



Closure and Post-Closure Care Plan NRG Indian River Generating Station Indian River Landfill Phase II

Prepared for:

Indian River Power LLC; a subsidiary of NRG

Indian River Landfill

Dagsboro, Delaware

Prepared by:

CB&I Environmental & Infrastructure, Inc.

October 2016



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1.0 CLOSURE AND POST-CLOSURE CARE PLAN OVERVIEW

1.1 General

CB&I Environmental and Infrastructure, Inc. (CB&I) has prepared the following Closure and Post-Closure Plan (Plan) at the request of Indian River Power LLC (Indian River, a subsidiary of NRG Energy, Inc. [NRG]) for the Indian River Landfill (Landfill) located in Dagsboro, Delaware.

The Indian River Landfill is located as shown in **Figure 1**. The current Indian River Landfill has been developed in two separately permitted landfill phases (Phase I and Phase II). The Phase I Landfill began accepting CCR material in 1980; cap construction was approved and Phase I was certified closed by DNREC on October 20, 2014. Because the Phase I Landfill was closed prior to the effective date of the CCR Rules, this Closure and Post-Closure Care Plan does not apply to Phase I. The Phase II Landfill (herein referred to as either “Phase II” or “Landfill”) began accepting CCR material in September 2010 and is being constructed in two cells. Within Phase II, the final cover will be constructed as each cell, or a phased portion or area thereof, reaches its permitted final waste grades as described herein.

The Landfill has been deemed to be a regulated coal combustion residual (CCR) unit by the United States Environmental Protection Agency (USEPA), under the *Disposal of Coal Combustion Residuals from Electric Utilities Final Rule* (CCR Rule) 40 CFR §257 and §261. As such, this Plan has been developed to comply with the CCR Rule. Specifically, this Plan details the closure requirements for CCR units closed in place, outlined in §257.102. The Plan includes the necessary steps to close the Landfill at any point during its remaining active life with good engineering practices, as required by §257.102(b)(1). The Plan also details post-closure care requirements outlined in §257.104 regarding ongoing monitoring and maintenance of the capping system during the post-closure period for the Landfill.

The applicable CCR Rule requirements and an index of where responsive information is found in this report is provided in **Appendix A**.

1.2 Existing Waste-Related Permits

The Landfill has been permitted by the Delaware Department of Natural Resources and Environmental Conservation (DNREC), consistent with the Delaware Regulations Governing Solid Waste (DRGSW). Under its DNREC permit, the Landfill has an existing Closure and Post-Closure Care Plan that was approved in 2011. Additionally, closure and post-closure cost estimates have been updated on an annual basis to reflect quantity, cost, or inflationary adjustments, as appropriate. The approved 2011 DNREC Closure and Post-Closure Care Plan and the most recent cost estimate (2016) are contained in **Appendix B** for reference.



2.0 CLOSURE PLAN

2.1 Closure Performance Standards

§257.102(b)(1)(iii) and §257.102(d)(1) outline performance standards for the in-place closure of ash wastes. These performance standards are summarized to include the following requirements:

- Preclude the probability of future impoundment of water, sediment, or slurry;
- Minimize maintenance;
- Minimize the potential for post-closure infiltration of liquids into the CCR material;
- Minimize the potential for potential releases of CCR, leachate, or contaminated runoff; and
- Provide long-term slope stability to prevent sloughing or movement of the final cover system.

The closure of Phase II will meet these performance standards through the use of an engineered final cover system that has positive draining slopes and stormwater controls, preventing erosion, movement, and sloughing of the final cover system. Terrace berms and letdown pipes will be installed to direct the flow of stormwater. Phased closure with an engineered cover and installation of stormwater controls, combined with landfill cover monitoring and maintenance following closure, represents good engineering practices.

2.2 Anticipated Date of Closure

The landfill is being developed in a phased manner. Closure construction will generally be conducted as part of typical operating procedures when a phase or area is filled to its final grades. Final closure of the Phase II Landfill will occur when the Landfill has accepted its final load of CCR waste. Closure will commence within 30 days of receiving the final load of CCR waste and will be completed within 6 months of commencing closure activities. Based on current remaining capacity and projected fill rates of the Landfill, final closure is expected to occur in 2026.

2.3 Landfill Closure Activities

Closure will generally be performed progressively as each phase or area in Phase II is filled to design grades. Closure of the Landfill will be accomplished by leaving the CCR material in place, per §257.102(b)(1)(i), and will meet the requirements of §257.102(d)(3)(i). The largest area requiring final cover at any time during the CCR unit's operating period is conservatively estimated to be the entirety of Phase II, which is approximately 28 acres. Closure cost estimates that have been previously provided to DNREC have assumed 30 acres of closure area as an additional level of conservatism. Closure and post-closure costs contained with this document are the same as those approved by DNREC.

Activities necessary to close the Landfill at the time of final closure will include the following:



- ❑ Equipment decontamination and removal: Indian River, or their contractor(s), will provide sufficient equipment to carry out the Landfill closure operations as designed and in a satisfactory manner. Equipment for the Landfill closure may include bulldozers, excavators, compactors, ash haul trucks, drum rollers, water trucks, and any other equipment deemed necessary and appropriate by Indian River or their contractor(s).

After closure, the Landfill equipment will be cleaned in a manner that does not provide an uncontrolled release of CCR into the environment. All lubricants, fuel, waste oil, and other residues will be properly managed and disposed of at an approved facility. Landfill equipment and temporary structures will be removed, as appropriate.

- ❑ Final cover construction: The final cover system will consist of the following, per the Landfill's DNREC permit:
 - A minimum 12-inch subgrade layer of compacted soil with a maximum particle size of 3/8-inch;
 - 40-mil textured Linear Low Density Polyethylene (LLDPE) geomembrane;
 - Double-sided geocomposite drainage layer;
 - A minimum 18-inch infiltration layer of compacted soil; and,
 - A minimum 6-inch erosion control layer of vegetative soil that will be seeded to establish vegetation.

If an alternate final cover is proposed in lieu of the final cover system described above, appropriate permit approvals from regulatory agencies will be secured and this Closure Plan will be updated in accordance with §257.102(d)(3)(ii).

- ❑ Erosion and sedimentation control: An Erosion and Sedimentation Control Plan has been incorporated into the Landfill's DNREC permit to assist in managing surface water, minimizing soil erosion, and controlling sedimentation during construction, operation, and closure. The Erosion and Sedimentation Control Plan was developed using the requirements of the 2005 Delaware Erosion and Sediment Control Handbook. An associated Run-On and Run-Off Control System Plan has also been developed that discusses these controls with respect to the CCR Rule. The plans detail the final closure design grades and stormwater and erosion control features, which collectively include the following:
 - The landfill final closure design grades were developed to minimize erosion and subsequent soil loss;
 - Erosion control benches have been designed into the final cover every 20 vertical feet (60-feet of slope). Letdown pipes direct the erosion control bench surface water flow off of the final cover to one of the two sedimentation basins surrounding the landfill;
 - A total of 24-inches of cover soils will be placed and seeded for stabilization;



- Temporary and permanent drainage channels have been designed to route surface water runoff from disturbed and closed areas and run-on from up gradient areas;
- Culverts have been designed to pass drainage under access roads; and,
- Sedimentation basins have been designed to collect surface water runoff, control sediment, and discharge to natural watercourses.

The erosion control measures described represent the minimum standards; additional controls may be required as Indian River, or their contractor(s), deem necessary.

- ❑ CQA activities: Closure for Phase II of the Landfill will follow construction quality assurance and quality control (QA/QC) procedures documented in the Landfill's Construction Quality Assurance (CQA) Plan incorporated into its DNREC permit. This will ensure the final cover is designed, constructed, and installed in accordance with recognized standards and accepted good engineering practices. Closure material descriptions and construction methods are included in the Project Specifications contained in the CQA Plan.
- ❑ Deed notification: Consistent with the requirements of §257.102(i) of the CCR Rule, Indian River will record a notification on the deed for the Landfill property, notifying any potential purchaser of the property that the land has been used as a CCR unit and its use is restricted under the post-closure care requirements.

2.4 Maximum Inventory of Wastes

Per §257.102(b)(1)(iv), the maximum inventory of CCR material on site in the Phase II Landfill will be approximately 1,705,000 cubic yards.



3.0 POST-CLOSURE CARE PLAN

Indian River will monitor and maintain the Landfill for a minimum period of 30 years following closure, as required by §257.104(c)(1).

After closure, the Landfill will be maintained as a vegetated passive space. The integrity of the final cover system and the functionality of the groundwater monitoring system will not be disturbed by the post-closure use, per §257.104(d)(1)(iii). If the Landfill is proposed to be developed for uses other than passive recreation, appropriate regulatory authorization will be secured and this Plan will be updated as necessary.

3.1 Post-Closure Contact

Per §257.104(d)(1)(ii), the post-closure contact for the Landfill will be as follows:

Post Closure Contact: Mr. David Burton
Indian River Power
29416 Power Plant Road
Dagsboro, Delaware 19939

Phone Number: (302) 934-3562

E-mail Address: david.burton@nrg.com

The appropriate regulatory agencies will be notified if the above information changes at any time.

3.2 Maintenance and Inspections

Inspection of the closed Landfill will be conducted by Indian River personnel or their designee(s) to detect any required repair of the closed areas. The inspector will perform a visual inspection of the closed Landfill following **Table 1**, which depicts the post-closure maintenance checklist. **Table 2** identifies the inspection frequency for the various features to be inspected.



TABLE 1. POST-CLOSURE MAINTENANCE CHECKLIST

		Date
Task	Remarks	
1. Diversion Ditches <ul style="list-style-type: none"> ● Clear of debris ● Erosion 		
2. Closure Cover <ul style="list-style-type: none"> ● Runoff control ditches clear of debris ● Erosion of closure cap ● Litter ● Vegetation condition ● Indications of settlement 		
3. Leachate Collection System <ul style="list-style-type: none"> ● General system operation ● System controls ● Piping damage and clogging ● Containment facility ● Loadout facility ● Other, as needed 		

TABLE 2. POST-CLOSURE INSPECTION SCHEDULE

Inspection Item	Frequency of Inspection
Erosion of closure cover.	Monthly and after severe storms.
Deterioration of vegetative cover.	Monthly and after severe storms.
Trash, litter.	Monthly and after severe storms.
Damage to erosion control facilities.	Monthly and after severe storms.
Settlement (by topographic survey).	Annually for first five years after closure.

Any damage to the facilities will be repaired to maintain the integrity and effectiveness of the final cover system from erosion, settlement, and subsidence, the leachate collection and removal system, and the groundwater monitoring system, per §257.104(d)(1)(i) and §257.104(b)(1-3).



Features will be maintained as follows:

- ❑ Settlement, subsidence, and displacement: Most settlement will occur shortly after landfilling and will not occur during the closure and post-closure care period. However, the final cover system may experience minor settlement over time due to CCR material or foundation consolidation/settlement. Minor regrading and repair of the erosion control layer soil component may be required in the event that future non-uniform settlement is observed to be impacting the functional design and/or operation of Landfill and surrounding areas.

In areas where settlement, subsidence, or displacement has occurred that impacts functional design, the area will be filled with soil and regraded to reestablish positive drainage. A stockpile of soil will be maintained onsite during post-closure for repairs. The soil surface will then be seeded, fertilized, and mulched to reestablish vegetation.

- ❑ Erosion damage: The erosion control layer on the final cover system will be inspected, filled with appropriate soil, regraded, and seeded, if the erosion channels exceed 6-inches in depth. The eroded areas will be filled with a soil capable of sustaining vegetative growth. The soil surface will then be seeded, fertilized, and mulched (or otherwise stabilized) to re-establish vegetation. Topsoil used to make erosion repairs will be stockpiled on-site. Straw mulch or other suitable material will also be stored onsite or brought in as required.
- ❑ Leachate collection: The leachate collection system, including the collection points, storage tank system, containment structures, and collection piping, will be maintained under the requirements in §257.70. It will be inspected and maintained on a routine basis, with any necessary repairs being conducted quickly following detection. The cleanout of leachate collection pipes will occur once annually with a self-propelled, high pressure jetting system.
- ❑ Groundwater monitoring wells: Monitoring of the groundwater and routine maintenance of groundwater monitoring wells, such as replacing locks, painting, pad repairs, and regrading of soil areas around the wells, will be performed in accordance with 40 CFR §257.90 through §257.98. Routine maintenance will be performed by Indian River personnel or their designee(s). Other maintenance work such as protective casing repair, well replacement, and repair of sampling pumps will be performed by specialty contractors.
- ❑ Security devices: Security controls such as locks, gates, and fencing will be inspected on a monthly basis. Security locks will be replaced immediately if damaged. Perimeter fencing will be repaired by the contractor or site personnel after a need has been identified.
- ❑ Run-on and run-off control structures: Routine maintenance of run-on and run-off control structures include cleaning sediment from structures such as ditches, culverts, sedimentation ponds, letdown pipes, and pond outlets. Repair of these structures will typically be performed by outside contractor(s). The contractor(s) will bring in heavy equipment such as backhoes, dump trucks, dozers, scrapers, and other equipment as seen necessary. Materials to assist in maintenance will be stored on site or brought on as required, such as silt fences, straw bales, and soil.



3.3 Security

One sign will be posted at the site entrance to the Landfill, notifying all persons of the final closure and prohibition against further receipt of CCR material. Unauthorized access to the site will be controlled by a fence and gate, which will be locked to prohibit entry to the site after closure. No CCR material will remain exposed after completion of the Landfill closure. Although the site will be closed to the public, the closed Landfill will not pose a health hazard in the event that the public, domestic livestock, or wildlife enter the property.

3.4 Vegetative Mowing

During the first year following Landfill closure, the Landfill will not be mowed in order to fully allow the vegetation to establish. After the first year of vegetation growth, the Landfill will be mowed two times per year and reseeded if necessary. The grass will be maintained at such a level as to facilitate inspection and to discourage inhabitation by burrowing animals.

If native, perennial grasses are used then mowing may not be necessary. However, if mowing is not performed, any small trees which establish on the cap will be removed on an annual basis.



4.0 NOTIFICATION AND SCHEDULING REQUIREMENTS

As required by §257.102(b)(1)(vi), the closure of the landfill will be completed according to the following schedule milestones:

- ❑ DNREC will be notified in writing at least 60 days prior to commencing closure activities, as required by §257.102(e)(3). The Notice of Intent to initiate closure will occur no later than the date of initiation of closure, per §257.102(g). This will include certification from a registered Delaware professional engineer that the final cover design meets the requirements in §257.102(d)(3), as required by §257.102(d)(3)(iii).
- ❑ Closure of the Landfill will commence when the activities described in §257.102(e)(3) occur. Closure must commence no later than 30 days after the date on which the cell receives the final receipt of CCR material, per §257.102(e)(1).
- ❑ Completion of closure activities will occur within 6 months of commencing closure activities as required by §257.102(f)(1). Within 30 days of completion of closure, a Notice of Completion of closure activities will be completed by a certified Delaware Professional Engineer and placed in the Landfill's operating record, as required by §257.102(h) and §257.102(f)(3). This will verify that the Landfill closure was performed and completed in accordance with the Plan.
- ❑ If necessary, a request for an extension of the closure timeframe may be submitted following the guidelines in §257.102(f)(2)(i-iii).
- ❑ The Plan will be placed in the Landfill's operating record as required by 257.104(d)(2)(ii). Post-closure monitoring of the cap and run-on/run-off controls will be conducted on a routine schedule to identify any potential stability issues with the cap and allow appropriate maintenance to be undertaken. Notice of Completion of post-closure care will be completed within 60 days of completion of the 30-year post-closure care period by a certified Delaware Professional Engineer, as required by §257.104(e); post-closure care is estimated to terminate in 2056, assuming the Phase 2 Landfill closes and closure activities are completed in 2026.



5.0 RECORDKEEPING REQUIREMENTS

Per §257.102(j) and §257.104(f), Indian River will maintain an operating record consisting of the documents specified in §257.105(i). These will include notification of intent to initiate closure, annual progress reports, inspection records, and notification of closure completion. All records that are relevant within the past five years will be maintained and available to DNREC and USEPA representatives for review upon request.

§257.102(j) and §257.104(f) require that Indian River will comply with the notification requirements specified in §257.106(i). This includes any notification on the closure or post-closure care intent or completion, annual progress reports, the Closure and Post-Closure Care Plan, demonstrations for time extensions, and the record of the deed notation which will follow the requirements in §257.102(i).

Internet requirements specified in §257.107(i) will be placed on the owner's and operator's publicly accessible website, per §257.104(f) and §257.102(j).

An amendment to this Plan will be completed when there is a change in the operation of the CCR unit that would substantially change the Plan, or if unanticipated events necessitate a revision to the Plan. These revisions will be amended at least 60 days prior a planned change in operations and no later than 60 days after an unanticipated event. If a written closure plan is revised after closure activity have commenced, the Plan will be amended within 30 days of a triggering event. A complete description of amendment and timing requirements described in §257.102(b)(3) are provided in **Appendix A**. Any amendments will be reviewed and recertified by a registered professional engineer and will be placed in the operating record as required per §257.102(b)(4). Any amended Plans will supersede and replace any prior versions and comply with the recordkeeping requirements in §257.106(i). Availability of any amended Plans will be noticed to the State Director per §257.106(i) and posted to the publicly accessible internet site per §257.107(i).



6.0 CLOSURE AND POST-CLOSURE CARE COST ESTIMATES

Financial assurance has been posted by the Landfill in accordance with DNREC permit requirements, ensuring sufficient funds are available to complete the closure and post-closure care of the Landfill. The financial assurance is inclusive of costs associated with the care of Phase I of the Landfill, which was closed prior to the CCR Rule becoming effective.

Closure and post-closure care cost estimates are provided in **Appendix C**. These cost estimates are the same as those developed for Phase II within the 2011 DNREC Closure and Post-Closure Care Plan and associated annual cost updates. It is noted that the 2011 DNREC Closure and Post-Closure Care Plan additionally includes Phase I, which was closed prior to the CCR Rule and is not included in this document.

The closure cost for Phase II is estimated to be approximately \$5.4 million. The 30-year post-closure care cost for the Phase II Landfill is estimated to be approximately \$2.8 million. These values are presented in current (2016) dollars.

In providing these cost estimates, it is recognized that neither Indian River nor CB&I have control over the costs of labor, equipment, or materials, or over a Contractor's method(s) of determining prices or bidding. Cost estimates may be adjusted from time to time due to changes in unit costs, engineering practices, inflation, and other factors.




7.0

PROFESSIONAL ENGINEER CERTIFICATION

The undersigned registered professional engineer is familiar with the requirements of §257.102 and §257.104. The undersigned registered professional engineer has visited and examined the Landfill or has supervised examination of Landfill by appropriately qualified personnel. The undersigned registered professional engineer attests that this Plan has been prepared in accordance with good engineering practice. This including consideration of applicable industry standards, meets the requirements of §257.102 and §257.104, and that this Closure and Post-Closure Plan is adequate for Phase II of the Landfill. This certification was prepared as required by §257.102(d)(3)(iii) and §257.104(d)(4).

Name of Professional Engineer: Richard Southorn

Company: CB&I

Signature: 

Date: OCT 12, 2016

PE Registration State: Delaware

PE Registration Number: 20894

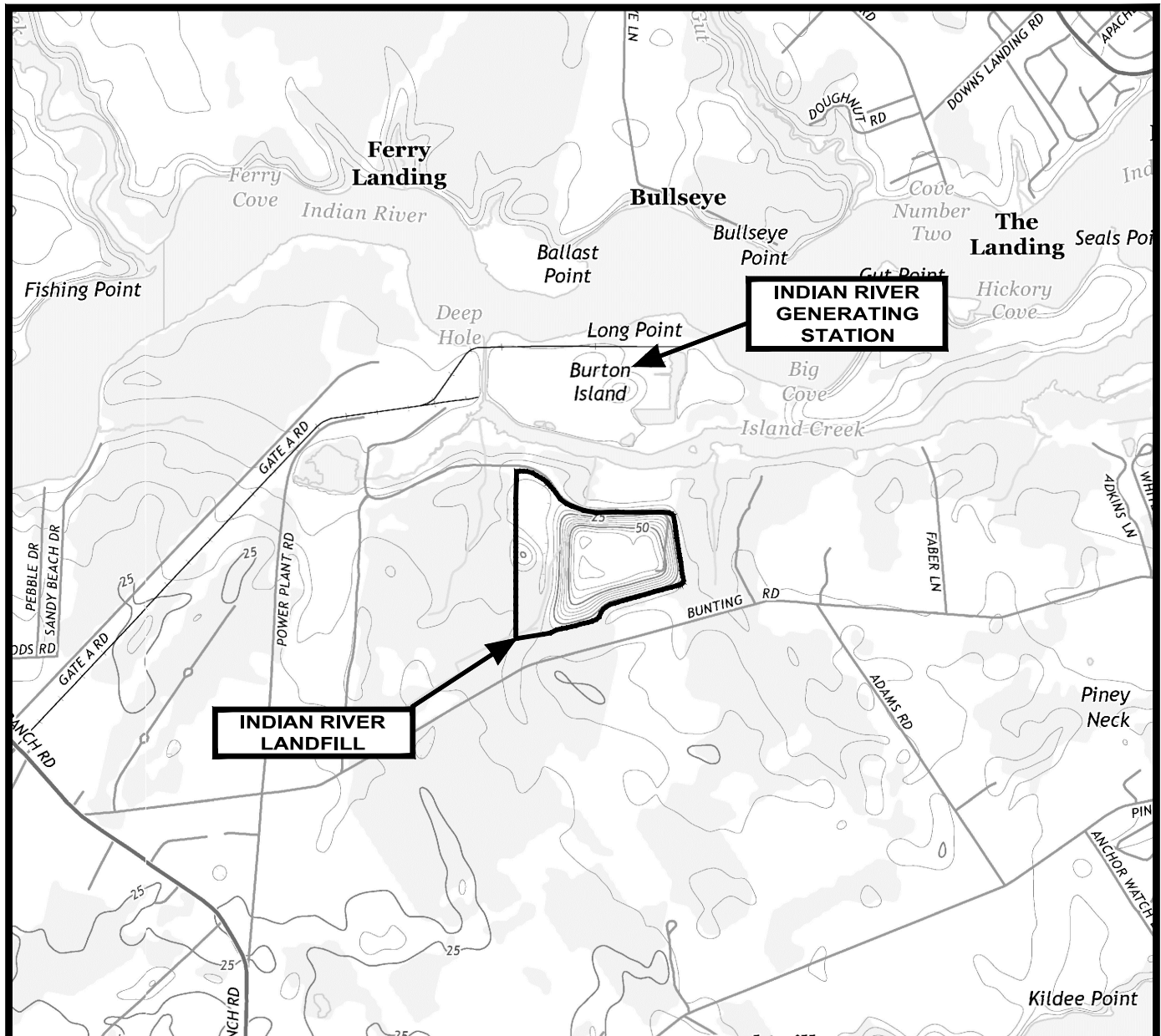
Professional Engineer Seal:



FIGURES

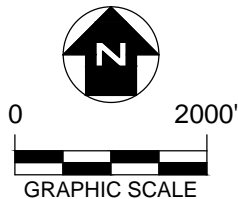
Figure 1 – Coal Ash Landfill, Site Location Plan

Figure 2 – Coal Ash Landfill, Permitted Final Landform



LEGEND

———— INDIAN RIVER LANDFILL FACILITY BOUNDARY



NOTES

1. AERIAL TOPO OBTAINED FROM USGS 7.5 - MINUTE SERIES (TOPOGRAPHIC) QUADRANGLE MAP: FRANKFORD, DELAWARE - SUSSEX CO. (2014), MILLSBORO, DELAWARE - SUSSEX CO. (2014).
2. ALL BOUNDARIES ARE APPROXIMATE.



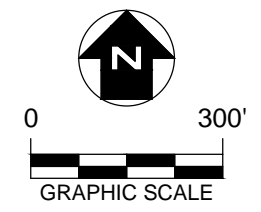
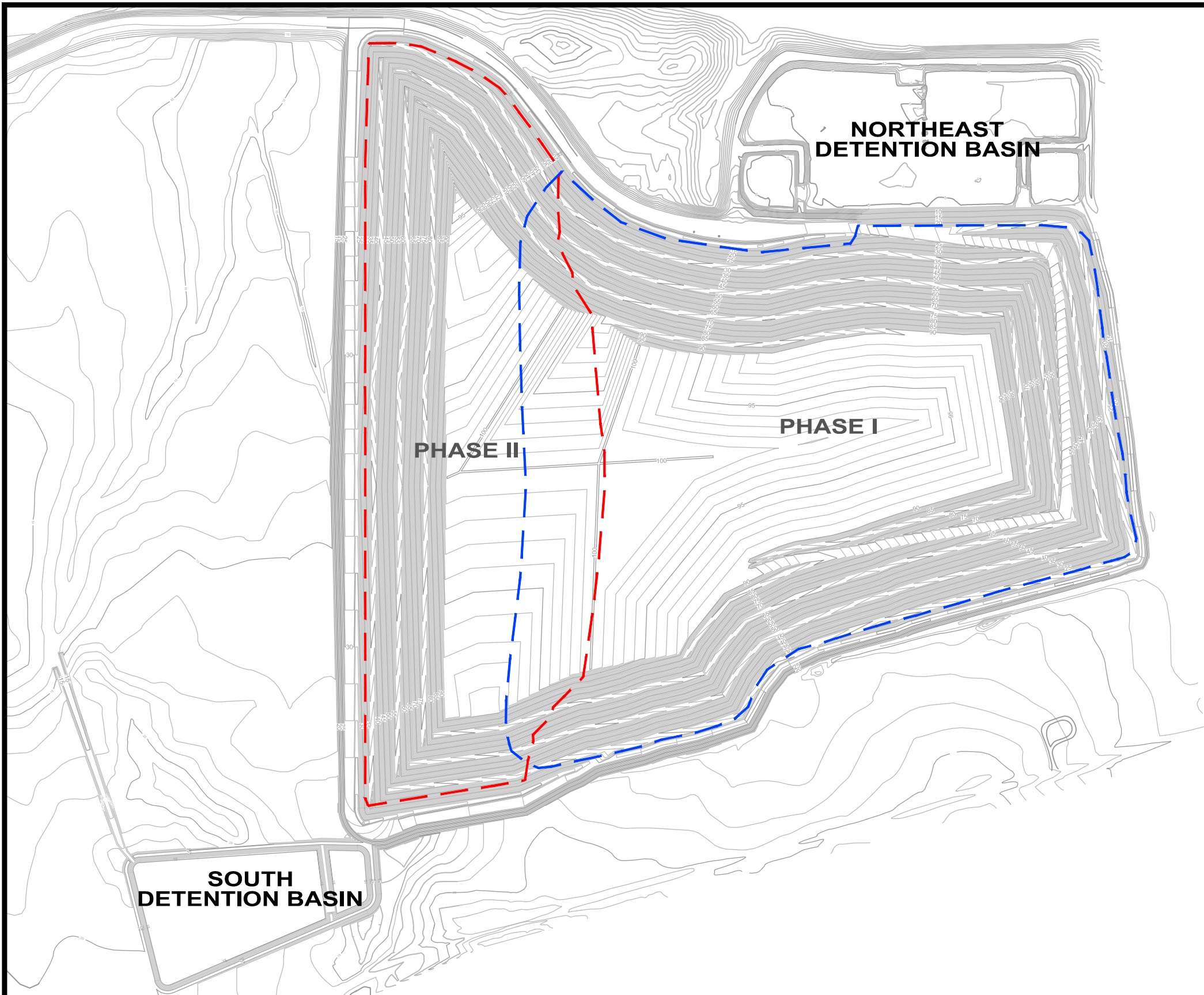
CB&I Environmental & Infrastructure, Inc.

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NRG INDIAN RIVER LANDFILL CLOSURE AND POST-CLOSURE PLAN

FIGURE 1 INDIAN RIVER LANDFILL SITE LOCATION PLAN

APPROVED BY: RDS PROJ. NO.: 6312142841 DATE: OCTOBER 2016



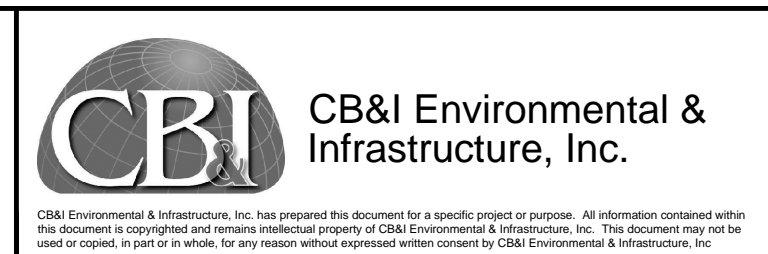
LEGEND

- - - - - LANDFILL PHASE BOUNDARY (PHASE I)
- - - - - LANDFILL PHASE BOUNDARY (PHASE II)

NOTES

1. FOR CLARITY, NOT ALL SITE FEATURES MAY BE SHOWN.
2. ALL BOUNDARIES ARE APPROXIMATE.

REV. NO.	DATE	DESCRIPTION



**NRG INDIAN RIVER LANDFILL
CLOSURE AND POST-CLOSURE PLAN**

**FIGURE 2
PERMITTED FINAL LANDFORM**

DRAWN BY:	SJL	APPROVED BY:	RDS	PROJ. NO.:	631214281	DATE:	OCTOBER 2016
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APPENDICES

APPENDIX A

Title 40 CFR §257 and §261 Regulations



Plan Review/Amendment Log §257.102(b)(3)

Date of Review	Reviewer Name	Amendment Required (YES/NO)	Sections Amended and Reason

Plan Review/Amendment Log §257.104(d)(3)

Date of Review	Reviewer Name	Amendment Required (YES/NO)	Sections Amended and Reason

CCR Regulatory Requirements

USEPA CCR Criteria 40 CFR §257.102	Closure Plan
<p>§257.102(a) stipulates:</p> <p><i>(a) Closure of a CCR landfill, CCR surface impoundment, or any lateral expansion of a CCR unit must be completed either by leaving the CCR in place and installing a final cover system or through removal of the CCR and decontamination of the CCR unit, as described in paragraphs (b) through (j) of this section. Retrofit of a CCR surface impoundment must be completed in accordance with the requirements in paragraph (k) of this section.</i></p>	Section 1.1, Page 1
<p>§257.102(b)(1) stipulates:</p> <p><i>(b) Written closure plan—(1) Content of the plan. The owner or operator of a CCR unit must prepare a written closure plan that describes the steps necessary to close the CCR unit at any point during the active life of the CCR unit consistent with recognized and generally accepted good engineering practices. The written closure plan must include, at a minimum, the information specified in paragraphs (b)(1)(i) through (vi) of this section.</i></p>	Section 1.1, Page 1
<p>§257.102(b)(1)(i) stipulates:</p> <p><i>(i) A narrative description of how the CCR unit will be closed in accordance with this section.</i></p>	Section 2.3, Page 3
<p>§257.102(b)(1)(iii) stipulates:</p> <p><i>(iii) If closure of the CCR unit will be accomplished by leaving CCR in place, a description of the final cover system, designed in accordance with paragraph (d) of this section, and the methods and procedures to be used to install the final cover. The closure plan must also discuss how the final cover system will achieve the performance standards specified in paragraph (d) of this section.</i></p>	Section 2.3, Page 3
<p>§257.102(b)(1)(iv) stipulates:</p> <p><i>(iv) An estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit</i></p>	Section 2.4, Page 4

USEPA CCR Criteria 40 CFR §257.102	Closure Plan
<p>§257.102(b)(1)(v) stipulates:</p> <p><i>(v) An estimate of the largest area of the CCR unit ever requiring a final cover as required by paragraph (d) of this section at any time during the CCR unit's active life.</i></p>	Section 2.3, Page 3
<p>§257.102(b)(1)(vi) stipulates:</p> <p><i>(vi) A schedule for completing all activities necessary to satisfy the closure criteria in this section, including an estimate of the year in which all closure activities for the CCR unit will be completed. The schedule should provide sufficient information to describe the sequential steps that will be taken to close the CCR unit, including identification of major milestones such as coordinating with and obtaining necessary approvals and permits from other agencies, the dewatering and stabilization phases of CCR surface impoundment closure, or installation of the final cover system, and the estimated timeframes to complete each step or phase of CCR unit closure. When preparing the written closure plan, if the owner or operator of a CCR unit estimates that the time required to complete closure will exceed the timeframes specified in paragraph (f)(1) of this section, the written closure plan must include the site-specific information, factors and considerations that would support any time extension sought under paragraph (f)(2) of this section.</i></p>	Section 4.0, Page 9
<p>§257.102(b)(2)(i) stipulates:</p> <p><i>(2) Timeframes for preparing the initial written closure plan – (i) Existing CCR landfills and existing CCR surface impoundments. No later than October 17, 2016, the owner or operator of the CCR unit must prepare an initial written closure plan consistent with the requirements specified in paragraph (b)(1) of this section.</i></p>	Report submitted prior to October 17, 2016.
<p>§257.102(b)(2)(iii) stipulates:</p> <p><i>(iii) The owner or operator has completed the written closure plan when the plan, including the certification required by paragraph (b)(4) of this section, has been placed in the facility's operating record as required by §257.105(i)(4).</i></p>	Section 5.0, Page 10

USEPA CCR Criteria 40 CFR §257.102	Closure Plan
<p>§257.102(b)(3) stipulates:</p> <p><i>(3) Amendment of a written closure plan. (i) The owner or operator may amend the initial or any subsequent written closure plan developed pursuant to paragraph (b)(1) of this section at any time.</i></p> <p><i>(ii) The owner or operator must amend the written closure plan whenever:</i></p> <p><i>(A) There is a change in the operation of the CCR unit that would substantially affect the written closure plan in effect; or</i></p> <p><i>(B) Before or after closure activities have commenced, unanticipated events necessitate a revision of the written closure plan.</i></p> <p><i>(iii) The owner or operator must amend the closure plan at least 60 days prior to a planned change in the operation of the facility or CCR unit, or no later than 60 days after an unanticipated event requires the need to revise an existing written closure plan. If a written closure plan is revised after closure activities have commenced for a CCR unit, the owner or operator must amend the current closure plan no later than 30 days following the triggering event.</i></p>	Section 5.0, Page 10
<p>§257.102(b)(4) stipulates:</p> <p><i>(4) The owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the initial and any amendment of the written closure plan meets the requirements of this section.</i></p>	Section 5.0, Page 10

<p align="center">USEPA CCR Criteria 40 CFR §257.102</p>	<p align="center">Closure Plan</p>
<p>§257.102(d)(1) stipulates:</p> <p><i>(d) Closure performance standard when leaving CCR in place –</i></p> <p><i>(1) The owner or operator of a CCR unit must ensure that, at a minimum, the CCR unit is closed in a manner that will:</i></p> <p><i>(i) Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate or contaminated run-off to the ground or surface waters or to the atmosphere;</i></p> <p><i>(ii) Preclude the probability of future impoundment of water, sediment or slurry;</i></p> <p><i>(iii) Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period;</i></p> <p><i>(iv) Minimize the need for further maintenance of the CCR unit; and</i></p> <p><i>(v) Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.</i></p>	<p align="center">Section 2.1, Page 2</p>

USEPA CCR Criteria 40 CFR §257.102	Closure Plan
<p>§257.102(d)(3)(i) stipulates:</p> <p><i>(3) Final cover system. If a CCR unit is closed by leaving CCR in place, the owner or operator must install a final cover system that is designed to minimize infiltration and erosion, and at a minimum, meets the requirements of paragraph (d)(3)(i) of this section, or the requirements of the alternative final cover system specified in paragraph (d)(3)(ii) of this section.(i) The final cover system must be designed and constructed to meet the criteria in paragraphs (d)(3)(i)(A) through (D) of this section. The design of the final cover system must be included in the written closure plan required by paragraph (b) of this section.</i></p> <p><i>(A) The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less.</i></p> <p><i>(B) The infiltration of liquids through the closed CCR unit must be minimized by the use of an infiltration layer that contains a minimum of 18 inches of earthen material.</i></p> <p><i>(C) The erosion of the final cover system must be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth.</i></p> <p><i>(D) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.</i></p>	<p>Section 2.3, Page 3</p>

<p align="center">USEPA CCR Criteria 40 CFR §257.102</p>	<p align="center">Closure Plan</p>
<p>§257.102(d)(3)(ii) stipulates:</p> <p><i>(ii) The owner or operator may select an alternative final cover system design, provided the alternative final cover system is designed and constructed to meet the criteria in paragraphs (f)(3)(ii)(A) through (D) of this section. The design of the final cover system must be included in the written closure plan required by paragraph (b) of this section.</i></p> <p><i>(A) The design of the final cover system must include an infiltration layer that achieves an equivalent reduction in infiltration as the infiltration layer specified in paragraphs (d)(3)(i)(A) and (B) of this section.</i></p> <p><i>(B) The design of the final cover system must include an erosion layer that provides equivalent protection from wind or water erosion as the erosion layer specified in paragraph (d)(3)(i)(C) of this section.</i></p> <p><i>(C) The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.</i></p>	<p align="center">Section 2.3, Page 3</p>
<p>§257.102(d)(3)(iii) stipulates:</p> <p><i>(iii) The owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the design of the final cover system meets the requirements of this section.</i></p>	<p align="center">Section 7.0, Page 12</p>
<p>§257.102(e)(1) stipulates:</p> <p><i>(e) Initiation of closure activities. Except as provided for in paragraph (e)(4) of this section and §257.103, the owner or operator of a CCR unit must commence closure of the CCR unit no later than the applicable timeframes specified in either paragraph (e)(1) or (2) of this section. (1) The owner or operator must commence closure of the CCR unit no later than 30 days after the date on which the CCR unit either:</i></p> <p><i>(i) Receives the known final receipt of waste, either CCR or any non-CCR waste stream; or</i></p> <p><i>(ii) Removes the known final volume of CCR from the CCR unit for the purpose of beneficial use of CCR.</i></p>	<p align="center">Section 2.2, Page 2 Section 4.0, Page 9</p>

<p align="center">USEPA CCR Criteria 40 CFR §257.102</p>	<p align="center">Closure Plan</p>
<p>§257.102(e)(3) stipulates:</p> <p><i>(3) For purposes of this subpart, closure of the CCR unit has commenced if the owner or operator has ceased placing waste and completes any of the following actions or activities:</i></p> <p><i>(i) Taken any steps necessary to implement the written closure plan required by paragraph (b) of this section;</i></p> <p><i>(ii) Submitted a completed application for any required state or agency permit or permit modification; or</i></p> <p><i>(iii) Taken any steps necessary to comply with any state or other agency standards that are prerequisite, or are otherwise applicable, to initiating or completing the closure of a CCR unit.</i></p>	<p align="center">Section 4.0, Page 9</p>
<p>§257.102(f)(1) stipulates:</p> <p><i>(f) Completion of closure activities. (1) Except as provided for in paragraph (f)(2) of this section, the owner or operator must complete closure of the CCR unit:</i></p> <p><i>(i) For existing and new CCR landfills and any lateral expansion of a CCR landfill, within six months of commencing closure activities.</i></p> <p><i>(ii) For existing and new CCR surface impoundments and any lateral expansion of a CCR surface impoundment, within five years of commencing closure activities.</i></p>	<p align="center">Section 4.0, Page 9</p>

USEPA CCR Criteria 40 CFR §257.102	Closure Plan
<p>§257.102(f)(2)(i) stipulates:</p> <p><i>(2)(i) Extensions of closure timeframes. The timeframes for completing closure of a CCR unit specified under paragraphs (f)(1) of this section may be extended if the owner or operator can demonstrate that it was not feasible to complete closure of the CCR unit within the required timeframes due to factors beyond the facility's control. If the owner or operator is seeking a time extension beyond the time specified in the written closure plan as required by paragraph (b)(1) of this section, the demonstration must include a narrative discussion providing the basis for additional time beyond that specified in the closure plan. The owner or operator must place each completed demonstration, if more than one time extension is sought, in the facility's operating record as required by §257.105(i)(6) prior to the end of any two-year period. Factors that may support such a demonstration include:</i></p> <p><i>(A) Complications stemming from the climate and weather, such as unusual amounts of precipitation or a significantly shortened construction season;</i></p> <p><i>(B) Time required to dewater a surface impoundment due to the volume of CCR contained in the CCR unit or characteristics of the CCR in the unit;</i></p> <p><i>(C) The geology and terrain surrounding the CCR unit will affect the amount of material needed to close the CCR unit; or</i></p> <p><i>(D) Time required or delays caused by the need to coordinate with and obtain necessary approvals and permits from a state or other agency.</i></p>	<p>Section 4.0, Page 9</p>

<p align="center">USEPA CCR Criteria 40 CFR §257.102</p>	<p align="center">Closure Plan</p>
<p>§257.102(f)(2)(ii) stipulates:</p> <p><i>(2)(ii) Maximum time extensions.</i></p> <p><i>(A) CCR surface impoundments of 40 acres or smaller may extend the time to complete closure by no longer than two years</i></p> <p><i>(B) CCR surface impoundments larger than 40 acres may extend the timeframe to complete closure of the CCR unit multiple times, in two-year increments. For each two-year extension sought, the owner or operator must substantiate the factual circumstances demonstrating the need for the extension. No more than a total of five two-year extensions may be obtained for any CCR surface impoundment.</i></p> <p><i>(C) CCR landfills may extend the timeframe to complete closure of the CCR unit multiple times, in one-year increments. For each one-year extension sought, the owner or operator must substantiate the factual circumstances demonstrating the need for the extension. No more than a total of two one-year extensions may be obtained for any CCR landfill.</i></p>	<p align="center">Section 4.0, Page 9</p>
<p>§257.102(f)(2)(iii) stipulates:</p> <p><i>(iii) In order to obtain additional time extension(s) to complete closure of a CCR unit beyond the times provided by paragraph (f)(1) of this section, the owner or operator of the CCR unit must include with the demonstration required by paragraph (f)(2)(i) of this section the following statement signed by the owner or operator or an authorized representative:</i></p> <p><i>I certify under penalty of law that I have personally examined and am familiar with the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.</i></p>	<p align="center">Section 4.0, Page 9</p>
<p>§257.102(f)(3) stipulates:</p> <p><i>(3) Upon completion, the owner or operator of the CCR unit must obtain a certification from a qualified professional engineer verifying that closure has been completed in accordance with the closure plan specified in paragraph (b) of this section and the requirements of this section.</i></p>	<p align="center">Section 4.0, Page 9</p>

<p align="center">USEPA CCR Criteria 40 CFR §257.102</p>	<p align="center">Closure Plan</p>
<p>§257.102(g) stipulates:</p> <p><i>(g) No later than the date the owner or operator initiate closure of a CCR unit, the owner or operator must prepare a notification of intent to close a CCR unit. The notification must include the certification by a qualified professional engineer for the design of the final cover system as required by §257.102(d)(3)(iii), if applicable. The owner or operator has completed the notification when it has been placed in the facility's operating record as required by §257.105(i)(7).</i></p>	<p align="center">Section 4.0, Page 9</p>
<p>§257.102(h) stipulates:</p> <p><i>(h) Within 30 days of completion of closure of the CCR unit, the owner or operator must prepare a notification of closure of a CCR unit. The notification must include the certification by a qualified professional engineer as required by §257.102(f)(3). The owner or operator has completed the notification when it has been placed in the facility's operating record as required by §257.105(i)(8).</i></p>	<p align="center">Section 4.0, Page 9</p>
<p>§257.102(i) stipulates:</p> <p><i>(i) Deed notations. (1) Except as provided by paragraph (i)(4) of this section, following closure of a CCR unit, the owner or operator must record a notation on the deed to the property, or some other instrument that is normally examined during title search. (2) The notation on the deed must in perpetuity notify any potential purchaser of the property that: (i) The land has been used as a CCR unit; and (ii) Its use is restricted under the post-closure care requirements as provided by §257.104(d)(1)(iii).</i></p>	<p align="center">Section 2.3, Page 4</p>
<p>§257.102(j) stipulates:</p> <p><i>(j) The owner or operator of the CCR unit must comply with the closure recordkeeping requirements specified in §257.105(i), the closure notification requirements specified in §257.106(i), and the closure Internet requirements specified in §257.107(i).</i></p>	<p align="center">Section 4.0, Page 9</p>

USEPA CCR Criteria 40 CFR §257.104	Post-Closure Plan
<p>§257.104(a)(1) stipulates:</p> <p><i>(a) Applicability. (1) Except as provided by either paragraph (a)(2) or (3) of this section, §257.104 applies to the owners or operators of CCR landfills, CCR surface impoundments, and all lateral expansions of CCR units that are subject to the closure criteria under §257.102.</i></p>	Section 1.1, Page 1
<p>§257.104(b)(1) stipulates:</p> <p><i>(b) Post-closure care maintenance requirements. Following closure of the CCR unit, the owner or operator must conduct post-closure care for the CCR unit, which must consist of at least the following:(1) Maintaining the integrity and effectiveness of the final cover system, including making repairs to the final cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the final cover;</i></p>	Section 3.2, Page 5
<p>§257.104(b)(2) stipulates:</p> <p><i>(2) If the CCR unit is subject to the design criteria under §257.70, maintaining the integrity and effectiveness of the leachate collection and removal system and operating the leachate collection and removal system in accordance with the requirements of §257.70; and</i></p>	Section 3.2, Page 7
<p>§257.104(b)(3) stipulates:</p> <p><i>(3) Maintaining the groundwater monitoring system and monitoring the groundwater in accordance with the requirements of §257.90 through §257.98.</i></p>	Section 3.2, Page 7
<p>§257.104(c)(1) stipulates:</p> <p><i>(c) Post-closure care period: (1) Except as provided by paragraph (c)(2) of this section, the owner or operator of the CCR unit must conduct post-closure care for 30 years.</i></p>	Section 3.0, Page 5

USEPA CCR Criteria 40 CFR §257.104	Post-Closure Plan
<p>§257.104(d)(1)(i) stipulates:</p> <p><i>(d) Written post-closure plan—(1) Content of the plan. The owner or operator of a CCR unit must prepare a written post-closure plan that includes, at a minimum, the information specified in paragraphs (d)(1)(i) through (iii) of this section. (i) A description of the monitoring and maintenance activities required in paragraph (b) of this section for the CCR unit, and the frequency at which these activities will be performed;</i></p>	Section 3.2, Pages 5 - 7
<p>§257.104(d)(1)(ii) stipulates:</p> <p><i>(ii) The name, address, telephone number, and email address of the person or office to contact about the facility during the post-closure care period; and.</i></p>	Section 3.1, Page 5
<p>§257.104(d)(1)(iii) stipulates:</p> <p><i>(iii) A description of the planned uses of the property during the post-closure period. Post-closure use of the property shall not disturb the integrity of the final cover, liner(s), or any other component of the containment system, or the function of the monitoring systems unless necessary to comply with the requirements in this subpart. Any other disturbance is allowed if the owner or operator of the CCR unit demonstrates that disturbance of the final cover, liner, or other component of the containment system, including any removal of CCR, will not increase the potential threat to human health or the environment. The demonstration must be certified by a qualified professional engineer, and notification shall be provided to the State Director that the demonstration has been placed in the operating record and on the owners or operator's publicly accessible Internet site.</i></p>	Section 3.0, Page 5
<p>§257.104(d)(2)(i) stipulates:</p> <p><i>(2) Deadline to prepare the initial written post-closure plan: (i) Existing CCR landfills and existing CCR surface impoundments. No later than October 17, 2016, the owner or operator of the CCR unit must prepare an initial written post-closure plan consistent with the requirements specified in paragraph (d)(1) of this section.</i></p>	Report submitted prior to October 17, 2016.

<p align="center">USEPA CCR Criteria 40 CFR §257.104</p>	<p align="center">Post-Closure Plan</p>
<p>§257.104(d)(2)(ii) stipulates:</p> <p><i>(ii) The owner or operator has completed the written post-closure plan when the plan, including the certification required by paragraph (d)(4) of this section, has been placed in the facility's operating record as required by §257.105(i)(4).</i></p>	<p align="center">Will be completed after approval</p>
<p>§257.104(d)(3) stipulates:</p> <p><i>(3) Amendment of a written post-closure plan. (i) The owner or operator may amend the initial or any subsequent written post-closure plan developed pursuant to paragraph (d)(1) of this section at any time.</i></p> <p><i>(ii) The owner or operator must amend the written closure plan whenever:</i></p> <p><i>(A) There is a change in the operation of the CCR unit that would substantially affect the written post-closure plan in effect; or</i></p> <p><i>(B) After post-closure activities have commenced, unanticipated events necessitate a revision of the written post-closure plan.</i></p> <p><i>(iii) The owner or operator must amend the written post-closure plan at least 60 days prior to a planned change in the operation of the facility or CCR unit, or no later than 60 days after an unanticipated event requires the need to revise an existing written post-closure plan. If a written post-closure plan is revised after post-closure activities have commenced for a CCR unit, the owner or operator must amend the written post-closure plan no later than 30 days following the triggering event.</i></p>	<p align="center">Section 5.0, Page 10</p>
<p>§257.104(d)(4) stipulates:</p> <p><i>(4) The owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the initial and any amendment of the written post-closure plan meets the requirements of this section.</i></p>	<p align="center">Section 7.0, Page 12</p>

<p align="center">USEPA CCR Criteria 40 CFR §257.104</p>	<p align="center">Post-Closure Plan</p>
<p>§257.104(e) stipulates:</p> <p><i>(e) Notification of completion of post-closure care period. No later than 60 days following the completion of the post-closure care period, the owner or operator of the CCR unit must prepare a notification verifying that post-closure care has been completed. The notification must include the certification by a qualified professional engineer verifying that post-closure care has been completed in accordance with the closure plan specified in paragraph (d) of this section and the requirements of this section. The owner or operator has completed the notification when it has been placed in the facility's operating record as required by §257.105(i)(13).</i></p>	<p align="center">Section 4.0, Page 9</p>
<p>§257.104(f) stipulates:</p> <p><i>(f) The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in §257.105(i), the notification requirements specified in §257.106(i), and the Internet requirements specified in §257.107(i).</i></p>	<p align="center">Section 5.0, Page 10</p>

APPENDIX B

DNREC-Approved Closure and Post-Closure Care Plan
(2011 Plan, 2016 Updated Cost Estimates)



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Appendix A – Closure and Post-Closure Cost Estimates

1.0 CLOSURE

1.1 General

This Closure and Post-Closure Plan for the Coal Ash Disposal Landfill (Phases I and II) has been prepared in accordance with the Delaware Regulations Governing Solid Waste (DRGSW). The landfill closure operation will be in accordance with the DRGSW, Section 6.8, and constructed in accordance with the Phase I and II specifications and design drawings.

This Closure and Post-Closure Plan describes the closure sequencing, final cover system, erosion and sedimentation control and maintenance of the capping system for the Coal Ash Landfill. The closure has been designed to minimize long-term maintenance and minimize infiltration of precipitation into the coal ash landfill and other adverse environmental impacts.

1.2 Closure Activities

1.2.1 Closure Plan Time Frame

The Phase I Landfill area is currently in the process of closure cap construction. The completion of the final closure cap is anticipated in 2011. The Phase II landfill will be constructed in two cells and closed as each cell reaches its final contour elevations as shown on Drawing 7. The closure cross sections are provided on Drawing 8. The size of the individual cells was selected to minimize the active landfill size, the area disturbed by landfill operations and the length of time before an active landfill area is closed.

The closure of each cell in Phase II will be completed within 180 days after receiving the final volume of waste for that cell. The estimated life span for filling Phase II is approximately 8 years.

1.2.2 Closure Performance

The landfill closure design system isolates the ash and air quality controls system (scrubber) wastes from the surrounding environment to minimize infiltration of surface water into the landfill and erosion/sedimentation of the closure area. The erosion and sedimentation controls such as the erosion control benches, sedimentation ponds, seeding, and downchute pipes will be constructed as the cover advances following the final grades.

1.2.3 Inventory Removal and Disposal

Landfill equipment should not require decontamination and all routine equipment maintenance will be performed in a manner so as not to result in adding waste to the Coal Ash Landfill. All lubricants, fuel, waste oil, and other residues will be properly managed and disposed of at an approved facility. All landfill equipment and temporary structures used during normal operations will be removed after their usefulness ends.

1.2.4 Closure of Stormwater Management Ponds

None of the stormwater management ponds constructed as part of the Coal Ash Landfill construction will require closure.

1.2.5 Cover Design

The closure operation will be performed progressively as each landfill construction Phase is completed to fulfill the design requirements depicted in the project design plans and the description below:

- The coal ash and scrubber wastes disposed in the Phase II landfill will be graded so that the final closure cover runoff will be directed to two sedimentation basins around the landfill. The drainage areas have been designed to minimize erosion of the landfill following closure. The maximum closure side slopes have been designed not to exceed 3H:1V (Horizontal:Vertical).
- As the coal ash and scrubber wastes reach the final closure grades shown on Drawing 7, the coal ash and scrubber wastes will be covered with (from the bottom to top):
 - A minimum 12-inch subgrade layer of compacted soil with a maximum particle size of 3/8-inch;
 - 40-mil textured Linear Low Density Polyethylene (LLDPE) geomembrane;
 - Double-sided geocomposite drainage layer;
 - A minimum 18-inch infiltration layer of compacted soil; and,
 - A minimum 6-inch erosion control layer of vegetative soil that is subsequently seeded.
- Erosion control benches have been designed into the final cover every 20 vertical feet (60-feet of slope). Downchute pipes direct the erosion control bench surface water flow off the final cover to one of the two sedimentation basins surrounding the landfill.
- The closure system will be used in the event that the coal ash will not be utilized as offsite structural fill or as a component in manufactured products or materials.

Construction quality assurance and quality control (QA/QC) procedures for the geosynthetic and soil components of the closure cover system are presented in the Construction Quality Assurance Plan. Closure material descriptions and construction methods are included in the Project Specifications.

1.2.5.1 Erosion and Sedimentation Control Plan

An Erosion and Sedimentation Control Plan has been prepared to manage surface water, minimize soil erosion, and control sedimentation during construction, operation, and closure. The

Erosion and Sedimentation Control Plan was developed following the requirements of the current (2005) Delaware Erosion and Sediment Control Handbook. The landfill erosion and sedimentation control design was prepared to manage the peak flow for the 2-hour, 10-year storm event and the Delaware Erosion and Sediment Control Handbook.

The Erosion and Sedimentation Control Plan includes the following:

- The landfill final closure design grades were developed to minimize erosion and subsequent soil loss;
- Erosion control benches have been designed into the final cover every 20 vertical feet (60-feet of slope). Downchute pipes direct the erosion control bench surface water flow off of the final cover to one of the two sedimentation basins surrounding the landfill;
- A total of 24-inches of cover soils will be placed and seeded for stabilization;
- Stormwater and erosion control structures as shown on Drawings 9 through 11;
- Temporary and permanent drainage channels have been designed to route surface water runoff from disturbed and closed areas and run-on from upgradient areas;
- Culverts have been designed to pass drainage under access roads; and,
- Sedimentation basins have been designed to collect surface water runoff, control sediment, and discharge to natural watercourses.

The erosion and sedimentation controls will be constructed in phases as landfill construction and closure progresses. Calculations for the erosion and sedimentation control diversion and collection systems are included in the Design Report. Erosion and sedimentation control details are included on Drawings 9 through 11.

Permits from DNREC for work at the landfill have been obtained, and the construction and operations contractors shall comply with the permit requirements, identified under the following permits:

- Sediment and Stormwater Management Plan for the Phase I Coal Ash Landfill, approved by DNREC in February 2008, including December 2009 revisions.
- Sediment and Stormwater Management Plan for the Phase II Coal Ash Landfill, approved by DNREC in March 2009.

The erosion controls shown in these permits represent the minimum controls and additional controls may be required, depending upon the contractor's sequencing.

1.2.5.2 Settlement Subsidence and Displacement

Phase II base grade settlement analyses indicate a potential differential settlement of

approximately 3 to 4 inches beneath the point of maximum refuse height and the perimeter of the landfill. This differential settlement of the base grade should not cause any adverse impacts of the integrity of the geosynthetic liner. The minimum design base grade slope of 2.5 percent is sufficient to maintain a 2 percent slope after settlement occurs.

The final cover system will experience some settlement relative to the base grade settlement due to waste consolidation. Since coal ash is non-organic in nature and is compacted to 90 percent of standard Proctor (ASTM D698) during placement, most of the settlement will be compression and occur shortly after landfilling. In the event that non-uniform settlement occurs, minor regrading and repair of the soil component above the closure geosynthetics may be required. However, the effectiveness of the closure geomembrane and drainage geocomposite should not be reduced since the synthetic components are flexible they will retain their integrity under minor differential settlement.

Landfill slope stability analyses have demonstrated that the landfill slopes and perimeter berms are stable for both static and seismic conditions. The detailed calculations are provided in the Design Narrative.

1.2.5.3 Freeze - Thaw

The regional average depth of frost penetration in the Millsboro, Delaware, area is approximately 6 inches. The cover soil is 24 inches thick, which includes a minimum six inches of topsoil. Therefore, the cover soils should not be damaged by frost action.

1.3 Groundwater Monitoring System

The permanent groundwater monitoring system consists of five (5) up-gradient, seventeen (17) down-gradient, and two (2) side-gradient wells. Sampling of the groundwater monitoring wells will continue throughout the closure period. Specific details of the groundwater monitoring system and methods are presented in the Ash, Leachate, and Groundwater Sampling Plan.

1.4 Leachate Collection System

The leachate collection system within the landfill area consists of a high permeability granular leachate collection medium composed of sand overlying a high-flow geocomposite drainage layer, that serves as the leachate collection layer, and High Density Polyethylene (HDPE) perforated drainage piping to promote rapid drainage and collection. The leachate will be collected into the primary leachate collection sumps and pumped to the leachate storage tanks. Leachate will be transported by tanker to the NRG Indian River Generating Station for utilization in the station's bottom ash management system.

Leachate flow through the closed landfill was modeled with the "Hydraulic Evaluation of Landfill Performance" (HELP) computer simulation developed by the U.S. Army Engineer Waterways Experiment Station. Design details of the leachate collection system are shown on Drawings 12 through 14, and 19 through 25.

1.5 Gas Collection System

Coal ash and scrubber wastes are non-organic materials, and do not degrade to produce landfill gas; therefore no landfill gas collection system is required for the coal ash landfill.

1.6 Schedule for Closure

The disposal cells will be developed in a staged manner and closure construction will be conducted as part of normal operating procedures. Final closure will begin after the waste materials in each cell is brought to final grade. The estimated closure times, assuming that the coal ash is not utilized for beneficial use, is shown in the table below.

ESTIMATED CLOSURE TIMES

PHASE II LANDFILL CELLS	TOTAL FILL (CY)	INCREMENTAL FILL (CY)	ESTIMATED LIFE SPAN (yr's)	+ ESTIMATED SCHEDULE FOR CLOSURE (yr)
CELL 1	525,000 *	525,000	2.5	2013
CELL 2	1,180,000	1,705,000	5	2017

* Estimated remaining available filling volume as of May 2011.

+ Estimated schedule based upon an average annual disposal of 225,000 c.y.

Beneficial use of the coal ash may extend the life of the landfill indefinitely. Sedimentation basins, intermediate benches, downchutes, and permanent channels will remain following landfill closure. The groundwater monitoring system will remain in place during the closure and post-closure periods.

1.7 Posting

One sign will be posted at the site entrance to the landfill notifying all persons of the final closure of the landfill, and prohibition against further receipt of coal ash or scrubber wastes. Unauthorized access to the site will be controlled by a fence and gate. A locked gate at the landfill entrance will prohibit entry to the site after closure.

1.8 Notification

The facility will be used solely for the disposal of coal ash from NRG Energy, Inc. owned facilities. The operation of the landfill will continue for the life of the generating station and will be under the control of Indian River. There will be no other users of the facility to be notified at the closure of the facility.

The closure operations will proceed as an ongoing operation of landfill operation. The landfill development plans in Drawings 26 through 28 describe the development of the closure operation.

DNREC will be notified 180 days prior to commencement of final closure activities for each landfill cell and 30 working days prior to commencing closure activities. The final capping system shall be in place 180 days following the final waste disposal activity. Final closure will be completed in accordance with the requirements in DRGSW, Section 6.H.1.b. Final closure will be completed within 12 months of placement of the last waste in a completed cell. DNREC will inspect the closed facility prior to entering into post-closure.

When closure of the landfill or landfill cell is completed, NRG Energy, Inc. will submit a final construction documentation report to SHWMB for approval. This report will certify that the closure of the landfill or cell was completed in accordance with the closure plan, the construction quality assurance plan, construction specifications, and design drawings. The final report will be certified by a construction quality assurance engineer, registered in Delaware, that the closure construction and the final report meet the requirements of the solid waste permit and regulations.

2.0 POST-CLOSURE

2.1 Post-Closure Contact

The post-closure contact for the coal ash landfill will be as follows:

Post-Closure Contact:

Mr. David Burton
Indian River Operations, Inc.
P.O. Box 408
Power Plant Road
Millsboro, Delaware 19966
Telephone (302) 934-3562

DNREC will be notified if the above information changes.

2.2 Security

The landfill entrance/exit gate will be locked when the landfill is closed. No waste will remain exposed after completion of the landfill closure. Although the site will be closed to the public and has no planned alternate end use, the closed landfill will not pose a health hazard in the event that the public or domestic livestock accidentally wander onto the landfill property.

2.3 Maintenance Plan

Inspection of the closed landfill facility will be conducted by Indian River personnel or their designee(s) to detect deterioration of the facilities. Any damage to facilities will be repaired to maintain the erosion control facilities and prevent a breach of the containment structures. Table 2-1 is a Post-Closure Maintenance Checklist. Preventative and corrective maintenance will include the following items:

2.3.1 Security Devices

Security controls such as locks, gates, and fencing will be inspected on a monthly basis. Security locks will be replaced immediately if damaged. Perimeter fencing will be repaired by a contractor or site personnel after a need has been identified.

2.3.2 Erosion Damage

Erosion damage to the vegetative soil layer on the final cover system will be repaired when the gullies are greater than six inches deep. The eroded areas will be filled with soil capable of sustaining vegetative growth. The soil surface will then be seeded, fertilized, and mulched to reestablish vegetation. Topsoil used to make erosion repairs will be stockpiled onsite. Straw mulch or other suitable material will also be stored onsite or brought in as required.

2.3.3 Settlement, Subsidence, and Displacement

In areas where settlement, subsidence, or displacement has occurred, the area will be filled with soil and regraded to reestablish the design grades in the surrounding area. A stockpile of soil will be maintained onsite during post-closure for repairs. The soil surface will then be seeded, fertilized, and mulched to reestablish vegetation.

2.3.4 Run-on and Run-off Control Structures

Routine maintenance of run-on and run-off control structures include cleaning sediment from structures such as ditches, culverts, sedimentation ponds, downchute pipes, and, pond outlets. Repair of these structures will typically be performed by outside contractors who will bring in heavy equipment such as backhoes, dump trucks, dozers, and scrapers. Materials such as silt fence, straw bales, and soil will be kept onsite to implement short-term repairs while waiting for permanent repairs.

2.3.5 Groundwater Monitoring Wells

Routine maintenance of groundwater monitoring wells such as replacing locks and regrading of soil areas around the wells will be performed by Indian River personnel or their designee(s). Other maintenance work such as protective casing repair, well replacement, and repair of sampling pumps will be performed by specialty contractors.

2.4 Inspection Plan

Inspection of the closed landfill facility will be conducted by Indian River personnel or their designee(s) to detect any deterioration of the facilities. Any damage to facilities will be repaired to maintain the erosion control facilities and prevent a breach of the containment structures. Table 2-2 is a Post-Closure Inspection Schedule.

Table 2-1 Post-Closure Maintenance Checklist	
	Date
Task	Remarks
1.0 Diversion Ditches <ul style="list-style-type: none"> • Clear of debris • Erosion 	
2.0 Closure Cover <ul style="list-style-type: none"> • Runoff control ditches clear of debris • Erosion of closure cap • Litter • Vegetation condition • Indications of settlement 	
3.0 Leachate Collection System <ul style="list-style-type: none"> • General system operation • System controls • Piping damage and clogging • Containment facility • Loadout facility • Other, as needed 	

Table 2-2 Post-Closure Inspection Schedule		
Item	Inspection Procedure	Frequency of Inspection
Landfill Area	Erosion of closure cover.	Monthly or after severe storms.
	Deterioration of vegetative cover.	Same
	Trash, litter.	Same
	Damage to erosion control facilities.	Same
	Settlement (by topographic survey).	Annually for first five years after closure.
Groundwater Monitoring System	See groundwater monitoring plan.	See groundwater monitoring plan.

2.5 Post-Closure Monitoring Plan

2.5.1 Water Quality Monitoring

Water quality monitoring will occur throughout the post-closure period includes groundwater monitoring wells and the surface water sedimentation basins. The groundwater monitoring requirements are included in the groundwater monitoring plan. The sampling of the surface water sedimentation basins are described in the facilities NPDES Permit.

2.5.2 Gas Control Monitoring

No gas will be generated by the landfill; therefore, no gas monitoring will be required.

2.6 Post-Closure Uses

After closure, the landfill will be maintained as a grass-covered hill with a variety of wildflowers, clover, and shrubs. Development of the area for uses other than passive recreation will be determined at the time of the closure.

2.7 Vegetation Mowing

During the first year of closure, the landfill will not be mowed in order to allow the vegetation to fully establish. After the first year of vegetation growth, the disposal facility will be mowed two times per year. If native, non-mow perennial grasses are used, then mowing is not necessary. However, if mowing is not performed, any established small trees should be removed on an annual basis.

2.8 Training

Indian River or their designee(s) will maintain training for the post-closure inspection and maintenance staff. Indian River employees or their designee(s) for landfill closure and post-closure operations will receive training to maintain the closed landfill in accordance with the requirements of this Operation Manual. The training will be performed by the landfill Site Manager or Indian River technical staff or their designee(s). The subjects to be covered include the following:

- Drainage system inspection and maintenance.
- Groundwater well monitoring and sampling.
- Leachate collection system monitoring, sampling, inspection and maintenance.
- Operation and maintenance of the closed landfill maintenance equipment.
- Site safety and emergency programs.

3.0 CLOSURE AND POST-CLOSURE CARE COST ESTIMATES

The combined Phase I and Phase II closure cost for the landfill, is estimated to be approximately \$8.75MM (Appendix A), for Cell 1 and the portions of Phase I for which closure cap construction is in progress as of May 2011. This value is presented in estimated 2011 dollars. A Closure and Post-Closure Cost has not been estimated for Cell 2 since it has not yet been constructed.

As required by the Regulations Governing Solid Waste, Section 6.K.1.a., *Post-Closure Care*, the post-closure period for the Phase I and II Landfill is 30 years. The 30-year post-closure care cost for the entire Phase I and II Landfill is estimated to be approximately \$11.78MM (Appendix A). This value is presented in estimated 2011 dollars.

In providing these cost estimates, it is recognized that neither NRG Energy, Inc., nor Golder Associates Inc. (Golder) have control over the costs of labor, equipment, or materials, or over a Contractor's method(s) of determining prices or bidding. These cost estimates are based on Golder's professional judgment and do not constitute a warranty, expressed or implied, that contractor bids or negotiated prices will match or be within any given percentage of this estimate.

4.0 FINANCIAL ASSURANCE

Financial Assurance has been developed using the financial mechanisms described in the Regulations Governing Solid Waste, Section 4.A.11, *Financial Assurance Criteria*. NRG Energy has provided financial assurance for the closure and post-closure amount needed to close Phase I. The financial assurance mechanism for the combined Phase I and Phase II will be provided by NRG Energy, Inc., once the financial assurance amounts are approved.

APPENDIX A
Closure and Post-Closure Cost Estimates



March 16, 2011

Project No. 033-6638

Mr. David Bacher
VP, Environmental Compliance Company
NRG Energy Inc.
Indian River Power, LLC
29416 Power Plant Road.
Dagsboro, Delaware 19939-4906

**RE: CLOSURE AND POST-CLOSURE COST ESTIMATES
2011 FINANCIAL ASSURANCE FOR PHASE I AND PHASE II CELL 1 COAL ASH LANDFILL
NRG INDIAN RIVER GENERATING STATION, MILLSBORO, DELAWARE**

Dear Mr. Bacher:

Golder Associates Inc. (Golder) is pleased to provide the attached closure and post-closure cost estimates for the Phase I and Phase II Cell 1 Coal Ash Landfill for the financial assurance for Year 2011. The closure and post-closure cost estimates are documented in this letter and the attached cost tables.

CLOSURE COST ESTIMATES

The capping of the Phase I Landfill commenced in 2010. At the time of the writing of this letter, approximately 19.3 acres of the 46 acres have received a low-permeability barrier. In particular, approximately 16 acres of the closure cap has been constructed, with hydroseeding scheduled to occur in the next few weeks, and approximately 3.3 acres of the western slope has been covered with the liner system for Cell 1 of the Phase II Landfill. As such, the attached closure cost estimate prepared in support of the annual financial assurance statement has been reduced to reflect the remaining 26.7 acres of the Phase I Landfill still requiring closure. Closure of the remainder of the Phase I Landfill is expected to be completed by the end of 2012.

Based upon the foregoing, the estimated construction cost associated with the closure of the remaining uncapped portion of Phase I is \$5.863M (in 2011 dollars). The estimated total construction cost associated with the closure of Phase II, Cell 1 is approximately \$2.886M (in 2011 dollars). These estimates include material and installation prices for geosynthetics and structural fill to construct the cap, underdrains and channels to manage stormwater, and measures to ensure vegetative stabilization following construction. In addition to construction costs, the total cost reflects administrative items such as construction quality assurance monitoring, construction management and oversight, and construction certification report preparation. The unit costs for these items were estimated from construction bid prices or are based on other recent landfill capping projects with which Golder has been involved.

POST-CLOSURE COST ESTIMATES

The long-term operation and monitoring costs associated with the post-closure of Phase I and Phase II Cell 1, are approximately \$4.165M and \$7.612M, respectively (in 2011 dollars) over a thirty (30) year monitoring period. The post-closure costs associated with both Phase I and Phase II Cell 1 reflect estimated costs for groundwater monitoring of additional wells, inspecting and maintaining the additional cap area, and the annual reporting of these additional items. The majority of the costs associated with the post-closure of Phase II, Cell 1 are attributed to leachate management. The Phase II Landfill incorporates a leachate collection system which has to be maintained, monitored, and cleaned throughout the post-closure period.

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Golder Associates: Operations in Africa, Asia, Australasia, Europe, North America and South America

CONCLUSION

As requested, Golder divided the costs for closure and post-closure between the Phase I and Phase II Cell 1 Landfills. The closure costs for Phase I have been prorated to reflect the portion of landfill closure cap which has already been constructed. In moving forward with an annual financial assurance, Golder can combine closure and post-closure costs of both landfills to arrive at a cost estimate for both phases.

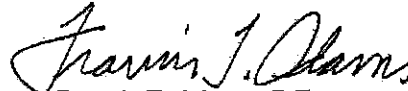
If you have any questions concerning this submission, please do not hesitate to contact the undersigned at (856) 793-2005.

Very truly yours,

GOLDER ASSOCIATES INC.



Veronica E. Foster, P.E.
Senior Engineer



Francis T. Adams, P.E.
Associate/Practice Leader

cc: J. Hefti, NRG
D. Burton, NRG

Attachment

RFT/VEF/crg



Project: NRG Phase I Landfill
 P.N.: 033-6638/024/05 Page: 1 of 1
 By: MTW Date: 01/28/2011
 Checked: J.Y.S. Date: 2/2/2011
 Reviewed: VEG Date: 3/15/2011
 Revised: Date:

**Indian River Power Station
 Coal Ash Landfill Closure Cost Estimate*
 Phase I Landfill, Closure Cap Construction - 2011 Dollars**

Description	Quantity	Unit	Unit Cost 2011	Cost	Remarks
Mobilization/Demobilization	1	LS	265,225.00	\$265,225	Engineering Estimate; Cell 1 Construction, Item 1
Erosion and Sediment Controls	1	LS	106,090.00	\$106,090	Engineering Estimate; Cell 1 Construction, Item 4
Clear Vegetation	26.70	AC	8,487.20	\$226,608	Cell 1 Construction Cost, Item 34
Cap Construction (1)					
Landfill Fine Grading (2)	26.70	AC	2,811.39	\$75,064	Means 2008 312323-17.0170 & 312323-23.5020
40-mil Geomembrane	129,228	SY	5.77	\$745,813	Cell 1 Construction Cost, Item 14 (60-mil Liner)
Geocomposite Drainage Material (3)	129,228	SY	7.36	\$960,089	Cell 1 Construction Cost, Item 15
18-Inch Soil Cover (4)	64,614	CY	16.76	\$1,083,074	Cell 1 Construction Cost, Item 28
6-Inch Topsoil (4)	129,228	SY	3.29	\$425,004	Engineering Estimate; 0436264.035 Cell 11, Item 7
Seeding (5)	26.70	AC	3,713.15	\$99,141	Engineering Estimate; 0436264.024 Cell 14, Item 7
Underdrains (6)	6,591	LF	32.04	\$211,173	Cell 1 Construction, Item 20
Buried Piping Under Terraces					
Coarse Aggregate Bedding Stone	2,535	CY	65.25	\$165,397	Means 2008 312323-16.0100
Geotextile	15,212	SY	1.89	\$28,726	Cell 1 Construction, Item 17
HDPE Perforated Drainage Pipe	17,114	LF	8.96	\$153,420	Means 2008 334616-35.0060
Storm Water Conveyance					
Downchute Piping (24" HDPE)	1,210	LF	106.09	\$128,369	Engineering Estimate; 0436264.024 Cell 14, Item 9
Drop Inlets	21	EA	5,304.60	\$111,395	Engineering Estimate; 0436264.024 Cell 14, Item 10
Pre-Construction, Construction, and Final Surveys	28.00	AC	4,774.05	\$133,673	Cell 1 Construction Cost, Item 2
Closure Plan / Final Design and Bidding	1	LS	81,624.16	\$81,624	Engineering Estimate
CQA Services	28.00	AC	13,112.72	\$367,156	Engineering Estimate; Similar Projects
Construction Management and Oversight	1	LS	180,299.96	\$180,300	Engineering Estimate
Final Construction Documentation Report	1	EA	21,854.64	\$21,855	Engineering Estimate
Post-Closure Plan	1	LS	25,204.64	\$25,205	Engineering Estimate
SUBTOTAL				\$5,584,401	
CONTINGENCY (5%)				\$279,220	
TOTAL COST				\$5,863,621	

Notes / Assumptions

- (1) Cap components in accordance with current Delaware Industrial Landfill Closure Requirements
- (2) Assumes interim cover soil material used for cap subbase layer
- (3) Not required by regulations, but assumed to be necessary for slope stability
- (4) Assumes material not available on-site
- (5) Assumes erosion mat is not required on slopes
- (6) Assumes one underdrain along entire toe of slope and one underdrain on slope
- (7) Costs include a 3% increase for converting from 2010 dollars to 2011 dollars.

* In providing this cost estimate, it is recognized that neither NRG Energy nor Golder have control over the costs of labor, equipment, or materials, or over a Contractor's method(s) of determining prices or bidding. This cost estimate is based on Golder's professional judgement and does not constitute a warranty, expressed or implied, that the Contractors' bid(s) or negotiated price(s) will match or be within any given percentage of this estimate.



Project: NRG Phase I Landfill
P.N.: 033-6638/024/05 **Page:** 1 of 1
By: MTW **Date:** 01/28/2011
Checked: J.Y.S. **Date:** 1/28/2011
Reviewed: J.Y.S. **Date:** 3/15/2011
Revised: **Date:**

**Indian River Power Station
 Coal Ash Landfill Closure Cost Estimate*
 Phase I Landfill, Post-Closure Care - 2011 Dollars**

Description	Quantity	Unit	Unit Cost 2011	Cost	Remarks
Annual Landfill Inspections					
Site Visit for Inspection	20	Day	956.68	\$19,134	Engineering Estimate
Prepare Inspection Report	20	Day	956.68	\$19,134	Engineering Estimate
Cap Maintenance					
Repair Rock Channels / Disipators(1)	23	Ton	43.04	\$990	Engineering Estimate
Fill Erosion Rills(2)	175	SY	3.57	\$625	Means 2002 (02310-460-0700)
Reseed Repairs / Bare Areas(3)	350	SY	4.83	\$1,690	Means 2002 (02310-460-0900)
Grass Cutting	46	AC	265.23	\$12,200	Engineering Estimate
Miscellaneous Repairs					
Fencing, Wells & Roadway around landfill	1	LS	3,709.68	\$3,710	Engineering Estimate
Annual Monitoring					
Sample Collection and Lab Analyses	2	EA	26,522.50	\$53,045	Cost Estimate from Michael Baker Corp.
Hydrologic Report	1	EA	11,948.00	\$11,948	Cost Estimate from Michael Baker Corp.
Permit Fees					
Annual Letter of Credit Maintenance Fee	1	EA	1,639.09	\$1,639	2007 NRG Fee Costs plus inflation
SUBTOTAL PER YEAR				\$132,230	
CONTINGENCY (5%)				\$6,612	
TOTAL COST PER YEAR				\$138,842	
TOTAL COST FOR 30 YEARS				\$4,165,247	

Notes / Assumptions

- (1) Assumes 1/2 of total Rip-Rap will be replaced over a 30-year period
- (2) Assumes 1 acre per year total repairs over 30-year period
- (3) Assumes reseeding 1 acre per year repair area, plus 1 acre per year total of bare areas over 30-year period
- (4) Costs include a 3% increase for converting from 2010 dollars to 2011 dollars.

* In providing this cost estimate, it is recognized that neither NRG Energy nor Golder have control over the costs of labor, equipment, or materials, or over a Contractor's method(s) of determining prices or bidding. This cost estimate is based on Golder's professional judgement and does not constitute a warranty, expressed or implied, that the Contractors' bid(s) or negotiated price(s) will match or be within any given percentage of this estimate.



Project: NRG Phase II Landfill
 P.N.: 033-6638.029.3 Page: 1 of 1
 By: MTW Date: 01/28/2011
 Checked: JYS Date: 1/28/2011
 Reviewed: UAG Date: 3/15/2011

**Indian River Power Station
 Coal Ash Landfill Closure Cost Estimate*
 Phase II Landfill, Cell 1 Closure Cap Construction - 2011 Dollars**

Description	Quantity	Unit	Unit Cost 2011	Cost	Remarks
Mobilization/Demobilization	1	LS	106,090.00	\$106,090	Engineering Estimate; Cell 1 Construction, Item 1
Erosion and Sediment Controls	1	LS	53,045.00	\$53,045	Engineering Estimate; Cell 1 Construction, Item 4
Clear Vegetation (8)	0	AC	8,487.20	\$0	Cell 1 Construction Cost, Item 34
Cap Construction (1) (6)					
Landfill Fine Grading (2)	14.00	AC	2,811.39	\$39,359	Means 2008 312323-17.0170 & 312323-23.5020
40-mil Geomembrane (7)	67,800	SY	5.77	\$391,294	Cell 1 Construction Cost, Item 14 (60-mil Liner)
Geocomposite Drainage Material (3) (7)	67,800	SY	7.35	\$498,468	Cell 1 Construction Cost, Item 15
16-inch Soil Cover (4)	33,900	CY	16.76	\$568,239	Cell 1 Construction Cost, Item 28
6-inch Topsoil (4)	67,800	SY	3.29	\$222,980	Engineering Estimate; 0436264.035 Cell 11, Item 7
Seeding (5)	14.00	AC	3,713.15	\$51,984	Engineering Estimate; 0436264.024 Cell 14, Item 7
Underdrains	900	LF	32.04	\$28,835	Cell 1 Construction, Item 20
Southwest Basin Cut	5,400	CY	5.74	\$30,993	Cell 1 Construction, Item 27
Buried Piping Under Terraces (6)					
HDPE Perforated Drainage Pipe	6,300	LF	8.96	\$56,477	Means 2008 334616-35.0060
Coarse Aggregate Bedding Stone	940	CY	65.25	\$61,331	Means 2008 312323-16.0100
Geotextile (7)	5,600	SY	1.89	\$10,575	Cell 1 Construction, Item 17
Storm Water Conveyance (6)					
Downslope Piping (24" HDPE)	760	LF	108.09	\$80,628	Engineering Estimate; 0436264.024 Cell 14, Item 9
Drop Inlets & Rock Filters	10	EA	5,304.50	\$53,045	Engineering Estimate; 0436264.024 Cell 14, Item 10
Pre-Construction, Construction, and Final Surveys	15	AC	4,774.05	\$71,611	Cell 1 Construction Cost, Item 2
Closure Plan / Final Design and Bidding	1	LS	53,045.00	\$53,045	Engineering Estimate
CQA Services	1	LS	265,225.00	\$265,225	Engineering Estimate
Construction Management and Oversight	1	LS	53,045.00	\$53,045	Engineering Estimate
Final Construction Documentation Report	1	EA	26,522.50	\$26,523	Engineering Estimate
Post-Closure Plan	1	LS	26,522.50	\$26,523	Engineering Estimate
SUBTOTAL				\$2,749,315	
CONTINGENCY (5%)				\$137,466	
TOTAL COST				\$2,886,781	

Notes / Assumptions

- (1) Cap components in accordance with current Delaware Industrial Landfill Closure Requirements
- (2) Assumes interim cover soil material used for cap subbase layer
- (3) Not required by regulations, but assumed to be necessary for slope stability
- (4) Assumes material not available on-site
- (5) Assumes erosion mat is not required on slopes
- (6) Quantities have been rounded up on this spreadsheet. Calculation package has exact quantities.
- (7) Quantities for geosynthetic items are exact and do not provide for overlap, waste, extra destructive testing, etc.
- (8) No vegetation will need to be cleared as part of Phase II Capping. The construction area will be actively filled and intermediate cover will be included as part of the cap.
- (9) Costs include a 3% increase for converting from 2010 dollars to 2011 dollars.

* In providing this cost estimate, it is recognized that neither NRG Energy nor Golder have control over the costs of labor, equipment, or materials, or over a Contractor's method(s) of determining prices or bidding. This cost estimate is based on Golder's professional judgement and does not constitute a warranty, expressed or implied, that the Contractors' bid(s) or negotiated price(s) will match or be within any given percentage of this estimate.



Project: NRG Phase II Landfill
 P.N.: 033-6638.029.3 Page: 1 of 1
 By: MTW Date: 01/28/2011
 Checked: J.Y.S. Date: 1/28/2011
 Reviewed: V.S.J. Date: 3/15/2011

**Indian River Power Station
 Coal Ash Landfill Closure Cost Estimate*
 Phase II Landfill, Cell 1 Post-Closure Care - 2011 Dollars**

Description	Quantity	Unit	Unit Cost 2011	Cost	Remarks
Annual Landfill Inspections (8)					
Site Visit for Inspection	20	Day	310.03	\$6,201	Incremental Costs from Phase I CPC
Prepare Inspection Report	20	Day	310.03	\$6,201	Incremental Costs from Phase I CPC
Cap Maintenance					
Repair Grass Channels	1	LS	1,060.90	\$1,061	Engineering Estimate
Fill Erosion Rills (2)	500	SY	3.57	\$1,787	Means 2002 (02310-460-0700)
Reseed Repairs / Bare Areas (2)	500	SY	4.83	\$2,415	Means 2002 (02310-460-0900)
Grass Cutting	15	AC	265.23	\$3,978	Engineering Estimate
Miscellaneous Repairs					
Fencing, Wells & Roadway Repairs	1	LS	2,121.80	\$2,122	Engineering Estimate
Annual Groundwater Monitoring (10)					
Sample Collection and Lab Analyses	2	EA	13,261.25	\$26,523	Incremental Costs from Phase I CPC
Hydrologic Report	1	EA	6,153.22	\$6,153	Incremental Costs from Phase I CPC
Leachate Management					
Cleaning Leachate Lines (3)	1	EA	103,001.06	\$103,001	Engineering Estimate
Leachate Tanker, equipment (4)	1	EA	15,913.50	\$15,914	Engineering Estimate
Leachate Tanker, O&M (5)	1	EA	2,652.25	\$2,652	Engineering Estimate
Leachate Tanker, operator (6)	1	EA	53,045.00	\$53,045	Engineering Estimate
Pump Replacement(s) (7)	1	EA	7,956.75	\$7,957	Engineering Estimate
Other System O&M (8)	1	EA	2,652.25	\$2,652	Engineering Estimate
Permit Fees (1)	1	LS	0.00	\$0	Cost Incorporated into Phase I Monitoring
Annual Letter of Credit Maintenance Fee (1)	1	EA	0.00	\$0	Cost Incorporated into Phase I Monitoring
SUBTOTAL PER YEAR				\$241,680	
CONTINGENCY (5%)				\$12,083	
TOTAL COST PER YEAR				\$253,743	
TOTAL COST FOR 30 YEARS				\$7,612,301	

Notes / Assumptions

- (1) Cost associated with these items are included in the financial assurance for Phase I Post-Closure Cost Estimate
- (2) Assumes 0.1 acre per year of repairs over 30-year period
- (3) Annual cleaning of leachate lines.
- (4) \$75,000 tanker cost equalized over 5 years.
- (5) Estimated annual O&M.
- (6) Annual employee salary and benefits.
- (7) Estimated pump replacement cost equalized over 3 years.
- (8) Estimated other system O&M (electrical, mechanical, etc.).
- (9) These items are based on incremental costs from the Phase I CPC estimate. Cell 1 Phase II will be approximately one-third the size of Phase I.
- (10) These items are based on incremental costs from the Phase I CPC estimate. The Phase II Permit requires 18 wells (up from 12) to be monitored.
- (11) Costs include a 3% increase for converting from 2010 dollars to 2011 dollars.

* In providing this cost estimate, it is recognized that neither NRG Energy nor Golder have control over the costs of labor, equipment, or materials, or over a Contractor's method(s) of determining prices or bidding. This cost estimate is based on Golder's professional judgement and does not constitute a warranty, expressed or implied, that the Contractors' bid(s) or negotiated price(s) will match or be within any given percentage of this estimate.

APPENDIX C

Phase II Closure and Post-Closure Care Cost Estimates

TABLE C.1 - INDIAN RIVER CLOSURE AND POST-CLOSURE CARE COSTS

Closure, Phase II	\$	5,402,860
Post-Closure, Phase II	\$	2,792,177
Total Indian River Closure and Post-Closure Care Costs	\$	8,195,037

Notes: All pricing was adjusted for inflation of 0% for 2015

Inflation number CPI index reducing from 244.050 to 243.858 during 2015



**Indian River Power Station
Coal Ash Landfill Closure Cost Estimate 2016
Table C.2 - Phase II Landfill, Closure Cap Construction**

Area of Required Cap Construction	30 acres				
Description	Quantity	Unit	Unit Cost	Cost	Remarks
Mob/Demob	1	LS	\$6,750.00	\$6,750	RS Means Code 01 54 3650 1500
Erosion and Sediment Controls					
Silt Fence	18,000	LFT	\$1.79	\$32,220	RS Means Code 31 25 1416 0000
Cap Construction (1)(6)					
40-mil Geomembrane(7)	145,200	SY	\$4.08	\$592,416	Based on 2015 FA and CPI/Inflation rate
Geocomposite Drainage Material(3)(7)	145,200	SY	\$7.29	\$1,058,508	Based on 2015 FA and CPI/Inflation rate
18-inch Soil Cover(4)	145,200	SY	\$8.59	\$1,247,268	Based on 2015 FA and CPI/Inflation rate
6-inch Topsoil (4)	145,200	SY	\$4.19	\$608,388	Based on 2015 FA and CPI/Inflation rate
Seeding (1) (5)	30	AC	\$4,902.42	\$147,073	Based on 2015 FA and CPI/Inflation rate
Buried Piping Under Terraces (6)	25,200	LF	\$22.03	\$555,156	Based on 2015 FA and CPI/Inflation rate
Stormwater Conveyance (6)	3,040	LF	\$119.31	\$362,702	Based on 2015 FA and CPI/Inflation rate
Pre-Construction, Construction, and Final Surveys	30	AC	\$1,000.00	\$30,000	Based on 2015 FA and CPI/Inflation rate
Closure Plan/Final Design and Bidding	1	LS	\$30,900.00	\$30,900	Based on 2015 CB&I engineering bids
CQA Services	30	AC	\$10,000.00	\$300,000	Based on 2015 CB&I engineering bids
Construction Management and Oversight	1	LS	\$144,200.00	\$144,200	Engineering Estimate
Final Construction Documentation Report	1	EA	\$20,000.00	\$20,000	Based on 2015 CB&I engineering bids
Post-Closure Plan	1	LS	\$10,000.00	\$10,000	Based on 2015 CB&I engineering bids
Subtotal				\$5,145,581	
Contingency				\$257,279	
Total Cost				\$5,402,860	

	Notes/Assumptions
1	Cap components in accordance with current Delaware Industrial Landfill Closure Requirements and the EPA CCR Rule.
2	Assume interim cover soil material used for grading layer.
3	Not required by regulations, but assumed to be necessary for slope stability.
4	Assumes material is not available on site,
5	Assumes erosion mat is not required on slopes.
6	Quantities have been rounded for this spreadsheet. Items include downchute piping, drop inlets, and rock filters.
7	Quantities are exact and do not provide for overlap, waste, extra destructive test
9	The unit costs are based on the previously approved cost estimates and the established inflation rate from Bureau of Labor Statistics



**Indian River Power Station
Coal Ash Landfill Closure Cost Estimate 2016
Table C.3 - Phase II Landfill, Post-Closure Care**

Description	Quantity	Unit	Unit Cost	Cost	Remarks
Annual Landfill Inspection(9)					
Site Visit for Inspection	12	Day	\$440.00	\$5,280	Modified unit rate based on tech hourly rate
Prepare Inspection Report	12	Day	\$440.00	\$5,280	Modified unit rate based on tech hourly rate
Cap Maintenance					
Repair Grass Channels	1	LS	\$1,194.05	\$1,194	Based on 2015 FA and CPI/inflation rate
Fill Erosion Rills (2)	1000	SY	\$4.02	\$4,020	Based on 2015 FA and CPI/inflation rate
Reseed Repairs/Bare Areas(2)	1000	SY	\$5.44	\$5,440	Based on 2015 FA and CPI/inflation rate
Grass Cutting	30	AC	\$208.22	\$6,247	RS Means 32 01 9019 4200
Miscellaneous Repairs					
Fencing, Wells & Roadway around Landfill	1	LS	\$2,388.10	\$2,388	Based on 2015 FA and CPI/inflation rate
Annual Groundwater Monitoring(18)					
Sample Collection and Lab Analyses	2	EA	\$14,925.65	\$29,851	Based on 2015 FA and CPI/inflation rate
Hydrologic Report	1	EA	\$6,925.50	\$6,926	Based on 2015 FA and CPI/inflation rate
Leachate Management					
Cleaning Leachate Lines (3)	2000	LFT	\$4.27	\$8,540	RS Means 33 01 3016 6140
LCS System O&M (8)	1	EA	\$5,000.00	\$5,000	Based on historical costs at IR
Pump Replacement(s) (7)	2	LFT	\$1,500.00	\$3,000	Engineer's Estimate
Leachate Transport Disposal (6)	54,750	GAL	\$0.10	\$5,475	Based on high range of waste water treatment costs and 6 hour roundtrip truck route

SUBTOTAL PER YEAR				\$88,641	
CONTINGENCY (5%)				\$4,432	Number of Post-Closure Years
TOTAL COST PER YEAR				\$93,073	30
TOTAL COST PER 30 YEARS				\$2,792,177	

Notes/Assumptions	
1	Cost associated with these items are included in the financial assurance for Phase I Post-Closure Cost Estimate.
2	Assumes 0.2 acre per Year of repairs over 30 year period
3	Annual cleaning of leachate lines
5	Estimated annual O&M.
6	Annual employee salary and benefits.
7	Estimated pump replacement cost equalized over 3 years.
8	Estimated other system O&M (electrical, mechanical, etc.)
9	These items are based on incremental costs from the Phase I CPC estimate. Phase II will be approximately 85% the size of Phase I.
10	These items are based on incremental costs from the Phase I CPC estimate. The Phase II Permit requires 18 wells (up from 12) to be monitored.
11	The unit costs are based on the previously approved cost estimates and the established inflation rate from Bureau of Labor Statistics