

STATE OF DELAWARE

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL
SITE INVESTIGATION AND RESTORATION BRANCH

PROPOSED PLAN OF REMEDIAL ACTION



**Hay Street Sludge Drying Site/
Cherry Island Landfill - Iron Rich Staging Area
Wilmington, DE**

DNREC Project No. DE-0024

This proposed plan of remedial action (proposed plan) presents the Department of Natural Resources and Environmental Control's (DNREC's) preferred cleanup alternative for the Hay Street Sludge Drying Site/Cherry Island Landfill - Iron Rich Staging Area (site) in Wilmington, Delaware. For site-related reports and additional information, please see the public participation section of this document.

As described in Section 12 of the Delaware Regulations Governing Hazardous Substance Cleanup (Regulations), DNREC will provide notice to the public and an opportunity for the public to comment on the proposed plan. At the comment period's conclusion, DNREC will review and consider all of the comments received and then will issue a final plan of remedial action (final plan). The final plan shall designate any changes to the current selected remedial action alternative for the site.

This proposed plan includes background information, the results of the remedial investigation/risk assessment, the focused feasibility study, and a description of the proposed remedial action requirements. The proposed plan includes remedial actions for groundwater based on its current and anticipated future use. Groundwater is considered a resource of the State of Delaware and if the future use of the groundwater resource in the area of the site changes or if it becomes known that groundwater conditions result in an unacceptable risk to public health and/or the environment additional remedial actions shall be required.

DNREC's proposed remedy is preliminary and a final decision will not be made until all of the public comments are considered. The final remedy selected could differ from the proposed remedy, based on DNREC's responses to comments.

INTRODUCTION & BACKGROUND

The E.I. DuPont de Nemours and Company (DuPont) owns approximately 108 acres of property on Cherry Island, in Wilmington, Delaware. Beginning in 1997, DuPont placed Iron Rich material in a product staging area next to the Cherry Island Landfill. Initially, DuPont intended to sell the Iron Rich material as a soil substitute. However, DuPont later learned that the Iron Rich material contained certain organic compounds in sufficient quantities that DuPont decided not to sell this product.

Under a Consent Order (C.A. 01c-10-288CHT) lodged with the Superior Court of the State of Delaware on November 2, 2001, DuPont agreed to enter into the DNREC Voluntary Cleanup Program (VCP) to close in place their Iron Rich staging area pursuant to the Hazardous Substance Cleanup Act, 7 Del. C. Chapter 91 (HSCA). DNREC's issuance of this proposed plan is a step towards meeting the requirements of the Consent Order.

SITE DESCRIPTION AND HISTORY

The site comprises a 22-acre parcel located on Cherry Island, in Wilmington, Delaware (New Castle County tax parcel number 26-046.00-002) and contains a pile of DuPont Iron Rich material covering approximately 15.9 acres of the site. The site is adjacent to a closed DuPont solid waste landfill, the Cherry Island Landfill, which continues to be regulated by DNREC's Solid and Hazardous Waste Management Branch. The site is bordered on the north by Shellpot Creek, on the east by the Delaware River, on the south by 12th Street extension, and on the west by Hay Road. Industrial facilities around the site include the City of Wilmington's wastewater treatment facilities located across Hay Road and 12th Street, and Conectiv's Coal-fired Power Plant north of Shellpot Creek (Fig. 1).

Approximately thirty (30) to forty (40) feet of dredge material underlies the Cherry Island industrial area. This material was placed on the area from historical dredging of the Delaware River shipping channel.

In 1958, DuPont purchased the 108 acre Cherry Island property from the American Dredge Company. DuPont operated a disposal facility, the Cherry Island Landfill, for the solid waste by-products produced from its Titanium Dioxide Plant. After the discovery and perfection of the Iron Rich process from 1990 to 1993, the landfill was no longer needed. Therefore, DuPont closed the landfill in full compliance with DNREC's Regulations Governing Solid Waste.

In 1997, DuPont intended to sell the Iron Rich material as a soil substitute and began stockpiling and adding the material to the existing Iron Rich material pile until 2001. Previous stockpiles of this material were used as fill material as part of the closure of the Cherry Island Landfill. Prior to 1997, the City of Wilmington utilized the site as a sludge drying bed for its wastewater treatment of solids; hence the name "Hay Street Sludge Drying" as part of the site's official name in the DNREC VCP program.

Since 2001, DuPont has disposed of all Iron Rich material produced from its operations as an industrial solid waste at the Lee County Landfill in South Carolina.

INVESTIGATION RESULTS

Since 1958, many investigations of subsurface conditions at the DuPont Cherry Island property have been conducted. These investigations have focused on the use of the adjacent property as a solid waste landfill. Because of the historic land use and close proximity of the landfill to the site, the subsurface data and hydrological conceptual model for the landfill area also pertains to the Iron Rich pile site.

In 2003-2004, the remedial investigation/risk assessment (RI/RA) of the Iron Rich pile site was performed to determine the nature and extent of contamination as well as the risk posed by the site to human health and the environment. The focus of the RI/RA was the Iron Rich material and the historic dredge spoils material which underlay the entire Cherry Island area, as well as the groundwater in the vicinity of the Iron Rich pile.

The analytical results of the RI/RA indicated that several metals and organic compounds were detected in the iron rich material, dredge spoils, and groundwater above their respective Uniform Risk-Based Remediation Standard (URS) values, as indicated in the following table. The URS values were published in DNREC's Remediation Standards Guidance Document in December 1999.

CONTAMINANTS OF CONCERN AT THE SITE

CONTAMINANT	ME CONCENTRATION*	URS**	DEFAULT NATURAL BACKGROUND CONCENTRATION
IRON RICH MATERIAL	mg/kg	Restricted use mg/kg	mg/kg
Arsenic	14.9	4	11
Iron	234,000	61,000 (SMCL)	3,000-22,000
Manganese	28,200	4,100 (SMCL)	60-350
Hexachlorobenzene	54.96	4	
Total Polychlorinated Biphenyls (PCBs)	1,627 ppb	1,000 ppb	
DREDGE MATERIAL	mg/kg	Restricted use mg/kg	mg/kg
Iron	96,200	61,000 (SMCL)	3,000-22,000
Manganese	5,860	4,100 (SMCL)	60-350
GROUNDWATER ***	ug/l	ug/l	
Iron	444,188	300 (SMCL)	
Manganese	36,350	50 (SMCL)	
Chloride	4,653 mg/l	250 (SMCL) mg/l	

* ME Maximum Exposure Concentration of contaminants detected at the site.

** URS Uniform Risk-Based Remediation Standard for Protection of the Human Health, 12/99.

*** Highest average concentrations in the existing down gradient monitoring wells.

(SMCL) Secondary maximum contaminants levels.

SITE RISK EVALUATION

Risk associated with exposure to the contaminants of concern at the site were assessed using DNREC's Site-Specific Standard Calculator for Multiple Analytes, 1999 and an Exposure and Risk Evaluation Study performed by ENVIRON, on behalf of DuPont, in 2003. The Iron Rich material and underlying dredge material was treated as two distinct issues for the purpose of performing the risk assessment since the Iron Rich material is staged in a consolidated pile contained within, and on top of, a larger area consisting of dredge spoil material.

The human health risk screening calculation for the Iron Rich material was performed using conservative assumptions, including using the maximum concentration of the contaminants of concern found at the site due to the limited data set. This assessment showed a carcinogenic risk of 1.99×10^{-5} and a non-carcinogenic risk of Hazard Index (HI) 0.96 based on restricted land use. The carcinogenic risk for the iron rich material itself was above DNREC's cleanup standard of 1.0×10^{-5} which triggers remedial actions as described below.

For the dredge spoils, using the same exposure assumptions for purposes of the risk evaluation the carcinogenic risk was estimated at 1.96×10^{-6} and a non-carcinogenic risk at HI 0.26. The risks for the dredge spoils were below the DNREC's cleanup standards.

For groundwater, the risk was estimated for the shallow, intermediate and deep groundwater. There were no carcinogenic human health risks associated with the contaminants detected in the down gradient wells; however several contaminants iron, manganese, and chlorides did present an unacceptable non-carcinogenic human health risk.

The highest non-carcinogenic risk was obtained for the shallow groundwater due to the presence of elevated iron concentrations. This risk was estimated at an HI of 48.76, which was above the remediation standard of HI equal to 1.0. The maximum concentration of iron in groundwater for the Hay Street Sludge Drying Site (iron rich pile) detected was 444,188 ug/L. This concentration is approximately 40 times higher than the EPA health based acceptable level in drinking water.

Human health and ecological risk assessments performed by Dupont's consultant ENVIRON concluded that concentrations of the contaminants of concern present in the iron rich material would not result in an exceedence of the risk-based surface water quality criteria.

Iron is an essential nutrient. Therefore, the risk assessment for iron protects against deficiency in the diet as well as the harmful effects from ingesting excessive amounts of iron over a chronic time period. Iron is not a carcinogen. The toxic effects of ingesting high levels of iron result from massive iron overload in the tissues (hemochromatosis) and cirrhosis of the liver. The EPA provisional reference dose (RfD) for iron is the no observable adverse effect level (NOAEL) in humans of 0.3 mg/kg/day which assuming standard assumptions results in a health based drinking water standard of 11,000 ug/L.

This intake is high enough to be protective of iron diet deficiency and low enough to prevent the toxic effects of iron. The provisional RfD for iron is contained in the Risk Assessment Issue Paper for Derivation of the Provisional RfD for Iron (CASRN 7439-89-6) and Compounds published by the EPA Superfund Technical Support Center (STSC) in December 2001.

DNREC concurs that there are no risks to human health relating to the elevated levels of iron at the site since there is no current residential or commercial/industrial potable use of groundwater in the local area. With regards to ecological risk, Environ presented groundwater to surface water modeling demonstrating that the concentration of iron in groundwater discharging to surface water did not pose an ecological concern. Please note that maximum allowable concentrations for groundwater contaminants are discussed below in the remedial action objectives for this site. The use of groundwater monitoring and institutional controls will ensure that groundwater conditions remain protective of human health and the environment.

REMEDIAL ACTION OBJECTIVES

The following qualitative objectives have been established for the site:

- Minimize human and ecological exposure to the Iron Rich material and historic dredge spoils,
- Minimize migration of the Iron Rich material - which contains iron, manganese, hexachlorobenzene, and polychlorinated biphenyls as contaminants of concern - to air, surface water, and sediments by wind transport, storm water runoff, and/or groundwater-surface water interaction,
- Minimize further migration of iron and any other contaminant to the groundwater,
- Prohibit the withdrawal of groundwater for other than environmental monitoring purposes, and
- Prohibit the use of the property for residential or unrestricted use.

Based on the qualitative objectives, the approved quantitative objectives are:

- Capping the Iron Rich material to minimize human exposure to this material to achieve a carcinogenic risk less than or equal to 1.0×10^{-5} or a hazard index less than or equal to 1.0,
- Establish adequate storm water controls in the storm water retention area adjacent to the Iron Rich pile to minimize human and ecological exposure to the historic dredge spoils,
- Minimize discharge of Iron Rich material into Shellpot Creek and the Delaware River above the EPA Ambient Water Quality Criteria (AWQC),
- Place a deed restriction on the property, prohibiting the withdrawal of groundwater for other than environmental monitoring purposes and prohibiting the use of the property for any purpose other than industrial use, and
- Develop a groundwater monitoring program to monitor contaminants of concern in the groundwater for compliance with the EPA AWQC for Shellpot Creek or the Delaware River; the maximum concentrations allowed in groundwater will be 726,787 mg/l for iron, 242,262 mg/l for manganese and 1.9 mg/l for hexachlorobenzene.

PROPOSED PLAN OF REMEDIAL ACTION

Based on DNREC's evaluation of the site information, which includes current and past environmental investigations, historical information and the above remedial action objectives, two alternatives were evaluated: 1) capping and institutional/engineering controls, and 2) source removal and disposal. Based on a detailed analysis of the alternatives presented in the feasibility

study report, alternative 1 was selected. Therefore the proposed remedial action requirements are as follows:

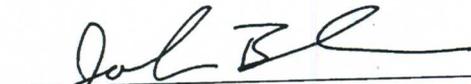
- Construct a capping system over the Iron Rich material consisting of a multilayer geosynthetic liner system pursuant to a DNREC approved remedial design plan. This design plan must be submitted to DNREC within 90 days of the effective date of the final plan. The capping system shall consist of a geomembrane, drainage layer, soil layer, final vegetative cover, and stormwater/surface water controls. Stormwater and Erosion Controls associated with this project must be approved by DNREC's Division of Soil and Water prior to construction of the capping system.
- Placement of a deed restriction on the property within ninety (90) days following DNREC's adoption of the final plan: a) prohibiting current and future residential or unrestricted use of the property b) prohibiting any digging, drilling, excavating, grading, constructing, earth moving, or any other land disturbing activities on the property without the prior written approval of DNREC; and c) prohibiting the installation of any water wells on, or use of groundwater at, the site without the prior written approval of DNREC. DNREC will identify the site as located within a groundwater management zone (GMZ), which is an internal DNREC document that restricts groundwater withdrawals at the site.
- An operation and maintenance (O&M) plan which includes a groundwater monitoring program, inspections of the capping system, and 5-year remedy evaluations shall be submitted to DNREC within 90 days of issuance of the final plan and will be implemented to ensure the long-term integrity of the remedy, following the completion of the remedial action.

This proposed plan includes remedial actions for groundwater based on the Department's best understanding of the current and anticipated future use of groundwater at or near the site. Groundwater is considered a valuable resource in the State of Delaware. Therefore, if the actual or potential future use of the groundwater resource at or near the site changes or if it becomes known that groundwater conditions result in an unacceptable risk to public health and/or the environment additional remedial actions shall be required.

DNREC believes that the above proposed alternative meets all the remedial action objectives for the site and is a cost-effective alternative. It is effective at protecting human health and the environment because it prevents direct contact and migration of the Iron Rich material.

PUBLIC PARTICIPATION
The Department is actively soliciting written public comments and suggestions on the proposed plan of remedial action. The comment period begins December 20, 2004, and ends at the close of business (4:30 p.m.) January 10, 2004. A public meeting will be conducted on January 07, 2005 at the Fire Hall at the Brandywine Hundred Fire Company (1006 Brandywine Blvd. Wilmington, DE 19809). Meeting will be from 6:00pm to 9:00pm.
If you have any questions or concerns regarding the Hay Street Sludge Drying site, or if you would like to view reports or other information regarding this site, please contact the project manager, Mr. Wilmer Reyes, 391 Lukens Drive, New Castle, Delaware 19720 or at (302) 395-2600.

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John Blevins, Director

12.14.04

Date