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## Annual PE Inspection Report

**To:** David Burton, Facility Manager (NRG Indian River Generating Station)

**From:** Jesse Varsho, P.E.

**Re:** Indian River Landfill – Annual CCR Unit Inspection Report

**Inspection Date:** December 15, 2015

**Memo Date:** January 14, 2016

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### INTRODUCTION

Title 40 Code of Federal Regulations (CFR) Part 257 addresses, in part, the management of Coal Combustion Residuals (CCR Rule) 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) consisting of a closed Phase I and active Phase II. The closed Phase I is exempt from the regulations but since Phase II piggybacks onto Phase I, it was necessary to include Phase I within the annual inspection since it impacts the structural performance of Phase II.

In support of this obligation, Mr. Jesse Varsho (a qualified professional engineer with CB&I Environmental & Infrastructure, Inc. [CB&I]) conducted an on-site inspection of the Indian River Landfill on December 15, 2015. The findings from this first 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 this first annual inspection report into the facility's operating record must be accomplished no later than January 18, 2016 per §257.84(b)(3)(i). Deadlines for completion of subsequent annual inspection reports will be tied back to the actual date of placement of the previous year's report into the operating record.

### 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 landfill consists of two major phases, Phase I and Phase II. Phase I is unlined and has a 46 acre footprint. Phase II has a composite liner, and will occupy a 28 acre footprint when fully constructed. The IRLF disposal areas are located about one half of a mile south of the Generating Station. Phase I began accepting waste in 1980 and cap construction was approved and certified closed by DNREC on October 20<sup>th</sup>, 2014. Phase II expansion consisted on 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 by 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 and at this time there are two active fill areas (1) filling of the Cell 1 plateau area and (2) filling of the above grade portion of Cell 2. The estimated remaining life of 3.2 years within Phase II based on historical and projected filling rates. 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, CB&I'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 CB&I'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 operating record included but were not limited to: 2011 Phase II Landfill Expansion Application, NRG Permit SW-12/01, 2015 groundwater data, the 2014 Annual Report, Spill Prevention, Control and Countermeasure Plan (SPCC Plan), and Storm Water Plan (SWP). During the site inspection, Mr. Varsho 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, no final cover system has been installed on Phase II which is still an active unit.

#### Summary of Landfill Construction

As of the date of this inspection, Phase I was capped and closed. Cell 1 of Phase II was filled to a waste peak elevation of approximately 98 ft MSL. Cell 2 of Phase II received operational authorization during 2015, and had little more than CCR protective cover over its liner system.

#### Review of Prior Inspections

- a. Weekly inspections: Reviewed previous weekly inspections dating back to October 2015. Some minor corrective actions were noted for cover and erosion repairs.
- b. Annual inspections: No previous annual inspections have been conducted; this current inspection represents the first performed in accordance with the Rule.

#### Summary of CCR Volumes

Based on the 2014 Annual Report, the total in-place CCR volume within Phase II was estimated at approximately 1,394,188 airspace cubic yards (ascy) ( $2,394,788 \text{ ascy (total permitted)} - 1,000,600 \text{ ascy (2014 annual report)} = 1,394,188 \text{ ascy}$ ). Volumes for Phase I are not provided since the Phase I is a closed unit and therefore exempt from the regulations.

### **SITE INSPECTION**

The site inspection was performed on December 15, 2015 by Mr. Varsho. Mr. Varsho 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 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.

## **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, the IRLF had two active disposal areas (1) plateau of Cell 1, Phase II and bottom of Cell 2, Phase II. The peak fill elevations for Cell 1 was approximately 98 feet MSL and for Cell 2 was approximately 20 feet MSL to 30 feet MSL (refer to figure in Attachment 1). Since this is the first annual inspection, comparative changes in geometry were not directly relevant.

### CCR Volume

The total permitted disposal capacity for Phase II is 2,394,788 ascy. As of January 1, 2015, the remaining capacity was estimated at approximately 1,394,188 ascy. It is estimated that Phase II has a remaining operational life of approximately 3.2 years from April 2015.

### 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 Phases 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 poses a threat or concern to the stability of the land form.

## **RECOMMENDATIONS**

Based on the on-site inspection performed on December 15, 2015, CB&I recommend the following actions:

1. Continue the current operation and maintenance procedures.
2. Access to the closed portions of the landfill is currently adequate and well maintained. Going forward, IRLF will need to maintain adequate access to these areas to ensure the ability to perform weekly visual site structural inspections.

There were no deficiencies or releases identified during the 2015 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: 1/14/16 \_\_\_\_\_



Jesse Varsho, P.E., P.G.  
Professional Engineer Registration No. 20257  
CB&I Environmental & Infrastructure, Inc.

### ATTACHMENTS

1. Site Map
2. Inspection Photo Log

### REFERENCES

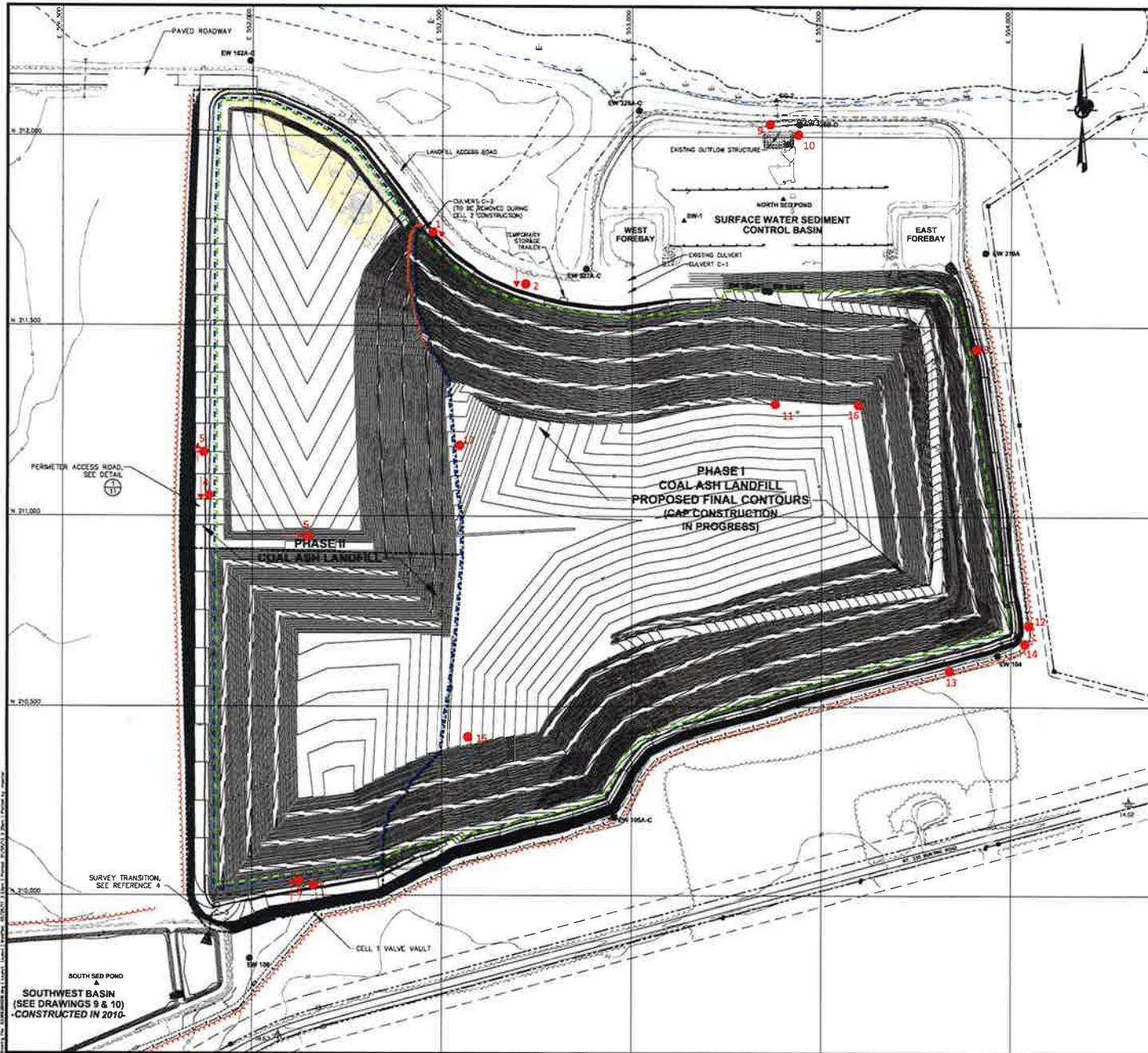
1. 2014 Annual Report NRG Energy Indian River Generating Station
2. 40 Code of Federal Regulations Part 257.

**Attachment 1**  
**Site Map**

**Attachment 2**  
**Photo Log**

**Attachment 1**  
**Site Map**





- ### LEGEND
- PROPERTY LINE
  - - - RIGHT OF WAY
  - EXISTING GROUND SURFACE ELEVATION CONTOURS
  - PROPOSED CONTOURS
  - EXISTING TREELINE
  - PROPOSED TREELINE
  - WETLAND LIMIT
  - 100 YEAR FLOODPLAIN LIMIT
  - EXISTING FENCE, SEE REFERENCE 2
  - PROPOSED FENCE (CONSTRUCTED IN 2010)
  - EXISTING BUILDING/STRUCTURE
  - ▲ SURVEY CONTROL POINT
  - PROPERTY LINE MONUMENT
  - ▲ SW-1 SURFACE WATER SAMPLING POINT
  - EW 104 GROUNDWATER MONITORING WELL
  - GROUNDWATER MONITORING WELL TO BE ABANDONED
  - PHASE II CELL BOUNDARIES
  - APPROXIMATE LIMIT OF WASTE
  - ANCHOR TRENCH, SEE DETAIL (12" OR 18") AND (12" AND 18")
  - DOWNSLOPE PIPE, SEE DETAIL (12" AND 18")
  - PHOTO LOCATION
  - PHOTO DIRECTION

- ### NOTES
- 1) CONTOURS WITHIN PHASE II, CELLS 1 AND 2, REPRESENT BASE GRADES.
  - 2) CONTOURS WITHIN PHASE I REPRESENT PROPOSED FINAL GRADES.
  - 3) REFER TO DRAWINGS 12-15 FOR LINER SYSTEM DETAILS.

- ### REFERENCES
- 1) EXISTING TOPOGRAPHY OF THE SURFACE WATER SEDIMENT CONTROL BASIN IS FROM FILE "09-034 topo.dwg," PREPARED BY SOULE AND ASSOCIATES, P.C., DATED MARCH 2009. ALL OTHER EXISTING TOPOGRAPHY PROVIDED BY MCRONE ASSOCIATES, INC., 1900 PIONEER CREEK CENTER, MAPLE PLAIN, MN 55359. DATE OF AERIAL PHOTOGRAPHY, JANUARY 9, 2003.
  - 2) FENCELINE PER GEORGE & LYNCH SURVEY, PROVIDED BY NRG IN JANUARY 2005; AND 10-FOOT RE-ALIGNMENT TO THE SOUTH OF THE SOUTHERN FENCELINE BASED UPON DESCRIPTION BY NRG AND LANDFILL OPERATIONS PERSONNEL.
  - 3) LOCATIONS OF WELLS EW 103A-C, EW 104, EW 105A-C AND EW 106B-D ARE FROM FILE "09-034 topo.dwg," PREPARED BY SOULE AND ASSOCIATES, P.C., DATED MARCH 2009. ALL OTHER WELL LOCATIONS ARE FROM FILE "Well Location NAD83 NAVD88 NRG.sxd," PROVIDED BY MCRONE, INC., DATED JULY 21, 2010.
  - 4) THE CELL 1 AS-BUILT LEACHATE FORCE MAIN ALIGNMENT FROM THE LEACHATE STORAGE TANKS TO THE CELL 1 VALVE VAULT, AND THE SOUTHWEST BASIN AS-BUILT GRADES ARE FROM FILE "S001b-fm-leachate-svbswh.dwg," PREPARED BY MCRONE, INC., DATED MAY 3, 2010.

REV	DATE	BY	CHK	DESCRIPTION

NRG ENERGY, INC.  
 INDIAN RIVER  
 GENERATING STATION  
 SUSSEX COUNTY, DELAWARE

PHASE II LANDFILL  
 CELL 2 LAYOUT  
 TOP OF PROTECTIVE  
 COVER GRADES

PROJECT No.	035-8838
FILE No.	0356330008
REV. 0	SCALE AS SHOWN
DESIGN	VEF 02/29/11
CADD	MJS 03/25/11
CHECK	VEF 03/29/11
REVIEW	PTA 03/29/11

**DRAWING 6**



**Attachment 2**  
**Photo Log**



*Photographic Documentation*

Project: Indian River CCR PE 2015 Annual Inspection

Project No.: 1009684058

Photograph No. 1

Date: 12/15/15

Photographer: JPV

Title: PE Annual Inspection



**Location of Photograph:**

North perimeter of landfill, transition between Phases I and II, looking west

**Description of Photograph:**

Observing toe of slope for sloughing or mass movement; inspecting perimeter stormwater drainage ditch for adequate flow capacity.



*Photographic Documentation*

Project: Indian River CCR PE 2015 Annual Inspection

Project No.: 1009684058

Photograph No. 2

Date: 12/15/15

Photographer: JPV

Title: PE Annual Inspection



**Location of Photograph:**

North perimeter of landfill, looking south at closed Phase I Unit

**Description of Photograph:**

Observing final cover over the closed Phase I Unit



*Photographic Documentation*

**Project:** Indian River CCR PE 2015 Annual Inspection

**Project No.:** 1009684058

**Photograph No. 3**

**Date:** 12/15/15

**Photographer:** JPV

**Title:** PE Annual Inspection



**Location of Photograph:**  
East perimeter of Phase I, looking south

**Description of Photograph:**  
Observing closed Phase I with stormwater downchutes



*Photographic Documentation*

Project: Indian River CCR PE 2015 Annual Inspection

Project No.: 1009684058

Photograph No. 4

Date: 12/15/15

Photographer: JPV

Title: PE Annual Inspection



**Location of Photograph:**

West perimeter haul road, looking south

**Description of Photograph:**

Observing the intermediate fill slopes of Cell 1 of Phase II



*Photographic Documentation*

Project: Indian River CCR PE 2015 Annual Inspection

Project No.: 1009684058

Photograph No. 5

Date: 12/15/15

Photographer: JPV

Title: PE Annual Inspection



**Location of Photograph:**

West perimeter haul road, looking north

**Description of Photograph:**

Observing CCR protective cover within Cell 2 of Phase II



*Photographic Documentation*

**Project:** Indian River CCR PE 2015 Annual Inspection

**Project No.:** 1009684058

**Photograph No. 6**

**Date:** 12/15/15

**Photographer:** JPV

**Title:** PE Annual Inspection



**Location of Photograph:**

Cell 1/Cell 2 of Phase II separation berm, looking east

**Description of Photograph:**

CCR placement within active area of the landfill





*Photographic Documentation*

**Project:** Indian River CCR PE 2015 Annual Inspection

**Project No.:** 1009684058

**Photograph No. 7**

**Date:** 12/15/15

**Photographer:** JPV

**Title:** PE Annual Inspection



**Location of Photograph:**  
Cell 1 Leachate loadout sump structure, looking west

**Description of Photograph:**  
Cell 1 Leachate loadout sump structure and stormwater culvert



*Photographic Documentation*

Project: Indian River CCR PE 2015 Annual Inspection

Project No.: 1009684058

Photograph No. 8

Date: 12/15/15

Photographer: JPV

Title: PE Annual Inspection



**Location of Photograph:**

South perimeter of Cell 1, looking northwest

**Description of Photograph:**

Final slopes with intermediate cover at Cell 1, Phase II



*Photographic Documentation*

**Project:** Indian River CCR PE 2015 Annual Inspection

**Project No.:** 1009684058

**Photograph No. 9**

**Date:** 12/15/15

**Photographer:** JPV

**Title:** PE Annual Inspection



**Location of Photograph:**

North perimeter of surface waste sediment control basin, looking south

**Description of Photograph:**

Observing outlet structure for north stormwater basin



*Photographic Documentation*

**Project:** Indian River CCR PE 2015 Annual Inspection

**Project No.:** 1009684058

**Photograph No. 10**

**Date:** 12/15/15

**Photographer:** JPV

**Title:** PE Annual Inspection



**Location of Photograph:**

North perimeter of landfill, looking south

**Description of Photograph:**

Observing final cover slopes along Phase I



*Photographic Documentation*

**Project:** Indian River CCR PE 2015 Annual Inspection

**Project No.:** 1009684058

**Photograph No. 11**

**Date:** 12/15/15

**Photographer:** JPV

**Title:** PE Annual Inspection



**Location of Photograph:**

Plateau area of Phase I, looking north

**Description of Photograph:**

Overview of north stormwater detention pond



**Photographic Documentation**

**Project:** Indian River CCR PE 2015 Annual Inspection

**Project No.:** 1009684058

**Photograph No. 12**

**Date:** 12/15/15

**Photographer:** JPV

**Title:** PE Annual Inspection



**Location of Photograph:**

Southeast corner of Phase I, looking north

**Description of Photograph:**

Toe of slope and eastern stormwater ditch at Phase I



**Photograph No. 13**

**Date:** 12/15/15

**Photographer:** JPV

**Title:** PE Annual Inspection



**Location of Photograph:**

South perimeter of Phase I, looking west

**Description of Photograph:**

South perimeter stormwater ditch



**Photograph No. 14**

**Date:** 12/15/15

**Photographer:** JPV

**Title:** PE Annual Inspection



**Location of Photograph:**

Southeast corner of Phase I, looking northwest

**Description of Photograph:**

Stormwater downchute and final cover slopes of Phase I





**Photograph No. 15**

**Date:** 12/15/15

**Photographer:** JPV

**Title:** PE Annual Inspection



**Location of Photograph:**

South side of Phase I plateau area, looking east

**Description of Photograph:**

Observing final cover slopes on south side of landfill, no evidence of tensile cracking



Project: Indian River CCR PE 2015 Annual Inspection

Project No.: 1009684058

Photograph No. 16

Date: 12/15/15

Photographer: JPV

Title: PE Annual Inspection



**Location of Photograph:**

Northeast corner of Phase I plateau area, looking north

**Description of Photograph:**

Looking for any tensile cracking at crest of slope, no tensile cracking was observed



**Photograph No. 17**

**Date:** 12/15/15

**Photographer:** JPV

**Title:** PE Annual Inspection



**Location of Photograph:**

Phase II piggyback, looking west

**Description of Photograph:**

Observing active filling operations, intermediate slopes of Cell 1, Phase II