



Inspection Report

To: David Bacher, NRG

From: Richard Southorn, P.E., P.G., CPSWQ

Re: Indian River Landfill – Annual CCR Unit Inspection Report No. 3

Inspection Date: October 5, 2017

Memo Date: January 18, 2018

INTRODUCTION

Title 40 Code of Federal Regulations (CFR) Part 257 addresses, in part, the management of Coal Combustion Residuals (CCR) in regulated units, including landfills. Specific to §257.84(b) of the Rule, existing and new CCR landfills must be inspected on an annual basis by a qualified professional engineer. For the Indian River Generating Station (owned by Indian River Power, LLC, a subsidiary of NRG Energy, Inc. [NRG]), this inspection requirement applies to the existing Indian River Landfill (IRLF). IRLF consists of two phases. Phase I was constructed and closed prior to the implementation of the CCR Rule and is therefore exempt from these regulations. Phase II is a horizontal expansion of Phase I and has a piggyback component (vertical expansion). Phase II is currently operational and therefore falls under the CCR Rule regulations. Due to the fact that Phase II is a piggyback expansion, it is recognized that the stability of Phase I may impact Phase II. Therefore, both Phases I and II are inspected on an annual basis.

Mr. Richard Southorn (a qualified professional engineer with APTIM Environmental & Infrastructure, Inc. [Aptim]) conducted the 2017 annual on-site inspection of IRLF on October 5, 2017. The findings from this annual inspection are summarized in the remaining sections of this correspondence.

As required, this report will be placed in the Indian River facility's operating record per §257.105(g)(9), noticed to the State Director per §257.106(g)(7), and posted to the publicly accessible internet site per §257.107(g)(7). Placement of the first annual inspection report into the facility's operating record was accomplished on January 18, 2016, meeting the January 18, 2016 deadline per §257.84(b)(3)(i). The following inspection report has been placed into the facility's operating record on January 18, 2018 per §257.84(b)(4).

BACKGROUND

The IRLF is an industrial waste landfill used solely for the disposal of CCR wastes or other industrial wastes generated at the station and is operated/maintained in accordance with the State of Delaware Department of Natural Resources and Environmental Control (DNREC) Solid Waste Permit No. 12/01. The IRLF disposal areas are located approximately one half of a mile south of the Generating Station.

The landfill consists of two major phases, Phase I and Phase II. Phase I is unlined and has a 46 acre footprint. Phase I began accepting waste in 1980 and cap construction was approved and

certified closed by DNREC on October 20th, 2014. Phase II has a composite liner, and is 28 acres in size. The Phase II expansion is comprised of two landfill cells (Cell 1 and 2) located west of Phase I and a piggyback (filling over Phase I) expansion on the western slopes of Phase I. The piggyback expansion of Phase II is separated from Phase I by a composite liner system.

The Phase II expansion began accepting waste on September 17, 2010 within Cell 1. Cell 2 received operational authorization in 2015. Cell 1 is not actively receiving CCR material and has a vegetated intermediate cover. Cell 2 is currently open and actively receiving CCR material. No additional areas have been closed. The facility is permitted to sell the CCR for beneficial reuse projects and will continue to seek opportunities to do so.

With respect to the IRLF, Aptim's evaluation has focused on the following items as outlined in §257.84(b)(1)(i-ii):

- *A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record; and*
- *A visual inspection of the CCR unit to identify signs of distress or malfunction.*

Specific to Aptim's preparation of this annual inspection report, and per §257.84(b)(2) (i-iv), the following aspects of the CCR unit have been documented:

- *Any changes in geometry of the structure since the previous annual inspection;*
- *The approximate volume of CCR contained in the unit at the time of the inspection;*
- *Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit; and*
- *Any other change(s) which may have affected the stability or operation of the CCR unit since the previous annual inspection.*

OPERATING RECORDS REVIEW

The operating records review of the facility's operating record and verification was performed during the site inspection. Files reviewed during the on-site inspection included but were not limited to: 2011 Phase II Landfill Expansion Application, NRG Permit SW-12/01, Annual Landfill Operations Report, Weekly Inspection Reports, Leachate Collection System Daily Inspection Reports, Phase I Cap Inspection Forms, Stormwater Conveyance and Discharge System Forms, and Daily/After Storm Event Erosion Control/Emissions Inspection Forms. During the site inspection, Mr. Southorn interviewed Charlie Griggs (Landfill Manager) to verify the information contained within the operating record.

Environmental Control System Overview

- a. **Bottom Liner System** - The Phase II has a composite liner system that consists of a geosynthetic clay liner (GCL) and geomembrane liner system. The composite liner system extends along the piggyback portion between Phase I and Phase II thereby creating a separate layer.

- b. Leachate Collection System - Phase II has a 12-inch drainage system with a series of collection pipes that drain to two sumps located on the north perimeter of Cell 2 and the south perimeter of Cell 1. The leachate is then pumped via a below grade leachate forcemain to the existing above grade leachate storage tanks located west of the landfill. From the tanks, leachate is trucked to the Indian River Generating Station for reuse in the bottom ash system.
- c. Stormwater Management - Non-contact stormwater is drained around the landfill in accordance with the current NPDES permit to stormwater detention basins/ponds located north and south of the landfill. Stormwater run-off from within the active area is collected and managed within the leachate collection system.
- d. Final Cover System - Phase I has received a final cover system and is closed, Cell 1 in Phase II has a vegetated intermediate cover and is not actively accepting CCR material, and Cell 2 in Phase II is an active unit and therefore has no final cover.

Summary of Landfill Construction

As of the date of this inspection, Phase I has been capped and closed. Cell 1 in Phase II is not actively receiving CCR material. Cell 2 in Phase II is currently open and actively receiving CCR material. No additional areas have been closed since the previous annual inspection.

Review of Prior Inspections

- a. Weekly inspections: A review of previous weekly inspections dating back to December 5, 2016 (the date of the previous annual inspection) was conducted to understand any deficiencies and remedial actions. Some minor corrective actions were noted for cover and erosion repairs. All deficiencies were found to be remedied in a timely manner.
- b. Annual inspections: A review of the previous annual inspection has determined that there were no deficiencies or releases, actual or potential structural weaknesses, or concern to the stability of the land form. All environmental control systems were in good operating condition and functioning as intended.

Summary of CCR Volumes

Approximately 784,850 tons (700,759 cy, where 1 cy = 1.12 ton) of CCR was disposed within Phase II as of December 5, 2016, as described in the 2016 Annual Inspection Report. It is estimated that approximately 813,259 cy (910,850 tons) of CCR material will be disposed of within Phase II by the end of 2017, based on an assumed fill rate of 112,500 cy per year (cy/yr) (126,000 ton/year) of CCR material.

Based on this fill rate it is estimated that approximately 6.7 years of landfill life will remain at the end of 2017. Sludge material may be accepted to the landfill in the future, which would provide an additional 2,000 cy/year of material. This additional fill would reduce the landfill life to approximately 6.5 years. Volumes for Phase I were not provided since the Phase I is a closed unit and therefore exempt from the regulations.

SITE INSPECTION

The site inspection was performed on October 5th, 2017 by Mr. Southorn. Mr. Southorn focused on standard geotechnical signs of distress or malfunction such as slumping at the toe of slope, tensile cracking, abnormal or excessive erosion on the side slopes or stormwater management facilities, slope bulging, groundwater/surface water seepage or ponding, etc. These visual signs are potential indicators of structural weakness of the CCR Landfill unit.

Visual Signs of Distress or Malfunction

No visual signs of distress or malfunction were observed during the inspection. Stormwater drainage features, slope appearance and stability, leachate conveyance mechanisms, and overall site conditions were assessed. Closed portions of Phase I and Phase II and stabilized intermediate cover areas of Phase II exhibited well established vegetative cover.

Review of Environmental Control Systems

With no evidence to the contrary, the environmental control systems at IRLF are believed to be in good operating condition and functioning as intended. At the time of the inspection, leachate and stormwater conveyance systems were operating as designed. It is noted that numerous significant storms at the facility shortly before the inspection produced elevated leachate levels in Cell 2 of Phase II. The leachate could be seen to be safely and appropriately contained as it was being drawn down. A high-level alarm indicated the liquid level on the collection system control panel, as intended. This observation confirms the effectiveness of environmental controls.

CONCLUSIONS

Based on a review of the facility's operating record, site interviews and a site inspection, the following conclusions were developed:

Changes in Geometry

As of the date of this inspection, Cell 2 of Phase II is open and receiving CCR material. Active filling operations in Cell 2 in the approximate location shown in the attached figure at a peak elevation generally equal the surrounding perimeter road elevation.

CCR Volume

Based on the CCR haul quantities provided by Indian River, approximately 813,259 cy (910,850 tons) of CCR material have been disposed within Phase II as of the end of 2017. Volumes for Phase I were not provided since Phase I is a closed unit and therefore exempt from the regulations.

Appearances of an Actual or Potential Structural Weakness of CCR Unit

At the time of inspection, there were no signs of distress or malfunction that would indicate actual or potential structural weakness at either Phase I or II.

Changes that May Affect the Stability or Operation of the CCR Unit

There have been no changes to the Indian River Landfill area that pose a threat or concern to the stability of the land form.

RECOMMENDATIONS

Based on the on-site inspection performed on October 5, 2017, APTIM recommends the following actions:

1. Continue operation and maintenance within the active landfilling area as currently performed.
2. Maintain adequate access to the closed portions of the landfill to maintain the ability to perform weekly visual site structural inspections.

There were no deficiencies or releases identified during the 2017 annual inspection that required the owner or operator to perform corrective actions as required under §257.84(b)(5).

PROFESSIONAL ENGINEER'S CERTIFICATION

In accordance with §257.84(b) of the Rule, I hereby certify based on a review of available information within the facility's operating records and observations from my personal on-site inspection (including the photographs contained in Attachment 2), that the IRLF does not exhibit any appearances of actual/potential structural weakness that would be disruptive to the normal operations of the IRLF. The unit is being operated and maintained consistent with recognized and generally accepted good engineering standards and practices.

Certified by: _____



Date: _____

JAN 18, 2018



Richard Southorn, P.E., P.G., CPSWQ
Professional Engineer Registration No. PE 20894
APTIM Environmental & Infrastructure, Inc.

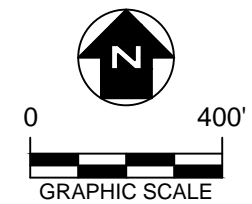
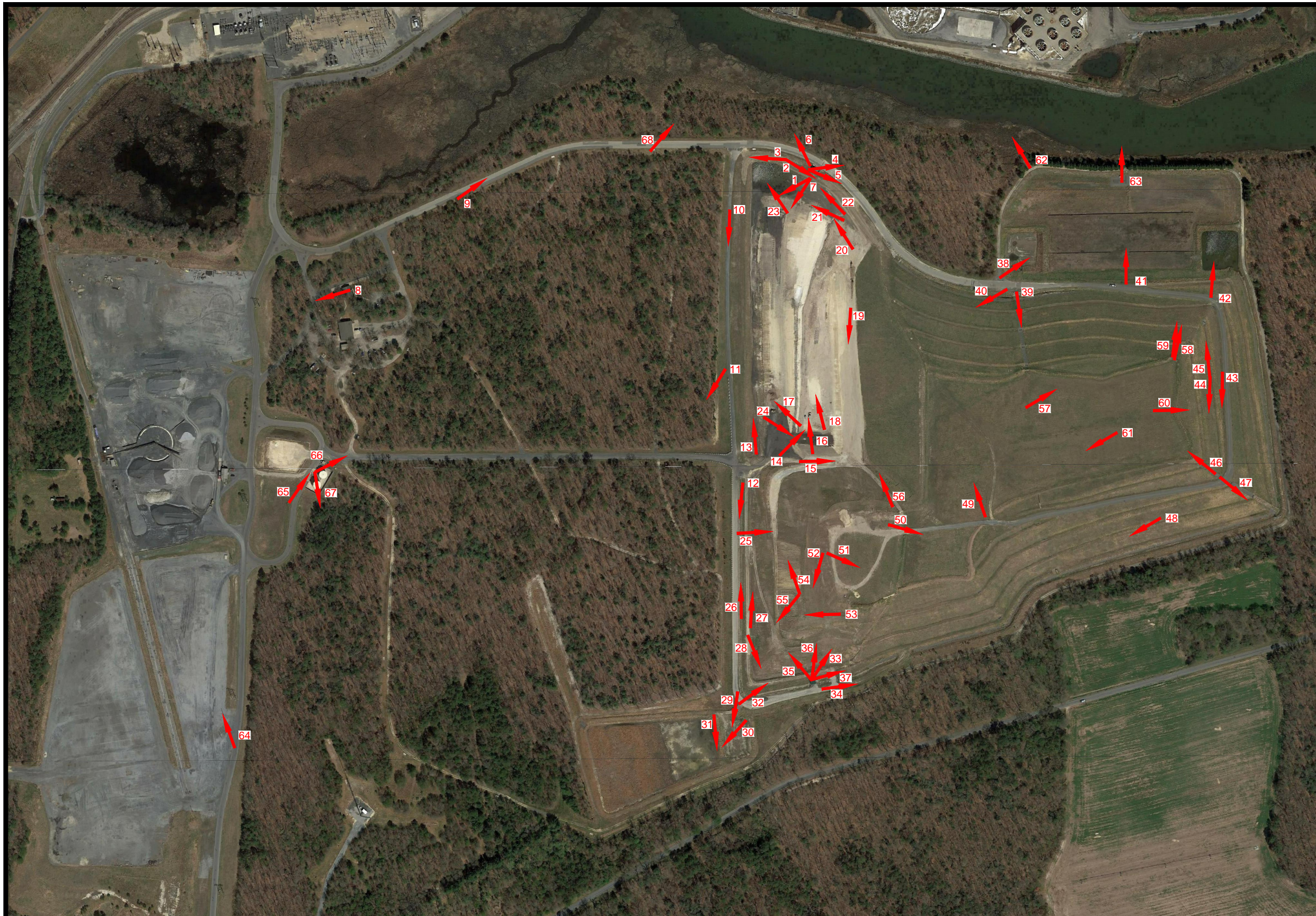
ATTACHMENTS

1. Site Map
2. Inspection Photo Log

REFERENCES

1. Landfill Periodic Inspection Report 2017, January 2017
2. 2017 Annual Landfill Operations Report NRG Energy Indian River Generating Station
3. 40 Code of Federal Regulations Part 257.

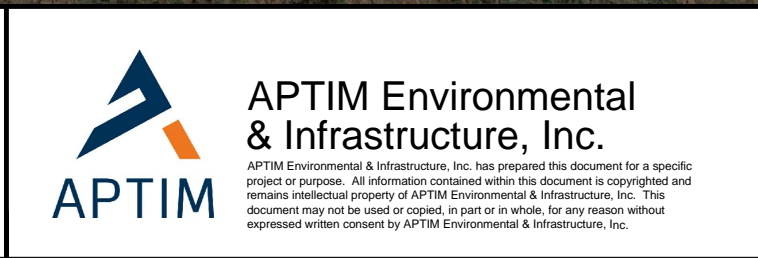
Attachment 1
Site Map



LEGEND

← 2017 ANNUAL INSPECTION PHOTOGRAPH (ARROW DENOTES DIRECTION OF VIEW)

REV. NO.	DATE	DESCRIPTION



INDIAN RIVER LANDFILL DAGSBORO, DELAWARE					
2017 ANNUAL INSPECTION					
DRAWN BY:	BWM	APPROVED BY:	DAM	PROJ. NO.:	631224966
				DATE:	JANUARY 2018

Attachment 2
Photo Log

Project: Indian River Landfill Inspection

Project No.: 1009174008

Photographer: Richard Southorn

Photograph No. 1

Date:

October 5, 2017

Direction:

241° SW

Description:

Standing water within cell due to recent rains. The stormwater water percolates through the ash into the leachate collection layer, where it is pumped out and removed as leachate.



Photograph No. 2

Date:

October 5, 2017

Direction:

240° SE

Description:

View of berm containing standing water within cell due to recent rains. The berms are in good condition and are effective in containing the water.



Photograph No. 3

Date:

October 5, 2017

Direction:

274° W

Description:

Second view of berm containing standing water within cell due to recent rains. The berms are in good condition and are effective in containing the water.



Photograph No. 4

Date:

October 5, 2017

Direction:

83° E

Description:

Phase 2, Cell 2 leachate pump house. Building exterior is in good condition and appropriately signed.



Photograph No. 5

Date:

October 5, 2017

Direction:

113° E

Description:

Leachate liquid level indicator and controls in the Phase 2, Cell 2 leachate pump house. Red light is indicating a high leachate level associated with standing water.



Photograph No. 6

Date:

October 5, 2017

Direction:

334° SNW

Description:

Phase 2, Cell 2 spare leachate pump.



Photograph No. 7

Date:

October 5, 2017

Direction:

213° SW

Description:

Inside Phase, Cell 2 leachate pump riser.



Photograph No. 8

Date:

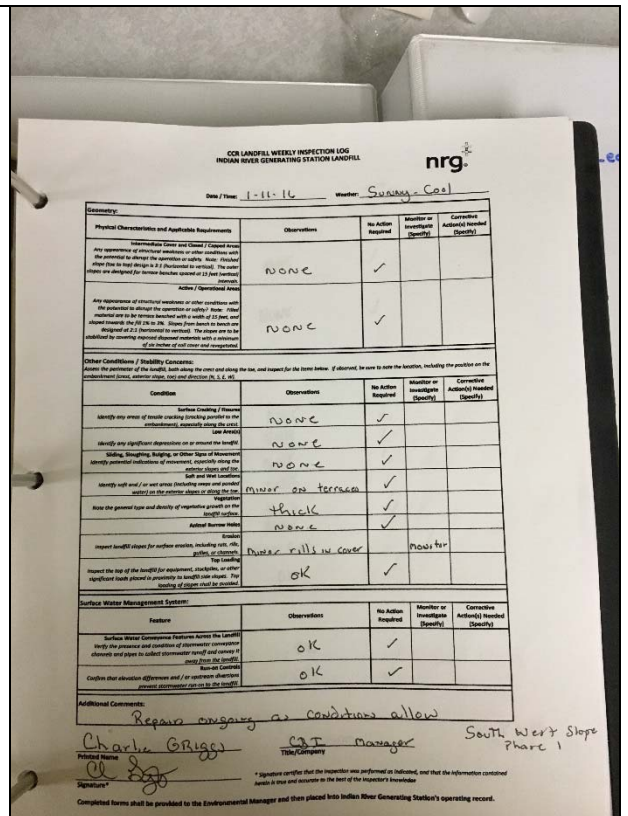
October 5, 2017

Direction:

253° W

Description:

Typical weekly inspection report. Logs appear to be correctly used and up to date.



Photograph No. 9

Date:

October 5, 2017

Direction:

55° NE

Description:

15 mph speed limit sign.



Photograph No. 10

Date:

October 5, 2017

Direction:

208° SW

Description:

Access roads are well maintained.



Photograph No. 11

Date:

October 5, 2017

Direction:

212° SW

Description:

5 mph speed limit near active area.



Photograph No. 12

Date:

October 5, 2017

Direction:

186° S

Description:

Armored perimeter stormwater channel.



Photograph No. 13

Date:

October 5, 2017

Direction:

355° N

Description:

Spill cleanup kit near active face of Phase 2, Cell 2.



Photograph No. 14

Date:

October 5, 2017

Direction:

45° NE

Description:

Bottom ash for disposal in Cell 2, Phase 2. The material is segregated for use as an interior driving surface.



Photograph No. 15

Date:

October 5, 2017

Direction:

89° E

Description:

Phase 2 Cell 1/Cell 2 boundary looking towards the separation berm. No erosion or dust observed.



Photograph No. 16

Date:

October 5, 2017

Direction:

353° N

Description:

Lime being placed in Phase 2, Cell 2.



Photograph No. 17

Date:

October 5, 2017

Direction:

313° NW

Description:

Daily cover soil stockpile in active area of Phase 2, Cell 2. Area is well maintained.



Photograph No. 18

Date:

October 5, 2017

Direction:

346° N

Description:

Haul truck unloading CCR material (lime) for placement in active area of Phase 2, Cell 2. Area is well maintained and graded.



Photograph No. 19

Date:

October 5, 2017

Direction:

184° S

Description:

Phase 1 and Phase 2, Cell 2 boundary.



Photograph No. 20

Date:

October 5, 2017

Direction:

328° NW

Description:

Phase 2 Cell 2 sump area and pump house in background.



Photograph No. 21

Date:

October 5, 2017

Direction:

295° NW

Description:

Sump area of Phase 2, Cell 2.



Photograph No. 22

Date:

October 5, 2017

Direction:

317° NW

Description:

Sump area of Phase 2, Cell 2. Phase 2, Cell 2 leachate pump house in the background.



Photograph No. 23

Date:

October 5, 2017

Direction:

326° NW

Description:

Phase 2, Cell 2 sump area. Leachate from significant rain events is present as standing water, but is effectively contained.



Photograph No. 24

Date:

October 5, 2017

Direction:

123° SE

Description:

Active Phase 2, Cell 2 area. Active area is well maintained with no ponding areas or dust generation.



Photograph No. 25

Date:

October 5, 2017

Direction:

87° E

Description:

Phase 2, Cell 1 final cover has established vegetation which is well maintained. No signs of stability issues on slope or at toe.



Photograph No. 26

Date:

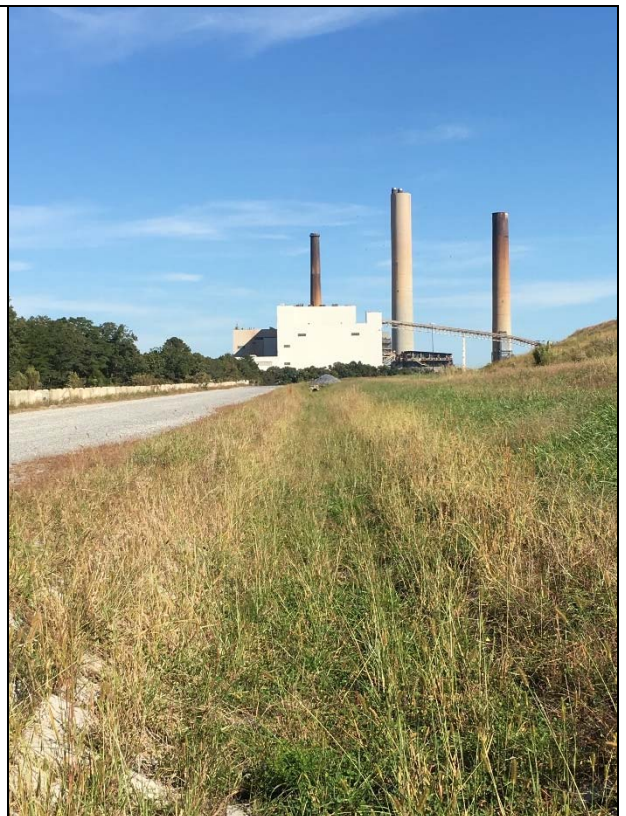
October 5, 2017

Direction:

359° N

Description:

Phase 2, Cell 1 stormwater ditch. Well maintained with armor present.



Photograph No. 27

Date:

October 5, 2017

Direction:

4° N

Description:

Phase 2, Cell 1 interior ditch.



Photograph No. 28

Date:

October 5, 2017

Direction:

158° SE

Description:

Cell 1 final cover rill area repaired in 2016 (see 2016 annual report). Vegetation is lush and no evidence of previous rill is present.



Photograph No. 29

Date:

October 5, 2017

Direction:

189° S

Description:

Inlets to stormwater basin. Clear of obstruction at inlets and outlets.



Photograph No. 30

Date:

October 5, 2017

Direction:

222° SW

Description:

Stormwater basin forebay. In good condition.



Photograph No. 31

Date:

October 5, 2017

Direction:

175° S

Description:

Stormwater basin forebay berm.



Photograph No. 32

Date:

October 5, 2017

Direction:

54° NE

Description:

Phase 1, Cell 1 final cover on sideslopes. Vegetation is established.



Photograph No. 33

Date:

October 5, 2017

Direction:

33° NE

Description:

Phase 1, Cell 1 leachate pump house and stormwater culvert. Building is appropriately signed. Culvert is free of obstructions.



Photograph No. 34

Date:

October 5, 2017

Direction:

82° E

Description:

Stormwater rock check dams in an armored perimeter stormwater ditch. Stormwater rock check dams in an armored perimeter stormwater ditch.



Photograph No. 35

Date:

October 5, 2017

Direction:

320° NW

Description:

Inside Phase 1, Cell 1 Leachate Pump House. Cleanout riser and pump risers with T connection to forcemain shown. Building is well maintained.



Photograph No. 36

Date:

October 5, 2017

Direction:

8° N

Description:

Phase 1, Cell 1 leachate instrument panel. Good working order.



Photograph No. 37

Date:

October 5, 2017

Direction:

75° E

Description:

Terrace berm. Clear of obstructions and functioning as intended. Vegetative cover is dense and healthy.



Photograph No. 38

Date:

October 5, 2017

Direction:

56° NE

Description:

Northwest basin west forebay.



Photograph No. 39

Date:

October 5, 2017

Direction:

172° S

Description:

Downchute near northwest basin west forebay.



Photograph No. 40

Date:

October 5, 2017

Direction:

240° SW

Description:

Phase 1 final cover. Vegetation is healthy and well maintained.



Photograph No. 41

Date:

October 5, 2017

Direction:

5° N

Description:

Northwest basin with outlet in background.



Photograph No. 42

Date:

October 5, 2017

Direction:

5° N

Description:

East forebay of northwest basin.



Photograph No. 43

Date:

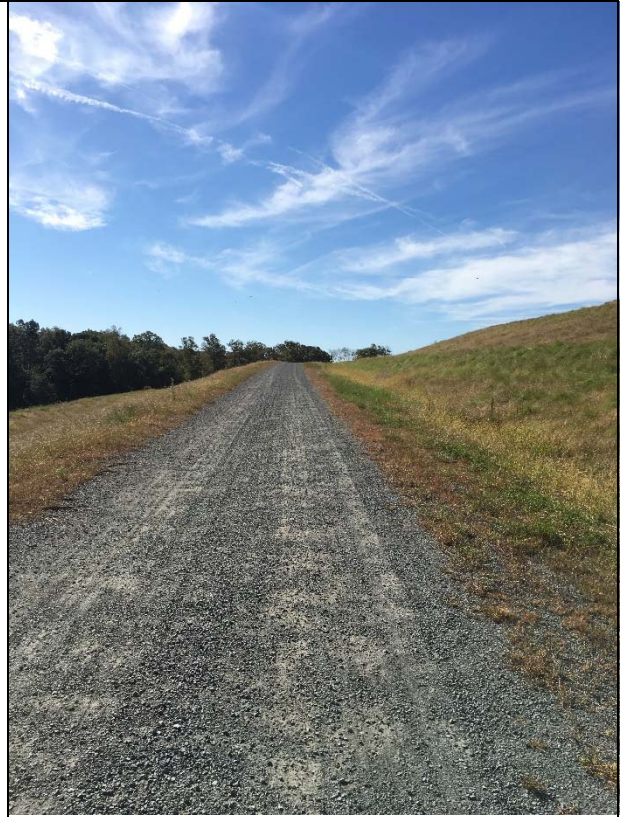
October 5, 2017

Direction:

182° S

Description:

Phase 1 plateau access road. Well maintained. No rutting or potholes. Final cover on either side of road is well maintained with no evidence of stability issues or erosion.



Photograph No. 44

Date:

October 5, 2017

Direction:

295° NW

Description:

Phase 1 terrace berm. Clear of obstructions and functioning as intended. Vegetative cover is dense and healthy.



Photograph No. 45

Date:

October 5, 2017

Direction:

295° NW

Description:

Phase 1 terrace berm. Clear of obstructions and functioning as intended. Vegetative cover is dense and healthy.



Photograph No. 46

Date:

October 5, 2017

Direction:

130° SE

Description:

Phase 1 corner downchute. Rock is in-place and not migrating. No evidence of washouts.



Photograph No. 47

Date:

October 5, 2017

Direction:

240° SW

Description:

Phase 1 corner downchute road crossing equalizing pipes. Free of obstructions.



Photograph No. 48

Date:

October 5, 2017

Direction:

341° N

Description:

Phase 1 final cover and stormwater terraces. Well maintained and functioning as intended.



Photograph No. 49

Date:

October 5, 2017

Direction:

106° E

Description:

Final cover on plateau. Vegetation is well established. No signs of animal burrows or erosion.



Photograph No. 50

Date:

October 5, 2017

Direction:

114° SE

Description:

Final cover on plateau. Vegetation is well established. No signs of animal burrows or erosion.



Photograph No. 51

Date:

October 5, 2017

Direction:

196° S

Description:

Final cover on plateau. Vegetation is well established. No signs of animal burrows or erosion.



Photograph No. 52

Date:

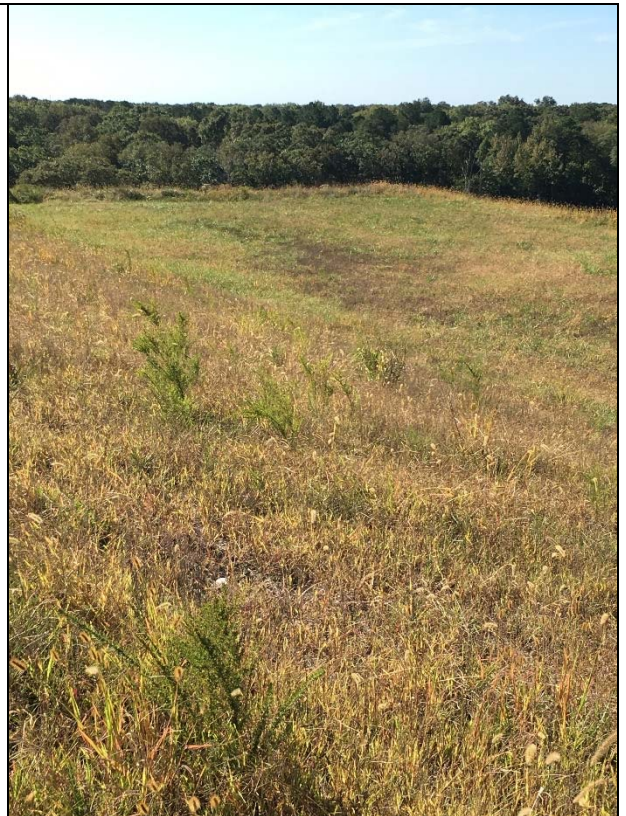
October 5, 2017

Direction:

269° W

Description:

Final cover on plateau. Vegetation is well established. No signs of animal burrows or erosion.



Photograph No. 53

Date:

October 5, 2017

Direction:

341° N

Description:

Pump used to remove collected stormwater.



Photograph No. 54

Date:

October 5, 2017

Direction:

219° SW

Description:

Final cover sideslopes. Vegetation is well established. No signs of animal burrows or erosion.



Photograph No. 55

Date:

October 5, 2017

Direction:

338° N

Description:

View of Southeast Basin from top of landfill.



Photograph No. 56

Date:

October 5, 2017

Direction:

59° NE

Description:

Phase 2, Cell 2 active area.



Photograph No. 57

Date:

October 5, 2017

Direction:

12° N

Description:

Final cover on plateau. Vegetation is well established. No signs of animal burrows or erosion.



Photograph No. 58

Date:

October 5, 2017

Direction:

7° N

Description:

Downchute inlet from plateau. Free of obstruction. Berms show no evidence of erosion.



Photograph No. 59

Date:

October 5, 2017

Direction:

89° E

Description:

East forebay of surface water sediment control basin.



Photograph No. 60

Date:

October 5, 2017

Direction:

240° SW

Description:

Final cover on plateau. Vegetation is well established. No signs of animal burrows or erosion.



Photograph No. 61

Date:

October 5, 2017

Direction:

262° W

Description:

Final cover on plateau. Vegetation is well established. No signs of animal burrows or erosion.



Photograph No. 62

Date:

October 5, 2017

Direction:

285° NW

Description:

Monitoring well cluster.



Photograph No. 63

Date:

October 5, 2017

Direction:

4° N

Description:

Northeast basin outlet skimmer.



Photograph No. 64

Date:

October 5, 2017

Direction:

35° NE

Description:

Beneficial use product area.



Photograph No. 65

Date:

October 5, 2017

Direction:

63° NE

Description:

Leachate storage tanks and the leachate control building.



Photograph No. 66

Date:

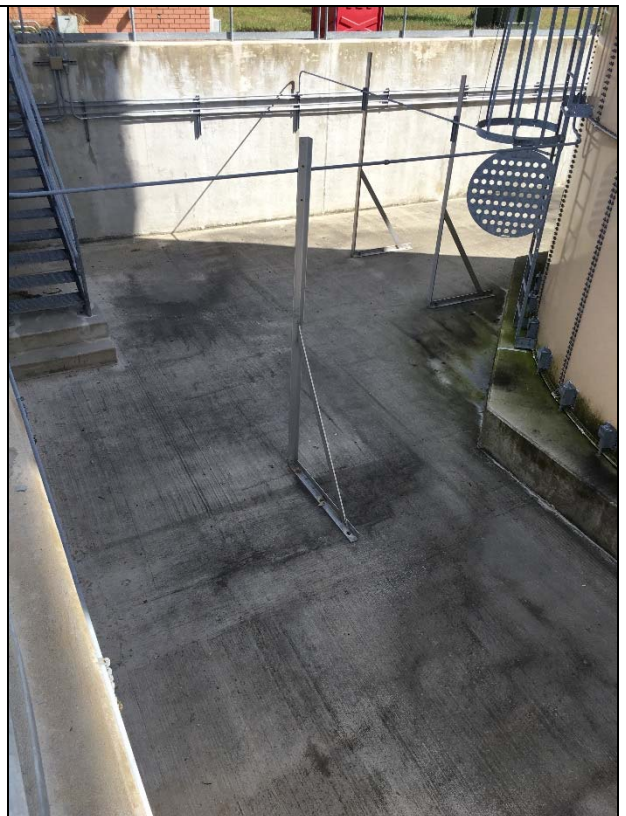
October 5, 2017

Direction:

171° S

Description:

Leachate storage tanks secondary containment. Secondary containment was dry with no evidence of staining.



Photograph No. 67

Date:

October 5, 2017

Direction:

41° NE

Description:

Leachate storage vault and secondary containment controls.

