Gainesville Regional Utilities
Deerhaven Generating Station

Coal Combustion Residual Units
Annual Inspection Report

(October 17, 2015-January 8, 2016)

Prepared by:

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1 Introduction

The Deerhaven Generating Station (site) has two coal combustion residual (CCR) units: a surface impoundment system and a landfill. The surface impoundment system is comprised of two ash ponds (i.e., Ash Cell #1, Ash Cell #2) located within the same slurry wall containment system. These ponds receive bottom ash sluice water from the site's coal-fired combustion unit (i.e., Unit #2) through a piping network which is designed to direct discharge to either pond; cooling tower blowdown represents the largest discharge stream routed to these ponds and sluiced ash constitutes a relatively small portion of the discharges received by these impoundments. As the water travels through the surface impoundments, bottom ash settles and the decant water gravity drains to adjacent pump back ponds (i.e., Pump Back Cell #1, Pump Back Cell #2) via subsurface culverts which run beneath the embankment separating each ash pond from its adjacent pump back pond. The adjacent pump back ponds are exclusively used to store decant water prior to treatment and re-use in plant operations. The slurry wall containment system is located in the peripheral embankment which runs around and encompasses the surface impoundment system, the pump back ponds, and the front-end treatment lime sludge ponds. The slurry wall is keyed into an existing, underlying clay layer. Figure 1 presents a layout of the ponds at the site, including the pump back ponds and several piezometers that are used to qualitatively monitor for seepage through the exterior embankments.

Figure 1. Layout of the CCR Surface Impoundment System and Adjacent Pump Back Ponds (IWCS 2016a)

Currently the CCR landfill primarily accepts flue gas desulfurization byproduct from the Unit #2 scrubbing process. The landfill also accepts bottom ash which is periodically (i.e., approximately every 5 years) dredged from the surface impoundment system ash ponds. Occasionally, loads of fly ash which are not utilized in beneficial use applications are also deposited at the landfill. The landfill is comprised of four cells (Cells 1-4). Similar to the surface impoundment system, a slurry wall containment system which is keyed into an existing underlying clay layer encompasses the landfill as well as a ditch located to the north of the landfill. This northern ditch receives all CCR contact water (i.e., water that comes in contact with CCR). Additional ditches located to the west, east and south of the landfill are exclusively used for routing stormwater run-off to the stormwater pond located to the southeast of the landfill. Figure 2 presents a layout of the CCR landfill at the site, facing east.

Figure 2. Aerial Image of CCR Landfill Facing East (IWCS 2016b)

Title 40 Code of Federal Regulations (CFR) 257.83(b) and 84(b) require that CCR units must be annually inspected by a qualified professional engineer to ensure that the design, construction, operation, and maintenance of each CCR unit is consistent with recognized and generally accepted good engineering standards. 40 CFR 257.53 defines a qualified professional engineer as "an individual who is licensed by a state as a Professional Engineer to practice one or more disciplines of engineering and who is qualified by education, technical knowledge and experience to make the specific technical certifications required under this subpart. Professional engineers making these certifications must be currently licensed in the state where the CCR unit(s) is located". This report is prepared by Dr. Pradeep Jain (FL PE License No. 68657) and Mr. Justin Smith (FL PE License No. 80463); both Dr. Jain and Mr. Smith are licensed professional engineers in the State of Florida.

2 CCR Surface Impoundment System

2.1 Review of Relevant Information

The following documents were reviewed as part of understanding the design and operation of the CCR surface impoundment system located at the site:

- Construction drawings for the surface impoundment system certified as conforming to construction records (B&M 1981)
- Bid documents for the site including construction specifications for the surface impoundments (B&M 1980)
- A Site Certification Application for Unit 2 (RUB 1977)
- A State of Florida Department of Environmental Regulation Electric Power Plant Site Certification Review FDER (1978)
- A slope stability and liquefaction potential analysis conducted for the surface impoundment system (UES 2015)
- A topographic survey of the surface impoundment system (DSI 2015)
- Completed weekly (7-day) inspection worksheets – 12 Total
- Completed monthly (30-day) inspection worksheets – 3 Total

2.1.1 Review of Design and Construction Information

GRU and IWCS started compiling and reviewing historical design and construction documents for the surface impoundment system located at the site in order to prepare documents such as a "history of construction" to comply with CCR regulations. As many of the documents required for CCR rule compliance are not due until later in 2016, a review of historical design and construction reports is not complete. For example, the history of construction completion deadline is 17 October 2016 (§257.73(c)). The assessment presented in this report is based on the extent of documents that were available and a partial review of these documents at the time of this annual inspection. Based on a limited review of these historical reports, the design and construction of the surface impoundments appear to have been consistent with recognized and generally accepted good engineering standards. In the event that future information (e.g., following a complete review of available documents, additional surface impoundment design and construction information becomes available) suggests any potential deficiency in the design and construction of the surface impoundment system, GRU will be notified of this information.

2.1.2 Review of Slope Stability and Liquefaction Potential Analysis

IWCS reviewed a report summarizing the results of a slope stability and liquefaction potential analysis conducted by Universal Engineering Sciences (UES) that was prepared according to the requirements of

§257.73(e). The stability factors of safety presented by UES for the surface impoundment system are all acceptable according to the minimum values required per §257.73(e)(1)(i-iv).

2.1.3 Review of a Topographic Survey of the CCR Surface Impoundment System

IWCS reviewed a topographic survey completed by Degrove Surveyors, Inc. on 13 August 2015. The elevation of key points from this survey were compared to the original construction drawing set (B&M 1981) for an evaluation of geometry changes in the surface impoundments since construction completion in 1981 (i.e., approximately 34 years ago). A table comparing the elevation differences between these two drawing sets is presented in Appendix A. Elevations for the same points/areas between the two drawing sets were typically within a few inches of each other suggesting no significant change in topographic conditions of the impoundment system since its construction.

2.1.4 Review of Weekly and Monthly Inspection Worksheets

Weekly inspection worksheets for the CCR surface impoundment system have been completed and placed in the operating record since 19 October 2015. The following unusual conditions have been noted since initiation of weekly inspections in accordance with the CCR rule:

- Side Slope Vegetation Height > 6 Inches - the grass height on the outer slopes of both Ash Cell #1 and Ash Cell #2 was observed to be greater than the 6-inch requirement (§257.73(a)(4)) on both 19 October 2015 and 26 October 2015. On 26 October 2015, a work order was generated (i.e., #56235) to mow/trim these areas.
- Damaged Butterfly Valve for Drainage of Ash Cell #1 - since 26 October 2015, the butterfly valve which allows control of the drainage of decant water from Ash Cell #1 to Pump Back Cell #1 has been inoperative. An active work order was generated (i.e., #52611) for its repair the same day the condition was observed (i.e., 26 October 2015). An in-depth discussion of this condition is included in the Summary of Deficient Conditions section.
- Inability to Inspect for Abnormal Discoloration, Foaming, Flow, Discharge at the Outlet to the Pump Back Cells - weekly inspection worksheets document that the outfalls of the culverts that discharge decant water from each of the ash ponds to the adjacent pump back ponds are typically approximately 11 feet below the water's surface. Therefore, the inspector is unable to check to see if there is any abnormal discoloration, foaming, flow or discharge at these outlets.

During each monthly inspection, an inspector documents the depth to the phreatic surface in piezometers located in the embankments of Ash Cell #1 and Ash Cell 2. These piezometers are used as a point of comparison to assist in identifying potential embankment seepage areas; Piezometer P-2 and P-3 are each used to monitor each outside embankment for Ash Cell #1 and P-1 is used to monitor the outside embankment of Ash Cell #2. The phreatic surface of the liquid level in the piezometers was compared to the liquid elevation in each adjacent ash pond. Figure 3 and 4 present a comparison of the measured liquid levels for Ash Cell #1 and corresponding piezometers and Ash Cell #2 and corresponding piezometer, respectively. In general, IWCS measurements on the day of the inspection were consistent with those measured by GRU staff during monthly inspections.

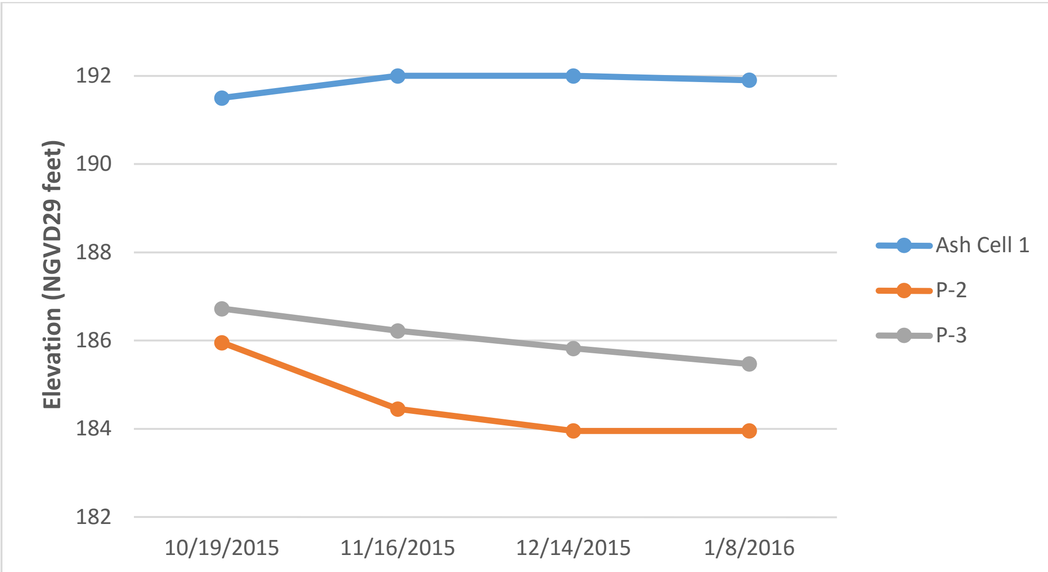

Figure 3. Liquid Elevations for Ash Cell #1 and Piezometers

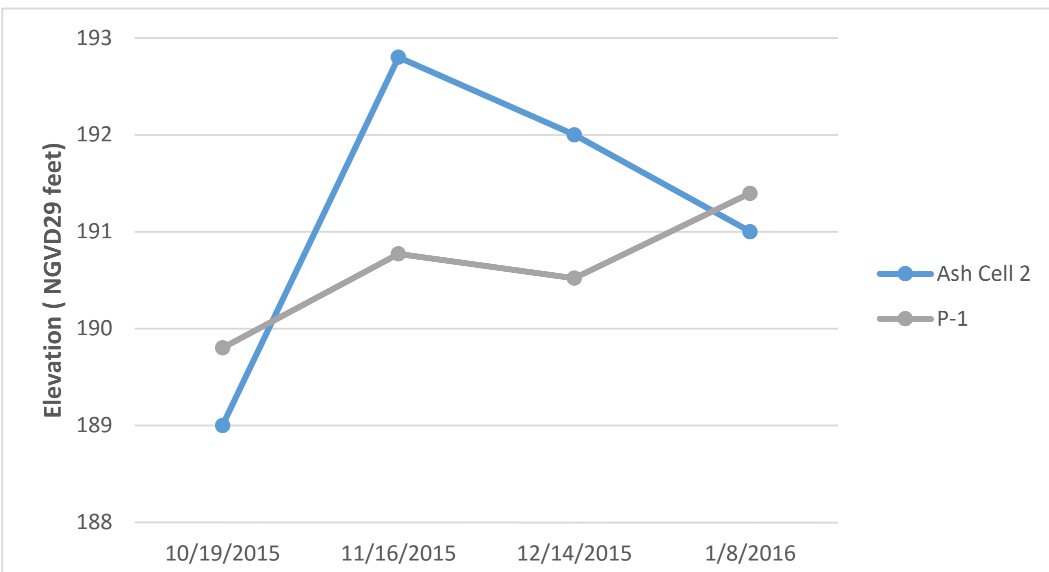

Figure 4. Liquid Elevations for Ash Cell #2 and Piezometers

2.2 Field Inspection

IWCS inspected the CCR surface impoundment system on 8 January 2016. Aerial images of the surface impoundment system were taken during the inspection. The following section describes observations made during the inspection event:

2.2.1 Signs of Distress or Malfunction of CCR Unit or Appurtenant Structures

Other than the operation of an external pump to move decant water from Ash Cell #1 to Pump Back Cell #1 (as a result of the inoperative butterfly valve located in the culvert that connects these ponds) as shown in Figure 5, no visible signs of distress or malfunction of the CCR unit or appurtenant structures were observed at the time of the inspection. An additional discussion concerning this inoperative valve is provided in the Summary of Deficient Conditions section.

Figure 5. Mobile Pump Transporting Decant Water from Ash Cell #1 to Pump Back Cell #1

2.2.2 Hydraulic Structures

IWCS inquired about the possibility of lowering the water level of the pump back ponds to visually inspect the culvert outfalls from the ash ponds. However, high water levels associated with the past rainy season and the associated lack of storage for the water which would have to be removed from the pump back ponds made inspection of the culverts infeasible.

2.2.3 Geometrical Changes of CCR Unit

A comparison of topographic conditions from DSI (2015) in August 2015 to the topographic conditions presented by B&M (1981) does not suggest any significant deviations in geometry since surface impoundment system construction.

2.2.4 Instrumentation Locations and Maximum Readings

The piezometers located adjacent to each of the two ash ponds are the only instruments used for the surface impoundment system. Table 1 presents the location of the piezometers, along with their maximum recorded readings from October 2015 to January 2016. Please note that the easting and northing coordinates are referenced to US State Plane 1983 Florida North 0903. The maximum reading liquid elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD29).

Table 1. Location, Type and Maximum Recorded Readings of Existing Instrumentation

Piezometer	Easting	Northing	Max Elevation (NGVD29)
P-1	2636972.5	284823.8	191.4
P-2	2636725.5	284571.1	186.0
P-3	2636691.7	284443.8	186.7

2.2.5 *Elevation of CCR and Impounded Water*

Table 2 presents a comparison of the water levels observed on the day of inspection with the maximum and minimum levels recorded by GRU staff during weekly and monthly inspections; the water in the ponds are tracked with a staff gauge painted on one of the concrete walls of the stoplog structure in each pond. It should be noted that all depths were calculated assuming the bottom of the ash ponds is located at 179 ft NGVD29, as indicated in the B&M (1981) drawing set. The elevation of ash in the ponds was not recorded as CCR deposits in Ash Pond 1 were not visible due to elevated water level in this pond. The maximum CCR elevation in Ash Pond 2 was slightly above the water level in the pond. As expected, the CCR deposits are deepest near the ash sluice discharge pipe outlets and become shallower with increasing distance away from these pipes.

Table 2. Maximum, Minimum and Present Depth and Elevation of CCR and Water

Location	Media	Parameter	Unit	Present	Minimum	Maximum
Ash Cell #1	Water	Elevation	feet (NGVD29)	191.9	190.6	192.8
		Depth	feet	12.9	11.6	13.8
Ash Cell #2	Water	Elevation	feet (NGVD29)	191.0	189	192.8
		Depth	feet	12.0	10	13.8

2.2.6 *Storage Capacity and Volume of CCR and Impounded Water*

Because the majority of the CCR surface in the ash ponds was inundated at the time of this inspection, the current storage capacity of the CCR unit was not estimated. However, based on construction records, it is estimated that the CCR surface impoundment system has a total volumetric capacity of 17.3 million gallons (or approximately 85,400 cubic yards) with 2 feet of freeboard.

Also, because the CCR surface was mostly inundated, a volumetric estimate of impounded CCR was not conducted. However, based on the present water elevations in each of the ash ponds, the in-place volume of water and CCRs in the ash ponds on 8 January 2016 was estimated to be approximately 14.8 million gallons (or approximately 73,400 cubic yards).

2.2.7 Structural Weaknesses and Adverse Conditions

IWCS walked the external side slopes of the surface impoundment system to look for any potential indicators of structural weakness or any other adverse condition including signs of erosion; bulging; depressions; cracks; animal burrows; boils; or excessive, turbid, or sediment-laden seepage.

Two animal burrows located on the northwest external slope of Ash Cell #1 and Ash Cell #2 were observed. These two burrows were flagged and brought to the attention of GRU personnel on 14 January 2016.

2.2.8 Other Changes Affecting Stability or Operation

No other changes or circumstances were noted during the inspection which may have impacted the stability or operation of the surface impoundment system.

3 CCR Landfill

3.1 Review of Relevant Information

A total of 12 weekly inspection worksheets completed for the CCR landfill were reviewed; these worksheets covered the time period from 19 October 2015 (the day weekly inspections were initiated in accordance with the CCR rule) through 4 January 2015. The worksheets allow the inspector to categorize observations as Acceptable, Area of Concern, or Needs Attention. Needs Attention is defined on the worksheet as "currently or imminently presents a human health, operation or environmental hazard/problem. Address as soon as possible." Area of Concern is defined on the worksheet as "may develop into a "Needs Attention" area if not addressed. Monitor situation and reevaluate during next inspection. Address as necessary." It should be noted that an Area of Concern is not indicative of a problem, but is used to proactively identify and monitor circumstances that have an elevated potential of developing into a problem.

Two (2) Needs Attention observations were made in the timeframe of weekly inspection worksheets reviewed for this report:

- On 9 November 2015, an inspector noted that the Cell 2 to Cell 3 area had compaction and loose pile issues that would be addressed as weather permits.
- On 16 November 2015, an inspector noted that water was beginning to back up into the underdrains which discharge CCR contact water to the northern ditch located within the landfill containment system.

Based on additional notes included in these inspection worksheets, it appears that both these issues were addressed as soon as possible.

Eleven (11) Areas of Concerns were noted. The majority (i.e., five) of these had to do with maintaining a stormwater flow pathway in the southern and western ditches. Areas of Concern appear to have been monitored and typically addressed within a week of observation.

3.2 Field Inspection

IWCS inspected the CCR landfill on 6 January 2016 and 8 January 2016. The following section describes observations made during the inspection event.

3.2.1 Signs of Distress or Malfunction

No signs of distress or malfunction were noted at the CCR landfill during the inspection.

3.2.2 Geometrical Changes of CCR Landfill

The peripheral berm on the external side slopes of Cell 1 and Cell 2 of the CCR landfill has been (and is in the process of being) progressively raised by approximately 4 feet over the last 5 months to receive and contain additional CCR material. No changes in the geometry of the landfill indicative of structural instability or weakness were noted.

3.2.3 Volume of CCR

IWCS conducted a topographic survey of the landfill on 6 January 2016, AutoCAD Civil 3D 2010 cut and fill procedures were used to estimate the volume of in-place CCRs; the landfill bottom elevation was assumed to be 184 feet NGVD29 (as approximately shown in B&M 1981). Approximately 307,000 cubic yards of CCR have been deposited in the landfill to date. The topographic survey and the estimated in-place volume should be considered as a rough approximation as the survey was not performed by a licensed surveyor.

3.2.4 Structural Weaknesses and Adverse Conditions

IWCS performed a visual inspection of all exterior slopes of the CCR landfill for any appearance of actual or potential structural weakness including signs of erosion; bulging; depressions; cracks; animal burrows; boils; or excessive, turbid, or sediment-laden seepage. A number of animal burrows were observed on the external southern slope and the southern portion of the external western slope. An example of one of these burrows is depicted in Figure 6.

Figure 6. Animal Burrow Located on Landfill Southern Exterior Side Slope

A heavily occluded culvert was observed which routes stormwater from a ditch (located on the eastern side of Cell 4) to the stormwater pond located southeast of the landfill. Figures 7 and 8 show images of what appear to be the inlet and outlet locations, respectively, of this culvert.

Figure 7. Inlet Location of Occluded Stormwater Culvert

Figure 8. Outlet Location of Occluded Stormwater Culvert

3.2.5 Other Changes Affecting Stability or Operation

No other changes or circumstances were noted during the inspection which may have impacted the stability or operation of the landfill.

4 Summary of Deficient Conditions

Table 3 presents a summary of the locations of each deficient condition observed during the annual inspection.

Table 3. Location Summary of Deficient Conditions Observed During the Annual Inspection

CCR Unit	Location	Condition
Surface Impoundment System	Ash Cell #1 Butterfly Valve	Inoperative Valve
	Northwest Exterior Slope of Ash Cell #1 and #2	Animal Burrows
Landfill	Southern End of N-S Stormwater Drainage Ditch Located Along East Cell 4	Occluded Culvert
	Southern Exterior Side Slope and Southern Portion of Western Exterior Side Slope	Animal Burrows

As noted previously, the inoperative butterfly valve which controls the gravity discharge of decant water from Ash Cell #1 to Pump Back Cell #1 has had an active work order in effect since the day the condition was first observed (i.e., 26 October 2015). This valve is critical to the operation of the CCR surface impoundment system and GRU personnel are currently working to repair/replace this valve. GRU has installed a diesel-powered pump to move water from this ash pond to the corresponding pumpback pond. IWCS recommends that GRU complete this repair as soon as possible.

IWCS flagged all animal burrows and brought them to the attention of GRU personnel on 14 January 2016. We recommend that GRU both relocate resident animal(s) and backfill these burrows in accordance with federal, state, and local law.

IWCS notified GRU of an occluded stormwater culvert located near the southeast corner of Cell 4 on 14 January 2016. While the vegetation covering the stormwater culvert inlet and outlet is not currently resulting in ponded conditions at the culvert inlet, IWCS recommends that GRU clear the vegetation around the culvert inlet and outlet to improve its capacity.

Per §257.83(b)(5) and §257.84(b)(5), GRU is required to address these identified deficiencies as soon as feasible and document the corrective measures taken.

5 References

B&M (1980). Deerhaven Generating Station – Unit 2, Bid Documents, Contract 29C – Yard Structures III. Prepared for the City of Gainesville, Florida, by Burns and McDonnell.

B&M (1981). Deerhaven Generating Station - Unit 2 Construction, Contract 29C – Yard Structures III. Drawing set conforming to construction records. Prepared for the City of Gainesville, Florida – Alachua County Regional Utilities Board, by Burns and McDonnell. Revised 1 July 1981.

DSI (2015). Map Showing Topographic Survey of a Part of Sections 26 and 27, Township 8 South, Range 19 East, Alachua County, Florida. Survey conducted by Degrove Surveyors, Inc. on 13 April 2015 and Certified to Gainesville Regional Utilities. Drawing set completed 8 September 2015.

FDER (1978). State of Florida Department of Environmental Regulation Electric Power Plant Site Certification Review. Prepared for the Gainesville-Alachua County Regional Utilities Board, Deerhaven, Unit No. 2, Case No. PA 74-04, by the Power Plant Siting Section, Bureau of Permitting, Division of Environmental Permitting, 17 March 1978.

IWCS (2016a). CCR Surface Impoundment System and Pump Back Ponds. Composite Aerial Imagery. Deerhaven Generating Station, Gainesville, Florida. Photographs taken 8 January 2016.

IWCS (2016b). CCR Landfill. Aerial Imagery. Deerhaven Generating Station, Gainesville, Florida. Photograph taken 14 January 2016.

RUB (1977). Site Certification Application, Deerhaven Station Unit 2, Vol. 1. Amended Application For Certification For The Deerhaven Unit 2 Steam Electric Generating Facility. Submitted to the Florida Department of Environmental Regulation by Gainesville/Alachua County Regional Electric, Water & Sewer Utilities Board, 9 December 1977.

UES (2015). Geotechnical Exploration Services – Slope Stability and Liqueaction Potential Analysis, Process Pond Impoundment Dikes, Deerhaven Generating Station (DGS), 10001 NW 13th Street, Gainesville, Alachua County, Florida. Project No. 0230.1500077. Report No. 1251804. Prepared for Innovative Waste Consulting Services, LLC by Universal Engineering Sciences, 20 November 2015.

6 Professional Engineer Certification

This plan was prepared under the supervision, direction and control of the undersigned, registered professional engineer (PE). The undersigned PE is familiar with the requirements of 40 CFR 257.83(b) and 84(b). The undersigned PE certifies that this CCR unit annual inspection report meets the requirements of 40 CFR 257.83(b) and 84(b).

Name of Professional Engineer: Pradeep Jain

Company: Innovative Waste Consulting Services, LLC

Signature:

Date: January 18, 2016

PE Registration State: Florida

PE License No.: 68657

PRADEEP JAIN LICENSE No 68657 STATE OF FLORIDA PROFESSIONAL ENGINEER

APPENDIX A

Table A-1. Comparison of Surveyed Elevations with the Elevation Data in Burns and McDonnell (1981) Drawings

Structural Description of Pond	B&M Drawing Elevation, ft	Survey Elevation, ft	B&M Drawing No.	Notes
Top of Embankment - Ash Cell 1 (Northwestern)	195	194.94 - 195.87	Y70	Surveyed elevations vary around the embankment top
Top of Embankment - Ash Cell 2 (Northwestern)	195	194.67 - 195.62	Y70	Surveyed elevations vary around the embankment top
Top of Embankment - Pump Back Cell 1 (Southeastern)	188	187.60 - 188.66	Y70	Surveyed elevations vary around the embankment top
Top of Embankment - Pump Back Cell 2 (Southeastern)	188	188.08 - 188.76	Y81	Surveyed elevations vary around the embankment top
Stoplog Structure - Ash Cell 1	195.33	195.3	S224	-
Stoplog Structure - Ash Cell 2	195.33	195.2	S224	-
Stoplog Bridge Abutment - Ash Cell 1	195	194.77 - 194.92	S226	-
Stoplog Bridge Abutment - Ash Cell 2	195	194.76 - 194.88	S226	-
Top of North-Western Splashblock Ash Cell 1	195	194.67 - 194.73	UP 46	Drawing indicates that top of splashblock is flush with dike, so it was assumed that the elevation would be the same as the dike elevation of 195 ft
Top of South-Eastern Splashblock Ash Cell 1	195	194.68 - 194.74	UP 46	
Top of North-Western Splashblock Ash Cell 2	195	194.65 - 194.70	UP 46	
Top of South-Eastern Splashblock Ash Cell 2	195	194.62 - 194.65	UP 46	
Electrical Equipment Building Retaining Walls	188.5	188.10 - 188.40	S223	Section C of drawing S223 indicates a TOC of 188.5 ft
Ash Pipe Drain Pit	179.833	179.61-180.27	S231	Section C of the drawing indicates a TOC point of 179'-10" located approximately 50 ft from the edge of the pump back cell dike from Y70.
Ash Cell 1 Toe (Northwestern)	181.68	182.6 - 182.7	Y81	Surveyed elevations vary
Ash Cell 2 Toe (Northwestern)	181.9	182.1 - 182.7	Y81	Surveyed elevations vary