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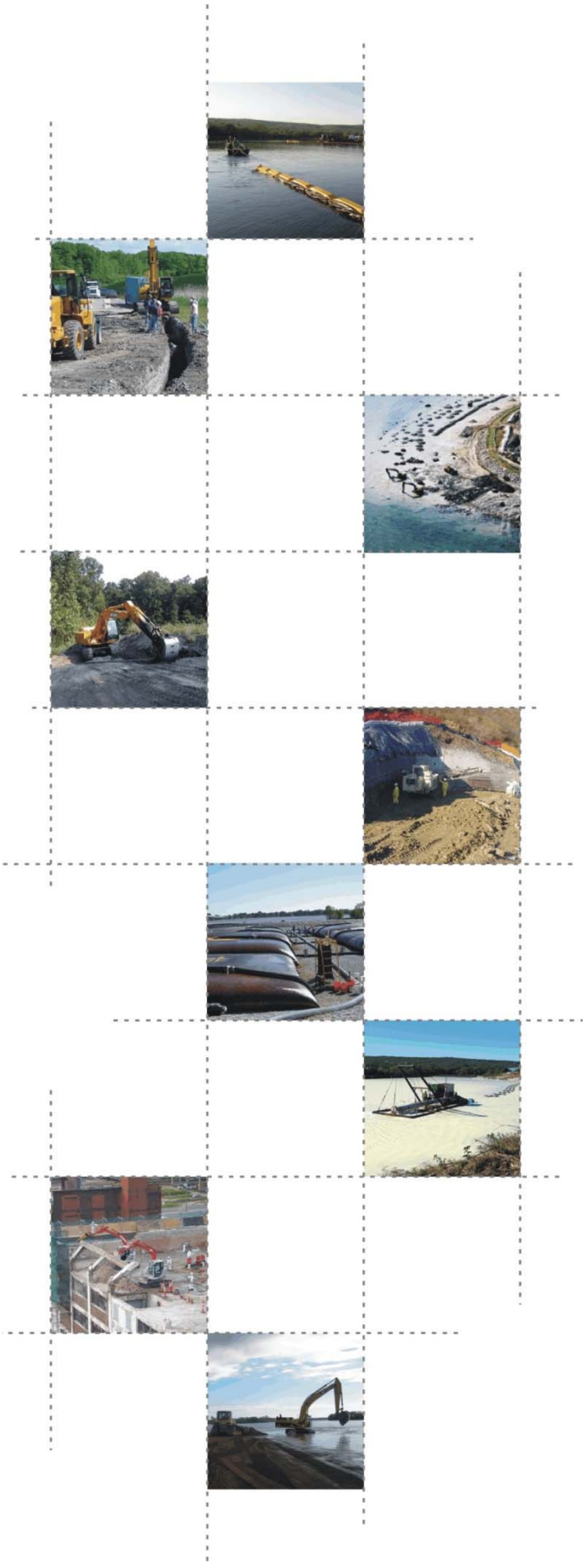
WISCONSIN POWER AND LIGHT
COLUMBIA ENERGY CENTER

CCR SURFACE IMPOUNDMENT

ANNUAL INSPECTION REPORT

January 15, 2016



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EXECUTIVE SUMMARY

This annual inspection report has been prepared in accordance with the requirements of the United States Environmental Protection Agency (USEPA) 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 know as the CCR Rule) published on April 17, 2015 and effective October 19, 2015.

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

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1.0 INTRODUCTION

This annual inspection report has been prepared in accordance with the requirements of §257.83(b) of 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)).

1.2 Annual Inspection Applicability to the Columbia Energy Center

The Wisconsin Power and Light Company (WPL), Columbia Energy Center (COL) in Pardeeville, Wisconsin has two existing CCR surface impoundments, identified as the COL Primary Ash Pond and COL Secondary Pond. The existing CCR surface impoundments at COL meet the requirements of §257.73(b)(1) and §257.73(b)(2) of the CCR Rule, as the existing CCR surface impoundments have a storage height greater than 20 feet and a storage volume greater than 20 acre-feet, and thus are subject to the periodic structural stability assessment requirements of §257.73(d) of the CCR Rule. Therefore, the existing CCR surface impoundments at COL are required to be inspected by a qualified PE on a periodic basis per §257.83(b) of the CCR Rule.

The initial annual inspection of the existing CCR surface impoundments at COL was completed by a qualified PE on October 20, 2015. The annual inspection was completed by a qualified PE to ensure that the design, construction, operation, and maintenance of the existing CCR surface impoundments at COL are consistent with recognized and generally accepted good engineering standards.

The initial annual inspection of the existing CCR surface impoundments included a review of available information regarding the status and condition of the existing CCR surface impoundments. The information reviewed included all relavant files available in the operating record at the time of the initial annual inspection. These files for the existing CCR surface impoundments at COL included the 7-day inspection forms and 30-day instrumentation monitoring forms.

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

2.0 DESCRIPTION OF EXISTING CCR SURFACE IMPOUNDMENTS AT COL

The following sub-sections provides a summary description of the existing CCR surface impoundments located at COL.

2.1 COL Primary Ash Pond

The COL Primary Ash Pond is located north of the generating plant and west of the COL Secondary 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 impoundment.

The western half 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 half 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 half 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 half of the COL Primary Ash Pond for dewatering. Once dewatered the CCR is ran 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 half of the COL Primary Ash Pond. The recirculating pumps return the 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, as well as a visual staff gauge, for monitoring water elevations in the COL Primary Ash Pond.

Regarding hydraulic structures, an 18-inch diameter corrugated metal pipe is located immediately south of the pump house, along the interior dike between the COL Primary Ash Pond and COL Secondary Pond. The hydraulic structure 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 Pond

The COL Secondary Pond is located north of the generating plant and east of the COL Primary Ash Pond. The COL Secondary Pond was previously a downstream receiver of influent flows from the COL Primary Ash Pond. The water within the COL Secondary 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 Pond acts as a storm water detention pond with the only influent sources being precipitation and storm water runoff from the surrounding area. The water within the COL Secondary Pond either infiltrates or evaporates. The water within the COL Secondary Pond has significantly decreased in elevation since no longer being a downstream receiver of influent flows from the COL Primary Ash Pond.

3.0 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 CCR surface impoundment located at COL.

3.1 COL Primary Ash Pond

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

After review of available information provided by COL pertaining to the status and condition of the 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 identified changes in the geometry of the impounding structure that would warrant additional investigation or remedial activities.

Additionally, review of historical annual inspections completed in 2011 through 2014, prior to this initial CCR Rule annual inspection, has shown there have been no previously identified changes in the geometry of the COL Primary Ash Pond.

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, as well as a visual staff gauge, 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 to the the elevation of the water surface of the COL Primary Ash Pond. The instrumentation is not associated with a data collector, however, the measurement readings are checked on a weekly basis.

As this is the initial CCR Rule annual inspection, there is no historical record of available information regarding the maximum recorded readings of each instrument from a previous annual inspection that was reviewed. However, at the time of the initial CCR Rule annual inspection, the submersible hydrostatic level transducer had a measurement reading of approximately 12.9 feet.

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

As this is the initial CCR Rule annual inspection, there was no historical record of available information regarding the approximate minimum, maximum, and present

depths and elevations of the impounded CCR and water in the COL Primary Ash Pond from a previous annual inspection was available for review.

However, historical information was previously provided from WPL staff, including original design drawing contours of the COL Primary Ash Pond prepared by Sargent & Lundy (1975), the most recent topographic survey of the COL Primary Ash Pond (1995), as well as a technical memorandum titled "Holding Capacity Settling Ponds" prepared by RMT (2003) which included information regarding water elevation data and the deepest recorded water depth. Reviewing the information provided within the above mentioned documents, the following depths and elevations were approximated for the impounded CCR and water:

Eastern Half of COL Primary Ash Pond

- From the 1975 original design drawing contours of the COL Primary Ash Pond, the original design bottom contour elevation of the existing CCR surface impoundment was approximately 780.
- From the 1995 topographic survey data and the 2003 RMT technical memorandum, the water elevation of the COL Primary Ash Pond was approximately 792.
- From the 2003 RMT technical memorandum, water depths were recorded in the COL Primary Ash Pond on an approximate 100-foot grid. The deepest recorded water depth measured was approximately 11 feet, at elevation 781.
- Comparing the 2003 calculated bathymetric surface depth to the 1975 original design drawing contours, the total deposition thickness of the COL Primary Ash Pond, in the eastern half, was approximately 1 foot.

Western Half of COL Primary Ash Pond (CCR handling area)

- From the 1975 original design drawing contours of the COL Primary Ash Pond, the original design bottom contour elevation of the existing CCR surface impoundment was approximately 780.
- From the 1995 topographic survey data, the water elevation in the western half of the COL Primary Ash Pond was approximately 794. Note, the volume of water present in the western half of the COL Primary Ash Pond was minimal due to the majority of the area is a CCR handling area.
- From the 1995 topographic survey data, the average top of CCR elevation surveyed in the CCR handling area was approximately 795.

- Comparing the 1995 topographic survey data to the 1975 original design drawing contours, the total deposition thickness of the COL Primary Ash Pond, in the western half, was approximately 15 feet.

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

The storage capacity (water volume) of the COL Primary Ash Pond at the time of the initial annual inspection was not readily available.

However, historical information was previously provided from WPL staff, including original design drawing contours of the COL Primary Ash Pond prepared by Sargent & Lundy (1975), the most recent topographic survey of the COL Primary Ash Pond (1995), as well as a technical memorandum titled "Holding Capacity Settling Ponds" prepared by RMT (2003) which included information regarding water elevation data and the deepest recorded water depth. Reviewing the information provided within the above mentioned documents, the approximate storage capacity of the COL Primary Ash Pond was calculated.

From the 1995 topographic survey, the surveyed water elevation in the eastern half of the COL Primary Ash Pond was approximately 792. From the 2003 RMT technical memorandum, the deepest recorded water depth of the COL Primary Ash Pond was approximately 11 feet, at elevation 781.

The total surface area of the COL Primary Ash Pond, including the eastern and western halfs of the existing CCR surface impoundment, was approximately 14.7 acres. However, as the western half of the COL Primary Ash Pond is mostly a CCR handling area and has little available storage capacity, only the surface area in the eastern half of the COL Primary Ash Pond was considered in the calculation of the storage capacity. The surface area of the eastern half of the COL Primary Ash Pond was approximately 6 acres. Thus, the total volume of water within the COL Primary Ash Pond available for storage was approximately 106,000 cubic yards.

Note, the surveyed water elevation of 792 is significantly below the lowest surveyed point of the top of the impounding structure which was approximately 801. Therefore, the COL Primary Ash Pond could have a significantly larger storage capacity if future operations raised the current operating water level.

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

The volume of impounded CCR and water (total volume) within the COL Primary Ash Pond at the time of the initial annual inspection was not readily obtained available.

However, historical information was previously provided from WPL staff, including original design drawing contours of the COL Primary Ash Pond prepared by Sargent & Lundy (1975), the most recent topographic survey of the COL Primary Ash Pond (1995), as well as a technical memorandum titled "Holding Capacity Settling Ponds" prepared by RMT (2003) which included information regarding water elevation data and the deepest recorded water depth. Reviewing the information provided within the above mentioned documents, the approximate volume of impounded CCR and water in the COL Primary Ash Pond was calculated.

From the 1975 original design drawing contours, the original design bottom contour elevation of the COL Primary Ash Pond was approximately 780. From the 1995 topographic survey, the surveyed water elevation within the COL Primary Ash Pond was between 792 (eastern half) and 794 (western half). Using the maximum surveyed water elevation of 794, the interior storage height of the COL Primary Ash Pond was approximately 14 feet. The total surface area of the COL Primary Ash Pond, including the eastern and western halfs, was approximately 14.7 acres. Thus, the total volume of impounded CCR and water within the COL Primary Ash Pond was approximately 330,000 cubic yards.

From the 1995 topographic survey, the lowest elevation surveyed along the top of the impounding structure was approximately 801. The lowest elevation was located along the interior dike that separates the COL Primary Ash Pond from the COL Secondary Pond. Using the lowest elevation surveyed of the top of the impounding structure, the maximum interior storage height possible of CCR and water was approximately 21 feet. Thus, the maximum total volume of impounded CCR and water capable of being contained in the COL Primary Ash Pond, if required, was approximately 500,000 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 that would warrant additional investigation or remedial activities. Additionally, there were no identified issues with the structural integrity of the hydraulic structures (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.

Additionally, review of historical annual inspections completed in 2011 through 2014, prior to this initial CCR Rule annual inspection, has shown there have been no previously identified changes that have affected the stability or operation of the COL Primary Ash Pond.

3.2 COL Secondary 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 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 identified changes in the geometry of the impounding structure that would warrant additional investigation or remedial activities.

Additionally, review of historical annual inspections completed in 2011 through 2014, prior to this initial CCR Rule annual inspection, has shown there have been no previously identified changes in the geometry of the COL Secondary Pond.

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

The COL Secondary Pond, at the time of this initial CCR Rule annual inspection, does not have instrumentation that supports the operation of the existing CCR surface impoundment.

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

As this is the initial CCR Rule annual inspection, there was no historical record of available information regarding the approximate minimum, maximum, and present depths and elevations of the impounded CCR and water in the COL Secondary Pond from a previous annual inspection that were available for review.

However, historical information was previously provided from WPL staff, including original design drawing contours of the COL Secondary Pond prepared by Sargent & Lundy (1975), the most recent topographic survey of the COL Secondary Pond (1995), as well as a technical memorandum titled "Holding Capacity Settling Ponds" prepared by RMT (2003) which included information regarding water elevation data and the deepest recorded water depth. Reviewing the information provided within the above mentioned documents, the following depths and elevations were approximated for the impounded CCR and water:

- From the 1975 original design drawing contours of the COL Secondary Pond, the original design bottom contour elevation of the existing CCR surface impoundment was approximately 780.
- From the 2003 RMT technical memorandum, the water elevation of the COL Secondary Pond was approximately 792.
- From the 2003 RMT technical memorandum, water depths were recorded in the COL Secondary Pond on an approximate 100-foot grid. The deepest recorded water depth measured was approximately 11.3 feet, at elevation 780.7.
- Comparing the 2003 calculated bathymetric surface depth to the 1975 original design drawing contours, the total deposition thickness of the COL Secondary Pond was approximately 0.7 feet.

Note, the water within the COL Secondary Pond has significantly decreased in elevation since 2004, as the COL Secondary Pond is no longer a downstream receiver of influent flows from the COL Primary Ash Pond.

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

The storage capacity (water volume) of the COL Secondary Pond at the time of the initial annual inspection was not readily obtained available.

However, historical information was previously provided from WPL staff, including original design drawing contours of the COL Secondary Pond prepared by Sargent & Lundy (1975), the most recent topographic survey of the COL Secondary Pond (1995), as well as a technical memorandum titled "Holding Capacity Settling Ponds" prepared by RMT (2003) which included information regarding water elevation data and the deepest recorded water depth. Reviewing the information provided within the above mentioned documents, the approximate storage capacity of the COL Secondary Pond was calculated.

From the 2003 RMT technical memorandum, the water elevation in the COL Secondary was approximately 792. From the 2003 RMT technical memorandum, the deepest recorded water depth of the COL Secondary Pond was approximately 11.3 feet, at elevation 780.7.

The total surface area of the COL Secondary Pond was approximately 9.6 acres. Thus, the total volume of water within the COL Secondary Pond available for storage was approximately 175,000 cubic yards.

Note, the surveyed water elevation of 792 is significantly below the lowest surveyed point of the top of the impounding structure which was approximately 801. Therefore, the COL Secondary Pond could have a significantly larger storage capacity if future operations required. Additionally, the water within the COL Secondary Pond has significantly decreased in elevation since 2004, as the COL Secondary Pond is no longer a downstream receiver of influent flows from the COL Primary Ash Pond.

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

The volume of impounded CCR and water (total volume) within the COL Secondary Pond at the time of the initial annual inspection was not readily available.

However, historical information was previously provided from WPL staff, including original design drawing contours of the COL Secondary Pond prepared by Sargent & Lundy (1975), the most recent topographic survey of the COL Secondary Pond (1995), as well as a technical memorandum titled "Holding Capacity Settling Ponds" prepared by RMT (2003) which included information regarding water elevation data and the deepest recorded water depth. Reviewing the information provided within the above mentioned

documents, the approximate volume of impounded CCR and water in the COL Secondary Pond was calculated.

From the 1975 original design drawing contours, the original design bottom contour elevation of the COL Secondary Pond was approximately 780. From the 2003 RMT technical memorandum, the water elevation within the COL Secondary Pond was approximately 792. The interior storage height of the COL Secondary Pond was approximately 12 feet. The total surface area of the COL Secondary Pond was approximately 9.6 acres. Thus, the total volume of impounded CCR and water within the COL Secondary Pond was approximately 185,000 cubic yards.

From the 1995 topographic survey, the lowest elevation surveyed along the top of the impounding structure was approximately 801. The lowest elevation was located along the interior dike that separates the COL Secondary Pond from the COL Primary Ash Pond. Using the lowest elevation surveyed of the top of the impounding structure, the maximum interior storage height possible of CCR and water was approximately 21 feet. Thus, the maximum total volume of impounded CCR and water capable of being contained in the COL Secondary Pond, if required, was approximately 324,000 cubic yards.

Note, the water within the COL Secondary Pond has significantly decreased in elevation since 2004, as the COL Secondary Pond is no longer a downstream receiver of influent flows from the COL Primary Ash Pond.

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 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 that would warrant additional investigation or remedial activities. Additionally, there were no identified issues with the structural integrity of the hydraulic structures (18-inch corrugated metal pipe) associated with the COL Secondary Pond.

Regarding the existing conditions of the COL Secondary 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.

3.2.7 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 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 Secondary Pond.

Additionally, review of historical annual inspections completed in 2011 through 2014, prior to this initial CCR Rule annual inspection, has shown there have been no previously identified changes that have affected the stability or operation of the COL Secondary Pond.

4.0 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: JAN 15, 2016