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**Interstate Power and Light Company**

Burlington Generating Station  
CCR Surface Impoundment Annual Inspection Report  
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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 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) and Extension of Compliance Deadlines for Certain Inactive Surface Impoundments.

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 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.

After conducting the annual inspection, as well as review of available information provided by the Burlington Generating Station pertaining to the status and condition of the existing CCR surface impoundments, and discussions with facility personnel who oversee and maintain the operation, maintenance, and inspection activities of the existing CCR surface impoundments, there are no operating deficiencies and there have been no changes that have affected the stability or operation of the CCR surface impoundments since the previous annual inspection.

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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 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

The Interstate Power and Light Company (IPL), Burlington Generating Station (BGS) in Burlington, Iowa has four existing CCR surface impoundments that meet the requirements of Section 1.1, identified as follows:

- BGS Ash Seal Pond
- BGS Main Ash Pond
- BGS Economizer Pond
- BGS Upper Ash Pond

The CCR surface impoundments have been assigned a state identification number by the Iowa Department of Natural Resources (IDNR), which is 29-UDP-01-15.

The annual inspection of the CCR surface impoundments at BGS was completed by a qualified PE on May 23<sup>rd</sup>, 2018. The annual inspection was completed to ensure that the design, construction, operation, and maintenance of the CCR surface impoundments at BGS are consistent with recognized and generally accepted good engineering standards.

The annual inspection of the CCR surface impoundments at BGS 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 the Alliant Energy CCR Rule Compliance Data and Information website entries for BGS ([ccr.alliantenergy.com](http://ccr.alliantenergy.com)). These files for the CCR surface impoundments at BGS 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 CCR surface impoundments 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. 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 impoundments located at BGS.

### 2.1 BGS Ash Seal Pond

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

After conducting the annual inspection, as well as review of available information provided by BGS pertaining to the status and condition of the existing CCR surface impoundment, and discussions with BGS 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.

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

Instrumentation that supports the operation of the BGS Ash Seal Pond includes a staff gauge to monitor the water elevation of the CCR surface impoundment. The staff gauge, installed in October 2016, is in the southwest corner of the BGS Ash Seal Pond.

The staff gauge water elevation data, since the previous annual inspection, was provided by IPL. The staff gauge measurements were collected at the same time as the 7-day inspections. The water elevation data included measurements collected between October 05, 2017 and May 17, 2018. Review of the provided staff gauge water elevation data showed water was not observed to be present within the BGS Ash Seal Pond since the previous annual inspection. The elevation of the top of CCR/sediment within the BGS Ash Seal Pond, at the location of the staff gauge, is approximately 531.66 feet.

### 2.1.3 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 BGS Ash Seal 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 IPL.

Information collected at the time of the annual inspection included the water surface elevation of the CCR surface impoundment. The historical information provided from IPL included staff gauge water elevation data since the previous annual inspection, a drawing of the original structural site preparation grading plan contours of the BGS Ash Seal Pond prepared by Black & Veatch (1965), as well as the most recent topographic/bathymetric survey of the BGS Ash Seal Pond completed by French-Reneker-Associates (2016). Reviewing the information provided within the above-mentioned documents, the following minimum, maximum, and present depths and elevations were approximated for the impounded CCR and water:

- At the time of the annual inspection, water was not observed to be present within the BGS Ash Seal Pond. Therefore, the present depth and elevation of water within the CCR surface impoundment was unable to be determined. Additionally, review of the staff gauge water elevation data since the previous annual inspection showed no water being present within the BGS Ash Seal Pond during any of the instrumentation monitoring periods. Therefore, there was no data available to determine the minimum or maximum depths or elevations of impounded water within the BGS Ash Seal Pond since the previous annual inspection.



- From the 2016 topographic/bathymetric survey of the BGS Ash Seal Pond, the elevation of the top of CCR/sediment varied between an elevation of 529 feet in the southwest corner of the CCR surface impoundment to an elevation of 536 feet in the northeast corner of the CCR surface impoundment. The average elevation of the top of CCR/sediment within the BGS Ash Seal Pond was approximately 532.5 feet.
- From the 1965 drawing of the original structural site preparation grading plan contours, the bottom contour elevation of the BGS Ash Seal Pond was approximately 12 feet below the top of crest of the south embankment at an elevation of 521 feet. Comparing the 2016 topographic/bathymetric survey top of CCR/sediment elevations to the 1965 drawing of the original structural site preparation grading plan bottom contour elevation, the deposition thickness of the BGS Ash Seal Pond varied between 8 feet in the southwest corner to 15 feet in the northeast corner of the CCR surface impoundment.

#### **2.1.4 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 CCR surface impoundment in the area where water is present, and the approximate depth of water within that area of the CCR surface impoundment. The water depth measurements of the CCR surface impoundment, if water were present, were collected at the time of the annual inspection.

At the time of the annual inspection, water was not observed within the BGS Ash Seal Pond. However, historical information previously provided from IPL staff allowed for the calculation of the historical water volume of the BGS Ash

Seal Pond. From a topographic survey completed by Smith Engineering (2008), the normal operating surface water elevation of the BGS Ash Seal Pond was approximately 531.5 feet. From the 2016 topographic/bathymetric survey data, the area of the water surface at elevation 531.5 feet is approximately 2.45 acres. The estimated average top of CCR/sediment elevation within the BGS Ash Seal Pond, in the area where water is present at an elevation of 531.5 feet, was 530.25 feet. Comparing the 2008 topographic survey normal operating surface water elevation (531.5 feet) to the 2016 topographic/bathymetric survey of the top of the CCR/sediment (530.25 feet), the depth of water within the BGS Ash Seal Pond was approximately 1.25 feet. Thus, the water volume within the BGS Ash Seal Pond, based on historical information, is approximately 5,000 cubic yards.

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

The volume of impounded CCR and water (i.e. total volume, not including freeboard) within the BGS Ash Seal Pond at the time of the annual inspection was determined using information that was collected at the time of the annual inspection, as well as from historical information that was previously provided from IPL.

At the time of the annual inspection, water was not observed in the BGS Ash Seal Pond. Therefore, only the total volume of impounded CCR, and not total volume of CCR and water, could be determined.

The approximate volume of impounded CCR in the BGS Ash Seal Pond was calculated using historical information provided from IPL, which included a drawing of the original structural site preparation grading plan contours of the BGS Ash Seal Pond prepared by Black & Veatch (1965), as well as the most

recent topographic/bathymetric survey of the BGS Ash Seal Pond completed by French-Reneker-Associates (2016).

From the 2016 topographic/bathymetric survey of the BGS Ash Seal Pond, the average elevation of the top of CCR/sediment was approximately 532.5 feet. From the 1965 drawing of the original structural site preparation grading plan contours, the bottom contour elevation of the BGS Ash Seal Pond was approximately 12 feet below the top of crest of the south embankment at elevation 521 feet. Thus, the interior storage height of the BGS Ash Seal Pond was estimated to be approximately 11.5 feet.

The surface area of the BGS Ash Seal Pond was approximately 5.7 acres. Thus, the total volume of impounded CCR, not including freeboard, within the BGS Ash Seal Pond at the time of the annual inspection was approximately 106,000 cubic yards.

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

After review of available information provided by BGS pertaining to the status and condition of the existing CCR surface impoundment, discussions with BGS 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 and appurtenant structures.

Regarding the existing conditions of the BGS Ash Seal 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.

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

After review of available information provided by BGS pertaining to the status and condition of the existing CCR surface impoundment, as well as discussions with BGS 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 BGS Ash Seal Pond since the previous annual inspection.

## **2.2 BGS Main Ash Pond**

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

After conducting the annual inspection, as well as review of available information provided by BGS pertaining to the status and condition of the existing CCR surface impoundment, and discussions with BGS 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.

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

Instrumentation that supports the operation of the BGS Main Ash Pond includes a staff gauge to monitor the water elevation of the CCR surface impoundment. The staff gauge, installed in October 2016, is in the northwest corner of the BGS Main Ash Pond.

The staff gauge water elevation data, since the previous annual inspection, was provided by IPL. The staff gauge measurements were collected at the same time as the 7-day inspections. The water elevation data included measurements collected between October 05, 2017 and May 17, 2018. After review of the provided staff gauge water elevation data, the maximum water elevation recorded within the BGS Main Ash Pond was 531.92 feet (November 2017).

### **2.2.3 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 BGS Main 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 IPL.

Note, the annual inspections that were previously completed in 2016 and 2017 included the collection of field data such as surveying of the water surface elevation, as well as on-water GPS depth measurements from the water surface to the top of CCR/sediment to determine depths/elevations. Based on the information obtained during the prior annual inspections, it was determined that physical measurements of the BGS Main Ash Pond would not be required on an annual basis due to the minimal changes that have been observed within the CCR surface impoundment. Therefore, field data collected during the 2017 annual inspection was used in conjunction with information obtained during the annual inspection to approximate minimum, maximum, and present depths and elevations of the impounded CCR and water in the BGS Main Ash Pond.

Information collected at the time of the annual inspection included the water surface elevation of the CCR surface impoundment. The historical information provided from IPL included staff gauge water elevation data since the previous annual inspection, a drawing of the original structural site preparation grading plan contours of the BGS Main Ash Pond prepared by Black & Veatch (1965), as well as the most recent topographic/bathymetric survey of the BGS Main Ash Pond completed by French-Reneker-Associates (2016). Reviewing the information provided within the above-mentioned documents, as well as the collected field data during the annual inspection and the 2017 annual inspection, the following minimum, maximum, and present depths and elevations were approximated for the impounded CCR and water:

- The area of normally impounded water within the BGS Main Ash Pond is in the northwest corner of the CCR surface impoundment. The surface area of the impounded water is approximately 0.46 acres of the approximate 18.9 acres that makes up the BGS Main Ash Pond, which is 2.5% of the total surface area of the CCR surface impoundment. At the time of the annual inspection, the water surface elevation was observed to have a staff gauge elevation of 531.37 feet, 1.63 feet below the crest of the west embankment which has an elevation of approximately 533 feet.
- At the time of the prior annual inspection in 2017, the water depths that were measured within the CCR surface impoundment varied between 0.7 feet and 4.5 feet.
- The water surface elevation at the time of the annual inspection was approximately 0.58 feet higher than the water surface during the 2017

- annual inspection, therefore, the water depths within the CCR surface impoundment would vary between 1.28 feet and 5.08 feet.
- From the water depth measurements that were collected at the time of the prior annual inspection in 2017, the elevation of the top of the CCR/sediment that was measured varied between an elevation of 530.09 feet and 526.29 feet.
  - From staff gauge water elevation data provided by IPL since the 2017 annual inspection, the minimum water elevation within the BGS Main Ash Pond was recorded to be 530.37 feet. The maximum water elevation within the BGS Main Ash Pond was recorded to be 531.92 feet.
  - From the 1965 drawing of the original structural site preparation grading plan contours, the bottom contour elevation that was present prior to the construction of the BGS Main Ash Pond was approximately 524 feet. Comparing the results from the water depth measurements at the time of the 2017 annual inspection to the 1965 drawing of the original structural site preparation grading plan bottom contour elevation, the deposition thickness in the area of normally impounded water within the northwest corner of the BGS Main Ash Pond varied between 6.09 feet and 2.29 feet.
  - Of the 18.9 acres that makes up the surface area of the BGS Main Ash Pond, approximately 18.44 acres consists of CCR/sediment and does not normally consist of impounded water. From the 2016 topographic/bathymetric survey of the BGS Main Ash Pond, the elevation of the top of CCR/sediment varied throughout the CCR surface impoundment, as follows:

- In the western half of the BGS Main Ash Pond (i.e. non-CCR operational area), the top of CCR/sediment elevation varied between 532 feet and 536 feet. Comparing the 2016 topographic/bathymetric survey top of CCR/sediment elevations to the 1965 drawing of the original structural site preparation grading plan bottom contour elevation, the deposition thickness of the BGS Main Ash Pond in the western half of the CCR surface impoundment varied between 8 feet to 12 feet.
- In the eastern half of the BGS Main Ash Pond (i.e. CCR operational area), the top of CCR/sediment elevation varied between 534 feet and 563 feet. Comparing the 2016 topographic/bathymetric survey top of CCR/sediment elevations to the 1965 drawing of the original structural site preparation grading plan bottom contour elevation, the deposition thickness of the BGS Main Ash Pond in the eastern half of the CCR surface impoundment varied between 10 feet to 39 feet.

#### **2.2.4 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 is present, and the approximate depth of water within that area of the CCR surface impoundment. At the time of the annual inspection, the open water present within the BGS Main Ash Pond was located in the northwest corner of the CCR surface impoundment.



Note, the annual inspections that were previously completed in 2016 and 2017 included the collection of field data such as surveying of the water surface elevation, as well as on-water GPS depth measurements from the water surface to the top of CCR/sediment to determine depths/elevations. Based on the information obtained during the prior annual inspections, it was determined that physical measurements of the BGS Main Ash Pond would not be required on an annual basis due to the minimal changes that have been observed within the CCR surface impoundment. Therefore, field data collected during the prior annual inspection was used in conjunction with information obtained during the annual inspection to approximate the storage capacity of the CCR surface impoundment. The water depth measurement of the CCR surface impoundment was determined based on the observed staff gauge water elevation at the time of the annual inspection compared to the measured water depths collected at the time of the prior annual inspection in 2017.

From the 2016 topographic/bathymetric survey data, the area of the water surface located in the northwest corner of the CCR surface impoundment was approximately 0.46 acres. From the water depth data that was collected during the prior annual inspection in 2017, the average water depth within the northwest corner of the CCR surface impoundment was approximately 2.78 feet. During the annual inspection the water surface elevation was observed to be 531.37 feet, approximately 0.58 feet higher in elevation than that observed in 2017. Therefore, the average water depth within the CCR surface impoundment at the time of the annual inspection was approximately 3.36 feet. Thus, the water volume within the northwest corner of the BGS Main Ash Pond at the time of the annual inspection was approximately 2,500 cubic yards.

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

The volume of impounded CCR and water (i.e. total volume, not including freeboard) within the BGS Main 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 IPL.

Note, the annual inspections that were previously completed in 2016 and 2017 included the collection of field data such as surveying of the water surface elevation, as well as on-water GPS depth measurements from the water surface to the top of CCR/sediment to determine depths/elevations. Based on the information obtained during the prior annual inspections, it was determined that physical measurements of the BGS Main Ash Pond would not be required on an annual basis due to the minimal changes that have been observed within the CCR surface impoundment. Therefore, field data collected during the prior annual inspection was used in conjunction with information obtained during the annual inspection to approximate the volume of impounded CCR and water within the CCR surface impoundment.

Historical information provided from IPL included a drawing of the original structural site preparation grading plan contours of the BGS Main Ash Pond prepared by Black & Veatch (1965), the most recent topographic/bathymetric survey of the BGS Main Ash Pond completed by French-Reneker-Associates (2016), as well as the net total CCR added to the CCR surface impoundment since the prior annual inspection in 2017. It should be noted that removal of an unknown volume of hydrated fly ash from the eastern portion of the CCR surface impoundment has been conducted since the most recent topographic/bathymetric survey was completed in 2016. Therefore, the

calculated volume based on the 2016 survey is likely greater than the actual volume of impounded CCR and water that was present at the time of the annual inspection.

From the 2016 topographic/bathymetric survey of the BGS Main Ash Pond, the average elevation of the top of CCR/sediment in the western portion of the CCR surface impoundment (i.e. non-CCR operational area) was approximately 534.5 feet. The average elevation of the top of CCR/sediment in the eastern portion of the CCR surface impoundment (i.e. CCR operational area) was approximately 544 feet. From the 1965 drawing of the original structural site preparation grading plan contours, the bottom contour elevation that was present prior to the construction of the BGS Main Ash Pond was approximately 524. Thus, the interior storage height of the western portion of the CCR surface impoundment was approximately 10.5 feet and the interior storage height of the eastern portion of the CCR surface impoundment was approximately 20 feet.

The surface area of the western portion of the BGS Main Ash Pond was approximately 10.9 acres. Thus, the volume of impounded CCR and water within the western portion of the BGS Main Ash Pond was approximately 185,000 cubic yards. The surface area of the eastern portion of the BGS Main Ash Pond was approximately 8 acres. Thus, the volume of impounded CCR and water within the eastern portion of the BGS Main Ash Pond was approximately 258,000 cubic yards. Additionally, the net total CCR added to the BGS Main Ash Pond since the prior annual inspection in 2017 was approximately 4,000 cubic yards. Thus, the total volume of impounded CCR and water within the BGS Main Ash Pond at the time of the annual inspection was approximately 447,000 cubic yards.

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

After review of available information provided by BGS pertaining to the status and condition of the existing CCR surface impoundment, discussions with BGS 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 identified issues with the structural integrity of the hydraulic structures (two corrugated metal pipe culverts) associated with the BGS Main Ash Pond.

Regarding the existing conditions of the BGS Main 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.

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

After review of available information provided by BGS pertaining to the status and condition of the existing CCR surface impoundment, as well as discussions with BGS 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 BGS Main Ash Pond since the previous annual inspection.

## 2.3 BGS Economizer Pond

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

After conducting the annual inspection, as well as review of available information provided by BGS pertaining to the status and condition of the existing CCR surface impoundment, and discussions with BGS 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.

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

Instrumentation that supports the operation of the BGS Economizer Pond includes a staff gauge to monitor the water elevation of the CCR surface impoundment. The staff gauge, installed in October 2016, is in the southwest corner of the BGS Economizer Pond.

The staff gauge water elevation data, since the previous annual inspection, was provided by IPL. The staff gauge measurements were collected at the same time as the 7-day inspections. The water elevation data included measurements collected between October 05, 2017 and May 17, 2018. After review of the provided staff gauge water elevation data, the maximum water elevation recorded within the BGS Economizer Pond was 546.82 feet (October 2017).

### 2.3.3 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 BGS Economizer 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 IPL.

Note, the annual inspections that were previously completed in 2016 and 2017 included the collection of field data such as surveying of the water surface elevation, as well as on-water GPS depth measurements from the water surface to the top of CCR/sediment to determine depths/elevations. Based on the information obtained during the prior annual inspections, it was determined that physical measurements of the BGS Economizer Pond would not be required on an annual basis due to the minimal changes that have been observed within the CCR surface impoundment. Therefore, field data collected during the 2017 annual inspection was used in conjunction with information obtained during the annual inspection to approximate minimum, maximum, and present depths and elevations of the impounded CCR and water in the BGS Economizer Pond.

Information collected at the time of the annual inspection included the water surface elevation of the CCR surface impoundment. The historical information provided from IPL included staff gauge water elevation data since the previous annual inspection, a drawing of the original structural site preparation grading plan contours prepared by Black & Veatch (1965) which show the original contours prior to the construction of the BGS Economizer Pond, as well as the most recent topographic/bathymetric survey of the BGS Economizer Pond completed by French-Reneker-Associates (2016). Reviewing the information provided within the above-mentioned documents, as well as the collected field data during the annual inspection and the 2017 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 was observed to have a staff gauge elevation of 546.16 feet, 1.39 feet below the crest of the south side of the CCR surface impoundment which had an elevation of 547.55 feet at that location.
- At the time of the prior annual inspection in 2017, the water depths that were measured within the CCR surface impoundment varied between 0.1 feet and 3.2 feet.
- The water surface elevation at the time of the annual inspection was approximately 0.54 feet lower than the water surface during the 2017 annual inspection, therefore, the water depths within the CCR surface impoundment would vary between 0.0 feet (water surface) and 2.66 feet.
- From the water depth measurements that were collected at the time of the prior annual inspection in 2017, the elevation of the top of CCR/sediment that was measured varied between an elevation of 546.6 feet and 543.5 feet.
- From staff gauge water elevation data provided by IPL since the previous annual inspection, the minimum water elevation within the BGS Economizer Pond was recorded to be 545.51 feet. The maximum water elevation within the BGS Economizer Pond was recorded to be 546.82 feet.
- From the 1965 drawing of the original structural site preparation grading plan contours, the bottom contour elevation that was present prior to the construction of the BGS Economizer Pond was approximately 521 feet. Comparing the results from the water depth

measurements collected at the time of the prior annual inspection in 2017 to the 1965 drawing of the original structural site preparation grading plan bottom contour elevation, the deposition thickness within the BGS Economizer Pond varied between 25.6 feet and 22.5 feet.

- From the 2016 topographic/bathymetric survey, the top of CCR elevation along the economizer embankment varied between 546 feet and 550 feet. Comparing the 2016 topographic/bathymetric survey top of CCR elevations to the 1965 drawing of the original structural site preparation grading plan bottom contour elevation, the deposition thickness of the economizer embankment varied between 25 feet to 29 feet.

#### **2.3.4 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 is present, and the approximate depth of water within that area of the CCR surface impoundment.

Note, the annual inspections that were previously completed in 2016 and 2017 included the collection of field data such as surveying of the water surface elevation, as well as on-water GPS depth measurements from the water surface to the top of CCR/sediment to determine depths/elevations. Based on the information obtained during the prior annual inspections, it was determined that physical measurements of the BGS Economizer Pond would not be required on an annual basis due to the minimal changes that have been observed within the CCR surface impoundment. Therefore, field data collected during the prior annual inspection was used in conjunction with information



obtained during the annual inspection to approximate the storage capacity of the CCR surface impoundment. The water depth measurement of the CCR surface impoundment was determined based on the observed staff gauge water elevation at the time of the annual inspection compared to the measured water depths collected at the time of the prior annual inspection in 2017.

From the 2016 topographic/bathymetric survey data, the area of the water surface of the CCR surface impoundment was approximately 0.35 acres. From the water depth data that was collected during the prior annual inspection in 2017, the average water depth within the CCR surface impoundment was approximately 1.78 feet. During the annual inspection the water surface elevation was observed to be 546.16 feet, approximately 0.54 feet lower in elevation than that observed in 2017. Therefore, the average water depth within the CCR surface impoundment at the time of the annual inspection was approximately 1.35 feet. Thus, the water volume within the BGS Economizer Pond at the time of the annual inspection was approximately 775 cubic yards.

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

The volume of impounded CCR and water (i.e. total volume, not including freeboard) within the BGS Economizer 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 IPL.

Note, the annual inspections that were previously completed in 2016 and 2017 included the collection of field data such as surveying of the water surface elevation, as well as on-water GPS depth measurements from the water surface to the top of CCR/sediment to determine depths/elevations. Based on the

information obtained during the prior annual inspections, it was determined that physical measurements of the BGS Economizer Pond would not be required on an annual basis due to the minimal changes that have been observed within the CCR surface impoundment. Therefore, field data collected during the prior annual inspection was used in conjunction with information obtained during the annual inspection to approximate the volume of impounded CCR and water within the CCR surface impoundment.

Historical information provided from IPL included a drawing of the original structural site preparation grading plan contours prepared by Black & Veatch (1965), the most recent topographic/bathymetric survey of the BGS Economizer Pond completed by French-Reneker-Associates (2016), as well as the net total CCR added to the CCR surface impoundment since the prior annual inspection in 2017.

The water surface elevation at the time of the annual inspection was observed to have a staff gauge elevation of 546.16 feet. From the 2016 topographic survey of the economizer embankment, the average elevation of the top of CCR along the economizer embankment was approximately 548 feet. From the 1965 drawing of the original structural site preparation grading plan contours, the bottom contour elevation that was present prior to the construction of the BGS Economizer Pond and economizer embankment was approximately 521 feet. Thus, the interior storage height of the BGS Economizer Pond is approximately 25.16 feet and the interior storage height of the economizer embankment (not including the area of the BGS Economizer Pond) was approximately 27 feet.

The surface area of the BGS Economizer Pond was approximately 0.35 acres. Thus, the volume of impounded CCR and water, not including freeboard, within

the BGS Economizer Pond was approximately 14,200 cubic yards. The surface area of the economizer embankment (not including the area of the BGS Economizer Pond) was approximately 10.65 acres. Thus, the volume of impounded CCR within the economizer embankment was approximately 464,000 cubic yards. Additionally, the net total CCR added to the BGS Economizer Pond since the prior annual inspection was approximately 260 cubic yards. Thus, the total volume of impounded CCR and water within the BGS Economizer Pond and economizer embankment at the time of the annual inspection was approximately 478,500 cubic yards.

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

After review of available information provided by BGS pertaining to the status and condition of the existing CCR surface impoundment, discussions with BGS 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 identified issues with the structural integrity of the hydraulic structures (two 18-inch diameter high-density polyethylene pipes, rock filled overflow spillway) associated with the BGS Economizer Pond.

Regarding the existing conditions of the BGS Economizer 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.

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

After review of available information provided by BGS pertaining to the status and condition of the existing CCR surface impoundment, as well as discussions with BGS 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 BGS Economizer Pond since the previous annual inspection.

## **2.4 BGS Upper Ash Pond**

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

After conducting the annual inspection, as well as review of available information provided by BGS pertaining to the status and condition of the existing CCR surface impoundment, and discussions with BGS 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.

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

Instrumentation that supports the operation of the BGS Upper Ash Pond includes a Parshall flume discharge structure and equipment to measure the flow of the discharged water, as well as a staff gauge to monitor the water elevation of the CCR surface impoundment. The instrumentation is in the northeast corner of the BGS Upper Ash Pond and is associated with the NPDES Outfall 001 at BGS.

The flow data associated with the NPDES Outfall 001 discharge (i.e. maximum daily flow), since the previous annual inspection, was provided by IPL for 2017

and 2018 (October 01, 2017 through April 30, 2018). Reviewing the provided flow data, the maximum daily flow recorded through NPDES Outfall 001 was 12.74 million gallons (March 2018).

The staff gauge water elevation data, since the previous annual inspection, was provided by IPL. The staff gauge measurements were collected at the same time as the 7-day inspections. The water elevation data included measurements collected between October 05, 2017 and May 17, 2018. After review of the provided staff gauge water elevation data, the maximum water elevation recorded within the BGS Upper Ash Pond was 528.12 feet (March 2018).

#### **2.4.3 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 BGS Upper 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 IPL.

Note, the annual inspections that were previously completed in 2016 and 2017 included the collection of field data such as surveying of the water surface elevation, as well as on-water GPS depth measurements from the water surface to the top of CCR/sediment to determine depths/elevations. Based on the information obtained during the prior annual inspections, it was determined that physical measurements of the BGS Upper Ash Pond would not be required on an annual basis due to the minimal changes that have been observed within the CCR surface impoundment. Therefore, field data collected during the 2017 annual inspection was used in conjunction with information obtained during the

annual inspection in order to approximate minimum, maximum, and present depths and elevations of the impounded CCR and water in the BGS Upper Ash Pond.

Information collected at the time of the annual inspection included the water surface elevation of the CCR surface impoundment. The historical information provided from IPL included staff gauge water elevation data since the previous annual inspection, a drawing of the original structural site preparation grading plan contours prepared by Black & Veatch (1965) which show the original contours prior to the construction of the BGS Upper Ash Pond, as well as the most recent topographic/bathymetric survey of the BGS Upper Ash Pond completed by French-Reneker-Associates (2016). Reviewing the information provided within the above-mentioned documents, as well as the collected field data during the annual inspection and the 2017 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 was observed to have a staff gauge elevation of 527.48 feet, 1.76 feet below the crest of the north embankment of the CCR surface impoundment which has an elevation of 529.24 feet at the lowest point of the embankment.
- At the time of the prior annual inspection in 2017, the water depths that were measured within the CCR surface impoundment varied between 1.4 feet and 4.1 feet.

The water surface elevation at the time of the annual inspection was approximately .04 feet higher than the water surface during the 2017

- annual inspection, therefore, the water depths within the CCR surface impoundment would vary between 1.44 feet and 4.14 feet.
- From the water depth measurements that were collected at the time of the prior annual inspection in 2017, the elevation of the top of CCR/sediment varied between an elevation of 526.04 feet and 523.34 feet.
  - From staff gauge water elevation data provided by IPL since the previous annual inspection, the minimum water elevation within the BGS Upper Ash Pond was recorded to be 527.43 feet. The maximum water elevation within the BGS Upper Ash Pond was recorded to be 528.12 feet.
  - From the 1965 drawing of the original structural site preparation grading plan contours, the bottom contour elevation that was present prior to the construction of the BGS Upper Ash Pond was approximately 521 feet. Comparing the results from the water depth measurements at the time of the 2017 annual inspection to the 1965 drawing of the original structural site preparation grading plan bottom contour elevation, the deposition thickness within the BGS Upper Ash Pond varied between 5.04 feet to 2.34 feet.

#### **2.4.4 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 is present, and the approximate depth of water within that area of the CCR surface impoundment.

Note, the annual inspections that were previously completed in 2016 and 2017 included the collection of field data such as surveying of the water surface elevation, as well as on-water GPS depth measurements from the water surface to the top of CCR/sediment to determine depths/elevations. Based on the information obtained during the prior annual inspections, it was determined that physical measurements of the BGS Upper Ash Pond would not be required on an annual basis due to the minimal changes that have been observed within the CCR surface impoundment. Therefore, field data collected during the prior annual inspection was used in conjunction with information obtained during the annual inspection to approximate the storage capacity of the CCR surface impoundment. The water depth measurement of the CCR surface impoundment was determined based on the observed staff gauge water elevation at the time of the annual inspection compared to the measured water depths collected at the time of the prior annual inspection in 2017.

From the 2016 topographic/bathymetric survey data, the area of the water surface of the CCR surface impoundment was approximately 7.7 acres. From the water depth data that was collected during the prior annual inspection in 2017, the average water depth within the CCR surface impoundment was approximately 3.07 feet. During the annual inspection the water surface elevation was observed to be 527.48 feet, approximately .04 feet higher in elevation than that observed in 2017. Therefore, the average water depth within the CCR surface impoundment at the time of the annual inspection was approximately 3.11 feet. Thus, the water volume within the BGS Upper Ash at the time of the annual inspection was approximately 38,650 cubic yards.



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

The volume of impounded CCR and water (i.e. total volume, not including freeboard) within the BGS Upper 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 IPL.

Note, the annual inspections that were previously completed in 2016 and 2017 included the collection of field data such as surveying of the water surface elevation, as well as on-water GPS depth measurements from the water surface to the top of CCR/sediment to determine depths/elevations. Based on the information obtained during the prior annual inspections, it was determined that physical measurements of the BGS Upper Ash Pond would not be required on an annual basis due to the minimal changes that have been observed within the CCR surface impoundment. Therefore, field data collected during the prior annual inspection was used in conjunction with information obtained during the annual inspection to approximate the volume of impounded CCR and water within the CCR surface impoundment.

Historical information provided from IPL included a drawing of the original structural site preparation grading plan contours prepared by Black & Veatch (1965), as well as the most recent topographic/bathymetric survey of the BGS Upper Ash Pond completed by French-Reneker-Associates (2016).

The water surface elevation within the CCR surface impoundment that was observed at the time of the annual inspection was 527.48 feet. From the 2016 topographic survey of the BGS Upper Ash Pond, the average elevation of the top of CCR/sediment outside the footprint of the water surface was

approximately 529 feet. From the 1965 drawing of the original structural site preparation grading plan contours, the bottom contour elevation that was present prior to the construction of the BGS Upper Ash Pond was approximately 521 feet. Thus, the interior storage height of the BGS Upper Ash Pond (water portion) was approximately 6.48 feet and the interior storage height of the CCR/sediment located outside the footprint of the water surface was approximately 8 feet.

The surface area of the BGS Upper Ash Pond, in the area where water is present, was approximately 7.7 acres. Thus, the volume of impounded CCR and water within the BGS Upper Ash Pond, within the area where water was present but not including freeboard, was approximately 80,500 cubic yards. The surface area of the BGS Upper Ash Pond, in the area located outside of the footprint of the water portion, was approximately 5.6 acres. Thus, the volume of impounded CCR within the BGS Upper Ash Pond, in the area located outside of the footprint of the water portion, was approximately 72,300 cubic yards. The total volume of impounded CCR and water within the BGS Upper Ash Pond at the time of the annual inspection was approximately 152,800 cubic yards.

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

After review of available information provided by BGS pertaining to the status and condition of the existing CCR surface impoundment, discussions with BGS 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 identified issues with the structural integrity of the

hydraulic structures (NPDES Outfall 001) associated with the BGS Upper Ash Pond.

Regarding the existing conditions of the BGS Upper 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.

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

After review of available information provided by BGS pertaining to the status and condition of the existing CCR surface impoundment, as well as discussions with BGS 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 BGS Upper Ash Pond since the previous annual inspection.

### 3. 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 Iowa; 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 W. LOEROP \_\_\_\_\_

Date: July 16, 2018 \_\_\_\_\_

