INVISTA purchased the assets of the Seaford site on April 30, 2004 from E.I. DuPont de Nemours & Company (DuPont) but did not purchase the underlying property which it leases from DuPont. The ash landfill permit was transferred from DuPont to INVISTA on June 23, 2005. Therefore, by way of clarification, any references to activities, documents, data, reports and other information contained in this application that convey that such information occurred or are dated prior to June 23, 2005 were prepared by or on behalf of DuPont.

INVISTA S.à r.l. Seaford Site
Ash Landfill Permit Renewal Application

Engineering Report Addendum

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The attached addendum was prepared July 2007 in response to comments provided the Delaware Department of Natural Resources and Environmental Control (DNREC) Solid and Hazardous Waste Management Branch. This addendum serves as an update to Sections 3.1 and 3.7 of the Engineering Report prepared by DuPont Engineering dated September 2003 and is intended to provide clarification of the aerial extent of the ash landfill that is the subject of this permit renewal application and a statement that the landfill closure will meet stormwater and sediment regulations at the time of closure.

Section 3.1
The INVISTA Seaford Nylon facility encompasses a total site area of approximately 650 acres of land. Sixty (60) of those acres were previously land marked by the previous owner (E.I. DuPont) for use as the site's ash landfill. INVISTA has also land marked this same acreage for use as an ash landfill; however, the area of the landfill cells pertaining to this permit renewal application only encompasses approximately 12.25 acres of the total identified acreage.

Section 3.7
Stormwater run-off calculations will be performed prior to the time of closure and the landfill closure will meet stormwater and sediment regulations at the time of closure. Such calculations will meet the requirements of Del. Code Title 7, Chapter 40 the Sediment and Stormwater Law. See Drawing # W1567130 Erosion Control Plan for preliminary closure stormwater control plans.

INVISTA S.à r.l. Seaford Site
Ash Landfill Permit Renewal Application

Engineering Report Addendum

May 2006 Addendum to Engineering Report dated September 2003

The attached addendum was prepared May 2006 and is provided as an update to Section 4.0 of the Engineering Report dated September 2003. The certification for this addendum is provided below.

CERTIFICATION:
Malcolm Pirnie, Inc., in its professional opinion, based on knowledge, information and belief, certifies that information contained in this ash landfill permit renewal application, dated May 31, 2006 is consistent with the requirements of the landfill permit, dated June 23, 2005 and that the data collected and presented herein is consistent with information requirements previously approved by DNREC.

Raymond E. Lees, PE

PE8270
Delaware PE Number

5·26·06
Date

4.0 PROPOSED DESIGN CAPACITY

Section 4 of the Engineering Report dated September, 2003 is amended by the information provided below.

4.1 ULTIMATE LANDFILL CAPACITY

Based on final contours developed in the facility's closure plan and the original contours (before ash filling), the total landfill capacity of the present active footprint (Cells 1 through 12), is 690,000 cubic yards (in-place capacity). Of this total capacity, 58,000 cubic yards were placed in the landfill prior to 2003. It is estimated that a volume of 34,000 cubic yards of additional ash was placed in the landfill associated with the 2003 North Pond excavation (using a 1.5 compactor factor). Based on these quantities, approximately 600,000 cubic yards (in place capacity) of ash air-space, or approximately 406,000 tons of ash capacity remains within the active footprint. Based on the annual rate of ash generation, and not factoring in any ash utilization projects, it is estimated that the ash landfill would reach capacity in 2027.

4.2 FILLING SCHEDULE

The last ash land filling event was in 2003. INVISTA is planning to excavate the South Ash Pond and landfill the ash in 2006. Assuming an average of 25,000 cubic yards (in-place compacted volume) of ash is generated a year, then about 75,000 cubic yards (in-place compacted volume) is placed in the landfill every third year. Table 1 presents an estimated filling schedule based on the current estimated average fill rate. Note that the anticipated filling rate is contingent upon the disposition of plant activities, weather conditions, and the plant's ash utilization effort.

Table 1 – Estimated Filling Schedule

Filling Event (year)	Estimated Annual Volume (in –place cubic yards)	Estimated Total Volume (in-place cubic yards)
2006	75,000	75,000
2009	75,000	150,000
2012	75,000	225,000
2015	75,000	300,000
2018	75,000	375,000
2021	75,000	450,000
2024	75,000	525,000
2027	75,000	600,000

ENGINEERING REPORT

INVISTA SEAFORD POWERHOUSE ASH LANDFILL

Prepared for

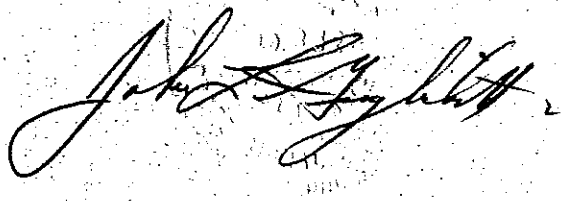
SEAFORD PLANT

Seaford, Delaware

Prepared by

John L. Guglielmetti, P.E.
DuPont Engineering
Civil Engineering Systems

September 2003



Engineering Report
Invista Seaford Powerhouse Ash Landfill
September 2003

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1.0 INTRODUCTION

1.1 SUMMARY

The Seaford plant is located in Seaford, Delaware, southeast of the town of Seaford. The plant powerhouse generates two by-products, bottom and fly ash, from the burning of coal. The ash is sluiced by pumping through a piping system to settling ponds located south of the powerhouse. The ash settles to the bottom of the ponds, is dewatered over time, and periodically excavated and transported to the on-site ash landfill. The landfill is located south of the settling ponds.

The ash is placed in designated areas in the landfill. When excavation of the ash from the settling ponds is completed, an intermediate soil cover is placed over the ash in the landfill and seeded. The process is repeated, as needed, typically every 3 years.

1.2 OBJECTIVES

The objective of this engineering report is to describe in detail the environmentally safe handling and disposal of the ash material from the settling ponds to the landfill. This report includes details of the landfill design, including placement and compaction of ash, intermediate cover, stormwater management, erosion and sediment control, final closure, and post-closure. The report also includes design drawings, construction specifications, construction quality assurance (CQA) plan, construction schedule, and financial details. The closure plan is included in Section 10 of the application submittal.

2.0 BACKGROUND

2.1 ASH PRODUCTION

Three steam boilers burn bituminous coal for steam and power generation in the Seaford powerhouse. This coal originates from sources in Pennsylvania and West Virginia. The burning of the coal produces two by-products, bottom ash and fly ash.

The bottom ash is collected in the bottom of each boiler in a large, refractory lined hopper. A small amount of ash also collects in the base of the main powerhouse stack. All other ash is considered fly ash and is collected at several different locations along the gas release system, with each location having one or more hoppers.

Of the ash generated from combustion of the coal, 85 percent, by volume, is fly ash and 15 percent bottom ash. These percentages can change from 5 to 10 percent as a function of the coal source or boiler operation. Physically, there is not much difference between the generated bottom ash and fly ash, other than particle size. The bottom ash passes through a grinder as it is sluiced to the ponds and its particle size distribution becomes similar to that of the fly ash. The amount of ash generated per year is approximately 25,000 tons (dry weight) based on a material balance (assumes that a certain percentage of the coal burned is ash and that 100 percent of this ash is recovered through the electrostatic precipitator or the bottom ash collection system).

2.2 PHYSICAL PROPERTIES OF ASH

A comprehensive study of the physical characterization of the powerhouse ash was conducted in 1992 by Patton Harris Rust & Associates, and made available to DNREC. This study conducted laboratory testing including moisture-density, California Bearing Ratio, specific gravity, swell, permeability, classification, loss on ignition, soil/ash/cement compressive strength, wetting/drying, and freezing/thawing tests.

The results of this study showed that the powerhouse ash is suitable for use as an embankment material, in lieu of borrow soil, and the ash may be successfully used as a constituent in soil/ash/cement mixtures and flowable fill.

A copy of the study, "Coal Ash Utilization Study – Investigation, Testing and Engineering" . December 20, 1992, is on file in the Seaford Site SHE Section.

2.3 ASH STORAGE

Separate procedures exist for transferring the bottom and fly ash to the settling ponds. The fly ash is collected in hoppers and conveyed pneumatically by vacuum to a water hydro-vactor. There, it mixes with water in the venturi and discharges into an ash sluice pit. This ash sluice pit is located on the ground floor of the powerhouse.

The bottom ash collected in the refractory lined hoppers is periodically removed by a water spray system. The bottom ash and water mixture flows into a trench, through a clinker grinder, and finally, into the same ash sluice pit as the fly ash. The ash collected in the base of the powerhouse stack is sprayed with water and conveyed to the bottom ash trench by a hydro-ejector. As before, the ash is deposited in the ash sluice pit.

Both the fly and bottom ash are sluiced by pump through piping to the settling ponds south of the powerhouse. A cationic polyelectrolyte is added to the ash sluice to enhance flocculation and settling. A carbon dioxide (CO_2) water treatment system is utilized in the pond operation to control the pH of the discharge water between 6 and 9 standard units. The ash system is designed to operate 24 hours per day, if required, but averages around 12 hours per day at full powerhouse load. In operation, the ash sluice pump moves 1,000 to 1,200 gallons per minute (gpm) to the settling ponds.

2.4 SETTLING PONDS

There are two coal ash settling ponds and an associated finishing pond. The North Pond (Pond No. 1) is approximately 480 feet long, the South Pond (Pond No. 2) is approximately 650 feet long, and the central finishing pond is approximately 240 feet long. All three ponds are approximately 300 to 320 feet wide. The bottom elevation of each pond is 4.0 feet and the elevation at the top of the perimeter berm is 18.5 feet. The berm is designed to have a slope of 3:1 (horizontal:vertical) on the interior and 2:1 on the exterior. The top of the berm has a width of 10 feet. The ponds are not lined with a synthetic or natural liner. The overflow from Pond No. 1 and Pond No. 2 goes into a secondary finishing pond, located between both ponds.

The secondary finishing pond also has an overflow at an elevation of 12.0 feet. A floating boom is located around this overflow. The overflow discharges through a weir box into a combined outfall ditch which discharges into the Nanticoke River. This discharge is regulated as Outfall 007 under the NPDES permit DE0000035.

From past use, each primary pond, when filled to the 17.0 feet overflow elevation, will hold between 55,000 and 80,000 cubic yards of settled ash. Ponds reach full capacity in about 21 to 30 months at the disposal rate of 37,000 cubic yards per year (25,000 dry tons per year). These numbers are based on the assumptions that the ash has a dry density of 50 pcf in the ponds and the moisture contained within the ash does not cause a substantial increase in the volume of ash generated for disposal. The actual volume of ash may vary.

2.5 TRANSPORTATION TO LANDFILL

After the ash is transferred to the settling ponds by sluicing through pipe, the solid-liquid separation occurs. The ash settles to the bottom of the ponds and the water flows into the secondary pond and eventually to the Nanticoke River by means of Outfall 007 and the combined outfall ditch. The ponds are left undisturbed up to 6 months after reaching their full storage capacity. During this time period, the ash is dewatered by evaporation.

Any excess water present in the ponds when full capacity is reached is removed by pumping. A trench is excavated along the sides of the pond and any water flowing into the trench is pumped into the active pond.

The settled coal ash in the ponds is excavated and transported to the landfill by standard earth moving equipment such as front end loaders, dragline cranes, dump trucks, etc. Certified surveys are conducted before and after excavation to verify the actual volume of material removed from the ponds. On the average, each coal ash pond is emptied every three years.

The ash in a full pond is excavated to the original grade and slopes of the dikes. An acceptable deviation from this requirement would be to leave sufficient ash undisturbed to prevent seepage through the dikes.

To prevent clogging of the overflows, the 18-inch concrete pipes are plugged. If any damage to the overflows or the sluice piping and flotation equipment occurs during excavation, it is repaired.

Existing haul roads are used to transport the ash from the ponds to the landfill. These roads are maintained during transportation operations. Spilled material from the hauling trucks is cleaned up weekly. If there is a potential dusting problem with the ash, the haul trucks cover the material while transporting it to the landfill. Water is used to control dusting problems at the settling ponds, haul roads, and landfill.

The excavation and transportation of ash from a full pond to the landfill takes approximately 145 calendar days. This includes allowances for inclement weather and working from dawn to dusk, 7 days a week.

3.0 LANDFILL SYSTEM DESIGN

3.1 EXTENT OF LANDFILL AREA

A recent survey of the landfill area was conducted by T.A. Surveying, Inc. on June 30, 2003. This survey was used to establish the baseline conditions for all design drawings, which are included in Appendix A. The landfill encompasses a total of about 60 acres. About 12 acres is considered "active" and about 48 acres is considered "inactive" storage area.

3.2 LANDFILL SEQUENCING

There are a total of 12 cells in the "active" portion of the landfill, each cell with a one-acre footprint. Specific cells will be designated for each pond excavation and landfilling event. The first level of filling will place ash between about elevation 7 feet and elevation 15 feet. When this first level is filled in all 12 cells, a second level of filling will commence over the first level. As each level of filling is completed, another level of ash will be placed over the previous level to the final grades shown on the closure plan drawing.

3.3 STARTER BERMS, SIDESLOPES, AND BENCHES

Prior to each ash placement event in the landfill, a starter berm will be constructed along the outside perimeter of the cells to be filled. The starter berms will be about 45 feet wide at the base, 8 feet high, and have a 5-foot wide top bench. Maximum exterior and interior slopes of the starter berms will be 3:1 and 2:1, respectively. The berms will be constructed using soil placed in lifts not exceeding 12 inches in thickness and compacted. Each lift of soil shall be compacted to at least 92 percent of the maximum dry density per the standard Proctor test (ASTM D698). The moisture content of the fill shall be controlled such that the required density can be obtained.

Testing will be performed on each lift to verify the soil fill is placed and compacted to the specified criteria. A minimum of 1 density test per 1,000 cubic yards of compacted fill will be performed. Documentation of certified testing will be provided to the Seaford plant during and after the completion of the landfilling operations.

Exterior sideslopes will be graded to a final 3 horizontal to 1 vertical slope (3:1). A permanent 5-foot wide bench will be incorporated into the sideslopes every 17 feet in elevation (i.e. benches at elevations 20, 37, 54, 71, and 88 feet). The top rim elevation of the completely filled landfill is elevation 88 feet. The peak of the closure system is at elevation 92 feet.

3.4 ACCESS ROAD

Access will be required to allow construction equipment to enter and work in the landfill throughout its active life. A 20-foot wide unpaved road will provide access throughout the life of the landfill. The road will consist of placing a geotextile over firm subgrade materials (soil or ash) and covering with 12 inches of crushed stone. The access road will rise as the landfill elevations rise. The final access road location is shown on drawing W1567129. This road will also provide access after closure (i.e. for inspections). For safety, as the road rises in elevation, concrete barricades will be placed along the outside edge of the road along the steep sideslopes. A construction entrance/scrubber pad can be located at the base of the access road to reduce soil and ash from the tires of trucks exiting the landfill, if conditions warrant such installation.

3.5 PLACEMENT AND COMPACTION OF ASH

Prior to each new landfilling phase, the topsoil overlying previously placed soil and ash will be stripped and stockpiled for future use as intermediate cover or in the final cover system. The excavated ash from the ponds will be hauled to the landfill with trucks and deposited over previously placed ash in the designated cells. The ash will be spread in lifts not exceeding 12 inches in thickness and compacted. Each lift shall be compacted to at least 92 percent of the maximum dry density per the standard Proctor test (ASTM D698). If the ash is too wet to meet the compaction requirement, the material will be air-dried, as necessary, before compaction. Each filling operation will place a total of 8 feet of compacted ash in the designated cells. Ash will be deposited at approximately 12,900 cubic yards (in-place volume) per acre.

Testing will be performed on each lift to verify the ash fill is placed and compacted to the specified criteria. A minimum of 2 density tests per acre per 12-inch lift will be performed on representative samples of ash at appropriate intervals, but no less than 1 test per 15,000 cubic yards of ash will be performed. Documentation of certified testing will be provided to the Seaford plant during and after the completion of the landfilling operations.

Details of the ash placement and operations procedures are described in the Operations Plan in Section 4 of this application submittal.

3.6 INTERMEDIATE COVER

After each landfilling operation, an intermediate cover will be placed over the disturbed areas to minimize erosion until future landfilling operations. The intermediate cover will consist of 6 inches of topsoil placed directly over the ash and seeded.

After final ash placement for each landfilling operation, the disposal area will be graded to be nearly level with a gentle inward slope. Center catch basins with discharge pipe will be provided for surface water control across the intermediate cover. The final grade of the sideslopes will be, at a maximum, three horizontal to one vertical (3:1). Six inches of topsoil will be spread and

uniformly rolled into place on the exposed ash, and the surface seeded. Appropriate erosion protection measures will be employed to facilitate seed germination and prevent erosion.

3.7 STORMWATER, EROSION, AND SEDIMENT CONTROL

The stormwater management system operating at the Seaford ash landfill meets the specifications under Section 6.F. of the "Delaware Regulations Governing Solid Wastes". The general provision of this section is to ensure that the "owner or operator of an industrial landfill shall design, construct, and maintain a surface water management system to:

- Prevent erosion of the waste and cover
- Prevent the collection of standing water, and
- Minimize surface water run-off onto and into the waste.

The following features exist at the landfill to manage surface water:

- Ash fill is placed within the landfill to direct stormwater run-off to a central location within the confines of the perimeter earthen berms. Stormwater in contact with ash fill is completely contained within the landfill facility.
- Ash-laden stormwater is filtered through extended detention prior to its discharge back to Pond #1 or Pond #2. Filtered stormwater is conveyed to ponds by way of a temporary forcemain and portable diesel pump. It is important to note that run-off at the site is not adversely affected by the ash landfill.
- Precipitation falling on the perimeter earthen berms, (exterior of the landfill), sheets down the side slopes of the landfill facility. Exterior berms are stabilized with a thick stand of vegetation and constructed with a reverse bench to reduce velocity of sheet flow. Reverse benches are provided at an interval of 17 feet vertically.

Stormwater run-off calculations, illustrating water quantity, have not been conducted for the preliminary closure system, as the property is adjacent to the Nanticoke River, (tidal waters). Although the closure system is considered impervious coverage, the thick stand of vegetation over the landfill shall not adversely affect stormwater run-off, or alter water quality. Additionally, a generous buffer of combined grass and woodlands shall serve as a filter strip for any sedimentation in final closure.

4.0 PROPOSED DESIGN CAPACITY

4.1 ULTIMATE LANDFILL CAPACITY

Based on final contours developed in the closure plan (W1567129) and the original contours (before ash filling), the total landfill capacity is 690,000 cubic yards (in-place capacity). Of this total capacity, 58,000 cubic yards have already been placed in the landfill. A filling operation is currently underway and an estimated 32,000 cubic yards of additional ash will be placed when this operation is complete. After the current filling operation is complete, about 600,000 cubic yards (in place capacity) of ash air-space will remain. This estimate is for the "active" area only, and is based on the assumptions listed below. Additional capacity would be available from the "inactive" portion of the landfill.

The ash will be generated at a yearly rate of about 37,000 cubic yards (non-compacted volume). Prior to placement in the landfill, the ash is dewatered, excavated, and dried as necessary to meet compaction requirements. Thus, the non-compacted volume from the ponds will consume less volume in the landfill after compaction. Using a compaction factor of 1.5, the average landfill fill rate is about 25,000 in-place cubic yards per year.

With a capacity of about 600,000 in-place cubic yards remaining in the landfill and assuming an average fill rate of 25,000 in-place cubic yards per year, the landfill has about 24 years of air-space remaining. At this rate, the landfill's airspace will be consumed by the end of the year 2027. This estimate of landfill life is also dependent on the Seaford Plant's ash utilization effort, which could extend the life of the landfill.

4.2 FILLING SCHEDULE

Ash is presently being excavated from the ash ponds and placed in the landfill. Typically, a filling event occurs every 3 years. The next estimated filling event is in the year 2006. Assuming an average of 25,000 cubic yards (in-place compacted volume) of ash is generated a year, then about 75,000 cubic yards (in-place compacted volume) is placed in the landfill every third year. Table 1 presents an estimated filling schedule based on the current estimated average fill rate. Note that the anticipated filling rate is contingent upon the disposition of plant activities, weather conditions, and the plant's ash utilization effort.

Table 1 – Estimated Filling Schedule

Filling Event (year)	Estimated Annual Volume (in-place cubic yards)	Estimated Total Volume (in-place cubic yards)
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