

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.



**Ash Landfill
Environmental Assessment**

INVISTA Seaford Plant
Seaford, Delaware

Date: 12 August 2003
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1. Introduction

The INVISTA S.à r.l. (INVISTA) Seaford Plant (formerly known as DuPont Textiles and Interiors and prior to that as the DuPont Seaford Nylon Facility) is located at 25876 DuPont Road, outside the city limits of Seaford, Delaware. The 650-acre plant site contains a coal-burning powerhouse that generates the electricity needed to run the facility. Ash is disposed on site in a Delaware Department of Natural Resources and Environmental Control (DNREC) permitted industrial landfill.

INVISTA purchased the assets and operations of the Seaford site, including the Ash Landfill, from I.E. DuPont de Nemours & Company ("DuPont") on April 30, 2004, and 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 occurred or are dated prior to June 23, 2005, were prepared or performed by or on behalf of DuPont.

The Powerhouse Ash Landfill has accepted ash under a DNREC permit since 1979. The Solid Waste Permit (SW-91/02) for the Seaford Plant Ash Landfill was renewed by DNREC and issued as Permit SW 98/01 on January 30, 1998, pursuant to Section 4.A.1.a of the Delaware Regulations Governing Solid Waste (DRGSW). Permit modifications have been made since this time for the following reasons:

- July 31, 2002: Permit SW-98/01 was modified to incorporate the TCLP Analysis Ash Pond Sampling Plan dated May 16, 2002. References to the Solid Waste Management Branch were replaced with the Solid & Hazardous Waste Management Branch (SHWMB). The Department considers this a minor modification of the permit.
- January 22, 2003: Permit SW-98/01 was modified to extend the expiration date until January 31, 2004. The Department considers this a minor modification in accordance with the DRGSW, Section 4.A.7.b.
- January 29, 2004: Permit SW-98/01 was modified to extend the expiration date until May 3, 2004, to allow the Department more time to review the permit application submitted by INVISTA. The Department considers this a minor modification in accordance with the DRGSW, Section 4.A.7.d.(3).

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- April 30, 2004: Permit SW-98/01 was modified to extend the expiration date until July 31, 2004, to allow the Department more time to review the permit application submitted by INVISTA. The Department considers this a minor modification in accordance with the DRGSW, Section 4.A.7.d.(3).
- July 19, 2004: Permit SW-98/01 was modified to extend the expiration date until January 31, 2005, to allow the Department time to review the INVISTA application to transfer the permit from DuPont to INVISTA S.à r.l. The Department considers this a minor modification in accordance with the DRGSW, Section 4.A.7.d.(3).
- January 24, 2005: Permit SW-98/01 was modified to extend the expiration date until June 30, 2005, to allow the Department time to review the INVISTA application to transfer the permit from DuPont to INVISTA S.à r.l. The Department considers this a minor modification in accordance with the DRGSW, Section 4.A.7.d.(3).
- June 6, 2005: Permit SW-98/01 had a minor modification in order to aid in the transfer of the Solid Waste Permit from DuPont to INVISTA S.à r.l. These modifications exclude surface water monitoring in April and October for Staff Gauges SG-2 and SG-4 and outfall of Ash Settling Pond No. 2; April water quality sampling at Spring No. 1 and No. 2; groundwater monitoring in April and October for water levels at Wells 14S, 15S, 16S, and 14D; April water quality sampling at Wells 14S, 15S, 16S, and 14D; and October water quality sampling at Wells 14S, 15S, 16S, and 14D. The Department considers removal of these monitoring requirements a minor modification in accordance with the DRGSW, Section 4.A.7.d.(3). The monitoring requirements that were removed from the Solid Waste Permit are still required under DuPont's Resource Conservation and Recovery Act (RCRA) Corrective Action Program which is overseen by DNREC SHWMB.
- June 23, 2005: Groundwater Monitoring Requirement B.3 was removed due to an Administrative oversight, per DRGSW Section 4.7.d.(3)., and is therefore considered a minor modification. This requirement was originally added for the installation of Monitoring Wells 15S, 16S, and 17S, which was to be completed in time for the April 1999 sampling event. This requirement is no longer relevant to SW-98/01 and was removed before issuing the transferred permit to INVISTA. Permit SW-98/01 was transferred from DuPont to INVISTA after a public notice period of 15 days in accordance with the DRGSW, Section 4.A.2, and modified to

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extend the expiration date until January 15, 2007, to allow time for INVISTA to complete the renewal process and the Department ample time to review the renewal application documents. The Department considers this a minor modification in accordance with the DRGSW, Section 4.A.7.d.(3).

This Environmental Assessment (EA) is required as part of the application and renewal procedures for DNREC-permitted industrial landfills. This EA fulfills Section 4.B.1.f. of the DRGSW, described therein as an Environmental Assessment.

This EA provides a detailed analysis of the potential impact of the Ash Landfill on the environment. There are myriad factors an EA must consider per Section 4.B.1.f of the DRGSW. These factors include:

- Air Quality
- Stream Flow
- Plants
- Water Use
- Aesthetics
- Public Health and Safety
- Historical Sites
- Water Quality
- Fish and Wildlife
- Threatened or Endangered Species
- Land Use
- Traffic
- Cultural, Recreational, and Natural Areas
- Social and Economic Factors

If the operation of the landfill presents a potential impact to human health and the environment, this EA will discuss (at a conceptual level) how INVISTA operations of the landfill will mitigate that impact. The Landfill Operations Plan will contain a detailed engineering description of the mitigation plan.

2. Site Location

2.1 Regional Area

Seaford is located in the southwest portion of the state, in Sussex County, Delaware, and is situated along U.S. Route 13, the main north-south artery running from Wilmington, Delaware, to Norfolk, Virginia. The INVISTA Seaford Plant is located to the south of downtown Seaford (Figure 1).

2.2 Landfill Location

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 former owner of the facility (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 renewal application only encompasses approximately 12.25 acres of the total identified acreage. The landfill parcel is bordered by the plant ash ponds to the north, the Nanticoke River to the east, Lewes Creek to the south, and the Seaford Plant boundary along Woodland Road to the west (Figure 2).

The northern border of the active landfill parcel is approximately 600 feet from the edge of the South Ash Pond. The eastern border of the landfill parcel is approximately 1,000 feet from the Nanticoke River. The southern border of the landfill parcel is approximately 100 feet from Lewes Creek. At the Plant property boundary, Lewes Creek joins Chapel Branch (a navigable waterway). Chapel Branch is approximately 1,200 feet south of the southern border of the landfill. Woodland Road is approximately 100 feet from the western border of the landfill.

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3. Proposed Landfill Development

The area of the Ash Landfill that is the subject of this permit renewal application will occupy approximately 12.25 acres.

The ash will be generated at a yearly rate of 25,000 tons. The dry unit weight of the landfilled ash is the same as the settled ash in the ponds, which is 50 pounds per cubic foot (pcf). The moisture present in the ash upon disposal does not take additional volume; thus, 25,000 tons at a dry density of 50 pcf will equal a volume of 37,000 cubic yards per year (yd³/yr; as assumed in the 1993 Operations Plan). In addition, approval was granted to DuPont (previous owners and operators of the Ash Landfill) by DNREC on November 29, 1994, to dispose of ash from the cleanout of nine fuel oil fired dowtherm vaporizers into the landfill. This material is generated at a rate of approximately 9 yd³/yr. Based on TCLP analyses of fuel oil ash submitted with the request in 1994, this material is well below any regulatory threshold and should not present a risk to human health or the environment. The DNREC approval correspondence and 1994 TCLP results are provided as Appendix A.

Based on final contours developed in the Ash Landfill Closure Plan (see Section 5: Engineering Report of the Permit Renewal Application), the total landfill capacity is 690,000 cubic yards. Cells 1 through 12 are available for disposal of the ash. Considering that approximately 25,000 tons of in-place compacted ash are generated per year, the landfill has a lifetime of 20+ years.

Characterization of the ash in the landfill with respect to its geotechnical properties (e.g., shear strength) indicates that an engineered landfill can be constructed to reach 92 feet in height.

4. Impact of Proposed Development

The Ash Landfill Closure Plan for the INVISTA Ash Landfill ensures that the landfill cells are closed in manner that minimizes the need for further maintenance and escape of solid waste constituents. The minimization of leachate and landfill gases and their escape to the surface water, groundwater, or atmosphere are addressed through the design of the Final Closure System. This Plan is provided under separate cover and is not made part of the Environmental Assessment. A copy is provided in Section 10 of the Seaford Plant Ash Landfill Renewal Application.

4.1 Chemical Characterization of Ash

The ash from the Powerhouse is a product of the combustion of bituminous coal and contains elemental metals that cannot be broken down and unburned carbon from incomplete combustion of the coal. The presence of oxygen and the destructive environment in the boilers helps to promote the formation of metallic oxides. In general terms, the ash particles are composed of glass with some crystalline matter and carbon. Varying amounts of lime are also present (FHA 1986). Metal species often condense on the ash as flue gases carry particles out to the furnace combustion zone (Spencer and Drake 1987). The Seaford ash, exhibiting American Society for Testing and Materials (ASTM) Type F ash characteristics, will contain the following typical chemical compositions (FHA 1986):

<u>Compound</u>	<u>Percentage</u>
SiO ₂ (silica)	54.9
Al ₂ O ₃	25.8
Fe ₂ O ₃	6.9
CaO (lime)	8.7
MgO	1.8
SO ₃	0.6

The components, consisting of glassy spheres, silicon dioxide, aluminum oxide, and ferric oxide, comprise approximately 60 to 90 percent of the ash. The actual percentage of each compound varies according to the coal sources and the combustion process.

The loss of ignition (LOI), a measurement of the unburned carbon remaining in the ash, ranges from 9.3 percent to 14.5 percent, with an average of 11.6 percent.

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The 1980 Operations Plan included a section on the leachate analyses (Section 3.1) of composite split-spoon samples collected from Ponds No. 1 and No. 2. When the samples were collected in August 1978, Pond No. 1 was filled (1966) and overgrown with vegetation; Pond No. 2 was in service. Composite samples from each pond were analyzed for leachability, using a procedure applied by the DNREC for the extraction of sludge waste materials. The three-step procedures consisted of mixing water with the sludge at a certain weight ratio (water:sludge at 25:1, based on dry weight of sludge) and a pH of either 4, 7, or 10. The mixtures were then agitated with a magnetic stirrer for several hours, after which leachate was filtered off and analyzed using the U.S. Environmental Protection Agency (USEPA) Manual of Methods for Chemical Analysis of Water and Wastes. Per these procedures, the leachate was analyzed for various metal species, anions, total dissolved solids (TDS), and pH.

The results of these leach tests, for most of the analyzed parameters, indicated concentrations that were below the allowable detection limit. For all of the parameters and samples, concentrations were well below primary and secondary drinking water quality standards, thereby suggesting that the material will have no impact on the local groundwater system. Based on these results, in May 1980, the DNREC approved the excavation of the ash from the ponds and landfill and classified the coal ash as "inert material".

Further leach testing was completed in 1980 after Steam Boilers No. 2 and No. 3 were refitted for coal burning due to a Department of Energy prohibition order and the complete conversion of Boiler No. 1 to coal burning capability. An electrostatic precipitator was installed on each boiler in order to meet particulate emission limits for air quality control. Refitting created a new waste stream, which flowed into Pond No. 2. This new ash was tested using the above-mentioned procedure and the newly created (at the time) Extraction Procedure (EP) toxicity test, which was (until September 15, 1990) used to determine if a waste was RCRA-hazardous. Along with this ash, a sample of water overflowing from Pond No. 1 through Outfall 007 was also analyzed for certain specified parameters. Results from these analyses are comparable to those from the Pond No. 1 leach testing.

The initial EP toxicity tests and later TCLP tests were performed on the ash in 1981, 1989, 1992, 1993, 1995, 1999, 2001, and most recently in 2005. The fuel oil ash was analyzed by TCLP extraction at Entek Laboratories and by a non-volatile leachate extraction procedure at Lancaster Laboratories in 1994. Neither analysis indicated concentrations of metals above the RCRA standards. Results from these

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analyses show that the facility's ash material is not RCRA-hazardous. Results of the 2005 testing are also included in Appendix A. All other test results are on file at the INVISTA Seaford site.

4.2 Air Quality

Coal ash consists of fly ash and bottom ash. The fly ash is a light particulate with the potential to become airborne when dry. There is the potential for fugitive dust to travel off site. The ash contains some moisture when it is dug from the ponds, helping to control the fugitive dust issue. The ash is also sprayed with water, as needed, during moving operations to keep it in place. Please reference the Operations Manual for a detailed explanation of the engineered controls.

The minimization of landfill gases escaping to the atmosphere is addressed through the design of the Final Closure System (see Section 10 of the Seaford Plant Ash Landfill Renewal Application).

4.3 Water Quality

Under the current DNREC Permit SW-98/01, the surface water is monitored annually and groundwater is monitored semiannually. Historical results can be found in the *Powerhouse Ash Landfill – INVISTA 2005 Annual Hydrogeologic Report* submitted to DNREC on July 29, 2005.

The minimization of leachate escaping to surface water or groundwater is addressed through the design of the Final Closure System (see Section 10 of the Seaford Plant Ash Landfill Renewal Application).

The stormwater management system for the Ash Landfill is described within Section 5 (Systems and Equipment) of the Operations Plan (Section 4 of the Application).

4.3.1 Surface Water

The surrounding surface water bodies are the Nanticoke River to the east and Lewes Creek and Chapel Branch, both to the south of the Ash Landfill. There are no intakes off these water bodies in the vicinity of the Ash Landfill, and no possibility of human consumption. Lewes Creek is the surface water body closest to the landfill. The surface water quality in Lewes Creek is being addressed in connection with the RCRA Corrective Action activities being conducted by DuPont. Analytical data collected from groundwater that discharges to the surface at the toe of the landfill are

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available in the *Powerhouse Ash Landfill – DuPont 2005 Annual Hydrogeologic Report* submitted to DNREC on July 31, 2005.

Surface water monitoring at the Ash Landfill is conducted at the Drainage Ditch Upstream and Drainage Ditch Downstream. As indicated within the DuPont Powerhouse Ash Landfill 2005 Annual Hydrogeologic Report, historical data collected at these locations do not indicate impacts to surface water resulting from the Ash Landfill.

The Stormwater Management System operating at the Ash Landfill meets the specifications under Section 6.F of DRGSW. 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 runoff onto and into waste.

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

- Ash fill is placed within the landfill to direct storm water runoff to a central location within the confines of the perimeter earthen berms. Storm water in contact with ash fill is completely contained within the landfill facility.
- Ash-laden storm water is filtered through extended detention prior to its discharge back to Pond No. 1 or Pond No. 2. Filtered storm water is conveyed to ponds by way of a temporary forcemain and portable diesel pump.
- Precipitation falling on the perimeter earthen berms (exterior to 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 vertical.
- The Surface Water Management System is maintained by controlling the erosion of the cover and the ash. If the erosion of either is occurring, the area of concern will be stabilized first (e.g., straw bales, Portland cement) and filled in with cover material.

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Surface water monitoring is conducted as part of the Surface Water Management System. This monitoring is detailed in the INVISTA Seaford site's "Ash Landfill Groundwater, Surface Water, and Ash Monitoring Plan" which is provided under separate cover and is not included in the facility's Operations Plan.

4.3.2 Ground Water

A review of the April 2005 analytical event and historical groundwater data beginning in 1983 indicates no detection of constituents of concern above the Federal Safe Drinking Water Act's Maximum Contaminant Level (MCL) from the Ash Landfill to the Shallow or Deep Aquifer Units except for the detection of arsenic in MW-17S in certain sampling events. Monitor Well 17S is being monitored and addressed in connection with the RCRA corrective action activities being conducted by DuPont. Please reference the *Powerhouse Ash Landfill – INVISTA 2005 Annual Hydrogeologic Report* submitted to DNREC on July 29, 2005.

4.4 Stream Flow

The design of the landfill directs storm water toward the center of the landfill (the surface is sloped inward). This design reduces the velocity generated by sheet flow rainwater. Any excess surface water is captured by perimeter drains that discharge water to the toe of the perimeter berm. Excess storm water enters a drainage ditch system on the east side of the landfill and a marsh area on the west side.

The Surface Water Management System is maintained by controlling the erosion of the cover and the ash. If the erosion of either is occurring, the area of concern will be stabilized first (e.g., straw bales, Portland cement) and filled in with cover material.

Large berms contain the Ash Landfill, protecting the surrounding streams from uncovered ash carried in overland flow or runoff. Once the ash is in place, it is covered with a minimum of 6 inches of topsoil and perennial grass, rendering it immobile. There is no possible pathway from the contained ash to the surface streams. There is no risk of ash choking the stream and impeding flow.

4.5 Fish and Wildlife

Because the ash is well contained, there is no threat to fish or other aquatic creatures in the surface water bodies. Fish and other aquatic fauna do not ingest the ash. The animals that inhabit the surrounding area do not live on the ash pile.

4.6 Plants

There are no plants that currently live on the active areas of the Ash Landfill. Cells that are inactive are covered with soil and seeded with perennial grass. Because it is fully contained within the berms, the ash has no impact on indigenous flora in the area surrounding the Ash Landfill.

4.7 Threatened and Endangered Species

According to the Delaware Natural Heritage Program (a division of the Delaware DNREC), a bald eagle's nest has been identified within the area of the INVISTA facility. As indicated by the correspondences (Years 2003 and 2006) provided in Appendix A, no impacts to the bald eagle's nest are anticipated during the operation of the Ash Landfill.

4.8 Water Uses

The INVISTA Seaford Plant uses several hundred thousand gallons of water a day from two sources: river water from the Nanticoke as non-contact cooling water; and groundwater from the pumping wells as potable water for the plant employees as well as process water. The amount of water used to control fugitive ash from the landfill is negligible compared to the total amount used daily. The Ash Landfill will not draw a significant amount of water away from other recipients.

4.9 Land Uses

The Ash Landfill will occupy the same footprint as the currently permitted Ash Landfill. The landfill is completely contained within the INVISTA Seaford Plant property and is approximately 400 feet from any property boundary. The closest residences are at least 400 feet to the outside of the Plant boundary, establishing a buffer of a minimum of 800 feet (Figure 2).

4.10 Aesthetics

The landfill is entirely within the fenced and gated INVISTA Seaford Plant. It is screened from view from beyond the property boundary and has no impact on the surrounding visual aesthetics.

The auditory aesthetics of the landfill are only a potential issue during the transport of ash from the ash ponds to the landfill. The ash is moved by standard earth moving

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equipment such as front-end loaders, dragline cranes, and dump trucks, which tend to be noisy. The ash is moved from the ponds to the landfill approximately once every three years, over a total of 145 days (reference the Operations Manual). The noise is produced only during daylight hours and is significantly diminished at the property boundary. There is no effect to the quality of life of residents outside the INVISTA Seaford Plant.

4.11 Traffic

The landfill is entirely within the fenced and gated INVISTA Seaford Plant. No public vehicular access is possible; therefore, impact to traffic patterns is not a concern.

4.12 Public Health and Safety

The public has no access to the landfill and, therefore, no exposure to the ash. Human health and safety are protected by physical barriers (fences), engineered controls (water spraying and soil capping of inactive cells), and monitoring (semiannual groundwater and annual surface water sampling). No impact to human health and safety is anticipated.

4.13 Cultural, Recreational, and Natural Areas

The Nanticoke River is used extensively by recreational users, including boaters and fishermen. There are two projects that have been recently completed in Seaford that allow for more activity along the Nanticoke River: A Riverwalk and a Canoe Launch. The Riverwalk is a 400-foot lighted, landscaped, and paved sidewalk. The Canoe Launch offers a safe and convenient place for canoes to be launched.

The Nanticoke River forms the eastern boundary of the INVISTA Seaford Plant property. The landfill is more than 400 feet west of the river and is separated from the river by a densely wooded area. Recreational river users should have no awareness of the existence of the landfill.

4.14 Historical Sites

The Ash Landfill will occupy the same footprint as the currently permitted Ash Landfill. There is no apparent evidence of historical human occupation. The Delaware Historic Preservation Office was contacted; their correspondences (years 2003 and 2005) indicates that there are no known historic sites within the Ash Landfill area (Appendix C).

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4.15 Social and Economic Factors

INVISTA intends to conduct operations in the landfill as it has been managed in the past (see the Operations Manual for greater detail). No negative impact to social or economic factors is anticipated.

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5. References

DuPont Environmental Remediation Services, 1993, Facility Investigation Phase I Hydrogeologic Study Technical Memorandum, DuPont Seaford Nylon Plant, Seaford Delaware. November 30.

Paul C. Rizzo Associates, Inc, 1992, RFI Task I - Description of Current Conditions, DuPont Seaford Facility, Seaford Delaware. April 24.

Seaford SHE Group, 1997, Operations Plan - DuPont Seaford Powerhouse Ash Landfill, DuPont Seaford Nylon Plant, Seaford Delaware. July 25.

State of Delaware, Department of Natural Resources & Environmental Control, Division of Air and Waste Management, 1998, Permit SW-98/01, Dover, Delaware. January 30.