261, also known as CCR Rule) published on April 17, 2015 and effective October 19, 2015 and Extension of Compliance Deadlines for Certain Inactive Surface Impoundments.

This annual inspection report has been prepared to assess the condition of existing and inactive CCR surface impoundments. Primarily, the annual inspection report is focused on the structural stability of the CCR surface impoundments and to ensure that the operation and maintenance of the CCR surface impoundments is in accordance with recognized and generally accepted good engineering standards.

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## 1. INTRODUCTION

This annual inspection report has been prepared in accordance with the requirements of §257.83(b) of the United States Environmental Protection Agency (USEPA) published Final Rule for Hazardous and Solid Waste Management System – Disposal of Coal Combustion Residual (CCR), herein referenced as the CCR Rule.

### 1.1 CCR Rule Applicability

The CCR Rule requires annual inspections by a qualified professional engineer (PE) for existing CCR surface impoundments with a height of 5 feet or more and a storage volume of 20 acre-feet or more or the existing CCR surface impoundment has a height of 20 feet or more (40 CFR §§ 257.73(b), 257.73(d) and 257.83(b)).

Additionally, per the Extension of Compliance Deadlines for Certain Inactive Surface Impoundments in accordance with the new 40 CFR 257.100(e)(4)(iv), inactive CCR surface impoundments that exceed the size threshold require annual inspections by a qualified PE in accordance with §257.83(b) of the CCR Rule.

### 1.2 Annual Inspection Applicability

The Wisconsin Power and Light Company (WPL), Columbia Energy Center (COL) in Pardeeville, Wisconsin has one existing CCR surface impoundment and one inactive CCR surface impoundment that meet the requirements of Section 1.1, identified as follows:

- COL Primary Ash Pond (existing)
- COL Secondary Ash Pond (inactive)

The annual inspection of the CCR surface impoundments at COL was completed by a qualified PE on October 13<sup>th</sup> and 14<sup>th</sup>, 2016. The annual

inspection was completed to ensure that the design, construction, operation, and maintenance of the existing and inactive CCR surface impoundments at COL are consistent with recognized and generally accepted good engineering standards.

The annual inspection of the existing and inactive CCR surface impoundments at COL included a review of available information regarding the status and condition of the CCR surface impoundments. The information reviewed included all relevant files available in the operating record at the time of the annual inspection, as well as all relevant publicly accessible internet site entries. These files for the existing and inactive CCR surface impoundments at COL include, but is not limited to, CCR surface impoundment design and construction information (history of construction), hazard potential classification, structural stability assessment, safety factor assessment, hydrologic and hydraulic capacities (inflow flood control plan), results of 7-day inspections and instrumentation monitoring by a qualified person, and results of the previous annual inspection.

The annual inspection also included a visual inspection of the existing and inactive CCR surface impoundments in order to identify signs of distress or malfunction of the CCR surface impoundments and appurtenant structures. Additionally, the visual inspection included hydraulic structures underlying the base of the CCR surface impoundments or passing through the dikes of the CCR surface impoundments for structural integrity and continued safe and reliable operation.

## 2. FACILITY DESCRIPTION

The following sub-section provides a summary description of the facility, as well as a description of both the existing and inactive CCR surface impoundments located at COL.

COL is located southeast of the City of Portage on the eastern shore of the Wisconsin River in Columbia County at W8375 Murray Road, Pardeeville, Wisconsin. Wisconsin River backwaters are located north of the generating station, while Lake Columbia, south of the generating plant, is a 480-acre non-contact cooling water pond.

COL is a fossil-fueled electric generating station that initiated operations in 1975. COL consists of two steam electric generating units. Sub-bituminous coal is the primary fuel for producing steam. The burning of coal produces a by-product of CCR. The CCR at COL includes bottom ash, fly ash, and spray dryer absorber waste from scrubbers. The fly ash can also be subdivided into two types, economizer fly ash and precipitator fly ash.

#### General Facility Information:

Date of Initial Facility Operations:	1975
WPDES Permit Number:	WI-0002780-08-0
Latitude / Longitude:	43° 29' 9.73" N 89° 25' 8.40" W
Site Coordinates:	Section 27, Township 12 North, Range 9 East
Unit Nameplate Ratings:	Unit 1 (1975): 512 MW Unit 2 (1978): 511 MW

## 2.1 COL Primary Ash Pond

The COL Primary Ash Pond is located north of the generating plant and west of the COL Secondary Ash Pond. The COL Primary Ash Pond is the primary receiver of process flows from the generating plant. Process flows include CCR sluice water (bottom ash and economizer fly ash), boiler/precipitator wash water, plant floor drains, ash line freeze protection flows, bottom ash area sump water, demineralizer area sump water, and air heater sump water. Additionally,

the COL Primary Ash Pond receives storm water runoff from the surrounding area, inclusive of the closed ash landfill, located south of the CCR surface impoundments.

The western portion of the COL Primary Ash Pond is a CCR handling area. A shallow narrow drainage channel is located along the south, west, and north sides of the CCR handling area. The sluiced CCR is discharged into the southeast corner of the western portion of the COL Primary Ash Pond. The sluiced CCR settles out through the water column as it follows the flow of the narrow channel around the southern, western, and northern sides of the existing CCR surface impoundment. The water in the channel flows to the east and discharges through a narrow cut-out of an interior dike into the northwest corner of the large open area in the eastern portion of the COL Primary Ash Pond.

The majority of the CCR that is discharged into the COL Primary Ash Pond is removed during routine maintenance dredging activities of the shallow narrow channel. The CCR that is dredged is stockpiled in the western portion of the COL Primary Ash Pond for dewatering. Once dewatered the CCR is run through a sieve shaker machine to separate the coarsely graded CCR from the finely graded CCR. The CCR is then transported off-site for beneficial reuse or to the on-site active dry ash landfill.

The water in the COL Primary Ash Pond is recirculated to the generating plant via effluent pumps located in the ash recirculating pump house in the northeast corner of the eastern portion of the COL Primary Ash Pond. The recirculating pumps return water to the generating plant for reuse and/or treatment and disposal per the facility's Wisconsin Pollution Discharge Elimination System (WPDES) permit. Instrumentation associated with the pump house in the northeast corner of the COL Primary Ash Pond includes a submersible

hydrostatic level transducer for monitoring water elevations in the COL Primary Ash Pond. An 18-inch diameter corrugated metal pipe is located immediately south of the pump house, in the interior dike between the COL Primary Ash Pond and COL Secondary Ash Pond. The pipe drains to the COL Secondary Ash Pond and is no longer used. The influent end of the hydraulic structure, on the COL Primary Ash Pond side, consists of a manually operated gate valve which is closed.

## 2.2 COL Secondary Ash Pond

The COL Secondary Ash Pond is located north of the generating plant and east of the COL Primary Ash Pond. The COL Secondary Ash Pond was previously a downstream receiver of influent flows from the COL Primary Ash Pond. The water within the COL Secondary Ash Pond, prior to 2004, was pumped to a surface impoundment identified as the polishing pond. The polishing pond was located east of the generating plant. The water pumped to the polishing pond would flow to the south through the facility's WPDES Outfall 002 into "Mint Ditch" and eventually flow into the backwaters of the Wisconsin River. Presently, the COL Secondary Ash Pond acts as a storm water detention impoundment with the only influent sources being precipitation and storm water runoff from the surrounding area. The water within the COL Secondary Ash Pond either exfiltrates or evaporates. The water elevation within the COL Secondary Ash Pond is normally the same as the ground water elevation under the CCR surface impoundments approximately 10 feet lower than the COL Primary Ash Pond.



## 3. ANNUAL INSPECTION REPORTING CRITERIA

The following sub-sections address the annual inspection reporting criteria per §257.83(b)(2) of the CCR Rule for the existing and inactive CCR surface impoundments located at COL.

### 3.1 COL Primary Ash Pond

#### 3.1.1 Changes in Geometry (§257.83(b)(2)(i))

After conducting the annual inspection, as well as review of available information provided by COL pertaining to the status and condition of the existing CCR surface impoundment, and discussions with COL facility personnel who oversee and maintain the operation, maintenance, and inspection activities of the existing CCR surface impoundment, there have been no identified changes in the geometry since the previous annual inspection.

#### 3.1.2 Existing Instrumentation (§257.83(b)(2)(ii))

Instrumentation that supports the operation of the COL Primary Ash Pond includes a submersible hydrostatic level transducer for monitoring water elevations in the COL Primary Ash Pond. The instrumentation is located in the northeast corner of the COL Primary Ash Pond. The submersible hydrostatic level transducer was installed in 2010 and provides measurement readings from the elevation of the ultrasonic gauge (805.16 feet) to the elevation of the water surface of the COL Primary Ash Pond.

The water elevation data from the submersible hydrostatic level transducer, since the previous annual inspection, was provided by WPL for 2016 (dates between January 04, 2016 through October 17, 2016). Reviewing the provided water elevation data, the maximum water elevation recorded within the COL Primary Ash Pond was 797.14 feet (March 2016).

### 3.1.3 Depth and Elevation of Impounded CCR and Water (§257.83(b)(2)(iii))

The approximate minimum, maximum, and present depths and elevations of the impounded CCR and water in the COL Primary Ash Pond since the previous annual inspection were determined using information that was collected during the annual inspection, as well as from historical information that was previously provided from WPL.

At the time of the annual inspection a survey was completed in order to determine the present surface water elevation of the CCR surface impoundment. Additionally, depth measurements from the water surface to the top of CCR/sediment were obtained in order to determine present depths/elevations.

The historical information provided from WPL included original design drawing contours of the COL Primary Ash Pond prepared by Sargent & Lundy (1975), as well as the most recent topographic/bathymetric survey of the COL Primary Ash Pond completed by Cornerstone Surveying and Mapping (2016). Reviewing the information provided within the above mentioned documents, as well as the data collected during the annual inspection, the following minimum, maximum, and present depths and elevations were approximated for the impounded CCR and water:

- **Eastern Portion of COL Primary Ash Pond (CCR Settling Pond Area)**
  - At the time of the annual inspection, the water surface elevation was surveyed to be 791.43 feet, 10.57 feet below the crest of the east embankment of the CCR surface impoundment, which had an elevation of approximately 802 feet at the lowest point of the embankment.
  - At the time of the annual inspection, the water depth that was measured within the CCR surface impoundment varied between

- 1.10 feet in the western portion and 8.10 feet in the eastern portion.
- From the water depth measurements at the time of the annual inspection, the elevation of the top of CCR/sediment that was measured varied between an elevation of 790.33 feet in the western portion and 783.33 feet in the eastern.
  - From the 1975 original design drawing contours of the COL Primary Ash Pond, the original design bottom contour elevation of the CCR surface impoundment was approximately 780 feet. The depth of the COL Primary Ash Pond varied between elevation 790.33 feet in the western portion to an elevation of 783.33 feet in the eastern portion. Comparing the results from the water depth measurements at the time of the annual inspection to the 1975 original design drawing contours, the deposition thickness varied between 10.33 feet in the western portion to 3.33 feet in the eastern portion.
- **Western Portion of COL Primary Ash Pond (CCR Handling Area)**
    - At the time of the annual inspection, the surveyed water surface elevations of the channel that surrounded the CCR handling area along the west and north sides of the western portion of the CCR surface impoundment varied between 798.33 feet along the western channel and 796.03 feet along the northern channel. The elevation of the crests of the north and west embankments were 804 feet at the lowest point of the embankments, which was 5.67 feet above the highest surveyed water surface elevation in the western portion of the CCR surface impoundment.
    - At the time of the annual inspection, the water depth that was measured within the CCR surface impoundment was 0.45 feet in both the western channel and northern channel.

- From the water depth measurements at the time of the annual inspection, the elevation of the top of CCR/sediment that was measured varied between an elevation of 797.88 feet in the western channel and 795.58 feet in the northern channel.
- From the 1975 original design drawing contours of the COL Primary Ash Pond, the original design bottom contour elevation of the CCR surface impoundment was approximately 780 feet. The depth of the north and west channels of the COL Primary Ash Pond varied between an elevation of 797.88 feet in the western channel to an elevation of 795.58 feet in the northern channel. Comparing the results from the water depth measurements at the time of the annual inspection to the 1975 original design drawing contours, the deposition thickness varied between 17.88 feet in the west channel to 15.58 feet in the northern channel.
- From the 2016 topographic/bathymetric survey, the average top of CCR/sediment in the CCR handling area of the western portion of the CCR surface impoundment was approximately 802 feet. Comparing the average top of CCR/sediment at the time of the 2016 topographic/bathymetric survey to the 1975 original design drawing contours, the deposition thickness was approximately 22 feet in the western portion of the CCR surface impoundment.

### **3.1.4 Storage Capacity of Impounding Structure (§257.83(b)(2)(iv))**

The storage capacity (i.e. water volume) of the CCR surface impoundment at the time of the annual inspection was calculated based on the acreage of the eastern portion of the CCR surface impoundment in the large open area where water was present, and the approximate depth of water within that area of the eastern portion of the CCR surface impoundment. The water depth

measurements of the CCR surface impoundment were collected at the time of the annual inspection.

From the 2016 topographic/bathymetric survey data, the area of the water surface of the CCR surface impoundment was 7.1 acres. From the water depth data that was collected during the annual inspection, the average water depth within the CCR surface impoundment was 6.04 feet. Thus, the storage capacity within the COL Primary Ash Pond at the time of the annual inspection was approximately 69,000 cubic yards.

### **3.1.5 Volume of Impounded CCR and Water (§257.83(b)(2)(v))**

The volume of impounded CCR and water (i.e. total volume) within the COL Primary Ash Pond at the time of the annual inspection was determined using information that was collected during the annual inspection, as well as from historical information that was previously provided from WPL. Historical information provided from WPL included original design drawing contours of the COL Primary Ash Pond prepared by Sargent & Lundy (1975), as well as the most recent topographic/bathymetric survey of the COL Primary Ash Pond completed by Cornerstone Surveying and Mapping (2016).

The water surface elevation of the eastern portion of the CCR surface impoundment (CCR settling area) that was surveyed at the time of the annual inspection was 791.43 feet. From the 2016 topographic/bathymetric survey of the COL Primary Ash Pond, the average elevation of the top of CCR/sediment in the western portion of the CCR surface impoundment (CCR handling area) was estimated to be approximately 802 feet. From the 1975 original design drawing contours of the COL Primary Ash Pond, the original design bottom contour elevation of the CCR surface impoundment was approximately 780 feet. Thus, the interior storage height of the eastern portion of the COL Primary Ash Pond (CCR settling area) was 11.43 feet and the interior storage height of

the western portion of the COL Primary Ash Pond (CCR handling area) was approximately 22 feet.

The surface area of the eastern portion of the COL Primary Ash Pond (CCR settling area), in the area where both water and CCR were present, was 7.5 acres. Thus, the volume of impounded CCR and water within the eastern portion of the COL Primary Ash Pond was approximately 138,000 cubic yards. The surface area of the western portion of the COL Primary Ash Pond (CCR handling area) was approximately 10 acres. Thus, the volume of impounded CCR and water within the western portion of the COL Primary Ash Pond was approximately 355,000 cubic yards. Therefore, the total volume of impounded CCR and water within the COL Primary Ash Pond at the time of the annual inspection was approximately 493,000 cubic yards.

### **3.1.6 Structural Weaknesses and Disruptive Conditions (§257.83(b)(2)(vi))**

After review of available information provided by COL pertaining to the status and condition of the existing CCR surface impoundment, discussions with COL facility personnel who oversee and maintain the operation, maintenance, and inspection activities of the existing CCR surface impoundment, as well as conducting the on-site visual inspection of the existing CCR surface impoundment, there have been no identified appearances of an actual or potential structural weakness of the existing CCR surface impoundment. Additionally, there were no visual inspection issues with the structural integrity of the hydraulic structures (permanently closed 18-inch corrugated metal pipe) associated with the COL Primary Ash Pond.

Regarding the existing conditions of the COL Primary Ash Pond, there were no existing conditions identified along the upstream and downstream slopes of the embankments that were disrupting or have the potential to disrupt the operation and safety of the existing CCR surface impoundment.

### **3.1.7 Other Changes Affecting Stability or Operation of Impounding Structure (§257.83(b)(2)(vii))**

After review of available information provided by COL pertaining to the status and condition of the existing CCR surface impoundment, as well as discussions with COL facility personnel who oversee and maintain the operation, maintenance, and inspection activities of the existing CCR surface impoundment, there have been no other identified changes that have affected the stability or operation of the COL Primary Ash Pond since the previous annual inspection.

## **3.2 COL Secondary Ash Pond**

### **3.2.1 Changes in Geometry (§257.83(b)(2)(i))**

After review of available information provided by COL pertaining to the status and condition of the inactive CCR surface impoundment, discussions with COL facility personnel who oversee and maintain the operation, maintenance, and inspection activities of the inactive CCR surface impoundment, as well as conducting the on-site visual inspection of the inactive CCR surface impoundment, there has been one identified change in the geometry of the COL Secondary Ash Pond.

The identified change in the geometry was located along the upstream slope of the south side (incised side) of the CCR surface impoundment, as well as along the upstream slope of the southern portion of the west side (incised side) of the CCR surface impoundment. The identified change in the geometry involved the temporary placement of fill material along the upstream slopes. After placement of the fill material along the upstream slopes the areas were well graded and seeded.

Review of historical annual inspections completed since 2011, prior to this initial CCR Rule annual inspection for this inactive CCR surface impoundment, has

shown there have been no other previously identified changes in the geometry of the COL Secondary Ash Pond.

### **3.2.2 Existing Instrumentation (§257.83(b)(2)(ii))**

The COL Secondary Ash Pond, prior to this initial CCR Rule annual inspection for the inactive CCR surface impoundment, did not have instrumentation that supported the operation of the inactive CCR surface impoundment.

As of this initial annual inspection, WPL initiated collection of water elevation data of the COL Secondary Ash Pond by means of a global positioning system (GPS). WPL utilized GPS to survey the water surface of the COL Secondary Ash Pond. The water elevation data, since this initial annual inspection, was provided by WPL for 2016. Reviewing the provided water elevation data, the water elevation recorded within the COL Secondary Ash Pond was 785.49 feet (October 2016).

### **3.2.3 Depth and Elevation of Impounded CCR and Water (§257.83(b)(2)(iii))**

As of this initial annual inspection, the approximate minimum, maximum, and present depths and elevations of the impounded CCR and water in the COL Secondary Ash Pond were determined using information that was collected during the initial annual inspection, as well as from historical information that was previously provided from WPL.

At the time of the initial annual inspection a survey was completed in order to determine the present surface water elevation of the CCR surface impoundment. Additionally, depth measurements from the water surface to the top of CCR/sediment were obtained in order to determine present depths/elevations.

The historical information provided from WPL included original design drawing contours of the COL Secondary Ash Pond prepared by Sargent & Lundy (1975),



as well as the most recent topographic/bathymetric survey of the COL Secondary Ash Pond completed by Cornerstone Surveying and Mapping (2016). Reviewing the information provided within the above mentioned documents, as well as the data collected during the initial annual inspection, the following minimum, maximum, and present depths and elevations were approximated for the impounded CCR and water:

- At the time of the annual inspection, the water surface elevation of the COL Secondary Ash Pond was surveyed to be 785.64 feet, 16.36 feet below the crest of the west embankment of the CCR surface impoundment, which had an elevation of approximately 802 feet at the lowest point of the embankment.
- At the time of the annual inspection, the water depth that was measured within the CCR surface impoundment varied between 3.65 feet and 4.9 feet.
- From the water depth measurements at the time of the annual inspection, the elevation of the top of CCR/sediment that was measured varied between an elevation of 781.99 feet and 780.74 feet.
- From the 1975 original design drawing contours of the COL Secondary Ash Pond, the original design bottom contour elevation of the CCR surface impoundment was approximately 780 feet. The depth of the COL Secondary Ash Pond varied between 781.99 feet to an elevation of 780.74 feet. Comparing the results from the water depth measurements at the time of the annual inspection to the 1975 original design drawing contours, the deposition thickness varied between 1.99 feet to 0.74 feet.

### 3.2.4 Storage Capacity of Impounding Structure (§257.83(b)(2)(iv))

The storage capacity (i.e. water volume) of the CCR surface impoundment at the time of the annual inspection was calculated based on the acreage of the CCR surface impoundment in the area where water was present, and the approximate depth of water within that area of the CCR surface impoundment. The water depth measurements of the CCR surface impoundment were collected at the time of the annual inspection.

From the 2016 topographic/bathymetric survey data, the area of the water surface of the CCR surface impoundment was 10.1 acres. From the water depth data that was collected during the annual inspection, the average water depth within the CCR surface impoundment was 4.19 feet. Thus, the storage capacity within the COL Secondary Ash Pond at the time of the annual inspection was approximately 68,000 cubic yards.

### 3.2.5 Volume of Impounded CCR and Water (§257.83(b)(2)(v))

The volume of impounded CCR and water (i.e. total volume) within the COL Secondary Ash Pond at the time of the annual inspection was determined using information that was collected during the annual inspection, as well as from historical information that was previously provided from WPL. Historical information provided from WPL included original design drawing contours of the COL Secondary Ash Pond prepared by Sargent & Lundy (1975), as well as the most recent topographic/bathymetric survey of the COL Secondary Ash Pond completed by Cornerstone Surveying and Mapping (2016).

The water surface elevation of the CCR surface impoundment that was surveyed at the time of the annual inspection was 785.64 feet. From the 1975 original design drawing contours of the COL Secondary Ash Pond, the original design bottom contour elevation of the CCR surface impoundment was

approximately 780 feet. Thus, the interior storage height of the COL Secondary Ash Pond was 5.64 feet

The surface area of the COL Secondary Ash Pond, in the area where both water and CCR were present, was 10.1 acres. The total volume of impounded CCR and water within the COL Secondary Ash Pond at the time of the annual inspection was approximately 92,000 cubic yards.

### **3.2.6 Structural Weaknesses and Disruptive Conditions (§257.83(b)(2)(vi))**

After review of available information provided by COL pertaining to the status and condition of the inactive CCR surface impoundment, discussions with COL facility personnel who oversee and maintain the operation, maintenance, and inspection activities of the inactive CCR surface impoundment, as well as conducting the on-site visual inspection of the inactive CCR surface impoundment, there have been no identified appearances of an actual or potential structural weakness of the inactive CCR surface impoundment. Additionally, there were no visual inspection issues with the structural integrity of the hydraulic structures (permanently closed 18-inch corrugated metal pipe) associated with the COL Primary Ash Pond.

Regarding the existing conditions of the COL Secondary Ash Pond, there were no existing conditions identified along the upstream and downstream slopes of the embankments that were disrupting or have the potential to disrupt the operation and safety of the inactive CCR surface impoundment.


### **3.2.7 Other Changes Affecting Stability or Operation of Impounding Structure (§257.83(b)(2)(vii))**

After review of available information provided by COL pertaining to the status and condition of the inactive CCR surface impoundment, as well as discussions with COL facility personnel who oversee and maintain the operation, maintenance, and inspection activities of the inactive CCR surface

impoundment, there have been no other identified changes that have affected the stability or operation of the COL Secondary Ash Pond.

## 4. CERTIFICATION

To meet the requirements of 40 CFR 257.83(b), I Mark W. Loerop hereby certify that I am a licensed professional engineer in the State of Wisconsin; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in 40 CFR 257.83(b).

By:   
Name: MARK LOEROP  
Date: Dec 21, 2016

