

ORIGINAL



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**FIVE-YEAR REVIEW REPORT FOR  
DELAWARE SAND & GRAVEL LANDFILL SUPERFUND SITE  
NEW CASTLE COUNTY, DELAWARE**



**September 2015**

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3/28/2015  
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## LIST OF ABBREVIATIONS

1,2-DCA	1,2-Dichloroethane
AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
BCEE	Bis(2-chloroethyl)ether
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
DDA	Drum Disposal Area
DNREC	Delaware Department of Natural Resources and Environmental Control
DS&G	Delaware Sand & Gravel
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FOIA	Freedom of Information Act
FYR	Five-Year Review
GPRA	Government Performance and Results Act
GMNC	Groundwater Migration Not Under Control
GMZ	Groundwater Management Zone
HEUC	Current Human Exposure Controlled
IC	Institutional Control
µg/kg	Microgram per Kilogram
µg/L	Microgram per Liter
mg/kg	Milligram per Kilogram
mg/L	Milligrams per Liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PCB	Polychlorinated Biphenyl
PFC	Perfluorinated Chemical
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
PHA	Provisional Health Advisory
PRP	Potentially Responsible Party
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
SSDS	Sub-Slab Depressurization System
SVOC	Semi-Volatile Organic Compound
SWRAU	Sitewide Ready for Anticipated Use
TBC	To-Be-Considered
TTO	Total Toxic Organics
UAO	Unilateral Administrative Order
VOC	Volatile Organic Compound

## EXECUTIVE SUMMARY

The Delaware Sand & Gravel Landfill Superfund site (the Site) includes 27 acres of land and an associated groundwater plume near the City of New Castle, Delaware. The Site is a former sand and gravel quarry, which later operated as a landfill. Landfill operators deposited materials, including hazardous substances, into unlined gravel pits. Soil and groundwater became contaminated with metals, polychlorinated biphenyls (PCBs) and other organic contaminants. The triggering action for this five-year review (FYR) was the signing of the previous FYR on September 16, 2010.

To manage the cleanup, the United States Environmental Protection Agency divided the Site into six operable units (OUs):

- OU1: Grantham South Area.
- OU2: Drum Disposal Area (DDA) and Ridge Area (superseded by OUs 4 and 5).
- OU3: Inert Area.
- OU4: DDA and Ridge Area – excavation and preparation of contaminated soil for on-site bioremediation; excavation and off-site disposal of drums.
- OU5: DDA and Ridge Area – construction and operation of a bioremediation system.
- OU6: DDA Source Area and Groundwater – will be addressed in a future Record of Decision (ROD).

EPA addressed the Grantham South Area (OU1) by installing a landfill cap and a security fence. The Site's potentially responsible parties (PRPs) implemented response actions at the Inert Area (OU3), the DDA and the Ridge Area (OU4 and OU5). At the Inert Area, the PRPs constructed a landfill cap and security fence. The cap at the Surface Barrier Area, which is part of the Inert Area, was designed to allow for the property owner's reuse of that area. The PRPs installed a slurry wall around the DDA and excavated drums and PCB-contaminated soil and disposed of them off site. They excavated contaminated soil at the Ridge Area and consolidated it with the contaminated material at the DDA. Afterward the PRPs placed a soil cover over the Ridge Area and installed and operated a bioventing system at the DDA to treat the contaminated soil. The PRPs suspended operation of the bioventing system in 2009 to implement a low-flow groundwater extraction system at the DDA as an interim response action to mitigate contaminant releases to the Upper Potomac Aquifer. Because the remedies selected for groundwater and for soil in the DDA did not perform as expected, EPA will select a new remedy for these contaminated media.

The remedy at the Site currently protects human health and the environment for the following reasons: caps and fencing prevent exposure to contaminated soil; the State of Delaware has implemented a Groundwater Management Zone which places restrictions on the installation of new public or domestic water supply wells to prevent exposure to contaminated groundwater; and treatment is provided by Artesian Water Company to address site-related contaminants in the groundwater at the Llangollen well field.

For the remedy to be protective over the long term, additional response actions are needed at the DDA and contaminated groundwater in the Upper Potomac Aquifer needs remediation.<sup>1</sup> In

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<sup>1</sup> The PRPs are currently conducting a feasibility study to develop a comprehensive remediation strategy to address groundwater contamination and the source area at the DDA.

addition, the owner of the majority of the site property must record a notice describing land use restrictions and access requirements for the Inert Area, the DDA and a portion of the Grantham South Area in the land records of New Castle County in accordance with EPA's 2004 Unilateral Administrative Order (UAO). The property owner must also comply with provisions of the UAO to ensure his safe use of the Surface Barrier Area at the Inert Area. Corrective measures may be needed if encroachment of surface water onto the Grantham South Area continues or has the potential to interfere with the remedial action. In addition, institutional controls addressing potential vapor intrusion for new construction need to be developed and implemented for those areas beyond the perimeters of the Inert Area and Grantham South Area where landfill gas may be migrating.

#### **Government Performance and Results Act (GPRA) Measure Review**

As part of this FYR, the GPRA Measures have also been reviewed. The GPRA Measures and their status are provided as follows:

##### Environmental Indicators

Human Health: Current Human Exposure Controlled (HEUC)

Groundwater Migration: Groundwater Migration Not Under Control (GMNC)

##### Sitewide Ready for Anticipated Use

The Site has not achieved Sitewide Ready for Anticipated Use (SWRAU).

**FIVE-YEAR REVIEW SUMMARY FORM**

<b>SITE IDENTIFICATION</b>		
<b>Site Name:</b> Delaware Sand & Gravel Landfill		
<b>EPA ID:</b> DED000605972		
<b>Region:</b> 3	<b>State:</b> DE	<b>City/County:</b> New Castle City / New Castle County
<b>SITE STATUS</b>		
<b>NPL Status:</b> Final		
<b>Multiple OUs?</b> Yes	<b>Has the site achieved construction completion?</b> Yes	
<b>REVIEW STATUS</b>		
<b>Lead agency:</b> EPA If "Other Federal Agency" selected above, enter Agency name:		
<b>Author name:</b> Debra Rossi, with additional support provided by Skeo Solutions		
<b>Author affiliation:</b> EPA Region 3		
<b>Review period:</b> August 2014 – September 2015		
<b>Date of site inspection:</b> February 26, 2015		
<b>Type of review:</b> Statutory		
<b>Review number:</b> 5		
<b>Triggering action date:</b> September 26, 2010		
<b>Due date (five years after triggering action date):</b> September 26, 2015		

**FIVE-YEAR REVIEW SUMMARY FORM (CONTINUED)**

**Issues/Recommendations**

<b>OU(s) without Issues/Recommendations Identified in the Five-Year Review:</b>
None

**Issues and Recommendations Identified in the Five-Year Review:**

<b>OU(s):</b> OU4, OU5	<b>Issue Category:</b> Remedy Performance			
	<b>Issue:</b> The remedies selected for groundwater and for soil in the DDA did not perform as expected.			
	<b>Recommendation:</b> Complete feasibility study and issue ROD for groundwater and the DDA source area.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	PRP; EPA	EPA	9/30/2016

<b>OU(s):</b> OU1, OU3, OU4, OU5	<b>Issue Category:</b> Institutional Controls			
	<b>Issue:</b> The Respondent to the 2004 UAO has not complied with the provisions of the UAO requiring the owner to record a Notice of Institutional Controls, Access and Obligations Regarding Successors-in-Title in the land records of New Castle County.			
	<b>Recommendation:</b> Continue attempts to secure compliance with the 2004 UAO. Evaluate enforcement options.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	Respondent to 2004 UAO; EPA	EPA	3/31/2016

<b>OU(s):</b> OU3	<b>Issue Category:</b> Institutional Controls			
	<b>Issue:</b> The Respondent to the 2004 UAO has not complied with the provisions of the UAO requiring the owner to ensure safe use of the Surface Barrier Area at the Inert Area.			
	<b>Recommendation:</b> Continue attempts to secure compliance with 2004 UAO. Evaluate enforcement options.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	Respondent to 2004 UAO; EPA	EPA	3/31/2016

OU(s): OU1	<b>Issue Category:</b> Monitoring			
	<b>Issue:</b> Surface water that accumulates adjacent to the Grantham South Area has the potential to encroach on the landfill cap.			
	<b>Recommendation:</b> Continue to document this issue in the Quarterly Operating, Maintenance and Monitoring Reports. Photo-documentation of the extent of the ponded area should be included in the reports. Propose corrective measures if encroachment of surface water on the Grantham South Area continues or has the potential to interfere with the remedial action.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	PRP	EPA	Ongoing

OU(s): OU1, OU3	<b>Issue Category:</b> Monitoring			
	<b>Issue:</b> Groundwater monitoring data suggests that releases from the Inert Area and the Grantham South Area may be impacting groundwater quality in the Columbia Aquifer and the Upper Potomac Aquifer.			
	<b>Recommendation:</b> Additional investigations are needed to evaluate potential releases of contaminants of concern from the Inert Area and the Grantham South Area.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	PRP	EPA	12/30/2016

OU(s): OU1, OU3	<b>Issue Category:</b> Institutional Controls			
	<b>Issue:</b> Institutional controls are required to prevent potential exposure to landfill gas constituents in any new buildings constructed beyond the perimeters of the Inert Area and Grantham South Area where landfill gas may be migrating.			
	<b>Recommendation:</b> The selected remedy should be modified to include institutional controls for new construction for those areas near the Inert Area and Grantham South Area where landfill gas may be migrating.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	PRP; EPA	EPA	9/30/2016

OU(s): OU1, OU3	<b>Issue Category:</b> Operations and Maintenance			
	<b>Issue:</b> Operation and maintenance of the SSDS voluntarily installed by the DS&G Remedial Trust at an office building on Grantham Lane is not a requirement of the existing decision and enforcement documents.			
	<b>Recommendation:</b> The selected remedy should be modified to include the requirement for continued operation and maintenance of the SSDS.			
<b>Affect Current Protectiveness</b>	<b>Affect Future Protectiveness</b>	<b>Implementing Party</b>	<b>Oversight Party</b>	<b>Milestone Date</b>
No	Yes	PRP; EPA	EPA	9/30/2016

**Protectiveness Statements**

<i>Operable Unit:</i> OU1	<i>Protectiveness Determination:</i> Short-term Protective	<i>Addendum Due Date (if applicable):</i>
<i>Protectiveness Statement:</i> The remedy at the Grantham South Area (OU1) currently protects human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled through a landfill cap and a perimeter fence. Institutional controls are in place to restrict the current and future use of 1.85 acres of the Grantham South Area. For the remedy to be protective over the long term, the Respondent to the 2004 UAO must record a notice of institutional controls in the land records of New Castle County to restrict future use of 0.15 acres of the Grantham South Area. In addition, corrective measures may be needed if encroachment of surface water onto the Grantham South Area continues or has the potential to interfere with the remedial action. Furthermore, institutional controls addressing potential vapor intrusion for new construction need to be developed and implemented for those areas near the landfill boundary where landfill gas may be migrating.		

<i>Operable Unit:</i> OU3	<i>Protectiveness Determination:</i> Short-term Protective	<i>Addendum Due Date (if applicable):</i>
<i>Protectiveness Statement:</i> The remedy at the Inert Area (OU3) currently protects human health and the environment. Exposure pathways which could result in unacceptable risks at the Inert Area are being controlled through a landfill cap and a perimeter fence. For the remedy to be protective over the long term, the Respondent to the 2004 UAO must record a notice of institutional controls in the land records of New Castle County. The Respondent must also comply with provisions in the 2004 UAO to ensure safe use of the Surface Barrier Area. In addition, the vapor intrusion mitigation system installed at a nearby office building must be operated and maintained and institutional controls addressing potential vapor intrusion for new construction need to be developed and implemented for those areas near the landfill boundary where landfill gas may be migrating.		

<i>Operable Unit:</i> OU4, OU5	<i>Protectiveness Determination:</i> Short-term Protective	<i>Addendum Due Date</i> <i>(if applicable):</i>
<p><i>Protectiveness Statement:</i>  The remedy at the Ridge Area (part of OUs 4 and 5) is protective of human health and the environment. Soil with contaminant concentrations exceeding the cleanup standards was excavated and placed at the DDA. Unacceptable exposure pathways have been eliminated at the Ridge Area. The remedy at the DDA (part of OUs 4 and 5) currently protects human health and the environment. The potential for direct contact with contaminated soil is being controlled by containment and security measures. For the remedy to be protective over the long term, additional response actions are needed at the DDA due to the failure of the constructed remedy to meet performance standards for groundwater protection. In addition, the property owner must record a notice of institutional controls to restrict future use of the DDA in accordance with the 2004 UAO. The Site's groundwater response currently protects human health and the environment because there is no exposure to contaminated groundwater. For the remedy to be protective over the long term, remedial action is necessary to address contaminated groundwater. A feasibility study is being performed to develop a comprehensive remediation strategy to address groundwater contamination and the DDA source area.</p>		

<b>Sitewide Protectiveness Statement</b>	
<i>Protectiveness Determination:</i> Short-term Protective	<i>Addendum Due Date (if applicable):</i>
<p><i>Protectiveness Statement:</i>  The remedy at the Site currently protects human health and the environment for the following reasons: caps and fencing prevent exposure to contaminated soil; the State of Delaware has implemented a Groundwater Management Zone which places restrictions on the installation of new public or domestic water supply wells to prevent exposure to contaminated groundwater; and treatment is provided by Artesian Water Company to address site-related contaminants in the groundwater at the Llangollen well field. For the remedy to be protective over the long term, additional response actions are needed at the DDA due to the failure of the constructed remedy to meet performance standards for groundwater protection. Additional response actions are also needed to address contaminated groundwater in the Upper Potomac Aquifer and vapor intrusion affecting existing buildings. The PRPs are currently conducting a feasibility study to develop a comprehensive remediation strategy to address these areas of concern. To further ensure the long-term protectiveness of the remedy, the Respondent to EPA's 2004 UAO must record a notice of institutional controls in the land records of New Castle County to document restrictions on future use of the site property, including the DDA, the Inert Area and 0.15 acres of the Grantham South Area. The Respondent must also comply with provisions in the 2004 UAO for safe use of the Surface Barrier Area. Corrective measures may be needed if encroachment of surface water onto the Grantham South Area continues or has the potential to compromise the effectiveness of the remedial action. In addition, institutional controls addressing potential vapor intrusion for new construction need to be developed and implemented for those areas near the landfill boundaries where landfill gas may be migrating.</p>	

**Fifth Five-Year Review Report  
for  
Delaware Sand & Gravel Landfill Superfund Site**

**1.0 Introduction**

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy to determine if it will continue to be protective of human health and the environment. FYR reports document FYR methods, findings and conclusions. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The United States Environmental Protection Agency prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Section 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each 5 years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

EPA interpreted this requirement further in the NCP, 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action.

EPA Region 3, with contractor support from Skeo Solutions, conducted the FYR and prepared this report regarding the remedy implemented at the Delaware Sand & Gravel (DS&G) Landfill Superfund site (the Site) in New Castle City, New Castle County, Delaware. EPA conducted this FYR from August 2014 to September 2015. EPA is the lead agency for developing and implementing the remedy for the potentially responsible party (PRP)-financed cleanup at the Site. The Delaware Department of Natural Resources and Environmental Control (DNREC), as the support agency representing the State of Delaware, has reviewed all supporting documentation and provided input to EPA during the FYR process.

This is the fifth FYR for the Site. The triggering action for this statutory review is the signing of the previous FYR on September 26, 2010. The FYR is required due to the fact that hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited

use and unrestricted exposure. To manage the cleanup, EPA divided the Site into six operable units (OUs):

- OU1: Grantham South Area.
- OU2: Drum Disposal Area (DDA) and Ridge Area (superseded by OUs 4 and 5).
- OU3: Inert Area.
- OU4: DDA and Ridge Area – excavation and preparation of contaminated soil for on-site bioremediation; excavation and off-site disposal of drums.
- OU5: DDA and Ridge Area – construction and operation of a bioremediation system.
- OU6: DDA Source and Groundwater – will be addressed in a future Record of Decision (ROD).

This FYR Report addresses OUs 1 through 5. OU6 is not addressed because a remedy has not yet been selected, and no remedial action has been undertaken.

## 2.0 Site Chronology

Table 1 lists the dates of important events for the Site.

**Table 1: Chronology of Site Events**

Event	Date
Industrial waste and construction debris accepted for disposal into unlined sand and gravel pits	1968-1976
Contaminants found in residential well water located downgradient from Army Creek Landfill and DS&G Landfill	1971
New Castle County installed groundwater recovery wells to prevent contaminated groundwater beneath Army Creek Landfill and DS&G Landfill from reaching Artesian Water Company's Llangollen well field	1973
EPA placed Site on Superfund program's National Priorities List (NPL)	September 8, 1983
EPA and the State performed emergency removal of more than 1,600 drums from surface of DDA and Ridge Area	March-May 1984
DNREC conducted remedial investigation and feasibility study	1984-1987
EPA issued Record of Decision (ROD) documenting selection of cleanup plan	April 22, 1988
EPA began remedial design for Grantham South Area	August 26, 1988
EPA approved final remedial design for Grantham South Area	June 30, 1989
U.S. Army Corps of Engineers' contractor, on behalf of EPA, began construction of Grantham South Area landfill cap	September 1989
EPA conducted final inspection of Grantham South Area landfill cap and signed Remedial Action Completion Report for Grantham South Area (OU1 remedial action completed)	September 30, 1991
On behalf of EPA, U.S. Army Corps of Engineers conducted pre-design studies at DDA and Ridge Area. Findings led to 1993 ROD Amendment	1991-1993
EPA determined that buried drums in DDA posed an imminent threat	March 23, 1992
EPA entered into Administrative Order on Consent (AOC) with 22 PRPs, who agreed to design and construct slurry wall around DDA as an interim action and to design multi-layer cap for Inert Area	June 12, 1992
PRPs initiated remedial design for Inert Area	June 26, 1992

Event	Date
State of Delaware assumed responsibility for operation and maintenance (O&M) activities at Grantham South Area	October 1992
PRPs initiated remedial design for slurry wall, which was built as a removal action	November 1992
EPA approved remedial design for Inert Area (OU3)	July 28, 1993
EPA issued ROD Amendment to revise remedy selected for buried materials and soil in DDA, Ridge Area and Inert Area	September 30, 1993
EPA approved slurry wall design	November 1993
PRPs initiated slurry wall construction	May 1994
EPA conducted final inspection of slurry wall	October 12, 1994
EPA completed Site's first FYR	September 30, 1994
Thirty-one PRPs entered into AOC with EPA, agreeing to begin remedial design for modified response actions selected in ROD Amendment for DDA and Ridge Area	December 5, 1994
PRPs initiated remedial design for OU4 and OU5	December 15, 1994
EPA accepted PRPs' certification of completion of slurry wall construction, acknowledging removal action completion	February 23, 1995
Thirty-one PRPs entered into a Consent Decree with EPA, agreeing to implement remedial design and remedial action for modified response actions selected in ROD Amendment for DDA, Ridge Area and Inert Area, and to perform O&M activities at Grantham South Area	June 14, 1995
PRP contractor mobilized to begin drum and soil excavation activities at DDA and Ridge Area	June 26, 1995
PRPs completed OU4 remedial design	June 29, 1995
PRPs completed OU5 remedial design	July 24, 1996
PRPs began OU5 on-site construction	August 26, 1996
PRPs' contractor mobilized to begin construction of Inert Area cap	September 9, 1996
EPA accepted Remedial Action Report documenting completion of: 1) excavation and off-site disposal of drum carcasses and certain contaminated soils and waste materials from DDA and Ridge Area; 2) amendment of contaminated soil with sand, wood chips and fertilizer in preparation for on-site bioremediation; and 3) excavation of on-site bio-cell (OU4 remedial action complete)	September 27, 1996
EPA conducted final inspection of Inert Area cap and bioremediation area at DDA	August 8, 1997
EPA issued Preliminary Close-out Report (OU5 remedial action complete)	August 12, 1997
EPA accepted Remedial Action Report documenting completion of Inert Area cap construction (OU3 remedial action complete)	September 30, 1997
EPA completed Site's second FYR	September 30, 1999
EPA issued Explanation of Significant Differences (ESD) that clarified and expanded institutional controls needed for Site	July 8, 2003
EPA issued Administrative Order for Remedial Action to owner of most of site property calling for site access and implementation of institutional controls	September 27, 2004
EPA completed Site's third FYR	September 21, 2005
DNREC established a Groundwater Management Zone at Site and adjacent Army Creek Landfill site	June 2006
EPA issued Administrative Order for Remedial Action to Grantham Lane Associates LLC calling for site access and implementation of institutional controls	September 29, 2006

Event	Date
Grantham Lane Associates LLC recorded Notice of Institutional Controls, Access, and Obligations Regarding Successors-in-Interest, implementing institutional controls for portion of site property owned by Grantham Lane Associates LLC	October 20, 2006
EPA issued Administrative Order for Remedial Action to New Castle County calling for site access and implementation of institutional controls	March 30, 2007
EPA issued revised Administrative Order for Remedial Action to New Castle County	May 12, 2008
New Castle County recorded Notice of Institutional Controls, Access, and Obligations Regarding Successors-in-Interest implementing institutional controls for portion of site property owned by New Castle County	June 23, 2008
PRPs initiated low-flow groundwater extraction at DDA as an interim response action	May 2009
EPA completed Site's fourth FYR	September 16, 2010
PRPs started feasibility study for OU6 (DDA source and groundwater)	September 28, 2011

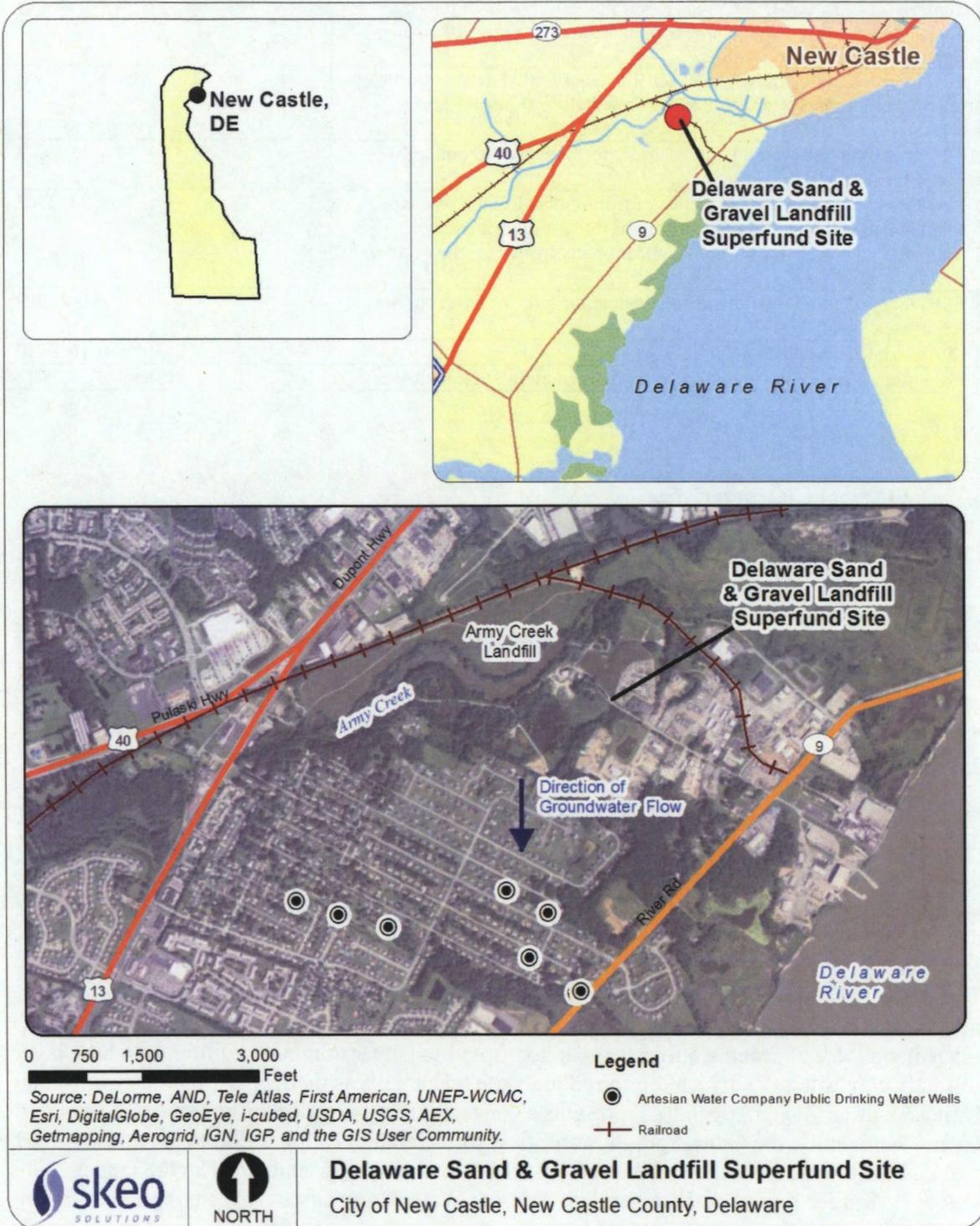
### 3.0 Background

#### 3.1 Physical Characteristics

The 27-acre site property is a half mile southwest of the city of New Castle, Delaware, east of U.S. Highway 13 (Dupont Highway) and west of Delaware Route 9 (River Road), on Grantham Lane (see Figures 1 and 2). The Site is bordered to the north by Penn Central Railroad tracks and to the west and north by Army Creek, which discharges into the Delaware River about one mile to the east. In addition to the landfill area, the Site includes areas to the south and west where groundwater has become contaminated due to releases of hazardous substances from the landfill. Another Superfund site, Army Creek Landfill, is located immediately west of the Site, on the opposite side of Army Creek.

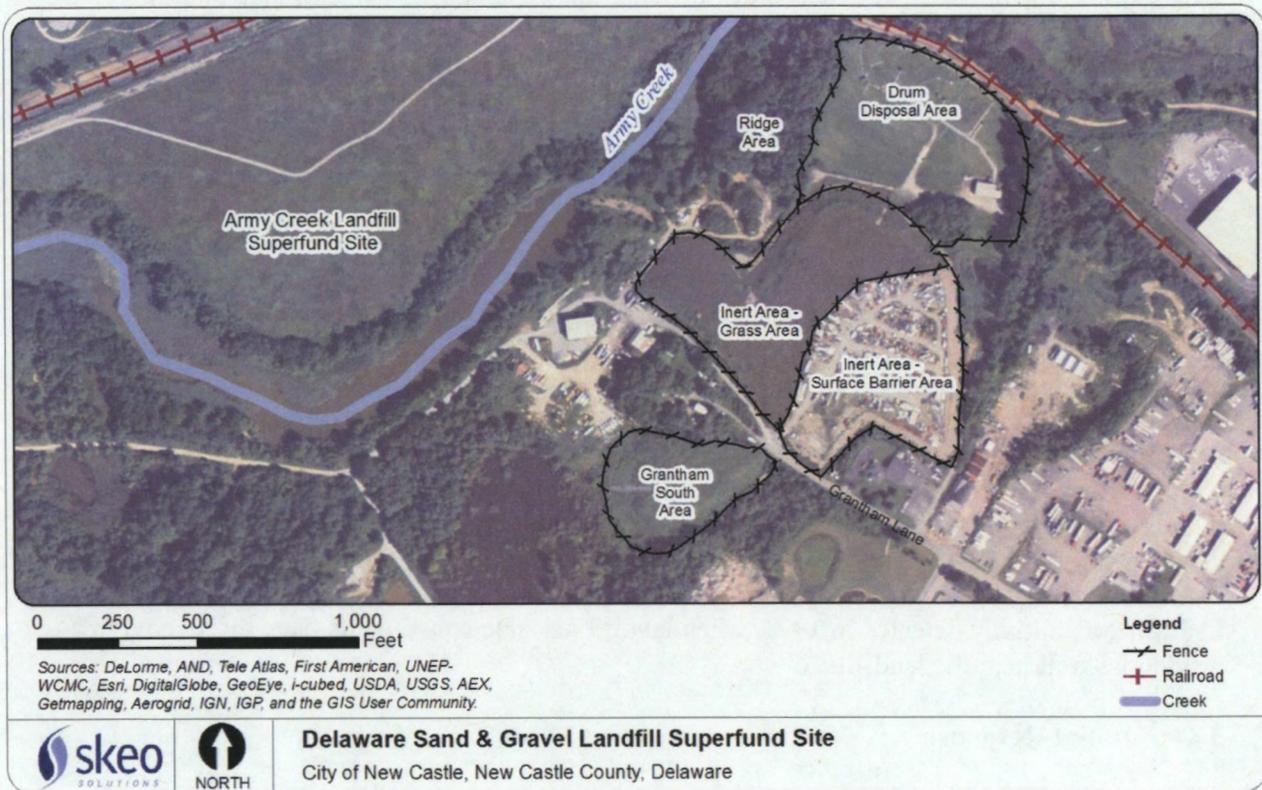
Geologic formations present beneath the Site include the Columbia Formation and the Potomac Formation. The Columbia Formation consists of sands with beds of clay and silt. It ranges in thickness from about 10 feet to over 100 feet and represents the surficial water table aquifer in the area of the Site. The underlying Potomac Formation is a several hundred foot thick sand deposit divided by silty clays and clays into the Upper, Middle and Lower Potomac Aquifers. Site investigations have focused on the Columbia Aquifer and the Upper Potomac Aquifer. These two formations are separated by the Upper Potomac Confining Unit, which is comprised of clay or silty clay; however, areas have been identified where the clay has been breached or eroded and the Columbia Aquifer is separated from the Upper Potomac Aquifer only by a layer of sandy clay, silt and silty sand referred to in site documents as the Upper Potomac Confining Unit Transition Zone. Appendix F presents a conceptual cross-section of the Site's geologic layers. Regionally, the natural groundwater flow direction in the Upper Potomac Aquifer is to the east and southeast, toward the Delaware River. In the site area, groundwater in the Upper Potomac Aquifer flows south, toward the Artesian Water Company's (Artesian) public drinking water wells.

**Figure 1: Site Location Map**



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

Figure 2: Detailed Site Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

### **3.2 Land and Resource Use**

The former landfill has various current land uses. A 5-acre portion of the 11-acre, fenced Inert Area (the Surface Barrier Area) is used for storage of impounded vehicles, propane tanks and salvage material. The owner of most of the site property maintains a residence adjacent to the Grantham South Area. Portions of the site property are fenced and unused, including a 3-acre area containing the Drum Disposal Area (DDA), where ongoing remediation work presently precludes use of the land, and the steeply sloped 2-acre Grantham South Area.

Land uses around the landfill include commercial/light industrial uses to the east, residential areas to the south, wildlife habitat at the Army Creek Landfill Superfund site to the west, and open space to the north. EPA expects that a similar mix of land uses will continue into the future.

The Upper Potomac Aquifer is used regionally as a drinking water supply. Locally, Artesian operates an active well field one half-mile south of the landfill (see Figure 1). The company supplies water to area homes and businesses.

### **3.3 History of Contamination**

The landfill is a former sand and gravel quarry that was later operated as a permitted landfill from 1968 until 1976. The Site consists of four major areas of contamination. Three of these – the Grantham South Area, the DDA and the Inert Area – were unlined gravel pits into which materials, including hazardous substances, were deposited. The fourth area, known as the Ridge Area, was used for temporary storage of chemical wastes and was affected by the spillage of hazardous substances. About 550,000 cubic yards of industrial and municipal wastes and construction rubble were disposed of at the Site, including at least 13,000 drums containing liquids and sludge from chemical production, manufacturing and petroleum refining processes.

The degradation of groundwater quality due to releases from the Site and from Army Creek Landfill was initially detected in 1971, when landfill leachate constituents were discovered in a residential well near the landfills.

### **3.4 Initial Response**

New Castle County started a groundwater monitoring program to determine the nature and extent of groundwater contamination in the Upper Potomac Aquifer in 1972. In 1973, the County installed a series of groundwater recovery wells in the Upper Potomac Aquifer between the landfills and the public water supply wells to intercept and contain the contaminant plume.

In 1975, DNREC installed several monitoring wells at the Site. In the same year, the State of Delaware initiated enforcement action against the Delaware Sand & Gravel Company, owner and operator of the landfill, for violations of the state solid waste permit. The State Attorney General's office ordered the landfill's closure in 1976.

In 1980, the County replaced some recovery wells with recovery wells closer to the landfills in an effort to increase the rate of contaminant removal while reducing the rate of uncontaminated

groundwater withdrawal. In addition, Artesian's state-permitted withdrawal rate was reduced and capped and Artesian's water supply lines were extended to residences along Grantham Lane and to the subdivision south of the Site.

EPA conducted a site inspection in 1981. EPA proposed listing the Site on the Superfund program's National Priorities List (NPL) in December 1982 and finalized the NPL listing in September 1983.

From March 1984 through May 1984, EPA and DNREC conducted an emergency removal action, removing more than 1,600 drums from the surface of the DDA. In July 1984, EPA awarded a grant to DNREC for the completion of a remedial investigation and feasibility study at the Site.

### 3.5 Basis for Taking Action

Hazardous substances found at the Site during the remedial investigation conducted from 1984 to 1987 include:

#### Groundwater

Benzene  
Bis(2-chloroethyl)ether (BCEE)  
1,2-Dichloroethane (1,2-DCA)  
Ethylbenzene  
Methylene chloride  
2-Butanone  
4-Methyl-2-pentanone  
Phenol  
Styrene  
Toluene  
Xylenes

#### Soil

Acetone  
Benzene  
BCEE  
Chlorobenzene  
1,2-DCA  
Methylene chloride  
Polychlorinated biphenyls (PCBs)  
Toluene  
Trichloroethylene  
Xylenes  
Antimony  
Arsenic  
Barium  
Copper  
Lead

Potential exposure to contaminated groundwater and soil (direct and indirect) was found to be associated with significant human health risks. EPA determined that the contaminants listed above for groundwater and soil would contribute to unacceptable levels of carcinogenic risk for any exposed individuals, and would have the potential to cause adverse noncancer health effects in any exposed individuals.

### 4.0 Remedial Actions

In accordance with CERCLA and the NCP, the overriding goals for any remedial action are protection of human health and the environment and compliance with applicable or relevant and

appropriate requirements (ARARs). A number of remedial alternatives were considered for the Site, and final selection was made based on an evaluation of each alternative against nine evaluation criteria that are specified in Section 300.430(e)(9)(iii) of the NCP.

#### **4.1 Remedy Selection**

EPA issued a ROD for the Site in April 1988. The ROD called for on-site incineration of contaminated soil and waste materials in the DDA and the Ridge Area, construction of a Resource Conservation and Recovery Act (RCRA) Subtitle C (dual-barrier) cap over the Grantham South Area, installation of a RCRA Subtitle D (single-barrier) cap over the Inert Area, and collection and treatment of contaminated groundwater with discharge of treated water to Army Creek.

Pre-design investigations conducted from 1991 to 1993 indicated that contamination at the DDA was more widespread and heterogeneous than previously understood. Following a reassessment of the selected remedy, EPA issued a ROD Amendment in September 1993. The 1993 ROD Amendment upgraded the selected cover system for the Inert Area to a Subtitle C cap and changed the selected remedy for contaminated soils in the DDA and the Ridge Area from excavation and on-site incineration to soil vapor extraction and bioventing to enhance the in-situ bioremediation of contaminated soil. EPA issued an Explanation of Significant Differences (ESD) in July 2003 to clarify and modify the institutional controls needed at the Site.

The 1993 ROD Amendment included the following remedial action objectives for the Site:

- Reduce the concentration of site-related contaminants such that:
  - The potential carcinogenic risk to people exposed to contaminated soil and groundwater is within the  $10^{-6}$  acceptable risk range.
  - The potential for adverse health effects from exposure to chemicals in soil and groundwater exhibiting noncarcinogenic effects is reduced to acceptable levels (i.e., a hazard index less than 1.0).
- Protect groundwater from contaminants leaching from buried drums and contaminated soils.

The major components of the remedy outlined in the 1988 ROD, the 1993 ROD Amendment and the 2003 ESD are listed below. The selected remedies described below for groundwater and for soil in the DDA did not perform as expected because of gaps in the conceptual site model, specifically, 1) unrecognized holes and transmissive zones in the clay layer underlying the DDA which prevented dewatering and adequate containment of contaminated media within the slurry wall at the DDA and 2) previously unidentified contamination in the stratigraphic unit immediately beneath the clay layer which represents a long-term secondary source of contamination to the groundwater in the Upper Potomac Aquifer. Therefore, EPA will select a new remedy for groundwater and the DDA. The PRP group (known as the DS&G Remedial Trust) is performing a feasibility study to evaluate additional cleanup options for the DDA and groundwater contamination in the Upper Potomac Aquifer. As part of the feasibility study that is currently underway, EPA is developing new remedial action objectives that will replace the remedial action objectives listed above. EPA expects to issue a proposed remedial action plan

and ROD in 2016 to address contamination remaining at the DDA and groundwater containing BCEE, 1,4-dioxane, benzene and other site-related contaminants.

#### Grantham South Area (OU1)

- Construction of a RCRA Subtitle C cap and gas venting system above the waste disposal area.
- Installation of a perimeter fence.
- Institutional controls, including land and groundwater use restrictions.

#### Inert Area (OU3)

- Removal of surface debris.
- Construction of a RCRA Subtitle C cap and gas venting system above the waste disposal area.
- Installation of a perimeter fence.
- Institutional controls, including land and groundwater use restrictions.

#### DDA and Ridge Area (originally OU2, superseded by OU4 and OU5)<sup>2</sup>

- Installation of a subsurface slurry wall around the DDA and contaminated soils at the base of the Columbia Aquifer surrounding the DDA.
- Dewatering of the saturated zone within the slurry wall containment structure.
- On-site or off-site treatment and disposal of extracted groundwater.
- Excavation and off-site disposal of buried drums, waste materials and “highly contaminated” soil.
- Treatment of contaminated soils within the slurry wall containment area using soil vapor extraction and bioremediation (bioventing).<sup>3</sup>
- Control of air emissions, if necessary, to comply with Delaware Regulations Governing the Control of Air Pollution.
- Construction of a RCRA Subtitle C cap above the soils within the slurry wall.
- Installation of a perimeter fence.
- Institutional controls, including land and groundwater use restrictions.

Table 2 below presents the soil cleanup goals for the DDA from the 1993 ROD Amendment, which were developed to ensure that releases from the remediated soil to groundwater would not result in unacceptable risks for individuals exposed to the groundwater. As part of the feasibility study that is currently underway, EPA is developing new cleanup goals for the DDA based on current site conditions.

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<sup>2</sup> The selected remedy described for soil in the DDA (OU4 and OU5) did not perform as expected; therefore, EPA will select a new remedy for the DDA and site groundwater. EPA expects to issue a proposed remedial action plan in 2016 for OU6 (DDA source and groundwater).

<sup>3</sup> A determination was made, based on pre-design studies, to treat the soils using bioventing only. The objective of bioventing was to stimulate the aerobic biodegradation of organic compounds while minimizing volatilization of volatile organic compounds (VOCs) and reducing the capital and utility costs required for vapor treatment.

**Table 2: Soil Cleanup Goals for DDA from 1993 ROD Amendment**

Soil Contaminant	Cleanup Goal (µg/kg)
Acetone	5,000
Benzene	831
Bis(2-chloroethyl)ether	5
Bis(2-chloroisopropyl)ether	576
Chlorobenzene	5,000
1,2-DCA	250
Ethylbenzene	45,660
Methylene chloride	1,000
2-Methylphenol	485
4-Methylphenol	1,213
Naphthalene	560
PCB-1248	10,930
PCB-1254	52,170
Phenols	5,000
Styrene	1,000
Tetrachloroethylene	1,000
Trichloroethylene	1,000
Toluene	5,000
Xylenes, total	5,000
<i>Note:</i> µg/kg = microgram per kilogram	

**Ridge Area (OU4 and OU5)**

- Removal of surface debris.
- Excavation of shallow soil with contaminant concentrations exceeding Ridge Area soil cleanup standards in the 1993 ROD Amendment (see Table 3 below).
- Transfer of excavated soil to the DDA for treatment by bioremediation.
- Regrading and placement of a soil cover above the Ridge Area.

Table 3 below presents the soil cleanup goals for the Ridge Area from the 1993 ROD Amendment. EPA calculated these soil cleanup goals based on the protection of groundwater.

**Table 3: Soil Cleanup Goals for Ridge Area from 1993 ROD Amendment**

Soil Contaminant	Cleanup Goal (µg/kg)
Bis(2-chloroethyl)ether	0.77
Bis(2-chloroisopropyl)ether	93
Methylene chloride	812

## Groundwater<sup>4</sup>

- Recovery of contaminated groundwater from extraction wells operated by New Castle County downgradient of the Army Creek Landfill.
- Treatment of recovered groundwater to remove iron prior to its discharge to Army Creek.
- Sitewide groundwater use restrictions.

The groundwater remedy for the Army Creek Landfill and DS&G Landfill sites were combined in order to eliminate redundancies and implemented by New Castle County under the 1991 Army Creek Landfill Consent Decree. Table 4 below presents the groundwater cleanup standards from the Consent Decree, which are the enforceable standards for the DS&G Landfill site. Table 4 also presents the groundwater cleanup goals from the DS&G Landfill site's 1988 ROD. The groundwater cleanup standards in the Consent Decree are not the same as those listed in the ROD. As part of the feasibility study currently underway, EPA is developing a new groundwater remedy for the DS&G site, with new groundwater cleanup goals based on current site conditions, ARARs and toxicity values.

**Table 4: Groundwater Cleanup Standards**

<b>Groundwater Contaminant</b>	<b>Cleanup Standard in 1991 Army Creek Landfill Consent Decree (mg/L)</b>	<b>Cleanup Goal from 1988 ROD (mg/L)</b>
Arsenic	0.05	None listed
Barium	1	None listed
Cadmium	0.01	None listed
Chromium	0.05	None listed
Lead	0.05	None listed
Mercury	0.002	None listed
Nitrate (as N)	10	None listed
Selenium	0.01	None listed
Silver	0.05	None listed
Endrin	0.0002	None listed
Lindane	0.004	None listed
Methoxychlor	0.1	None listed
Toxaphene	0.005	None listed
2,4-D	0.1	None listed
2,4,5-TP Silvex	0.01	None listed
Total trihalomethanes	0.10	None listed
Benzene	0.005	None listed
Vinyl chloride	0.002	None listed
Carbon tetrachloride	0.005	None listed
1,2-Dichloroethane	0.005	0.005

<sup>4</sup> The groundwater remedy selected in the 1988 ROD did not perform as expected; therefore, EPA will select a new remedy for groundwater. EPA expects to issue a proposed remedial action plan in 2016 for OU6 (DDA source and groundwater).

Groundwater Contaminant	Cleanup Standard in 1991 Army Creek Landfill Consent Decree (mg/L)	Cleanup Goal from 1988 ROD (mg/L)
Trichloroethylene	0.005	None listed
1,1-Dichloroethylene	0.007	None listed
1,1,1-Trichloroethane	0.2	None listed
para-Dichlorobenzene	0.075	None listed
Acetone	None listed	3.5
Bis(2-chloroethyl)ether	None listed	0.00003
2-Butanone	None listed	1.75
Ethylbenzene	None listed	0.68
Methylene chloride	None listed	0.0007
4-Methyl-2-pentanone	None listed	1.75
2-Methylphenol	None listed	1.75
4-Methylphenol	None listed	1.75
Naphthalene	None listed	0.40
Phenols	None listed	3.5
Toluene	None listed	2
Xylenes, total	None listed	0.002
<i>Notes:</i> mg/L = milligrams per liter		

## 4.2 Remedy Implementation

### Grantham South Area (OU1)

In June 1989, EPA completed a remedial design for the Grantham South Area landfill cap. EPA's contractor began on-site work in July 1990. Following clearing and grubbing, the waste disposal area was capped with not less than 24 inches of fill, followed successively by a 40-mil very-low-density polyethylene membrane, drainage net, geotextile and 24 inches of cover soil. A perimeter security fence, two gas vents and four gas monitoring wells were also installed. The work was completed when EPA, the U.S. Army Corps of Engineers and the State conducted the final inspection in September 1991.

### Inert Area (OU3)

In June 1992, EPA entered into an Administrative Order on Consent (AOC) for Removal Action with 22 site PRPs, who agreed to design a RCRA Subtitle C cap for the Inert Area. EPA approved the PRPs' remedial design in July 1993. The United States and the State of Delaware entered into a Consent Decree with 31 PRPs (Settling Defendants) in June 1995. The Settling Defendants formed, and are represented by, the DS&G Remedial Trust. The DS&G Remedial Trust implemented the remedial action for the Inert Area in accordance with the Consent Decree. In August 1996, EPA approved an addendum to the cap design that provided for a 6-acre Surface Barrier Area to accommodate the property owner's reuse of the land. The DS&G Remedial Trust's contractor mobilized to begin construction of the cap in September 1996.

The major components of the construction work were:

- Construction of sedimentation basins and drainage culverts.
- Placement of foundation fill.
- Installation of vertical gas vents in the western portion of the cap, outside the Surface Barrier Area.
- Installation of a horizontal gas venting system within the Surface Barrier Area.
- Installation of settlement markers.
- Installation of geosynthetic clay liner (barrier layer).
- Installation of linear low-density polyethylene geomembrane (barrier layer).
- Installation of geocomposite drainage layer.
- Sequential placement of low-permeability soil, geotextile and gravel above the drainage layer within the 6-acre Surface Barrier Area.
- Sequential placement of select fill material, top soil and grass seed above the drainage layer outside of the Surface Barrier Area.
- Placement of jersey barriers along the perimeter of the Surface Barrier Area.
- Installation of a security fence around the perimeter of the landfill.

EPA accepted the Remedial Action Report for this area of the Site in September 1997.

#### DDA and Ridge Area (OU4 and OU5)

A group of PRPs designed and constructed a subsurface slurry wall around the DDA as required by the 1992 AOC for Removal Action. EPA approved the slurry wall design in November 1993 and construction began in May 1994. The PRPs installed a soil-bentonite slurry wall around the 0.8-acre DDA and surrounding contaminated soils in the Columbia Aquifer. The slurry wall surrounds a 3-acre area of contaminated soil and groundwater and is keyed into the underlying clay unit. In October 1994, EPA, the State and the PRPs conducted a final inspection of the slurry wall. In February 1995, EPA accepted the PRPs' certification of completion of slurry wall construction.

In December 1994, 31 PRPs entered into an AOC with EPA, under which they initiated the remedial designs for the remaining response actions selected in the 1993 ROD Amendment for the DDA and the Ridge Area. The DS&G Remedial Trust completed the remedial designs and implemented the remedial actions for these areas as Settling Defendants under the Consent Decree.

EPA approved the remedial design for drum and soil excavation activities at the DDA and the Ridge Area (OU4) and the DS&G Remedial Trust's contractor mobilized to conduct these activities in June 1995. OU4 cleanup activities included:

- Excavation and off-site disposal of drums and waste materials within the DDA.
- Off-site disposal of organic liquid waste.
- Excavation of contaminated soil from the DDA and Ridge Area, and stockpiling contaminated soil within the DDA.

- Off-site disposal of contaminated groundwater and stormwater encountered during excavation activities.
- Off-site disposal of PCB-contaminated soil.
- Amendment of stockpiled soils with wood chips, sand and diammonium phosphate in preparation for treatment within the bio-cell constructed and operated as part of OU5.
- Regrading and placement of a soil cover over the Ridge Area.

In September 1996, EPA accepted the DS&G Remedial Trust's Remedial Action Report documenting completion of OU4 construction activities.

OU5 cleanup activities included constructing and operating the bioremediation area. This area consisted of a bioventing system to treat contaminated soil within the slurry wall and a perimeter security fence. EPA approved the remedial design for the bioremediation area in July 1996; on-site construction began in August 1996. Major components of the bioventing system included:

- A bio-cell, consisting of horizontal air injection and extraction wells to treat amended soil from the DDA and the Ridge Area.
- A vertical bioventing system to treat contaminated soil beneath and laterally beyond the bio-cell.
- A groundwater collection system to dewater the Columbia Aquifer within the slurry wall and a piezometer network to monitor hydraulic gradients across the slurry wall.
- A temporary cap over the area enclosed within the slurry wall.

In August 1997, EPA, the State and the Settling Defendants conducted the final inspection of the bioremediation area. EPA issued the Preliminary Close-out Report for the project on August 12, 1997, documenting the completion of construction activities at the Site. EPA will issue a Final Close-out Report once all cleanup levels have been met.

The remedy at the DDA did not perform as designed. Gaps and transmissive zones in the clay unit beneath the DDA have allowed groundwater flow between the Columbia Aquifer within the slurry wall and the underlying Upper Potomac Aquifer. The DS&G Remedial Trust suspended operation of the bioventing system in 2009 and implemented a low-flow groundwater extraction system as an interim response action at the DDA. The objectives of the low-flow groundwater extraction system are to maintain upward hydraulic gradients between the Upper Potomac Aquifer and the Columbia Aquifer at the DDA, to maintain inward gradients across the slurry wall and to remove contaminant mass from the DDA.

#### Collection of Contaminated Groundwater

From 1993 to 2004, in accordance with the Consent Decree for the neighboring Army Creek Landfill site, New Castle County operated a groundwater collection and treatment system in the Upper Potomac Aquifer to prevent contaminants from the Army Creek Landfill and DS&G sites from migrating to Artesian's Llangollen well field. In October 2004, New Castle County suspended operation of this system with EPA approval because the enforceable groundwater cleanup standards in the Army Creek Landfill Consent Decree had been met at the property boundary. Due to the presence of BCEE in groundwater at the DS&G site, New Castle County

began pumping groundwater from extraction well PW-1 downgradient of the DDA and discharging it to the New Castle County sewer system under a cost sharing agreement with the DS&G Remedial Trust. In October 2012, the DS&G Remedial Trust assumed responsibility for the operation and maintenance of extraction well PW-1.

In May 2009, the DS&G Remedial Trust also began low-flow extraction of groundwater within the slurry wall as an interim response action to reduce the contaminant mass at the DDA and curtail the release of contaminants into the Upper Potomac Aquifer. The system initially extracted groundwater from six wells, which provided only limited hydraulic containment of contamination at the DDA. The DS&G Remedial Trust installed additional wells in 2010 and 2012 and the system currently extracts groundwater from eight wells at about 8 to 10 gallons per minute and discharges the extracted water directly to the New Castle County sewer system.

#### **4.3 Operation and Maintenance (O&M)**

In September 2012, the DS&G Remedial Trust revised the O&M plan for the Inert Area and Grantham South Area, incorporating new objectives and procedures for landfill gas monitoring and establishing action levels and response actions for methane in indoor air. The DS&G Remedial Trust conducts O&M activities in accordance with its Revised O&M Plan for the Grantham South Area and Inert Area. Groundwater monitoring is conducted in accordance with the June 2009 Revision 1 Sampling and Analysis Plan Addendum and October 2011 Feasibility Study Work Plan, Revision 2. The DS&G Remedial Trust is conducting the following long-term O&M activities at the Site:

##### Grantham South Area

- Quarterly monitoring of combustible gases and oxygen at gas vents and gas monitoring wells using a combustible gas indicator; monitoring of combustible gases and oxygen levels in the indoor air of nearby buildings, if warranted.
- Quarterly inspection of the cover system, surface water control features and perimeter fence, as well as implementation of corrective measures, as necessary.
- Annual grass cutting.

##### Inert Area

- Quarterly monitoring of combustible gases and oxygen at gas vents and gas monitoring wells using a combustible gas indicator; monitoring of combustible gases and oxygen levels in the indoor air of nearby buildings, if warranted.
- Surveying of settlement markers (once every five years).
- Quarterly inspection of the cover system, including the Surface Barrier Area, surface water control features, gas venting system, settlement monuments, access roads and perimeter fence, as well as implementation of corrective measures, as necessary.
- Annual grass cutting.

### Ridge Area

- Quarterly visual inspection of vegetation and evidence of disturbance.

### DDA

- In September 2013, the DS&G Remedial Trust received approval from EPA to discontinue soil gas monitoring at the DDA because adequate data was obtained to characterize the nature of the DDA gas emissions.

### Sitewide Groundwater Monitoring

- Semi-annual measurement of groundwater elevations.
- Semi-annual monitoring of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and metals levels in the groundwater of the Columbia and Upper Potomac aquifers.

### Collection of Contaminated Groundwater

As described in Section 4.2 above, the DS&G Remedial Trust operates and maintains extraction well PW-1 and the low-flow groundwater extraction system. The low-flow groundwater extraction system is not part of the ROD's selected remedy; it is an interim response action at the DDA, pending selection of a final remedy. In 2014, the DS&G Remedial Trust began adding deposit control agents to wells and lines to improve system performance by preventing accumulation of biological and iron deposits.

Table 5 presents the Site's annual O&M costs from the past five years. EPA estimated an annual O&M cost of \$380,500 for six years in the 1993 ROD Amendment. Actual O&M costs are higher than estimated because the remedies selected for groundwater and for soil in the DDA did not perform as expected.

**Table 5: Annual O&M Costs**

<b>Year</b>	<b>Total Cost</b>
2010	\$609,000
2011	\$433,000
2012	\$501,000
2013	\$868,000
2014	\$733,000

### **5.0 Progress Since the Last Five-Year Review**

The protectiveness statement from the 2010 FYR for the Site stated:

*The Site is protective in the short term for the following reasons: the remedial actions for each operable unit currently protect human health and the environment; since 2006, the State has implemented a GMZ [Groundwater Management Zone] which places restrictions on the installation of new public or domestic water supply wells in order to prevent exposure to contaminated groundwater; and treatment is provided by Artesian Water Company to address Site-related contaminants in the groundwater at the Llangollen well field. Additional measures are necessary to ensure that Site conditions remain protective over the long term, as summarized below.*

*The remedy at the Grantham South Area currently protects human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled through a landfill cap and a perimeter fence. Institutional controls are in place to restrict the current and future use of 1.85 acres of the Grantham South Area. In order for the remedy to be protective in the long term, a deed notice must be recorded in order to restrict future use of the 0.15 acres of the Grantham South Area owned by the Respondent to the 2004 UAO [Unilateral Administrative Order]. Measures may need to be taken to repair or modify the security fence adjacent to the [private] residence if trespassing upon the landfill becomes an issue. In addition, corrective measures may be needed if encroachment of surface water on the Grantham South Area continues or has the potential to interfere with the remedial action.*

*Exposure pathways that could result in unacceptable risks at the Inert Area are being controlled through a landfill cap and a perimeter fence. The remedy at the Inert Area will provide long-term protection of human health and the environment upon full implementation of the institutional controls specified in the 2004 UAO and maintenance, if necessary, to ensure proper cap drainage.*

*The remedy at the Ridge Area is protective of human health and the environment. Soil with contaminant concentrations exceeding the cleanup standards was excavated and placed at the DDA for in situ bioremediation under OU5. Unacceptable exposure pathways have been eliminated at the Ridge Area.*

*The remedy at the DDA currently protects human health and the environment because the potential for direct contact with contaminated soil is being controlled by containment and security measures. In order for the remedy to be protective in the long term, additional response actions are needed at the DDA due to the failure of the constructed remedy to meet performance standards. In addition, the property owner must record a notice with the recorder of deeds in order to restrict future use of the DDA in accordance with the 2004 UAO.*

*Under the 1995 Consent Decree, the DS&G Remedial Trust is not required to implement response actions to address contaminants released from the Site into the groundwater of the Upper Potomac Aquifer. In order for the remedy to be protective in the long term, remedial action is necessary to address contaminated groundwater in the Upper Potomac Aquifer, in addition to the source area at the DDA. As discussed in Section V of this report, an FS [feasibility study] will be performed at the Site in order to develop a comprehensive remediation strategy to address BCEE and VOC contamination in soil and shallow groundwater at the DDA and within the Upper Potomac Aquifer impacted by releases from the DDA.*

The 2010 FYR included nine issues and recommendations. This report summarizes each recommendation and its current status below.

**Table 6: Progress on Recommendations from the 2010 FYR**

Recommendation	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
<p>A feasibility study should be completed to develop a comprehensive source control and groundwater remediation strategy that will form the basis of EPA's proposed remedial action plan for the Site.</p>	<p>Settling Defendants</p>	<p>9/30/12</p>	<p>The DS&amp;G Remedial Trust started a feasibility study in 2011 to evaluate additional cleanup options for the DDA and groundwater contamination in the Upper Potomac Aquifer.</p> <p>EPA expects to issue a proposed remedial action plan and ROD in 2016 to address contamination remaining at the DDA and groundwater containing BCEE, 1,4-dioxane, benzene and other site-related contaminants.</p>	<p>Ongoing</p>
<p>The Quarterly Operating, Maintenance and Monitoring Reports should include a section that addresses the status of each issue identified in the inspection checklists, including suggested corrective measures, a tentative schedule for implementing those measures, and a summary of the resolution of each issue.</p>	<p>Settling Defendants</p>	<p>12/30/10</p>	<p>The DS&amp;G Remedial Trust is including this information in its Quarterly Operating, Maintenance and Monitoring Reports.</p>	<p>2/8/11</p>
<p>Progress toward the attainment of remedial action objectives, changes in site conditions and opportunities for remedy optimization should be regularly evaluated using site data and documented in regularly submitted reports. If necessary, data collection objectives should be reviewed.</p>	<p>Settling Defendants</p>	<p>3/30/11</p>	<p>The DS&amp;G Remedial Trust is including information relating to the progress and optimization of interim response measures in its semi-annual groundwater monitoring reports. The DS&amp;G Remedial Trust also developed new objectives for data collection at the Grantham South Area and the Inert Area, made corresponding revisions to the landfill gas and indoor air monitoring program and established action levels and response actions for methane in indoor air. These changes were approved by EPA on 2/27/13.</p>	<p>February 2011 and September 2012</p>

Recommendation	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Replace settlement monument PM-1.	Settling Defendants	12/30/10	The DS&G Remedial Trust found that it is not possible to replace the settlement monument without excavating through the cap. Therefore, the Trust re-surveyed the remaining portion of the monument, and is using that portion as the reference point to determine future settlement.	12/31/10
Delineate the extent of the depression surrounding settlement monument PM-4. Fill the depression with a low-permeability material or implement alternative measures, if necessary, to promote runoff from this area of the cap.	Settling Defendants	6/30/11	The DS&G Remedial Trust surveyed the Inert Area's Surface Barrier Area to investigate the potential differential settlement in the area of PM-4 in September 2011. In May 2012, the Trust submitted to EPA a report of the test pit findings with recommendations. EPA approved the design of the repair in February 2013. The Trust repaired the Surface Barrier Area in September 2013.	9/23/13
Surface water that accumulates adjacent to the Grantham South Area has the potential to encroach on the landfill cap. Continue to document this issue in the Quarterly Operating, Maintenance and Monitoring Reports. Propose corrective measures if encroachment of surface water on the Grantham South Area continues or has the potential to interfere with the remedial action.	Settling Defendants	Ongoing	The DS&G Remedial Trust notes and records any surface water encroachment onto the Grantham South Area during quarterly site inspections. Surface water encroachment has not been observed since the first quarter 2010 inspection. The Trust will continue to document this issue in the Quarterly Operating, Maintenance and Monitoring Reports.	Ongoing
The owner of the major portion of the site property, including the Inert Area and the DDA, has not recorded a Notice of Institutional Controls, Access and Obligations Regarding Successors-in-Interest ("Notice") with the Recorder of Deeds of New Castle County as required by the 2004 UAO. Finalize Notice language and record Notice with Recorder of Deeds.	Respondent to 2004 UAO; EPA	6/30/11	EPA has continued efforts to secure the Respondent's cooperation in recording the Notice in the land records and is considering enforcement options.	Ongoing

Recommendation	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
The owner of the Inert Area has not submitted semi-annual O&M reports, providing an inventory of materials stored on the Surface Barrier Area and corrective actions, if any, to EPA. Continue discussions with Respondent regarding requirements of the 2004 UAO. Consider further EPA enforcement.	EPA	6/30/11	EPA conducted an inspection in May 2014 to document areas of noncompliance with the 2004 UAO and notified the property owner of the issues that need to be addressed to ensure safe use of the Surface Barrier Area and comply with other requirements of the UAO. The Agency will continue to monitor use of the Surface Barrier Area and is evaluating enforcement options.	Ongoing
Tall vegetation on the Inert Area and Grantham South Area caps during the site inspection did not allow a detailed inspection of the cover system. Conduct a follow-up inspection of the cap after the fall 2010 mowing.	EPA	11/15/10	An EPA contractor inspected the caps after they were mowed. The Grantham South Area cap and the grass-covered portion of the Inert Area cap were found to be in fair condition. The Surface Barrier Area cap was found to be in poor to fair condition, with settlement (repaired in 2013), oil stains, and small depressions and ruts.	11/19/10

## 6.0 Five-Year Review Process

### 6.1 Administrative Components

EPA Region 3 initiated the FYR in August 2014 and scheduled its completion for September 2015. EPA remedial project manager Debra Rossi led the EPA site review team, which also included hydrogeologist Ryan Bower, toxicologist Linda Watson, Patricia Flores-Brown of EPA's Air Protection Division, EPA's Biological Technical Assistance Group, site attorney Cynthia Nadolski, community involvement coordinator Larry Johnson and contractor support provided to EPA by Skeo Solutions. In October 2014, EPA held a scoping call with the review team to discuss the Site and items of interest as they related to the protectiveness of the remedy currently in place. The review schedule established consisted of the following activities:

- Community notification.
- Document review.
- Data collection and review.
- Site inspection.
- Local interviews.
- FYR Report development and review.

### 6.2 Community Involvement

In June 2015, EPA published a public notice in the *Delaware State News* newspaper announcing the commencement of the FYR process for the Site, providing contact information for EPA and

inviting community participation. The press notice is available in Appendix B. No one contacted EPA as a result of the advertisement.

EPA will make the final FYR Report available to the public. EPA will place copies of the document in the designated site repository: Delaware Department of Natural Resources and Environmental Control, Site Investigation and Restoration Section, located at 391 Lukens Drive in New Castle, Delaware. Many site documents are also available online, at [www.epa.gov/arweb](http://www.epa.gov/arweb).

### **6.3 Document, ARARs and Institutional Controls Review**

#### Document Review

This FYR included a review of relevant, site-related documents, including the ROD, ROD Amendment and ESD; quarterly operating, maintenance and monitoring reports which consist of field inspection reports and landfill gas monitoring reports for the Inert Area and the Grantham South Area; semi-annual monitoring reports which present groundwater monitoring results and performance assessments relating to supplemental site characterization activities and interim response actions (i.e., operation of the low-flow groundwater extraction system and extraction well PW-1); and the DS&G Remedial Trust's March 2014 Supplemental Site Characterization Report. Artesian's annual water quality reports (available at [www.artesianwater.com](http://www.artesianwater.com)) were also reviewed. A complete list of the documents reviewed can be found in Appendix A.

#### ARARs Review

CERCLA Section 121(d)(1) requires that Superfund remedial actions attain "a degree of cleanup of hazardous substance, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment." The remedial action must achieve a level of cleanup that at least attains those requirements that are legally applicable or relevant and appropriate.

#### *Groundwater ARARs*

As part of the feasibility study that is currently underway, EPA is identifying a new list of groundwater contaminants of concern (COCs) and developing new cleanup goals based on current site conditions, ARARs and toxicity values. The Site's earlier decision documents and enforcement documents do not address all of the COCs identified during the supplemental site characterization efforts for the ongoing OU6 feasibility study. In addition, the toxicity values for many chemicals have changed since the Site's ROD was issued in 1988 and since the Army Creek Landfill Consent Decree was entered in 1991. New performance standards for Upper Potomac Aquifer groundwater, based on recent site characterization data and current toxicity values, will be included in the OU6 ROD.

#### *Soil ARARs*

The 1993 ROD Amendment stated that the Delaware Regulations Governing Hazardous Substance Cleanup are relevant and appropriate for the development of soil cleanup standards at the DDA and the Ridge Area. This FYR reviewed the current Delaware Regulations Governing Hazardous Substance Cleanup and found that the soil cleanup levels required by the Delaware regulations have not changed since the 1993 ROD Amendment.<sup>5</sup> The regulations call for soil

<sup>5</sup> [http://www.dnrec.delaware.gov/dwhs/sirb/Documents/HSCA%20Regs\\_2012.pdf](http://www.dnrec.delaware.gov/dwhs/sirb/Documents/HSCA%20Regs_2012.pdf) (accessed 1/22/2015).

cleanup levels that achieve an acceptable cumulative risk ( $1 \times 10^{-5}$  or less for carcinogens and a hazard index of 1.0 or less for non-carcinogens) or background levels (if background levels are greater than the acceptable risk level).

EPA calculated soil cleanup goals for the DDA and the Ridge Area based on the protection of groundwater, as presented in the 1993 ROD Amendment. The 1993 ROD Amendment calculated that these soil cleanup goals would achieve the acceptable risk as defined in the Delaware ARAR ( $1 \times 10^{-5}$  or less for carcinogens and a hazard index of 1.0 or less for non-carcinogens). As part of the feasibility study that is currently underway, EPA is developing new soil cleanup goals for the DDA based on current site conditions, ARARs and toxicity values. See Section 7.2 for a discussion of the Ridge Area's soil cleanup goals.

#### *Air ARARs*

With respect to air emissions, the 1993 ROD Amendment specified the following ARARs:

- Delaware Regulations Governing the Control of Air Pollution.
- EPA Air Emission Standards for Process Vents.

The Site no longer has any active air vents. The bioventing system was shut down in 2009.

#### Institutional Control Review

Table 7 lists the institutional controls at the Site. Figure 3 shows the areas of the Site subject to recorded notices of institutional controls. Figure 4 shows the Groundwater Management Zone. Appendices I and J provide the Site's recorded notices of institutional controls.

Over the past five years, EPA has continued to work with the owner of most of the site property in an attempt to secure compliance with the 2004 UAO, which requires the owner to record a notice of institutional controls restricting land use with the land records of New Castle County.

**Table 7: Institutional Control (IC) Summary Table**

Media	ICs Needed?	ICs Called for in the Decision Documents?	Impacted Parcels	IC Objective	Instrument in Place	Notes
Soil	Yes	Yes (2003 ESD)	DDA, Inert Area, Grantham South Area, area between DDA and Inert Area	Prevent any future use that could compromise the remedy.	<p>Institutional controls have only been implemented for some parts of the site property.</p> <p>10/20/2006 and 6/23/2008 Notices of Institutional Controls, Access and Obligations Regarding Successors-in-Interest state that the named properties are not to be used unless EPA approves Safe Use Plan.</p>	<p>2006 Notice applies to a portion of the site property owned by Grantham Lane Associates LLC (the small section of parcel 10-035.00-005 identified in Figure 3).</p> <p>2008 Notice applies to a portion of the site property owned by New Castle County (sections of parcel 10-035.00-056 identified in Figure 3).</p> <p>An institutional control has not yet been implemented for the parcel that makes up most of the site property (the section of parcel 10-035.00-006 outlined in Figure 3).</p>
Groundwater	Yes	Yes (2003 ESD)	Entire Site	Prevent the installation of drinking water wells.	<p>10/20/2006 and 6/23/2008 Notices of Institutional Controls, Access and Obligations Regarding Successors-in-Interest provide notification that drinking water wells are not to be installed on the named properties.</p> <p>DNREC implemented a Groundwater Management Zone at the Site and nearby areas, which restricts the installation of new public or domestic water supply wells and non-potable wells. No new water wells are allowed in Zone A. Within Zone B, new well permit applications require joint review and approval by DNREC's Division of Water Resources and Division of Air and Waste Management.</p>	<p>2006 Notice applies to a portion of the site property owned by Grantham Lane Associates LLC (the small section of parcel 10-035.00-005 identified in Figure 3).</p> <p>2008 Notice applies to a portion of the site property owned by New Castle County (sections of parcel 10-035.00-056 identified in Figure 3).</p>

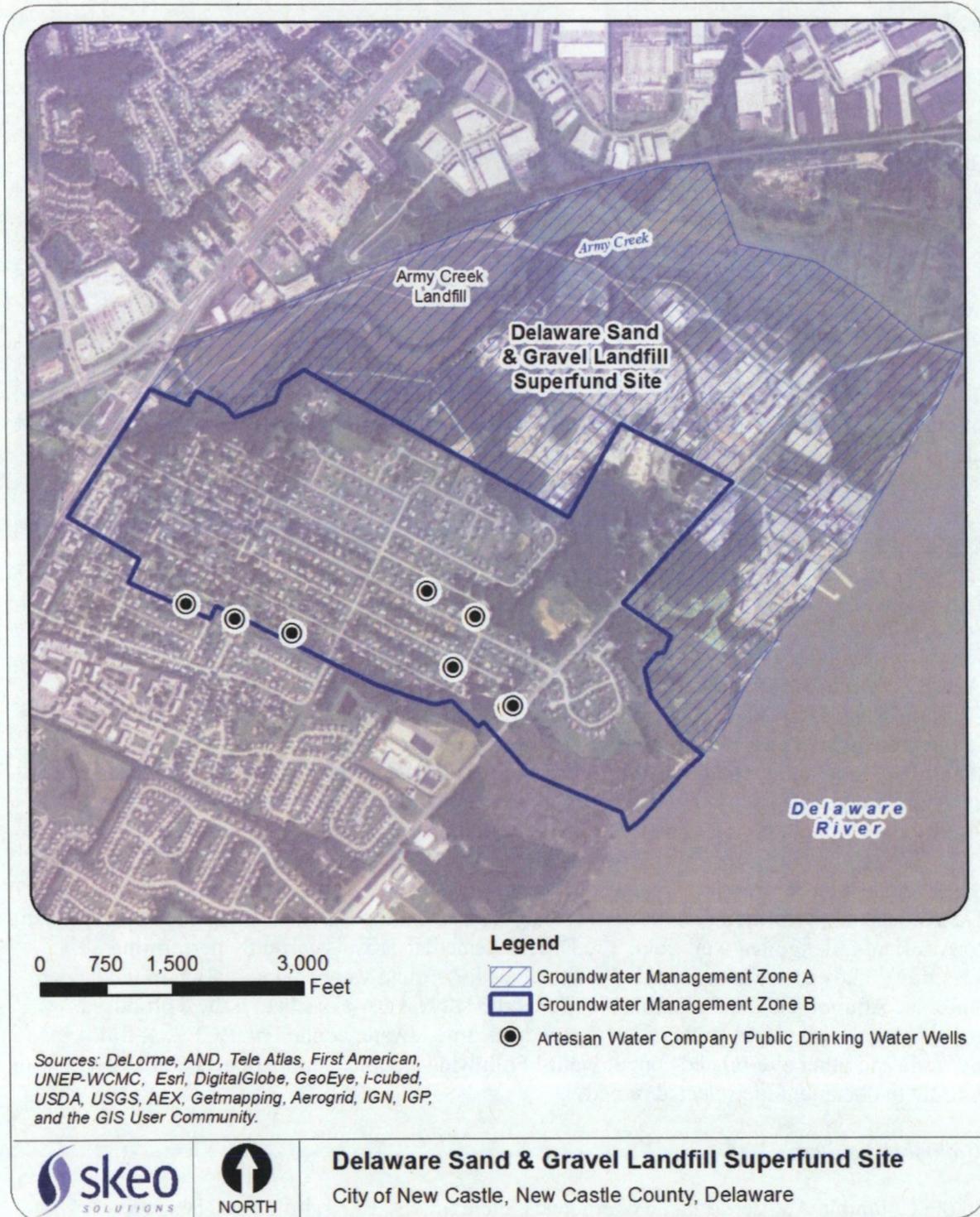
**Figure 3: Areas Subject to Recorded Notices of Institutional Controls<sup>6</sup>**



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

<sup>6</sup> The areas with (or still needing) recorded notices of institutional controls are: the Grantham South Area, the Inert Area, the DDA, the property between the DDA and the Inert Area, and a 10-foot buffer zone around all of these features. The solid red lines on Figure 3 represent portions of the fences surrounding the waste management areas plus a 10-foot buffer zone extending onto parcels 10-035.00-056 and 10-035.00-005.

**Figure 4: Groundwater Management Zone**



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site.

## 6.4 Data Review

### Soil

During this FYR, EPA reviewed the DS&G Remedial Trust's March 2014 Supplemental Site Characterization Report, which summarizes a very limited data set for subsurface soil samples collected between 2011 and 2013. Soil samples were collected from six soil borings at the DDA (both within and outside the slurry wall) and one soil boring adjacent to the Grantham South Area (well P-6 area). The soil samples contained benzene, styrene, toluene and/or total xylenes at concentrations which exceed the soil cleanup goals specified in Table 2, above. 1,4-dioxane was found in the soil sample collected from the well P-6 area. The 1993 ROD Amendment does not include a cleanup goal for 1,4-dioxane, which was not identified as a site-related contaminant of concern until 2012. 1,4-dioxane would not have been susceptible to remediation through bioventing at the DDA.

The source control remedy at the DDA has not performed as expected as discussed in section 4.1 of this report. The DS&G Remedial Trust is performing a feasibility study to evaluate additional cleanup options for contaminated soil at the DDA. EPA expects to issue a proposed remedial action plan and ROD in 2016 to address contamination remaining at the DDA.

### Groundwater

During this FYR, EPA reviewed the DS&G Remedial Trust's 2010-2014 *Semi-Annual Monitoring Reports* and the DS&G Remedial Trust's draft *Supplemental Site Characterization – Revision 1* (March 2014). EPA also reviewed analytical results for site groundwater samples the Agency collected in October 2013 and April 2015 and analyzed for perfluorinated chemicals (PFCs). The groundwater monitoring results indicate that VOCs, SVOCs and metals are present in the groundwater at the site property and downgradient of the site property at levels greater than EPA's maximum contaminant levels for public drinking water supplies and EPA's regional screening levels (RSLs) for residential tap water. Contaminants are present in the Columbia Aquifer and the underlying Upper Potomac Aquifer.

The groundwater remedy implemented at the Site pursuant to the Army Creek Landfill Consent Decree has not performed as expected; contaminants from the DDA have migrated downgradient to Artesian's Llangollen well field. The DS&G Remedial Trust is currently performing a feasibility study to evaluate remedial alternatives for groundwater contamination in the Upper Potomac Aquifer and the Columbia Aquifer at the DDA. EPA expects to issue a proposed remedial action plan and ROD in 2016 to address groundwater containing BCEE, 1,4-dioxane, benzene and other site-related contaminants. Following a public comment period, EPA will issue a ROD to document the selected remedy.

### *Columbia Aquifer*

In the Columbia Aquifer, organic compounds, including BCEE, 1,4-dioxane, benzene, ethylbenzene, xylenes and 1,2,4-trimethylbenzene, and elevated levels of iron, manganese and other metals have regularly been detected within the slurry wall at the DDA. Among the highest

concentrations of site-specific COCs detected in groundwater within the slurry wall during the March/April 2013 sampling event were 38 micrograms per liter ( $\mu\text{g/L}$ ) BCEE (extraction well BG-1), 5,000  $\mu\text{g/L}$  1,4-dioxane (monitoring well MHW-1M), 2,000  $\mu\text{g/L}$  benzene (piezometer PZ-6S) and 23,100  $\mu\text{g/L}$  manganese (monitoring well B-3D). In December 2011, a high concentration of manganese (23,700  $\mu\text{g/L}$ ) was detected in groundwater collected from a temporary monitoring well located downgradient of the Grantham South Area and elevated levels of arsenic, chromium, lead, iron and manganese were detected in groundwater collected from a perimeter gas monitoring well adjacent to the Inert Area. The elevated metals concentrations in the Columbia Aquifer downgradient of the Grantham South Area and adjacent to the Inert Area suggest releases or potential releases from these landfills into groundwater in the Columbia Aquifer. Perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS) and other PFCs were detected in groundwater samples collected at the DDA; the PFOA and PFOS concentrations were below EPA's Office of Water's provisional health advisories (PHA) for these chemicals.

### *Upper Potomac Aquifer*

Organic and inorganic contaminants are present in the Upper Potomac Aquifer which lies beneath the Columbia Aquifer. 1,4-dioxane and BCEE released from the Site have migrated downgradient in the Upper Potomac Aquifer to the public water supply wells at Artesian's Llangollen well field. 1,4-dioxane was initially detected in groundwater samples collected from Artesian's Llangollen well field in 2012. In October 2014, Artesian installed an ultraviolet/hydrogen peroxide treatment system to remove 1,4-dioxane from groundwater pumped from the Llangollen well field.<sup>7</sup>

Supplemental site characterization activities performed by the DS&G Remedial Trust from 2011 to 2013 also identified soil and groundwater contamination in the Upper Potomac Confining Unit Transition Zone downgradient of the DDA and the Inert Area. The contaminated transition zone represents an additional source to groundwater in the upper and lower sand units of the Upper Potomac Aquifer. Among the highest concentrations of site-specific COCs detected in groundwater samples collected from the transition zone during the February through April 2013 sampling events were 690  $\mu\text{g/L}$  BCEE, 2,800  $\mu\text{g/L}$  1,4-dioxane, 2,100  $\mu\text{g/L}$  benzene (all in samples from monitoring well DDA-16-TZ) and 7,000  $\mu\text{g/L}$  manganese (monitoring well DGC-5). Concentrations of BCEE, 1,4-dioxane and benzene detected in groundwater from transition zone monitoring well UPA-101-TZ in December 2013 (160  $\mu\text{g/L}$ , 850  $\mu\text{g/L}$  and 570  $\mu\text{g/L}$ , respectively) and upper sand monitoring well P-6, both located downgradient of the Inert Area, are comparable to concentrations found in the transition zone upgradient of the Inert Area, suggesting that there may be a localized source of groundwater contamination in the vicinity of these wells.

Site-specific COCs in the Upper Potomac Aquifer were identified using current toxicity data to support remedial alternatives for the OU6 feasibility study. Analytical results for groundwater samples collected from Upper Potomac Aquifer monitoring wells from April 2012 through April 2014 and April 2015 were used in the screening of groundwater contaminants, which yielded the

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<sup>7</sup> BCEE was initially detected at the Llangollen well field in 1999 and Artesian installed a treatment system to address it in 2000.

following groundwater COCs: benzene, BCEE, ethylbenzene, 1,4-dioxane, 1,2,4-trimethylbenzene, xylenes (total), arsenic, cobalt, iron and manganese (DS&G Remedial Trust's December 2014 *Development of Site-Specific Preliminary Remediation Goals – Revision 2*). See Appendix G for 2013 groundwater plume maps for BCEE, 1,4-dioxane, benzene, iron and manganese. PFCs were also detected in groundwater samples collected from the Upper Potomac Aquifer. PFOA and PFOS concentrations in the samples were below EPA's PHAs.

#### *Interim Response Actions at the DDA*

Monitoring results show that the low-flow groundwater extraction system is removing volatile organic compound (VOC), 1,4-dioxane and BCEE contaminant mass from the DDA. Groundwater elevation measurements indicate that the system is generally inducing inward horizontal gradients across the slurry wall and upward vertical gradients (from the Upper Potomac Aquifer into the Columbia Aquifer) across the most impacted portions of the DDA. Over the past five years, the DS&G Remedial Trust took steps to increase the low-flow groundwater extraction system's ability to consistently achieve hydraulic containment at the DDA. These steps include adding deposit control agents to reduce scaling and iron fouling. Additional improvements to the low-flow groundwater extraction system are under consideration in the new feasibility study.

#### *Artesian Water Quality Reports*

Artesian's 2010 through 2014 Water Quality Reports were reviewed. The Water Quality Reports for drinking water sources in northern New Castle County show that the water meets State and federal drinking water standards for regulated inorganic and organic contaminants.<sup>8</sup> Treated water collected at the Llangollen pump station consistently met the State interim standard for BCEE in drinking water. The 2013 and 2014 Water Quality Reports document that one of Artesian's northern New Castle County supply wells was removed from service due to the presence of 1,4-dioxane.<sup>9</sup> As noted above, Artesian installed an ultraviolet/hydrogen peroxide treatment system in October 2014 to remove 1,4-dioxane from groundwater pumped from the Llangollen well field and the well was put back into service.

#### Effluent

Twice per year, the DS&G Remedial Trust collects a water sample from the 10,000-gallon equalization tank, which collects effluent from the low-flow groundwater extraction system wells. The DS&G Remedial Trust analyzes the sample for metals, organics and other parameters as required by New Castle County for discharges to its wastewater treatment plant. A summary of the effluent analytical results is presented in Appendix H. For the past five years, all effluent

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<sup>8</sup> In 2010, Artesian reported a high fluoride result attributed to short-term fluctuations with the fluoride pump (and not related to site activities). All samples collected subsequently during those years indicated fluoride levels below the maximum allowable level.

<sup>9</sup> Public water systems are required to monitor for 1,4-dioxane and 29 other contaminants under EPA's third Unregulated Contaminant Monitoring Rule (UCMR 3) published on May 2, 2012. This monitoring provides a basis for future regulatory actions to protect public health.

parameters have been well below the limits specified in the Site's wastewater discharge permit issued by the County.

### Landfill Gas

Four times per year, the DS&G Remedial Trust collects gas samples from gas monitoring wells located near the edges of the Inert Area and the Grantham South Area, in accordance with the September 2012 *Revised O&M Plan: Grantham South & Inert Area*. See Appendix K for a map of gas monitoring well locations. The gas monitoring consists of three steps, or tiers, for each well. In Tier 1, the level of combustible gas is measured. If the level is greater than 25 percent of the lower explosive limit, then Tier 2 monitoring is conducted, which entails measuring the combustible gas levels while purging the well. If the combustible gas levels are still greater than 25 percent of the lower explosive limit, then Tier 3 monitoring is conducted, which entails measuring combustible gas levels in nearby occupied buildings. Over the past five years, combustible gas levels have been consistently greater than 25 percent of the lower explosive limit in most of the Inert Area and the Grantham South Area perimeter gas monitoring wells during both Tier 1 and Tier 2 monitoring. Consequently, gas levels have been measured in nearby occupied buildings as discussed in the section on Indoor Air, below.

In June and July 2014 and June 2015, the DS&G Remedial Trust performed barhole probe and utility corridor surveys to further evaluate the subsurface migration of landfill gas beyond the perimeters of the landfills and within nearby utility corridors. These studies provided additional evidence of landfill gas migration beyond the landfill boundaries. However, screening performed at the utility access points provided no evidence of landfill gas migration to local utility corridors at the time of the investigation, with the exception of the vault and other access points associated with the extraction well PW-1 discharge lines.

As detailed in a recent technical memorandum from Golder Associates to the DS&G Remedial Trust (Golder, 2015), the Trust is considering options for mitigation of landfill gas migration at the Inert Area and Grantham South Area and will submit a work plan for the installation of a soil vapor extraction well and monitoring wells near the Inert Area to EPA for approval. In addition, the DS&G Remedial Trust is gathering information on notification procedures to inform utility, roadway and construction workers of the potential for encountering methane during subsurface work activities at or near the Site. The Trust provided notification of the conditions to New Castle County in September 2014.

### Indoor Air

Combustible gas (methane) monitoring is intermittently conducted in the basement underlying an unoccupied portion of the site owner's home as warranted by Tier 2 monitoring results and permitted by the owner; methane has not been detected in the basement. In 2012 and 2013, methane was detected in the basement of an office building on Grantham Lane adjacent to the Inert Area, suggesting that landfill gas might be migrating into the building. Although the methane concentrations were well below the levels which would trigger additional monitoring, ventilation or building evacuation under the O&M plan, EPA requested that the PRPs perform a vapor intrusion assessment to determine whether potentially toxic chemicals were present in

indoor air. In April and June 2013, the DS&G Remedial Trust collected indoor air samples from the building for VOC analysis. EPA performed a risk assessment using the results of the June 2013 sampling and found that the following substances were present in indoor air in the basement at unacceptable levels for industrial exposure: 1,2,4-trimethylbenzene, 1,2,3-trichloropropane and 1,2-dibromoethane. The source(s) of these contaminants was not confirmed. However, the DS&G Remedial Trust installed a sub-slab depressurization system (SSDS) in November 2014 to prevent landfill gas from migrating into the building.

The DS&G Remedial Trust collected confirmatory indoor air samples on December 19, 2014, to determine whether the SSDS was functioning as intended, as documented in the DS&G Remedial Trust's March 2015 *Sub-Slab Depressurization System Construction Completion Report*. EPA reviewed the confirmatory sample analytical results and found that the VOCs detected in the indoor air while the system was in operation were within EPA's acceptable risk range. However, methane continues to be detected in the basement during quarterly Tier 3 monitoring events and in ambient air outside of the building at levels which are less than 1 percent of the lower explosive limit. Based on the results of the June 2015 barhole probe survey, methane in ambient air outside of the office building is due to methane migration from soil; the methane in the breathing zone inside the building's basement is due to landfill gas migration through the soil and into the basement through cracks and holes in the basement walls.

Based on quarterly gas vent monitoring and the results of the 2015 barhole probe survey, it is likely that landfill gas has migrated from the Grantham South Area and/or Inert Area onto the site owner's residential property. The DS&G Remedial Trust has extended the offer to the property owner for monitoring methane in the building when quarterly gas vent monitoring triggers a Tier 3 monitoring event (i.e., when sustained, elevated methane concentrations in gas monitoring wells exist near occupied structures warranting monitoring of indoor air). Access is not typically granted by the owner. Based on the results of the 2015 barhole probe monitoring, the DS&G Remedial Trust extended another offer to the owner to monitor the residence which was declined. The Trust is considering other options, such as soil vapor extraction, for evaluating and mitigating the potential for landfill gas migration to the residence.

### Cap Settlement

The DS&G Remedial Trust surveys the elevation of settlement monuments at the Inert Area and Grantham South Area every five years to determine the amount of settlement that has occurred. Between the initial elevation measurements in 1997 and the most recent measurements in 2010, the Inert Area settlement monuments settled between 0.12 and 3.53<sup>10</sup> or more feet, and the Grantham South Area settlement monuments settled between 0.03 and 0.73 feet.

In November 2011, Cummings/Riter Consultants, Inc. (Cummings/Riter) evaluated settlement in the vicinity of marker PM-4 on the Surface Barrier Area. Cummings/Riter's 2012 Revised Inert Area Cap Evaluation memorandum recommended backfilling the area with crusher run and regrading to restore positive drainage. The DS&G Remedial Trust implemented these recommendations in September 2013 as discussed in Section 5.0 of this report.

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<sup>10</sup> The cumulative settlement measured at settlement marker PM-1 was 3.53 feet in 2005, after which time the marker was damaged, rendering the 2010 measurement unreliable.

## 6.5 Site Inspection

EPA conducted the FYR site inspection on February 25, 2015. Site inspection participants included:

- Debra Rossi, EPA Region 3 Remedial Project Manager
- Larry Johnson, EPA Region 3 Community Involvement Coordinator
- Patricia Flores-Brown, EPA Region 3 Air Protection Division
- Ryan Bower, EPA Region 3 Hydrogeologist
- John Cargill, DNREC Project Manager
- Beth Klotzbach, DS&G Remedial Trust Project Engineer
- Doug Sutton, Project Coordinator, DS&G Remediation Steering Committee
- John Andrade, Chairman, DS&G Remedial Trust
- Theresa Miller, Golder Associates
- Johnny Zimmerman-Ward and Hagai Nassau, Skeo Solutions

Site inspection participants toured the DDA, the Inert Area – Grass Area, the Grantham South Area, and the building housing the electronics and holding tank. The inspection participants did not tour the Surface Barrier Area because the site owner requested that they be accompanied by his son who was unexpectedly absent during the inspection. Appendix E presents photographs from the site inspection. Grassy vegetation is established on the capped areas at the DDA, the Inert Area – Grass Area, and the Grantham South Area. The Surface Barrier Area is used for storage of scrapped vehicles. Site inspection participants did not observe any erosion, holes or other problems with the Site’s soil caps. However, the Site was covered with snow during the inspection, so the condition of the caps could not be completely determined.

All of the monitoring wells inspected were locked. Not all of the monitoring wells were labeled. There were no signs of trespassing on the site property. The sign on the Site’s fence provides phone numbers for EPA and DNREC; the number given for DNREC was found to be outdated during the inspection; however, the DS&G Remedial Trust corrected the sign in July 2015 (see photograph in Appendix E). The DDA, Inert Area and Grantham South Area are surrounded by locked 6-foot chain-link fences. The inspection team observed about 40 yards of destroyed fence along the northwest part of Inert Area – Grass Area, adjacent to the Ridge Area. The DS&G Remedial Trust repaired this section of fence in March 2015 (see photograph in Appendix E). As noted during EPA’s previous five-year reviews at the Site, a portion of the Grantham South Area fence is buried beneath soil and debris. However, there is no evidence of trespassing on the landfill cap.

Site inspection participants examined the SSDS at the office building and adjoining automotive garage located south of the Surface Barrier Area. The participants noticed an approximately 8-inch-diameter depression in the basement floor; the DS&G Remedial Trust subsequently filled this floor drain and sealed it with cement. Manometer readings were recorded prior to and after floor drain and sump modifications performed on March 11, 2015. Manometer readings did not change following these modifications and were observed as 0.5 inches of water column as

recorded for the system at installation. The depressurization system in the adjacent automotive garage had about 3.7 inches of vacuum.

SSDS U-tube manometer measurements recorded on November 19, 2014 (when the SSDS was commissioned), December 19, 2014 (prior to collection of indoor air samples), and March 11, 2015 (after the floor drain and sump modifications) were unchanged, indicating no decline in system performance. The SSDS is operating as designed and is inducing vacuum conditions beneath the slab to mitigate the potential for sub-slab vapors to enter the building.

EPA's FYR contractor visited the site repository on February 26, 2015, to verify that site documents are available for viewing by community members. The site repository is at the offices of DNREC's Site Investigation and Restoration Section, located at 391 Lukens Drive in New Castle, Delaware (302-395-2600). At first, EPA's contractor was told that a Freedom of Information Act (FOIA) request is needed to view paper files. Later, EPA's contractor was allowed to view the Site's paper documents and computerized documents. EPA provided DNREC with a new compact disc containing documents for the site repository in July 2015 and reviewed public availability of the site repository with DNREC. Documents in EPA's Administrative Record file are available on the Internet at [http://loggerhead.epa.gov/arweb/public/advanced\\_search.jsp](http://loggerhead.epa.gov/arweb/public/advanced_search.jsp).

## 6.6 Interviews

The FYR process included interviews with parties affected by the Site. The purpose was to document the perceived status of the Site and any perceived problems or successes with the phases of the remedy implemented to date. The interviews are summarized below. Appendix C provides detailed interview summaries.

Beth Klotzbach, the DS&G Remedial Trust's project engineer, stated that there is no direct contact with contamination at the Site. The low-flow extraction system is working well as an interim system; future work is to-be-determined. She believes groundwater containment is present. Iron in the groundwater has been a challenge; the addition of antifouling agents to the groundwater extraction wells and discharge lines has helped.

DNREC project manager John Cargill stated that the caps are functioning well. The contaminated soil and groundwater remaining at the DDA is still an issue; the involved parties are working to determine a solution. DNREC is awaiting the focused feasibility study and the new ROD. DNREC is looking forward to a resolution to the Site's impacts on the public water supply wells.

EPA's Community Involvement Branch conducted interviews with local residents, appointed local officials and area business owners. In general, the overall impression of EPA's ongoing work at the Site is positive. There have been significant impacts on Artesian, which has expended substantial capital to address site-related contaminants at its Llangollen well field. Artesian expressed concern that it had not received prompt redress for its investments in protecting water quality and appreciated the opportunity to go on record with its concerns.

Artesian affirmed its commitment to working with the Agency to achieve long-term cleanup goals and to implement protections for its business and the community at large.

The cleanup plan is seen as being well-managed by community leaders representing nearby Langollen Estates. The community is informed of the activities at the Site and is confident that Artesian is providing them with a high quality product. Community leaders expressed confidence that the Agency is monitoring the Site effectively.

## **7.0 Technical Assessment**

### **7.1 Question A: Is the remedy functioning as intended by the decision documents?**

The remedies selected for groundwater and for soil in the DDA did not perform as expected. A low-flow groundwater extraction system is being operated at the DDA and a recovery well is being operated in the Upper Potomac Aquifer downgradient of the DDA as an interim measure, and EPA will select a new remedy for site groundwater and the DDA source area in 2016. In the meantime, the treatment provided by Artesian at the Llangollen well field is preventing exposure to site-related contaminants in groundwater. The DDA is used only for ongoing remediation activities and is surrounded by a locked security fence; therefore, there is no route of exposure to contaminated soil at the DDA.

The landfill caps at the Inert Area and the Grantham South Area appear to be intact. The multilayer caps are designed to minimize infiltration. However, they are not intended to prevent releases from waste material, should it become saturated due to fluctuations in the water table, or migration of liquid organic waste, if present in the fill material, into groundwater under the influence of gravity. Groundwater monitoring results obtained during this five-year review period suggest potential releases from the Grantham South Area and/or the Inert Area to groundwater. In addition, surface water that accumulates adjacent to the Grantham South Area has the potential to encroach on the landfill cap. Additional investigations are required to evaluate potential releases from these waste management areas and verify or revise the conceptual site model.

Methane concentrations measured at gas monitoring wells along the perimeter of the Inert Area and the Grantham South Area, and during barhole probe surveys, indicate that landfill gas is migrating beyond the landfill boundaries. In addition, methane concentrations measured in the basement of an office building adjacent to the Inert Area suggest that landfill gas may be migrating into the building. The DS&G Remedial Trust installed and is operating an SSDS at the building and is also considering options for mitigation of landfill gas migration in the vicinity of the Inert Area and the Grantham South Area. These voluntary actions are not a component of the selected remedies at the Site but will be incorporated into remedial alternatives in the OU6 feasibility study and ROD.

Respondents to EPA's 2006 and 2008 UAOs are complying with restrictions on their use of site property at the Grantham South Area to ensure the continued effectiveness of the response actions. Both Respondents have also recorded notices of institutional controls with the land

records of New Castle County to bring the land use restrictions to the attention of any person examining the titles to the properties or searching for encumbrances.

The Respondent to EPA's 2004 UAO is providing the DS&G Remedial Trust access to his property to implement response actions and is complying in part with restrictions on the use of his site property which includes the Inert Area, the DDA and a small portion of the Grantham South Area. However, EPA has documented the Respondent's noncompliance with provisions of the UAO to ensure his safe use of the Surface Barrier Area. During a May 2014 inspection of the Surface Barrier Area, EPA noted several violations including fluids which were not adequately contained and spills and ruts which had not been addressed. Of particular concern were several pieces of heavy equipment in the scrap yard which may exceed the cap's load limits and have the potential to damage the cap's geosynthetic clay liner which serves as the infiltration barrier. In addition, the Respondent has not submitted the required semi-annual O&M reports or recorded a notice of institutional controls with New Castle County's land records, as required by the UAO. Over the past five years, EPA has worked with the Respondent in an attempt to secure full compliance with the 2004 UAO. These efforts have not been successful and the Agency is evaluating its enforcement options.

**7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives used at the time of remedy selection still valid?**

**Changes in Standards and To-Be-Considered (TBC) Criteria**

*Have standards identified in the ROD been revised, and does this call into question the protectiveness of the remedy? Do newly promulgated standards call into question the protectiveness of the remedy? Have TBCs used in selecting cleanup levels at the site changed, and could this affect the protectiveness of the remedy?*

The enforceable groundwater cleanup standards specified in the 1991 Army Creek Landfill Consent Decree are not consistent with the groundwater cleanup standards identified in the 1988 ROD for the DS&G site and do not address site-related contaminants such as BCEE and 1,4-dioxane. Furthermore, the existing decision documents and enforcement documents do not address all of the groundwater contaminants of concern identified during the supplemental site characterization efforts for the ongoing OU6 feasibility study. In addition, the toxicity values for many chemicals have changed since the Site's ROD was issued in 1988 and since the Army Creek Landfill Consent Decree was entered in 1991. As part of the feasibility study process that is currently underway, EPA is developing new remedial action objectives and cleanup goals for contaminated groundwater based on current site conditions, ARARs and toxicity values. EPA is also developing new remedial action objectives for the DDA.

The DS&G Remedial Trust removed contaminated soil from the Ridge Area in 1995, meeting the soil cleanup levels specified in the 1993 ROD Amendment (see Table 3). These cleanup levels, developed for the protection of groundwater, continue to be protective for residential and industrial exposure to contaminated soil based on EPA's current screening levels. However, the cleanup levels are less stringent than EPA's current soil screening levels for protection of groundwater (see Table 8). As part of this FYR, the Agency reviewed the distribution of

contaminated groundwater and has concluded that any remaining soil contamination at the Ridge Area is not affecting groundwater quality in the Upper Potomac Aquifer. Therefore, EPA does not find it necessary to update the cleanup levels for Ridge Area soil.

**Table 8: Soil Cleanup Goals for Ridge Area Compared with Current EPA Screening Levels**

Soil Contaminant	Cleanup Goal from 1993 ROD Amendment (mg/kg)	Current EPA Screening Level (mg/kg)		
		Residential	Industrial	Protection of Groundwater
Bis(2-chloroethyl)ether	0.00077	0.23	1	0.0000036
Bis(2-chloroisopropyl)ether	0.093	4.9	22	0.00013
Methylene chloride	0.81	57	1,000	0.0029
<i>Notes:</i> mg/kg = milligrams per kilogram				

**Changes in Exposure Pathways**

*Have land use or expected land use on or near the site changed?*

No.

*Have human health or ecological routes of exposure or receptors been newly identified or changed in a way that could affect the protectiveness of the remedy? Are there newly identified contaminants or contaminant sources? Are there unanticipated toxic byproducts of the remedy not previously addressed by the decision documents? Have physical site conditions or the understanding of these conditions changed in a way that could affect the protectiveness of the remedy?*

Soil vapor intrusion was recently identified as a potential exposure pathway of concern. EPA is working with the DS&G Remedial Trust to develop updated exposure assumptions and remedial action objectives for soil vapor intrusion. The remedial alternatives that are being developed for the OU6 feasibility study will address this potential exposure pathway.

The emerging contaminant 1,4-dioxane has been detected in groundwater and identified as a COC to be addressed by future response actions.

Supplemental site characterization activities performed by the DS&G Remedial Trust from 2011 to 2013 identified a previously unrecognized hydrostratigraphic unit between the confining unit and upper sand unit of the Upper Potomac Aquifer. Contaminants released from the DDA have entered this unit, which represents an ongoing secondary source of impacts to the upper sand unit of the Upper Potomac Aquifer.

### **Changes in Toxicity and Other Contaminant Characteristics**

*Have toxicity factors for contaminants of concern at the site changed in a way that could affect the protectiveness of the remedy? Have other contaminant characteristics changed in a way that could affect the protectiveness of the remedy?*

Some toxicity factors have increased while others have decreased. Current toxicity values (EPA, 2015) were used to determine the groundwater COCs and preliminary remediation goals that will become performance standards for future response actions in the OU6 ROD.

### **Changes in Risk Assessment Methods**

*Have standardized risk assessment methodologies changed in a way that could affect the protectiveness of the remedy?*

There have been significant changes in EPA's risk assessment guidance since 1988. Groundwater risk is being reassessed for the OU6 feasibility study using current EPA guidance and toxicity values.

### **Expected Progress Towards Meeting Remedial Action Objectives**

*Is the remedy progressing as expected?*

No. However, new remedial action objectives are being developed for contaminated groundwater and the DDA source area; EPA will issue a ROD for OU6 identifying the additional response actions needed to achieve these objectives.

#### **7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?**

No other information has come to light that calls into question the protectiveness of the remedy.

#### **7.4 Technical Assessment Summary**

Landfill caps, fencing and institutional controls are preventing direct contact with contaminated soil and wastes at the Grantham South Area, Inert Area and DDA. Remedial measures at the Ridge Area were implemented in accordance with the ROD Amendment and groundwater quality immediately downgradient of the Ridge Area suggests that the measures have been effective.

The remedies selected for groundwater and for soil in the DDA did not perform as expected because of gaps in the conceptual site model which formed the basis for the remedies selected in the 1988 ROD and 1993 ROD Amendment. The conceptual site model has been substantially updated with new information required for the OU6 feasibility study and EPA will select a new remedy for groundwater and the DDA based on this information. As part of the feasibility study process that is currently underway, EPA is identifying new cleanup goals for groundwater and

the DDA source area based on current site conditions, ARARs and toxicity values. The Groundwater Management Zone implemented by the State in 2006 will prevent exposure to groundwater COCs until groundwater quality is restored. Groundwater monitoring results obtained during this FYR period suggest potential releases from the Grantham South Area and/or the Inert Area to groundwater. In addition, as noted in the last FYR report, surface water that accumulates adjacent to the Grantham South Area has the potential to encroach on the landfill cap.

Evidence that landfill gas is migrating beyond the landfill boundaries with the potential to impact indoor air indicates that additional response actions are needed to prevent potential exposure to landfill gas constituents.

EPA's efforts over the past five years to secure the Respondent's full compliance with the 2004 UAO have not been successful. The Agency is evaluating options for enforcing the UAO.

## 8.0 Issues

Table 9 summarizes the current site issues.

**Table 9: Current Site Issues**

Issue	Affects Current Protectiveness?	Affects Future Protectiveness?
The remedies selected for groundwater and for soil in the DDA did not perform as expected.	No	Yes
The Respondent to the 2004 UAO has not complied with the provisions of the UAO requiring the owner to record a Notice of Institutional Controls, Access and Obligations Regarding Successors-in-Title in the land records of New Castle County.	No	Yes
The Respondent to the 2004 UAO has not complied with the provisions of the UAO requiring the owner to ensure safe use of the Surface Barrier Area at the Inert Area.	No	Yes
Surface water that accumulates adjacent to the Grantham South Area has the potential to encroach on the landfill cap.	No	Yes
Groundwater monitoring data suggests that releases from the Inert Area and the Grantham South Area may be impacting groundwater quality in the Columbia Aquifer and the Upper Potomac Aquifer.	No	Yes
Institutional controls are required to prevent potential exposure to landfill gas constituents in any new buildings constructed beyond the perimeters of the Inert Area and Grantham South Area where landfill gas may be migrating.	No	Yes
The SSDS installed by the DS&G Remedial Trust is not a requirement of the existing decision and enforcement documents.	No	Yes

## 9.0 Recommendations and Follow-up Actions

Table 10 provides recommendations to address the current site issues.

**Table 10: Recommendations to Address Current Site Issues**

Issue	Recommendation / Follow-Up Action	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
The remedies selected for groundwater and for soil in the DDA did not perform as expected.	Complete the feasibility study currently underway and issue a ROD for groundwater and the DDA source area.	DS&G Remedial Trust; EPA	EPA	9/30/2016	No	Yes
The Respondent to the 2004 UAO has not complied with the provisions of the UAO requiring the owner to record a Notice of Institutional Controls, Access and Obligations Regarding Successors-in-Title in the land records of New Castle County.	Continue attempts to secure compliance with the 2004 UAO. Evaluate enforcement options.	Respondent to 2004 UAO; EPA	EPA	3/31/2016	No	Yes
The Respondent to the 2004 UAO has not complied with the provisions of the UAO requiring the owner to ensure safe use of the Surface Barrier Area at the Inert Area.	Continue attempts to secure compliance with the 2004 UAO. Evaluate enforcement options.	Respondent to 2004 UAO; EPA	EPA	3/31/2016	No	Yes

Issue	Recommendation / Follow-Up Action	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
Surface water that accumulates adjacent to the Grantham South Area has the potential to encroach on the landfill cap.	Continue to document this issue in the Quarterly Operating, Maintenance and Monitoring Reports. Include in the reports photo-documentation of the extent of the ponded area. Propose corrective measures if encroachment of surface water on the Grantham South Area continues or has the potential to interfere with the remedial action.	DS&G Remedial Trust	EPA	Ongoing	No	Yes
Groundwater monitoring data suggests that releases from the Inert Area and the Grantham South Area may be impacting groundwater quality in the Columbia Aquifer and the Upper Potomac Aquifer.	Additional investigations are needed to evaluate potential releases of contaminants of concern from the Inert Area and the Grantham South Area.	DS&G Remedial Trust	EPA	12/30/2016	No	Yes
Institutional controls are required to prevent potential exposure to landfill gas constituents in any new buildings constructed beyond the perimeters of the Inert Area and Grantham South Area where landfill gas may be migrating.	The selected remedy should be modified to include institutional controls for new construction for those areas near the Inert Area and Grantham South Area where landfill gas may be migrating.	DS&G Remedial Trust; EPA	EPA	9/30/2016	No	Yes
The SSDS installed by the DS&G Remedial Trust is not a requirement of the existing decision and enforcement documents.	The selected remedy should be modified to include a requirement for continued operation and maintenance of the SSDS.	DS&G Remedial Trust; EPA	EPA	9/30/2016	No	Yes

The following additional items, though not expected to affect protectiveness, warrant follow up:

- EPA recommends that the DS&G Remedial Trust regularly monitor the performance of the low-flow groundwater extraction system and implement measures, including timely maintenance, procedures to minimize down time and continued addition of deposit control chemicals, to optimize operation of the system as it relates to hydraulic control and mass removal objectives at the DDA. If possible, the DS&G Remedial Trust should take water level measurements when the system is not shut down for maintenance. EPA additionally recommends that the DS&G Remedial Trust provide an O&M plan for the interim response measures at the DDA and extraction well PW-1 to EPA for approval.
- The semi-annual reports do not state whether the Site is in compliance with the County's wastewater discharge permit. For this FYR, EPA converted groundwater concentrations to loading rates to compare with the maximum loading rates specified in the discharge permit. EPA recommends that the DS&G Remedial Trust begin demonstrating compliance with the discharge permit by calculating whether the Site's effluent discharge meets the limitations specified in the wastewater discharge permit and reporting this information in the Site's semi-annual reports.
- During the February 2015 FYR site inspection, not all of the monitoring wells were labeled. EPA recommends that the DS&G Remedial Trust label all monitoring wells.

## **10.0 Protectiveness Statements**

### Grantham South Area

The remedy at the Grantham South Area (OU1) currently protects human health and the environment. Exposure pathways that could result in unacceptable risks are being controlled through a landfill cap and a perimeter fence. Institutional controls are in place to restrict the current and future use of 1.85 acres of the Grantham South Area. For the remedy to be protective over the long term, the Respondent to the 2004 UAO must record a notice of institutional controls in the land records of New Castle County to restrict future use of 0.15 acres of the Grantham South Area. In addition, corrective measures may be needed if encroachment of surface water onto the Grantham South Area continues or has the potential to interfere with the remedial action or if it is determined that releases from the landfill are impacting groundwater in the Upper Potomac Aquifer. Furthermore, institutional controls addressing potential vapor intrusion for new construction need to be developed and implemented for those areas near the landfill boundary where landfill gas may be migrating.

### Inert Area

The remedy at the Inert Area (OU3) currently protects human health and the environment. Exposure pathways which could result in unacceptable risks at the Inert Area are being controlled through a landfill cap and a perimeter fence. For the remedy to be protective over the long term, the Respondent to the 2004 UAO must record a notice of institutional controls in the land records of New Castle County and comply with provisions in the UAO to ensure safe use of the Surface Barrier Area. In addition, the vapor intrusion mitigation system installed at a nearby office building must be operated and maintained and institutional controls addressing potential vapor intrusion for new construction need to be developed and implemented for those areas near the landfill boundary where landfill gas may be migrating. Additional response actions may be

needed if it is determined that releases from the landfill are impacting groundwater in the Upper Potomac Aquifer.

### Ridge Area

The remedy at the Ridge Area (part of OUs 4 and 5) is protective of human health and the environment. Soil with contaminant concentrations exceeding the cleanup standards was excavated and placed at the DDA. Unacceptable exposure pathways have been eliminated at the Ridge Area.

### DDA

The remedy at the DDA (part of OUs 4 and 5) currently protects human health and the environment. The potential for direct contact with contaminated soil is being controlled by containment and security measures. For the remedy to be protective over the long term, additional response actions are needed at the DDA due to the failure of the constructed remedy to meet performance standards intended to prevent releases to groundwater. In addition, the property owner must record a notice of institutional controls to restrict future use of the DDA in accordance with the 2004 UAO.

### Groundwater

The Site's groundwater response currently protects human health and the environment because there is no exposure to contaminated groundwater. For the remedy to be protective over the long term, remedial action is necessary to address contaminated groundwater. A feasibility study is being performed to develop a comprehensive remediation strategy to address groundwater contamination and the DDA source area.

The remedy at the Site currently protects human health and the environment for the following reasons: caps and fencing prevent exposure to contaminated soil; the State of Delaware has implemented a Groundwater Management Zone which places restrictions on the installation of new public or domestic water supply wells to prevent exposure to contaminated groundwater; and treatment is provided by Artesian Water Company to address site-related contaminants in the groundwater at the Llangollen well field.

For the remedy to be protective over the long term:

- Additional response actions are needed at the DDA in order to prevent releases to groundwater in the Upper Potomac Aquifer due to the failure of the constructed remedy to meet performance standards for groundwater protection.
- Additional response actions are also needed to address contaminated groundwater in the Upper Potomac Aquifer based on new information regarding the sources, nature and extent of contamination.

- The Respondent to EPA's 2004 UAO must record a notice of institutional controls in the land records of New Castle County to document restrictions on future use of site property, including the DDA, the Inert Area and 0.15 acres of the Grantham South Area.
- The Respondent must comply with provisions in the 2004 UAO for safe use of the Surface Barrier Area.
- Corrective measures may be needed if encroachment of surface water onto the Grantham South Area continues or has the potential to compromise the effectiveness of the remedial action.
- Additional response actions may be needed if it is determined that any releases from the Inert Area or the Grantham South Area are impacting groundwater in the Upper Potomac Aquifer.
- The SSDS installed at the office building on Grantham Lane must be operated and maintained.
- Institutional controls addressing potential vapor intrusion for new construction need to be developed and implemented for those areas near the landfill boundaries where landfill gas may be migrating.

#### **11.0 Next Review**

The next FYR will be due within five years of the signature/approval date of this FYR.

## **Appendix A: List of Documents Reviewed**

Artesian Water Company Water Quality Report, PWSID# DE0000552. 2010-2014. Artesian Water Company.

CDM Smith. February 23, 2015. Surface Barrier Area Inspection Memorandum. Prepared for EPA.

Cummings Riter Consultants, Inc. May 21, 2012. Memorandum to Delaware Sand & Gravel Trust Regarding Revised Inert Area Cap Evaluation.

Delaware Sand & Gravel Remedial Trust. 2010-2014. Semi-Annual Monitoring Reports. Prepared by Golder Associates.

Delaware Sand & Gravel Remedial Trust. 2010-2015. Quarterly Operating, Maintenance and Monitoring Reports for the Delaware Sand & Gravel Superfund Site.

Delaware Sand & Gravel Remedial Trust. September 2012. Revised O&M Plan: Grantham South & Inert Area: Delaware Sand & Gravel Landfill Superfund Site. Prepared by Environmental Alliance, Inc.

Delaware Sand & Gravel Trust. March 2014. Supplemental Site Characterization – Revision 1. Prepared by Golder Associates.

Delaware Sand & Gravel Trust. December 2014. Development of Site-Specific Preliminary Remediation Goals – Revision 2. Prepared by Golder Associates.

Delaware Sand & Gravel Trust. March 19, 2015. Sub-Slab Depressurization System Construction Completion Report. Prepared by Golder Associates.

Environmental Alliance, Inc. 2010-2015. Quarterly Monitoring and Inspection Activities Reports for the Delaware Sand & Gravel Superfund Site.

EPA. April 22, 1988. Record of Decision for Delaware Sand & Gravel.

EPA. September 30, 1993. Record of Decision Amendment: Delaware Sand & Gravel Site.

EPA. July 8, 2003. Explanation of Significant Differences: Delaware Sand & Gravel Site – New Castle, Delaware.

EPA. September 16, 2010. Fourth Five-Year Review Report: Delaware Sand & Gravel Landfill Superfund Site.

EPA. June 2015. Regional Screening Levels for Chemical Contaminants at Superfund Sites.

Golder Associates. July 6, 2015. Technical Memorandum Regarding Assessment of Landfill Gas Migration: Delaware Sand & Gravel Superfund Site, New Castle, Delaware.

New Castle County. July 2014. Wastewater Discharge Permit for Delaware Sand & Gravel Site. Permit Number 04-107. Revision Number 5.

United States District Court for the District of Delaware. July 1991. Army Creek Landfill Consent Decree.

## Appendix B: Press Notice

### EPA Reviews Cleanup DE Sand & Gravel Landfill

The U.S. Environmental Protection Agency (EPA) is conducting a Five-Year Review of the Delaware Sand and Gravel Landfill Superfund Site located two miles south of the City of New Castle in New Castle County. EPA inspects sites regularly to ensure that cleanups conducted remain fully protective of public health and the environment. The previous review of this site determined that the cleanup remedy is protective; additional response actions are being undertaken to ensure long-term protectiveness of the cleanup remedy. The results of this review will be available by September 2015.

**To access results of the review (starting Sept 2015):**  
<http://epa.gov/5yr>

**To learn detailed site and contact information:**  
<http://go.usa.gov/38MjQ>

**To listen to a podcast about EPA Five-Year Reviews:**  
<http://go.usa.gov/9rkW>

**To ask questions or provide site information:**  
**Contact:** Larry Johnson **Phone:** 215-814-3239  
**Email:** [Johnson.larry-c@epa.gov](mailto:Johnson.larry-c@epa.gov)

Appendix C: Interview Forms

**Delaware Sand and Gravel Landfill  
Superfund Site**

**Five-Year Review Interview  
Form**

Site Name: Delaware Sand and Gravel  
Landfill Superfund Site

EPA ID No.: DED000605972

Interviewer Name: Debra Rossi

Affiliation: EPA project manager

Subject Name: Beth Klotzbach

Affiliation: DS&G Remedial Trust  
project engineer

Time: 11:30 a.m.

Date: February 25, 2015

Interview Location: DS&G site building

Interview Format (circle one):  In Person     Phone     Mail     Other:

Interview Category: **Potentially Responsible Parties (PRPs)**

1. What is your overall impression of the remedial activities at the Site?

There is no direct contact with contamination at the Site. The DS&G Remedial Trust is working to resolve the outstanding issues.

2. What is your assessment of the current performance of the remedy in place at the Site?

The landfills are capped. The wells are doing their job. Future work is to-be-determined. The low-flow extraction system is working well as an interim system.

3. What is your assessment of gas and groundwater monitoring data?

Data from the Grantham South Area have not changed over the years. The Trust added wells since the last FYR. There is an extensive network of groundwater monitoring wells. The groundwater monitoring data have not changed since the cutoff wells were turned off. The horses were already out of the barn. Groundwater containment is present.

4. Is there a continuous on-site O&M presence?

Yes. I am present on the Site four days per week.

5. Have there been any significant changes in site O&M requirements, maintenance schedules or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy?

O&M continues for the low-flow groundwater extraction system and groundwater extraction well PW-1. The operation of the low-flow extraction system and PW-1 enhance the protectiveness of the remedy.

6. Have there been unexpected O&M difficulties or costs at the Site since start-up or in the last five years? If so, please provide details.

No. The infrastructure is getting old. The Trust replaced a computer at the Site.

7. Have there been opportunities to optimize O&M activities or sampling efforts? Please describe changes and any resulting or desired cost savings or improved efficiencies.

They have reduced the frequency to semi-annual. Iron in the groundwater has been a challenge; the addition of Redux to the groundwater wells has helped.

8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site?

If we could dismantle the bioremediation system at the Drum Disposal Area, it would be easier to conduct sampling and mowing.

**Delaware Sand and Gravel Landfill  
Superfund Site**

**Five-Year Review Interview  
Form**

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Site Name: Delaware Sand and Gravel  
Landfill Superfund Site EPA ID No.: DED000605972

Interviewer Name: Debra Rossi Affiliation: EPA project manager  
Subject Name: John Cargill Affiliation: DNREC project manager  
Subject Contact: 302-395-2600

Information:  
Time: 11:45 a.m. Date: February 25, 2015  
Interview Location: DS&G site building

Interview Format (circle one):  In Person  Phone  Mail  Other:

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Interview Category: **State Agency**

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?

The caps are functioning well. DNREC is awaiting the results of the feasibility study. DNREC is looking forward to a resolution to the Site's impacts on the public water supply.

2. What is your assessment of the current performance of the remedy in place at the Site?

The capped areas are maintained well. The Drum Disposal Area is still an issue; the involved parties are working on figuring out a solution. DNREC is awaiting the focused feasibility study and the second ROD.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities from residents in the past five years?

Not from residents. DNREC does receive complaints from the water company.

4. Has your office conducted any site-related activities or communications in the past five years? If so, please describe the purpose and results of these activities.

No.

5. Are you aware of any changes to state laws that might affect the protectiveness of the Site's remedy?

No.

6. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

The existing institutional controls are okay. [EPA stated that it is still working on implementing institutional controls on the site property.]

7. Are you aware of any changes in projected land use(s) at the Site?

No.

8. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

No. Keep moving forward.

**Delaware Sand and Gravel Landfill  
Superfund Site**

**Five-Year Review Interview Form**

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Site Name: Delaware Sand and Gravel Landfill Superfund Site EPA ID No.: DED000605972

Interviewer Name: Larry Johnson Affiliation: EPA community involvement coordinator

Subject Name: Joseph DiNunzio Affiliation: Artesian Water Company, executive vice president

Subject Contact Information: JDinunzio@artesianwater.com  
Time: 12:30 PM Date: February 26, 2015  
Interview Location: Artesian Water Company, Newark, Delaware

Interview Format (circle one):  In Person    Phone    Mail    Other:

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Interview Category: Public Water Supplier

1. Are you familiar with the five-year review process?

This is actually the first time Artesian is part of the five-year review process.

2. Is public perception of water safety a hurdle for Artesian?

Artesian constantly educates the public about water sources and treatment. It is hard to overcome public mistrust. When BCEE arose at the Llangollen wellfield, the community was very worried. The parties handled it well. There are ways to address public concerns. For instance, carbon treatment addresses multiple contaminants.

3. How does the contamination affect Artesian's profitability and ability to serve its customers?

Artesian is not responsible for the contamination. We all know who is responsible; however, there is an argument between the County and the DS&G Trust about which of them is responsible. Artesian has spent millions of dollars at Llangollen to install carbon and ultraviolet systems. You are asking Artesian to be part of the remediation. Artesian's customers have to pay. The cost is spread across all Delaware customers because there is one rate for the whole state. Artesian's customers should not have to pay for extra water treatment.

4. Is there a lack of a mechanism to compensate Artesian for its losses?

Artesian is not made whole. That is a problem with the Superfund process – it is wonderful for lawyers and consultants, but not for the harmed parties, such as Artesian's customers. We intend to keep working at getting compensation. 1,4-dioxane is the most recent cause for expenditures. My understanding is that there is no way to include Artesian as part of the remedy until the ROD is reopened. We hope to be compensated for past costs. The compensation will be passed on to Artesian's customers. It is frustrating that Artesian's customers are paying for this. My understanding is that the ROD Amendment is one to two years away.

5. How has EPA's communication about the Site been?

Communication has improved recently. Artesian wants to know what is being detected in groundwater. We need to know if things are being addressed properly. We need open communication with EPA.

6. Do you have any comments, suggestions or recommendations regarding the project?

Artesian would appreciate being involved in the process. Including Artesian in the process would be good because we have expertise in hydrogeology and the effects of pumping our public water supply wells. In the past, Artesian was sometimes out of the loop. We understand we can't always be part, but we need to be involved regularly. Artesian has a technical lead and a water quality person who should be involved. Artesian should not be caught by surprise by the media.

Artesian would like EPA to have language ready for public notifications in case they are needed. We need to send timely public notifications.

7. What have been the positive impacts of EPA's actions over the past 15 years?

The groundwater monitoring is helpful.



Name _____ Title _____ Date _____ Phone No. _____ Problems/suggestions <input type="checkbox"/> Report attached: _____  Agency _____ Contact _____ Name _____ Title _____ Date _____ Phone No. _____ Problems/suggestions <input type="checkbox"/> Report attached: _____	
4. <b>Other Interviews (optional)</b> <input checked="" type="checkbox"/> Report attached: <u>Artesian Water Company</u>	
<b>III. ON-SITE DOCUMENTS AND RECORDS VERIFIED (check all that apply)</b>	
1. <b>O&amp;M Documents</b>	
<input checked="" type="checkbox"/> O&M manual	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A
<input checked="" type="checkbox"/> As-built drawings	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A
<input checked="" type="checkbox"/> Maintenance logs	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A
Remarks: _____	
2. <b>Site-Specific Health and Safety Plan</b>	
<input checked="" type="checkbox"/> Contingency plan/emergency response plan	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A
Remarks: _____	
3. <b>O&amp;M and OSHA Training Records</b>	
<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A	
Remarks: _____	
4. <b>Permits and Service Agreements</b>	
<input type="checkbox"/> Air discharge permit	<input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
<input checked="" type="checkbox"/> Effluent discharge	<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A
<input type="checkbox"/> Waste disposal, POTW	<input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
<input type="checkbox"/> Other permits: _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
Remarks: _____	
5. <b>Gas Generation Records</b>	
<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A	
Remarks: _____	
6. <b>Settlement Monument Records</b>	
<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A	
Remarks: _____	
7. <b>Groundwater Monitoring Records</b>	
<input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A	
Remarks: _____	
8. <b>Leachate Extraction Records</b>	
<input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A	
Remarks: _____	

9.	<b>Discharge Compliance Records</b>	<input type="checkbox"/> Air	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
		<input checked="" type="checkbox"/> Water (effluent)	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
Remarks: _____					
10.	<b>Daily Access/Security Logs</b>	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A	
Remarks: _____					
<b>IV. O&amp;M COSTS</b>					
1.	<b>O&amp;M Organization</b>	<input type="checkbox"/> State in-house	<input type="checkbox"/> Contractor for state		
		<input type="checkbox"/> PRP in-house	<input checked="" type="checkbox"/> Contractor for PRP		
		<input type="checkbox"/> Federal facility in-house	<input type="checkbox"/> Contractor for Federal facility		
		<input type="checkbox"/> _____			
2.	<b>O&amp;M Cost Records</b>	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date		
		<input checked="" type="checkbox"/> Funding mechanism/agreement in place	<input type="checkbox"/> Unavailable		
Original O&M cost estimate: \$380,500 <input type="checkbox"/> Breakdown attached					
Total annual cost by year for review period if available					
	From: <u>01/01/2010</u>	To: <u>12/31/2010</u>	<u>\$609,486</u>	<input type="checkbox"/> Breakdown attached	
	Date	Date	Total cost		
	From: <u>01/01/2011</u>	To: <u>12/31/2011</u>	<u>\$432,633</u>	<input type="checkbox"/> Breakdown attached	
	Date	Date	Total cost		
	From: <u>01/01/2012</u>	To: <u>12/31/2012</u>	<u>\$500,619</u>	<input type="checkbox"/> Breakdown attached	
	Date	Date	Total cost		
	From: <u>01/01/2013</u>	To: <u>12/31/2013</u>	<u>\$867,529</u>	<input type="checkbox"/> Breakdown attached	
	Date	Date	Total cost		
	From: <u>01/01/2014</u>	To: <u>12/31/2014</u>	<u>\$732,753</u>	<input type="checkbox"/> Breakdown attached	
	Date	Date	Total cost		
3.	<b>Unanticipated or Unusually High O&amp;M Costs during Review Period</b>				
Describe costs and reasons: _____					
<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A					
<b>A. Fencing</b>					
1.	<b>Fencing Damaged</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Gates secured	<input type="checkbox"/> N/A	
Remarks: <u>Fencing damaged between Inert Area and neighboring property. Will be repaired when weather improves and it is warm enough to pour concrete.</u>					

<b>B. Other Access Restrictions</b>			
1.	<b>Signs and Other Security Measures</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
Remarks: <u>Phone number for DNREC on signage needs to be updated.</u>			
<b>C. Institutional Controls (ICs)</b>			
1.	<b>Implementation and Enforcement</b>		
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by): _____		
	Frequency: _____		
	Responsible party/agency: _____		
	Contact _____	_____	_____
	Name	Title	Date
			Phone no.
	Reporting is up to date	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
	Reports are verified by the lead agency	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached		
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input checked="" type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A
Remarks: _____			
<b>D. General</b>			
1.	<b>Vandalism/Trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident
Remarks: _____			
2.	<b>Land Use Changes On Site</b>	<input checked="" type="checkbox"/> N/A	
Remarks: _____			
3.	<b>Land Use Changes Off Site</b>	<input checked="" type="checkbox"/> N/A	
Remarks: _____			
<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b>			
	<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
1.	<b>Roads Damaged</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A
Remarks: _____			
<b>B. Other Site Conditions</b>			
Remarks: _____			

VII. LANDFILL COVERS		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
<b>A. Landfill Surface</b>			
1.	<b>Settlement (low spots)</b> Arial extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Settlement not evident Depth: _____
2.	<b>Cracks</b> Lengths: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map Widths: _____	<input checked="" type="checkbox"/> Cracking not evident Depths: _____
3.	<b>Erosion</b> Arial extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Erosion not evident Depth: _____
4.	<b>Holes</b> Arial extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Holes not evident Depth: _____
5.	<b>Vegetative Cover</b> <input checked="" type="checkbox"/> No signs of stress	<input checked="" type="checkbox"/> Grass <input type="checkbox"/> Trees/shrubs (indicate size and locations on a diagram)	<input checked="" type="checkbox"/> Cover properly established
Remarks: <u>Snow on ground during site inspection.</u>			
6.	<b>Alternative Cover (e.g., armored rock, concrete)</b> Remarks: _____		<input checked="" type="checkbox"/> N/A
7.	<b>Bulges</b> Arial extent: _____ Remarks: _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Bulges not evident Height: _____
8.	<b>Wet Areas/Water Damage</b> <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks: _____	<input checked="" type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map	Arial extent: _____ Arial extent: _____ Arial extent: _____ Arial extent: _____
9.	<b>Slope Instability</b> <input checked="" type="checkbox"/> No evidence of slope instability Arial extent: _____ Remarks: _____	<input type="checkbox"/> Slides	<input type="checkbox"/> Location shown on site map



<b>D. Cover Penetrations</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	<b>Gas Vents</b>	<input type="checkbox"/> Active	<input checked="" type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input checked="" type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
Remarks: _____			
2.	<b>Gas Monitoring Probes</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Needs maintenance <input checked="" type="checkbox"/> N/A
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input checked="" type="checkbox"/> N/A
Remarks: _____			
3.	<b>Monitoring Wells (within surface area of landfill)</b>		
	<input checked="" type="checkbox"/> Properly secured/locked	<input checked="" type="checkbox"/> Functioning	<input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
Remarks: _____			
4.	<b>Extraction Wells Leachate</b>		
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs maintenance	<input checked="" type="checkbox"/> N/A
Remarks: _____			
5.	<b>Settlement Monuments</b>	<input checked="" type="checkbox"/> Located	<input checked="" type="checkbox"/> Routinely surveyed <input type="checkbox"/> N/A
Remarks: _____			
<b>E. Gas Collection and Treatment</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	<b>Gas Treatment Facilities</b>		
	<input type="checkbox"/> Flaring	<input type="checkbox"/> Thermal destruction	<input type="checkbox"/> Collection for reuse
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
Remarks: _____			
2.	<b>Gas Collection Wells, Manifolds and Piping</b>		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
Remarks: _____			
3.	<b>Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)</b>		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	<input type="checkbox"/> N/A
Remarks: _____			
<b>F. Cover Drainage Layer</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	<b>Outlet Pipes Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: _____			
2.	<b>Outlet Rock Inspected</b>	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
Remarks: _____			

<b>G. Detention/Sedimentation Ponds</b>				<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b>	Area extent: _____	Depth: _____	<input type="checkbox"/> N/A	
	<input checked="" type="checkbox"/> Siltation not evident				
	Remarks: _____				
2.	<b>Erosion</b>	Area extent: _____	Depth: _____		
	<input checked="" type="checkbox"/> Erosion not evident				
	Remarks: _____				
3.	<b>Outlet Works</b>	<input checked="" type="checkbox"/> Functioning		<input type="checkbox"/> N/A	
	Remarks: _____				
4.	<b>Dam</b>	<input type="checkbox"/> Functioning		<input checked="" type="checkbox"/> N/A	
	Remarks: _____				
<b>H. Retaining Walls</b>				<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Deformations</b>	<input type="checkbox"/> Location shown on site map		<input type="checkbox"/> Deformation not evident	
	Horizontal displacement: _____		Vertical displacement: _____		
	Rotational displacement: _____				
	Remarks: _____				
2.	<b>Degradation</b>	<input type="checkbox"/> Location shown on site map		<input type="checkbox"/> Degradation not evident	
	Remarks: _____				
<b>I. Perimeter Ditches/Off-Site Discharge</b>				<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Siltation</b>	<input type="checkbox"/> Location shown on site map		<input checked="" type="checkbox"/> Siltation not evident	
	Area extent: _____	Depth: _____			
	Remarks: _____				
2.	<b>Vegetative Growth</b>	<input type="checkbox"/> Location shown on site map		<input checked="" type="checkbox"/> N/A	
	<input type="checkbox"/> Vegetation does not impede flow				
	Area extent: _____	Type: _____			
	Remarks: _____				
3.	<b>Erosion</b>	<input type="checkbox"/> Location shown on site map		<input checked="" type="checkbox"/> Erosion not evident	
	Area extent: _____	Depth: _____			
	Remarks: _____				
4.	<b>Discharge Structure</b>	<input type="checkbox"/> Functioning		<input checked="" type="checkbox"/> N/A	
	Remarks: _____				

<b>VIII. VERTICAL BARRIER WALLS</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Settlement</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Settlement not evident
	Area extent: _____		Depth: _____
	Remarks: _____		
2.	<b>Performance Monitoring</b>	Type of monitoring: <u>water level measurements</u>	
	<input type="checkbox"/> Performance not monitored		
	Frequency: <u>semi-annual</u>		<input type="checkbox"/> Evidence of breaching
	Head differential: <u>varies</u>		
	Remarks: _____		
<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
<b>A. Groundwater Extraction Wells, Pumps and Pipelines</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Pumps, Wellhead Plumbing and Electrical</b>		
	<input checked="" type="checkbox"/> Good condition	<input checked="" type="checkbox"/> All required wells properly operating	<input type="checkbox"/> Needs maintenance <input type="checkbox"/> N/A
	Remarks: _____		
2.	<b>Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances</b>		
	<input checked="" type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
	Remarks: _____		
3.	<b>Spare Parts and Equipment</b>		
	<input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Good condition	<input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided
	Remarks: _____		
<b>B. Surface Water Collection Structures, Pumps and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps and Electrical</b>		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
	Remarks: _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances</b>		
	<input type="checkbox"/> Good condition	<input type="checkbox"/> Needs maintenance	
	Remarks: _____		
3.	<b>Spare Parts and Equipment</b>		
	<input type="checkbox"/> Readily available	<input type="checkbox"/> Good condition	<input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided
	Remarks: _____		

<b>C. Treatment System</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
<p>1. <b>Treatment Train</b> (check components that apply)</p> <p> <input type="checkbox"/> Metals removal                      <input type="checkbox"/> Oil/water separation                      <input type="checkbox"/> Bioremediation  <input type="checkbox"/> Air stripping                      <input type="checkbox"/> Carbon adsorbers  <input type="checkbox"/> Filters: _____  <input type="checkbox"/> Additive (e.g., chelation agent, flocculent): _____  <input type="checkbox"/> Others: _____  <input checked="" type="checkbox"/> Good condition                      <input type="checkbox"/> Needs maintenance  <input checked="" type="checkbox"/> Sampling ports properly marked and functional  <input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date  <input checked="" type="checkbox"/> Equipment properly identified  <input type="checkbox"/> Quantity of groundwater treated annually: _____  <input type="checkbox"/> Quantity of surface water treated annually: _____ </p> <p>Remarks: <u>Extracted groundwater is discharged to the county sewer without treatment.</u></p>			
<p>2. <b>Electrical Enclosures and Panels</b> (properly rated and functional)</p> <p> <input type="checkbox"/> N/A                      <input checked="" type="checkbox"/> Good condition                      <input type="checkbox"/> Needs maintenance  Remarks: _____ </p>			
<p>3. <b>Tanks, Vaults, Storage Vessels</b></p> <p> <input type="checkbox"/> N/A                      <input checked="" type="checkbox"/> Good condition                      <input type="checkbox"/> Proper secondary containment                      <input type="checkbox"/> Needs maintenance  Remarks: _____ </p>			
<p>4. <b>Discharge Structure and Appurtenances</b></p> <p> <input type="checkbox"/> N/A                      <input checked="" type="checkbox"/> Good condition                      <input type="checkbox"/> Needs maintenance  Remarks: _____ </p>			
<p>5. <b>Treatment Building(s)</b></p> <p> <input type="checkbox"/> N/A                      <input checked="" type="checkbox"/> Good condition (esp. roof and doorways)                      <input type="checkbox"/> Needs repair  <input checked="" type="checkbox"/> Chemicals and equipment properly stored  Remarks: _____ </p>			
<p>6. <b>Monitoring Wells</b> (pump and treatment remedy)</p> <p> <input checked="" type="checkbox"/> Properly secured/locked                      <input checked="" type="checkbox"/> Functioning                      <input checked="" type="checkbox"/> Routinely sampled                      <input checked="" type="checkbox"/> Good condition  <input type="checkbox"/> All required wells located                      <input type="checkbox"/> Needs maintenance                      <input type="checkbox"/> N/A  Remarks: _____ </p>			
<b>D. Monitoring Data</b>			
<p>1. <b>Monitoring Data</b></p> <p> <input checked="" type="checkbox"/> Is routinely submitted on time                      <input checked="" type="checkbox"/> Is of acceptable quality </p>			

<b>2. Monitoring Data Suggests:</b>	
<input type="checkbox"/> Groundwater plume is effectively contained	<input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>	
<b>1. Monitoring Wells (natural attenuation remedy)</b>	
<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition
<input type="checkbox"/> All required wells located	<input type="checkbox"/> Needs maintenance <input checked="" type="checkbox"/> N/A
Remarks: _____	
<b>X. OTHER REMEDIES</b>	
If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	
<b>XI. OVERALL OBSERVATIONS</b>	
<b>A. Implementation of the Remedy</b>	
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions). <u>The remedies selected for groundwater and for soil in the DDA did not perform as expected; therefore, EPA will select a new remedy for groundwater and the DDA source area.</u>	
<b>B. Adequacy of O&amp;M</b>	
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. <u>EPA recommends that the DS&amp;G Remedial Trust regularly monitor the performance of the low-flow groundwater extraction system and implement measures, including timely maintenance, procedures to minimize down time and continued addition of deposit control chemicals, in order to optimize operation of the system as it relates to hydraulic control and mass removal objectives at the DDA. Water level measurements should be taken when the system is not shut down for maintenance. EPA additionally recommends that the DS&amp;G Remedial Trust provide an O&amp;M plan for the interim response measures at the DDA and extraction well PW-1 to EPA for approval.</u>	
<b>C. Early Indicators of Potential Remedy Problems</b>	
Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future. <u>The remedies selected for groundwater and for soil in the DDA did not perform as expected; therefore, EPA will select a new remedy for groundwater and DDA source area.</u>	
<b>D. Opportunities for Optimization</b>	
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. <u>PRP contractors would like to remove unused bioremediation components. With those components removed, it will be easier to maintain the DDA.</u>	

Appendix E: Photographs from Site Inspection Visit and Follow Up



Drum Disposal Area



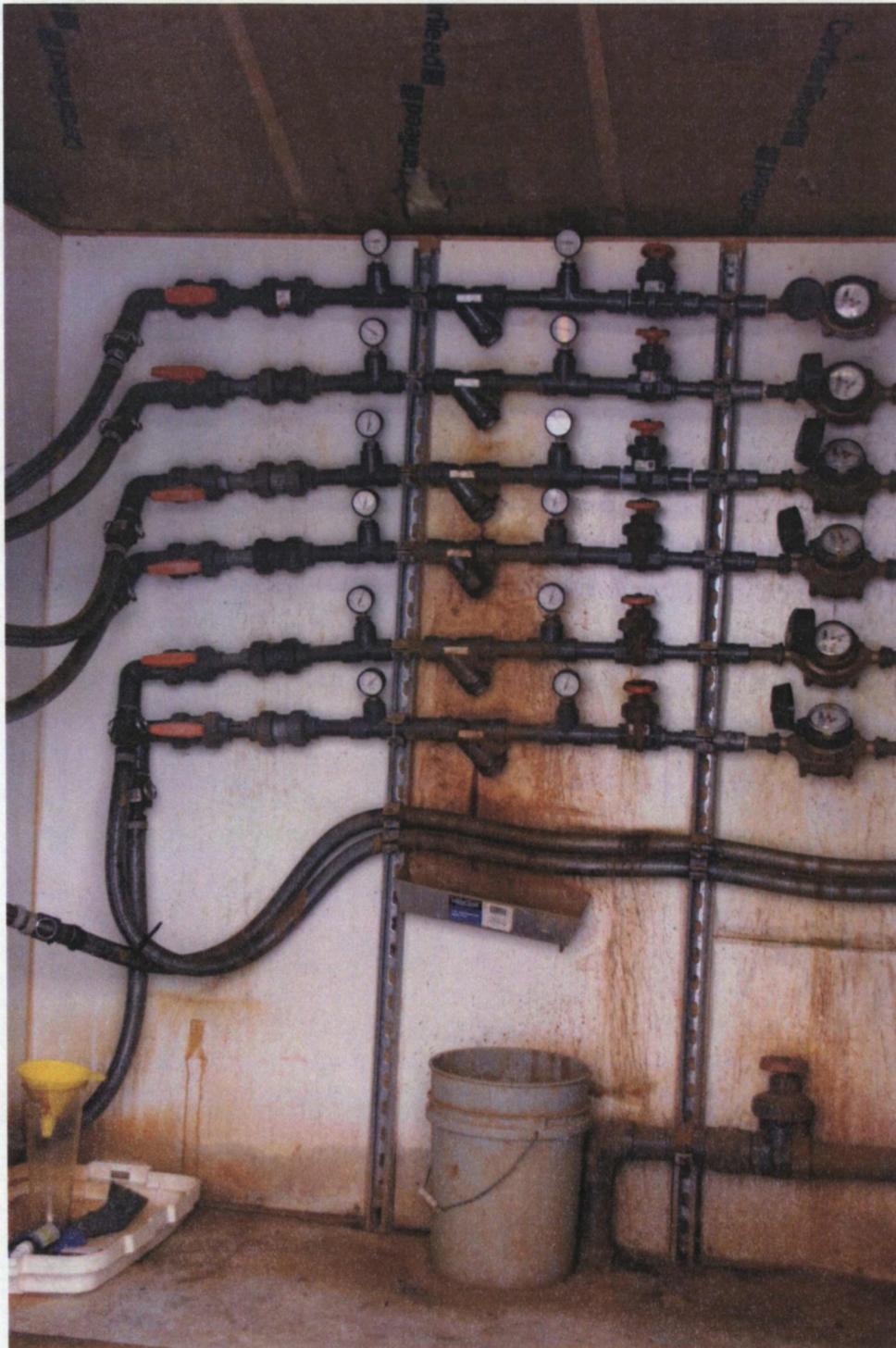
PW-1 area



Drum Disposal Area and on-site mechanical building



Inert Area – Grass Area



Low-flow groundwater extraction system piping in shed at Drum Disposal Area



Inert Area – Grass Area



Inert Area – Surface Barrier Area



Grantham South Area



Methane monitoring system in basement of office building on Grantham Lane



Section of damaged fence at Inert Area – Grass Area (prior to repair)

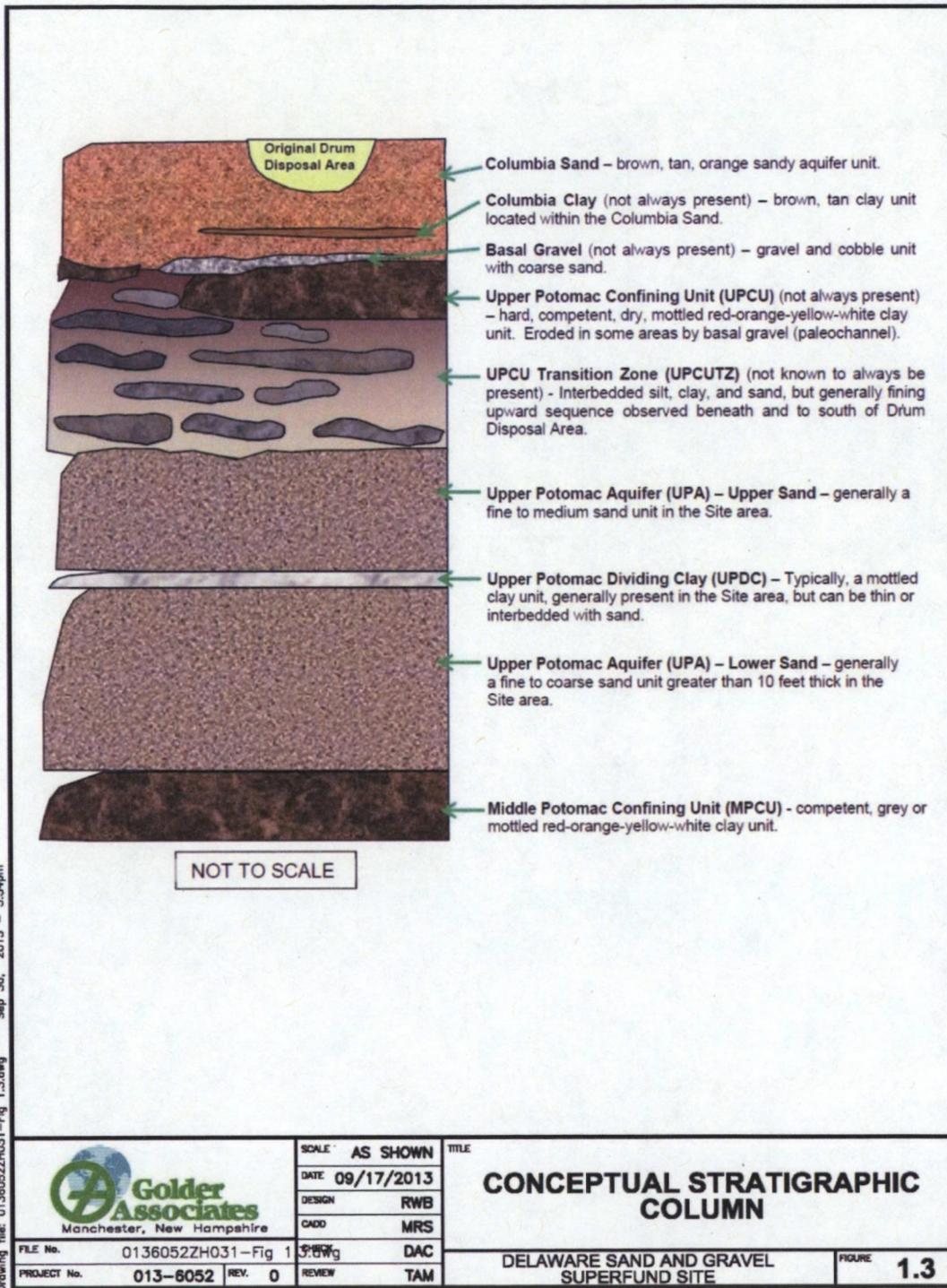


Repaired fence at Inert Area – Grass Area (photographed March 16, 2015)



Corrected sign (photographed July 2015)

Appendix F: Geologic Layers<sup>11</sup>

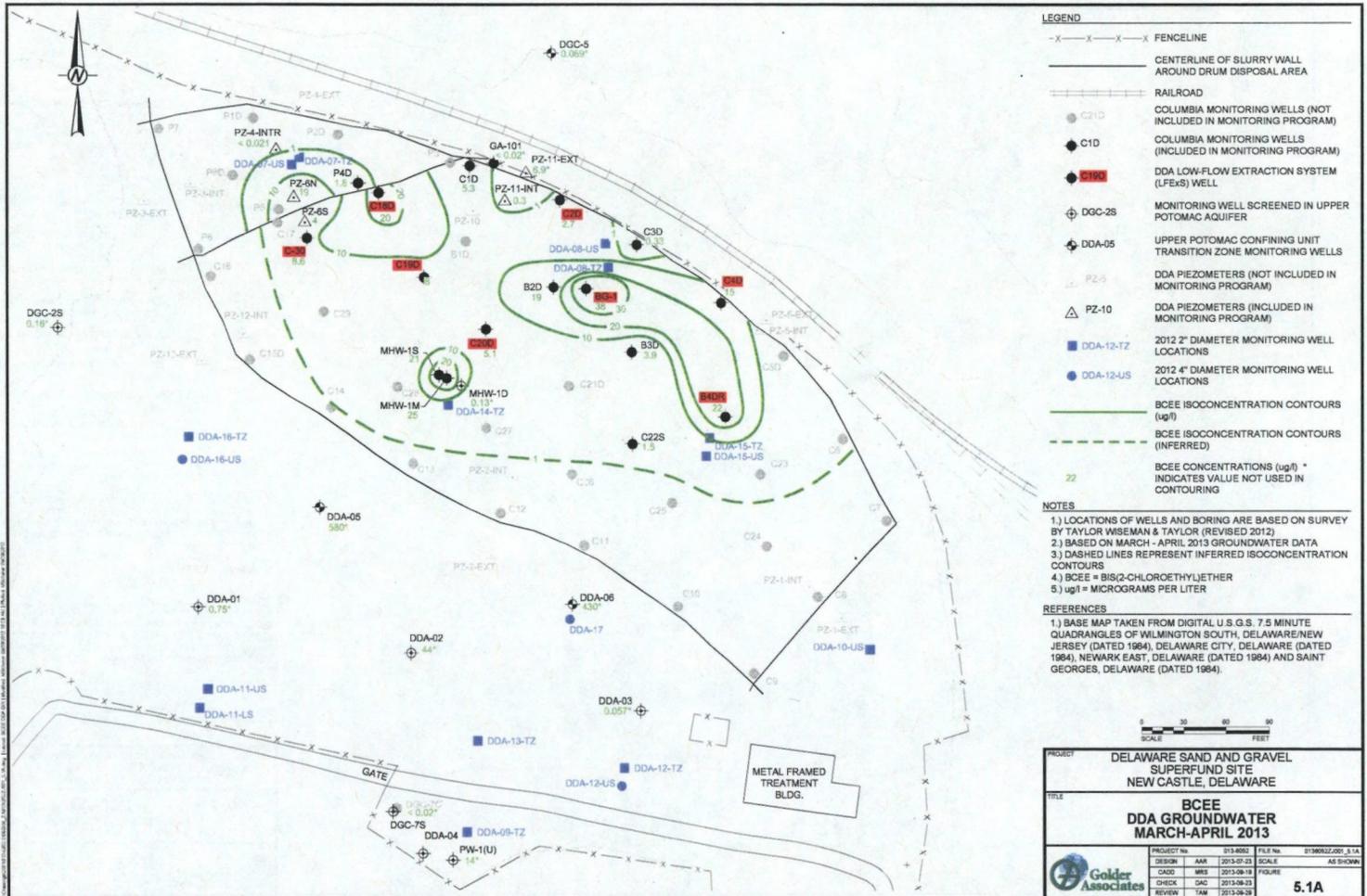


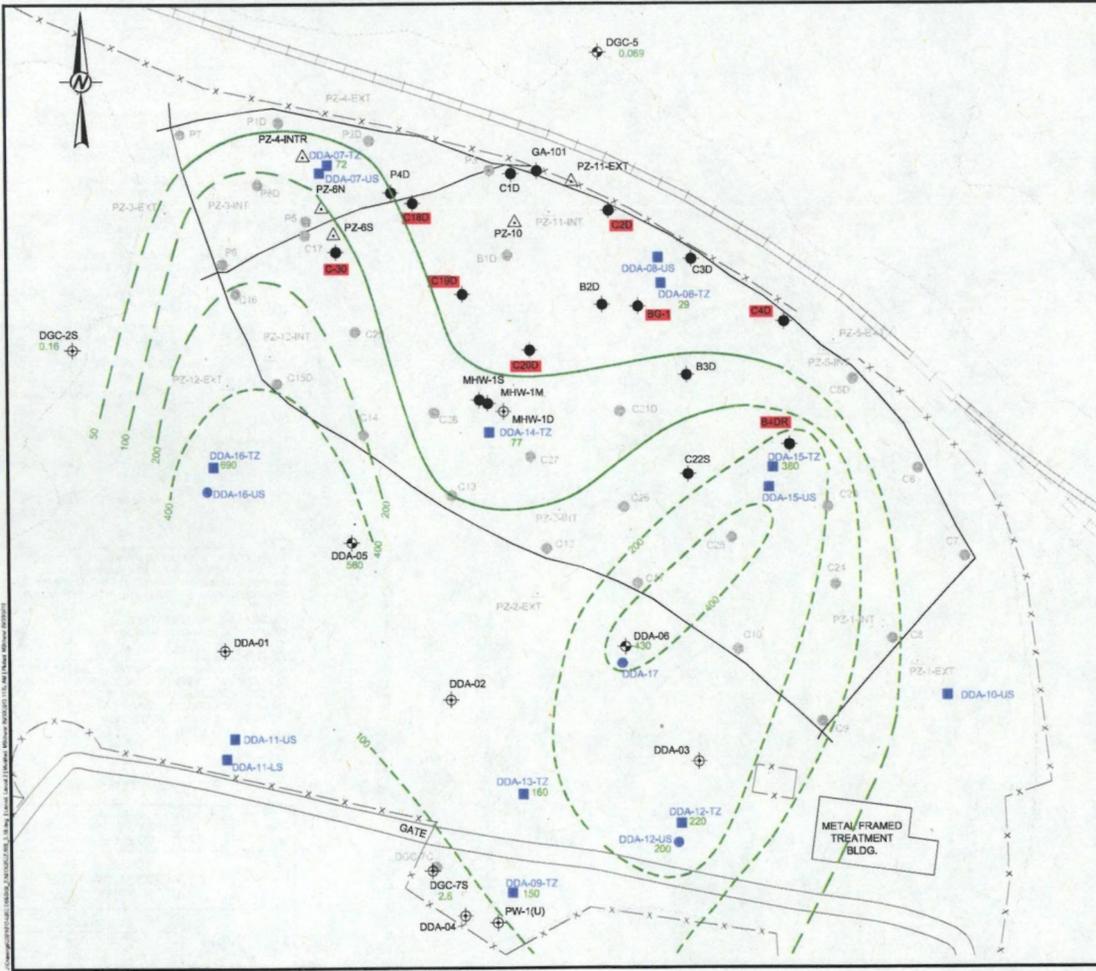
<sup>11</sup> From DS&G Remedial Trust's March 2014 Supplemental Site Characterization, Revision 1.

**Appendix G: Groundwater Plume Maps<sup>12</sup>**

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<sup>12</sup> From DS&G Remedial Trust's March 2014 Supplemental Site Characterization, Revision 1.





- LEGEND**
- X-X-X-X-X- FENCELINE
  - CENTERLINE OF SLURRY WALL AROUND DRUM DISPOSAL AREA
  - RAILROAD
  - C210 COLUMBIA MONITORING WELLS (NOT INCLUDED IN MONITORING PROGRAM)
  - C10 COLUMBIA MONITORING WELLS (INCLUDED IN MONITORING PROGRAM)
  - C100 DDA LOW-FLOW EXTRACTION SYSTEM (LFEWS) WELL
  - ⊕ DGC-2S MONITORING WELL SCREENED IN UPPER POTOMAC AQUIFER
  - ⊕ DDA-05 UPPER POTOMAC CONFINING UNIT TRANSITION ZONE MONITORING WELLS
  - △ PZ-5 DDA PIEZOMETERS (NOT INCLUDED IN MONITORING PROGRAM)
  - △ PZ-10 DDA PIEZOMETERS (INCLUDED IN MONITORING PROGRAM)
  - DDA-12-TZ 2012 2" DIAMETER MONITORING WELL LOCATIONS
  - DDA-12-US 2012 4" DIAMETER MONITORING WELL LOCATIONS
  - BCEE ISOCENTRATION CONTOURS (ug/l)
  - - - BCEE ISOCENTRATION CONTOURS (INFERRED)
  - 22 BCEE CONCENTRATIONS (ug/l) \* INDICATES VALUE NOT USED IN CONTOURING

- NOTES**
- 1.) LOCATIONS OF WELLS AND BORING ARE BASED ON SURVEY BY TAYLOR WISEMAN & TAYLOR (REVISED 2012)
  - 2.) BASED ON FEBRUARY - APRIL 2013 GROUNDWATER DATA
  - 3.) DASHED LINES REPRESENT INFERRED ISOCENTRATION CONTOURS
  - 4.) BCEE = BIS(2-CHLOROETHYL)ETHER
  - 5.) ug/l = MICROGRAMS PER LITER

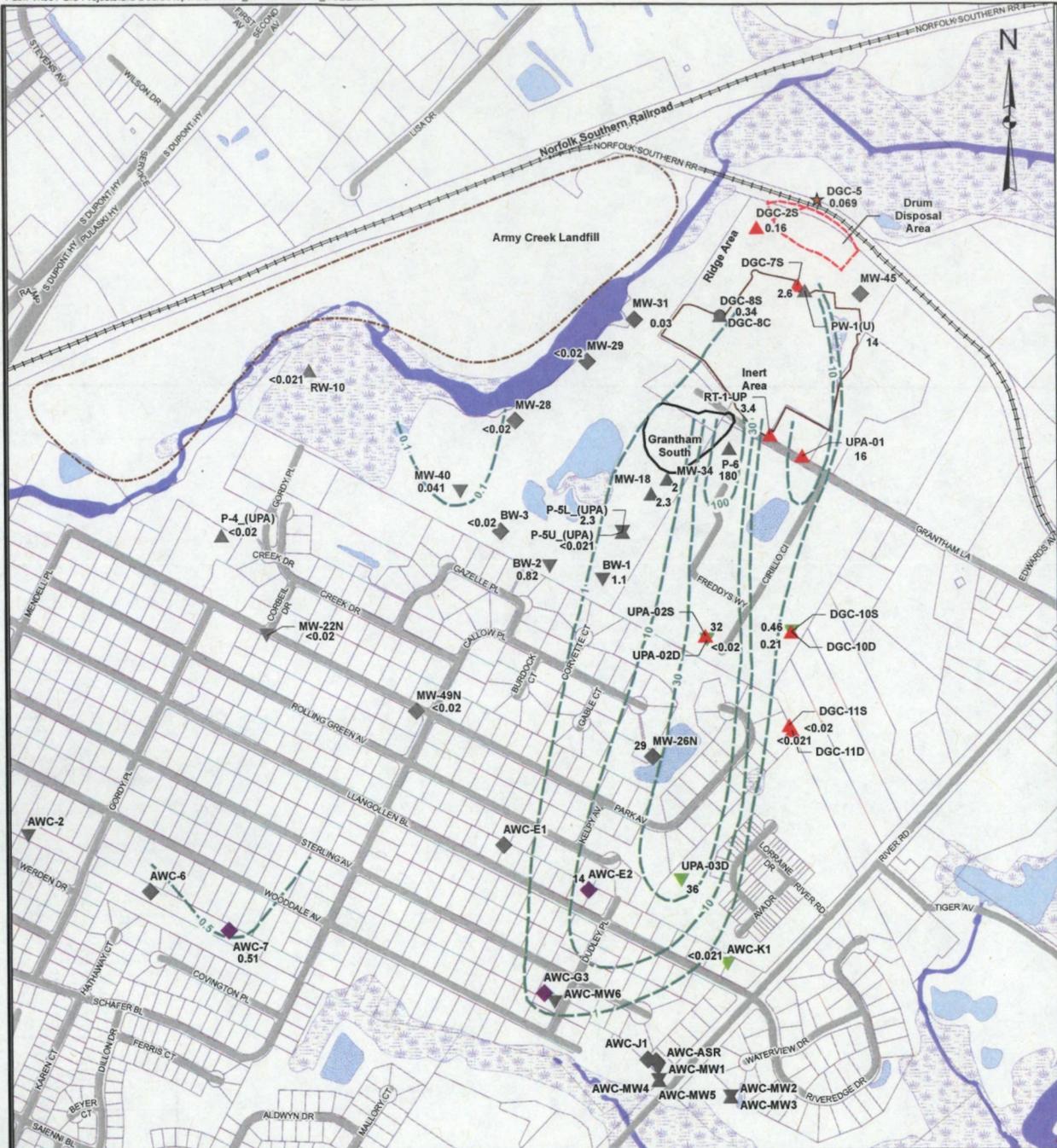
- REFERENCES**
- 1.) BASE MAP TAKEN FROM DIGITAL U.S.G.S. 7.5 MINUTE QUADRANGLES OF WILMINGTON SOUTH, DELAWARE/NEW JERSEY (DATED 1984), DELAWARE CITY, DELAWARE (DATED 1964), NEWARK EAST, DELAWARE (DATED 1984) AND SAINT GEORGES, DELAWARE (DATED 1984).



PROJECT	DELAWARE SAND AND GRAVEL SUPERFUND SITE NEW CASTLE, DELAWARE		
TITLE	BCEE DDA TO WELL PW-1(U) UPCU TRANSITION ZONE FEBRUARY - APRIL 2013		
PROJECT No.	013-002	FILE No.	013002.008_3.13
DESIGN	DAC	SCALE	AS SHOWN
DRAWN	MRS	FIGURE	
CHECK	AAR		
REVIEW	TAM		<b>5.1B</b>







**LEGEND**

- ★ Well screened in UPCU Transition Zone included in the current monitoring program
  - ▲ Well screened in UPA Upper Sand included in the current monitoring program
  - ▲ Well screened in UPA Upper Sand not included in the current monitoring program
  - ▲ Well screened in UPA Lower Sand included in the current monitoring program
  - ▲ Well screened in UPA Lower Sand not included in the current monitoring program
  - ◆ Well screened across UPA Upper Sand and Lower Sand included in the current monitoring program
  - ◆ Well screened across UPA Upper Sand and Lower Sand not included in the current monitoring program
  - Well screened in Columbia Aquifer included in the current monitoring program
  - Well screened in Columbia Aquifer not included in the current monitoring program
  - BCEE Isoconcentration Contour (inferred)
  - 14 - BCEE Concentrations (ug/L)
- BCEE = BIS(2-CHLOROETHYL)ETHER  
ug/L = Micrograms per Liter

**REFERENCE**

Base data from New Castle County Delaware, Department of Land Use, "eParcel View Map" web site GIS data download. Data acquired 01/18/2012.

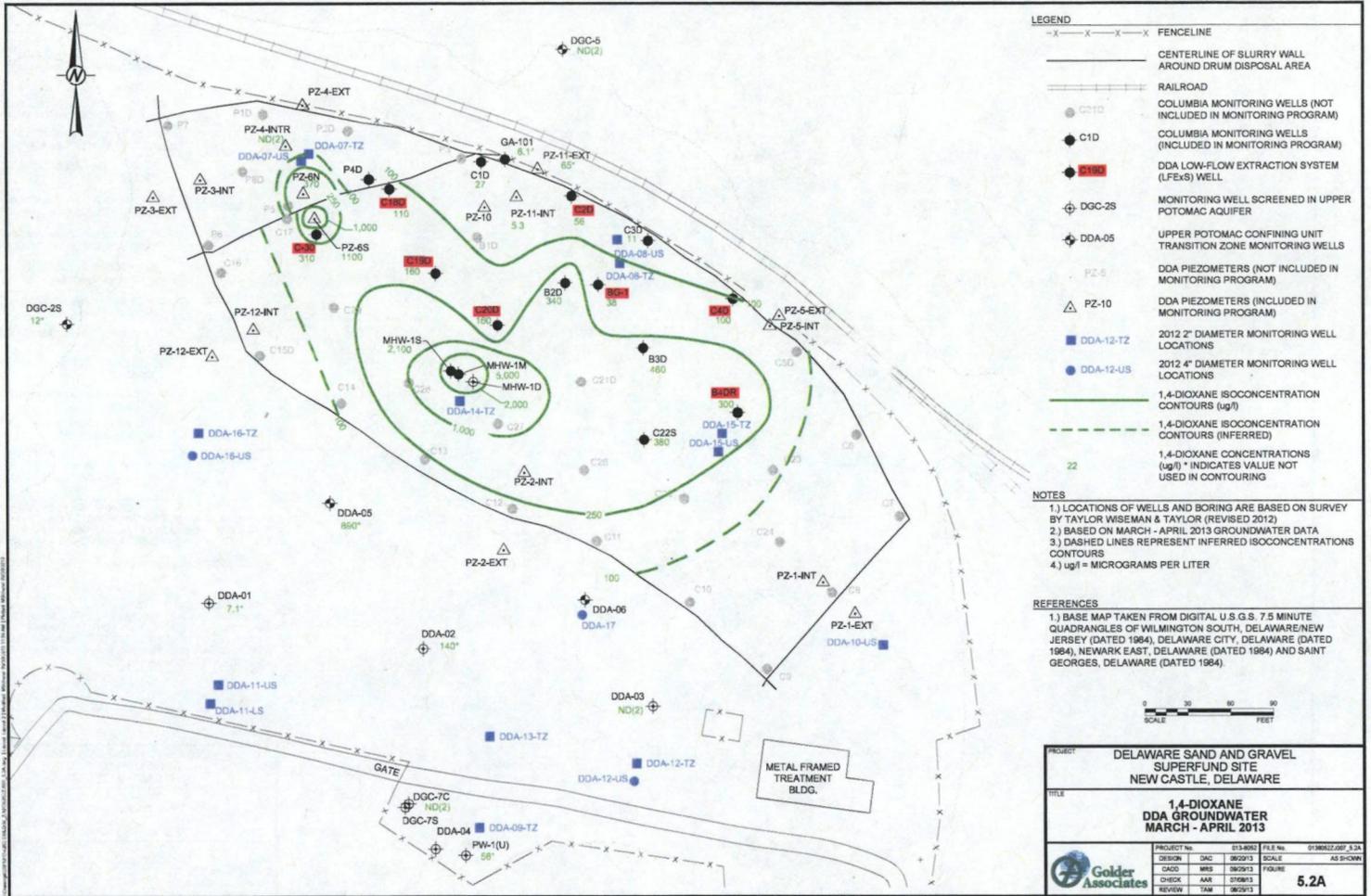


<b>FIGURE 5.1D</b>	PROJECT No.	013-0992.007
	FILE No.	0130992.003
	REV. 0	SCALE: AS SHOWN
	DESIGN	TAM 01/20/2012
	CHECK	RWG 02/20/13
	REVIEW	TAM 02/20/13

**BCEE  
UPA DOWNGRADEMENT OF  
WELL PW-1(U)  
MARCH - APRIL 2013**

**Delaware Sand and Gravel  
Superfund Site  
New Castle, Delaware**





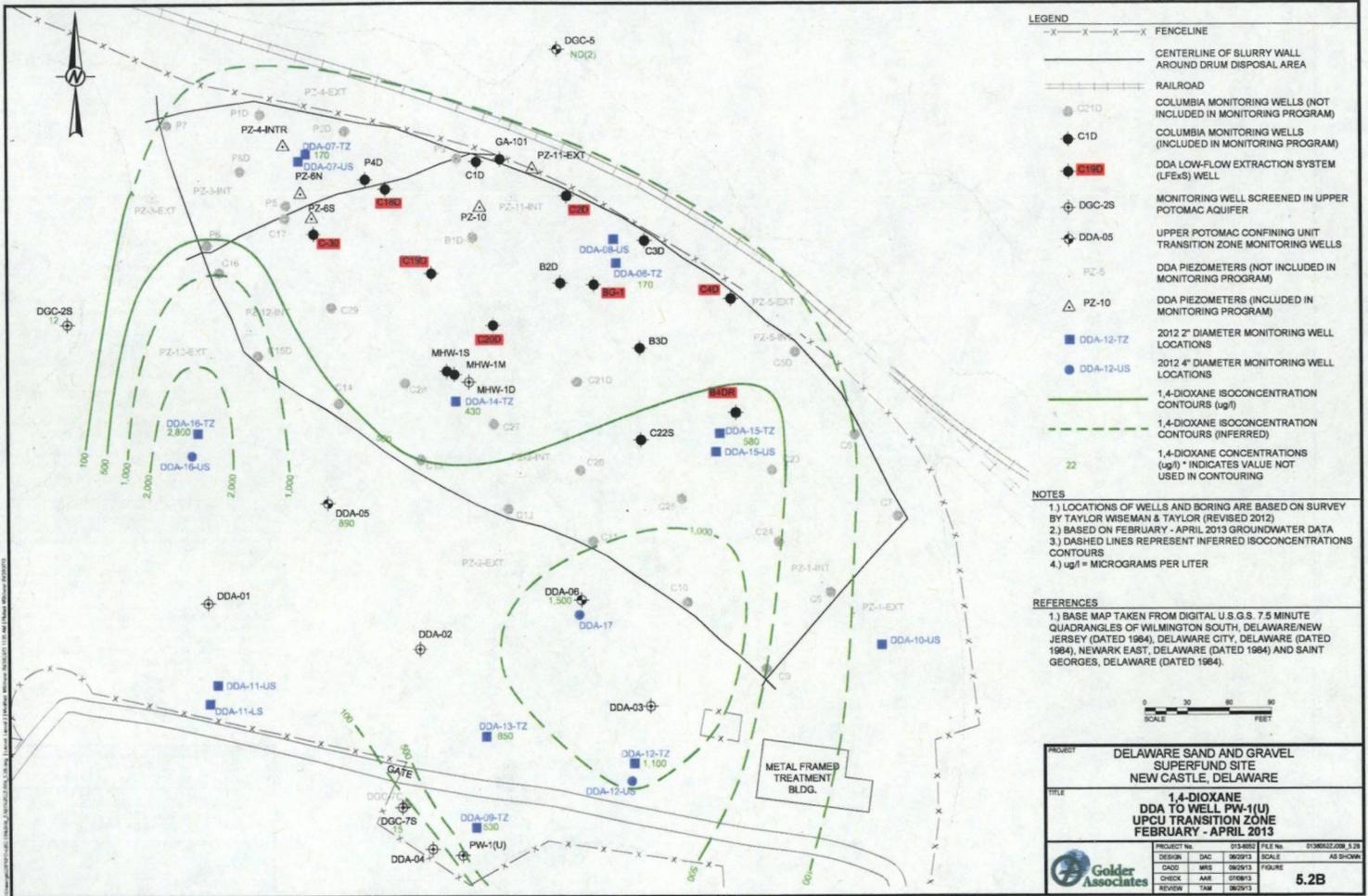
- LEGEND**
- X-X-X-X-X- FENCELINE
  - X—X—X—X—X—X— CENTERLINE OF SLURRY WALL AROUND DRUM DISPOSAL AREA
  - RAILROAD
  - C21D COLUMBIA MONITORING WELLS (NOT INCLUDED IN MONITORING PROGRAM)
  - C1D COLUMBIA MONITORING WELLS (INCLUDED IN MONITORING PROGRAM)
  - C18D DDA LOW-FLOW EXTRACTION SYSTEM (LFExS) WELL
  - ⊕ DGC-2S MONITORING WELL SCREENED IN UPPER POTOMAC AQUIFER
  - ⊕ DDA-05 UPPER POTOMAC CONFINING UNIT TRANSITION ZONE MONITORING WELLS
  - △ PZ-5 DDA PIEZOMETERS (NOT INCLUDED IN MONITORING PROGRAM)
  - △ PZ-10 DDA PIEZOMETERS (INCLUDED IN MONITORING PROGRAM)
  - DDA-12-TZ 2012 2" DIAMETER MONITORING WELL LOCATIONS
  - DDA-12-US 2012 4" DIAMETER MONITORING WELL LOCATIONS
  - 1,4-DIOXANE ISOCONCENTRATION CONTOURS (ug/l)
  - - - 1,4-DIOXANE ISOCONCENTRATION CONTOURS (INFERRED)
  - 22 1,4-DIOXANE CONCENTRATIONS (ug/l) \* INDICATES VALUE NOT USED IN CONTOURING

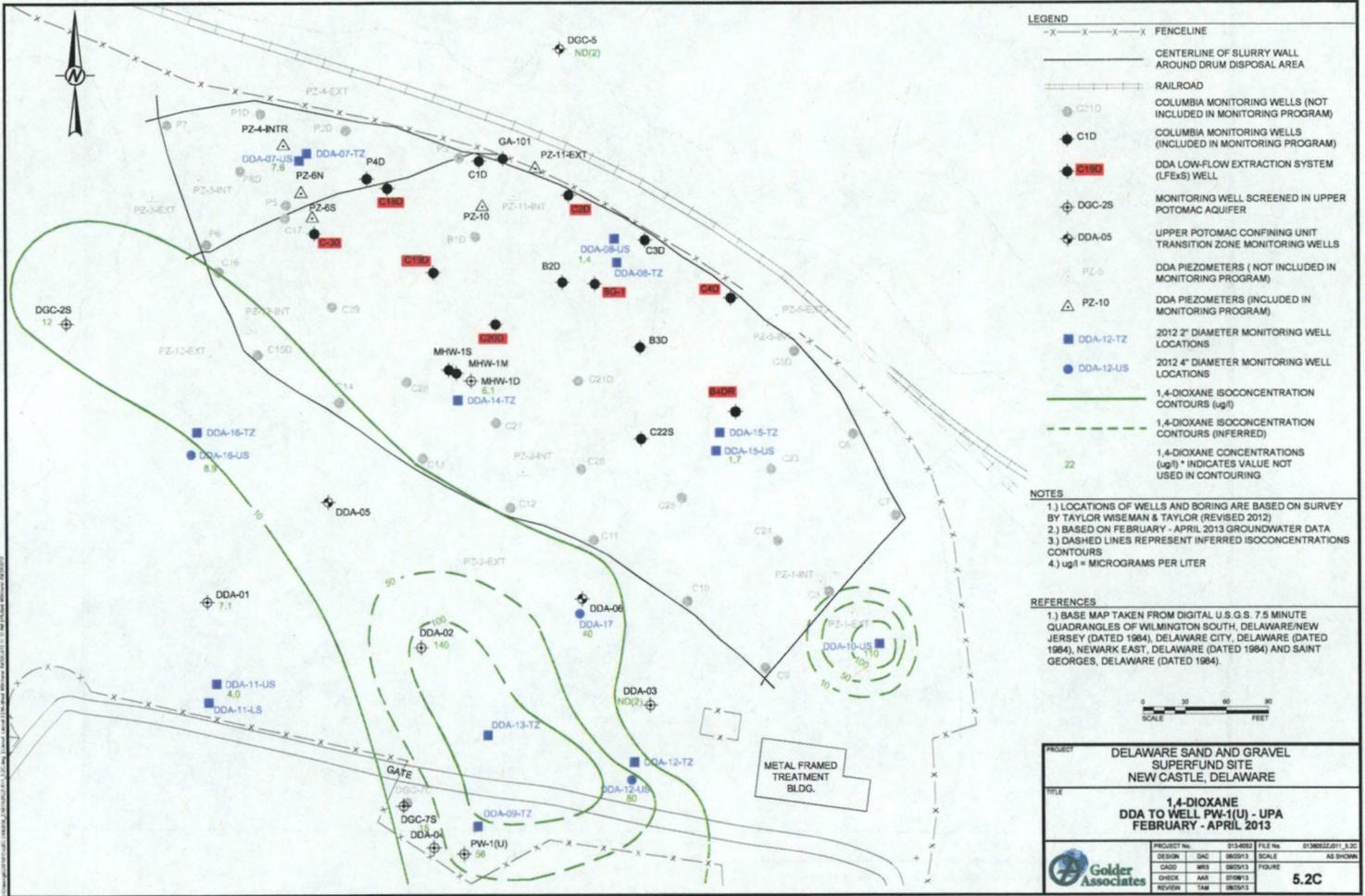
- NOTES**
- 1.) LOCATIONS OF WELLS AND BORING ARE BASED ON SURVEY BY TAYLOR WISEMAN & TAYLOR (REVISED 2012)
  - 2.) BASED ON MARCH - APRIL 2013 GROUNDWATER DATA
  - 3.) DASHED LINES REPRESENT INFERRED ISOCONCENTRATIONS CONTOURS
  - 4.) ug/l = MICROGRAMS PER LITER

- REFERENCES**
- 1.) BASE MAP TAKEN FROM DIGITAL U.S.G.S. 7.5 MINUTE QUADRANGLES OF WILMINGTON SOUTH, DELAWARE/NEW JERSEY (DATED 1984), DELAWARE CITY, DELAWARE (DATED 1984), NEWARK EAST, DELAWARE (DATED 1984) AND SAINT GEORGES, DELAWARE (DATED 1984).



PROJECT	DELAWARE SAND AND GRAVEL SUPERFUND SITE NEW CASTLE, DELAWARE			
TITLE	1,4-DIOXANE DDA GROUNDWATER MARCH - APRIL 2013			
PROJECT No.	013-0002	FILE No.	0100022.GPJ 3.2A	
DESIGN	DAD	06/20/13	SCALE	AS SHOWN
CADD	MRS	06/20/13	FIGURE	
CHECK	AKK	07/06/13		
REVIEW	TAM	08/29/13		
			<b>5.2A</b>	





- LEGEND**
- X-X-X-X-X- FENCELINE
  - CENTERLINE OF SLURRY WALL AROUND DRUM DISPOSAL AREA
  - RAILROAD
  - C10 COLUMBIA MONITORING WELLS (NOT INCLUDED IN MONITORING PROGRAM)
  - C1D COLUMBIA MONITORING WELLS (INCLUDED IN MONITORING PROGRAM)
  - C190 DDA LOW-FLOW EXTRACTION SYSTEM (LFE)S WELL
  - ⊕ DGC-2S MONITORING WELL SCREENED IN UPPER POTOMAC AQUIFER
  - ◆ DDA-05 UPPER POTOMAC CONFINING UNIT TRANSITION ZONE MONITORING WELLS
  - △ PZ-5 DDA PIEZOMETERS ( NOT INCLUDED IN MONITORING PROGRAM)
  - △ PZ-10 DDA PIEZOMETERS (INCLUDED IN MONITORING PROGRAM)
  - DDA-12-TZ 2012 2" DIAMETER MONITORING WELL LOCATIONS
  - DDA-12-US 2012 4" DIAMETER MONITORING WELL LOCATIONS
  - 1,4-DIOXANE ISOCENTRATION CONTOURS (ug/l)
  - - - 1,4-DIOXANE ISOCENTRATION CONTOURS (INFERRED)
  - 22 1,4-DIOXANE CONCENTRATIONS (ug/l) \* INDICATES VALUE NOT USED IN CONTOURING

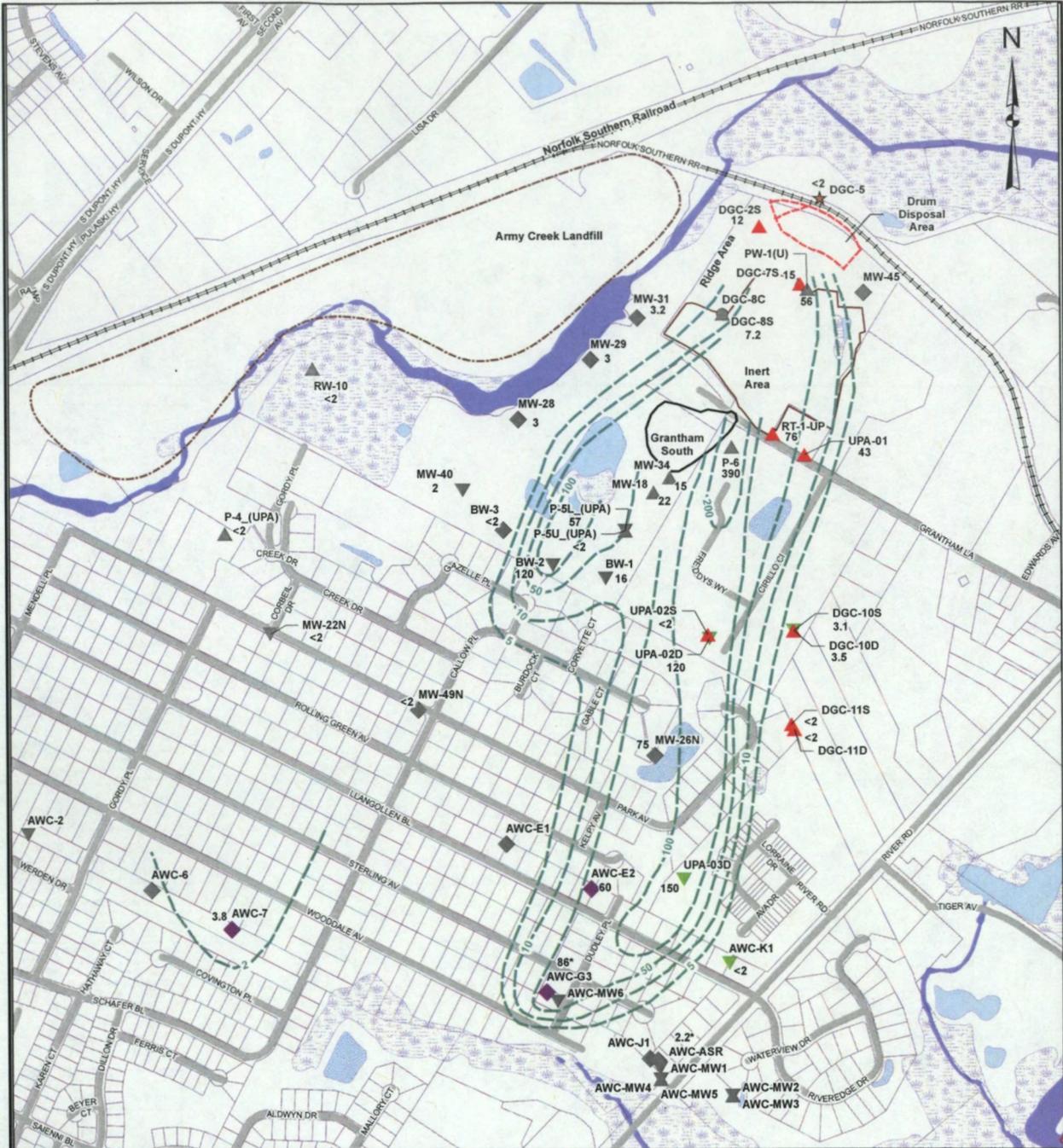
- NOTES**
- 1.) LOCATIONS OF WELLS AND BORING ARE BASED ON SURVEY BY TAYLOR WISEMAN & TAYLOR (REVISED 2012)
  - 2.) BASED ON FEBRUARY - APRIL 2013 GROUNDWATER DATA
  - 3.) DASHED LINES REPRESENT INFERRED ISOCENTRATIONS CONTOURS
  - 4.) ug/l = MICROGRAMS PER LITER

- REFERENCES**
- 1.) BASE MAP TAKEN FROM DIGITAL U.S.G.S. 7.5 MINUTE QUADRANGLES OF WILMINGTON SOUTH, DELAWARE(NEW JERSEY (DATED 1984), DELAWARE CITY, DELAWARE (DATED 1984), NEWARK EAST, DELAWARE (DATED 1984) AND SAINT GEORGES, DELAWARE (DATED 1984).



PROJECT	DELAWARE SAND AND GRAVEL SUPERFUND SITE NEW CASTLE, DELAWARE		
TITLE	1,4-DIOXANE DDA TO WELL PW-1(U) - UPA FEBRUARY - APRIL 2013		
DESIGN	DATE	FILE No.	SCALE
DRAWN	06/25/13	0130022/011_3.2C	AS SHOWN
CHECK	06/25/13		
REVIEW	07/08/13		5.2C





**LEGEND**

- ★ Well screened in UPCU Transition Zone included in the current monitoring program
- ▲ Well screened in UPA Upper Sand included in the current monitoring program
- ▲ Well screened in UPA Upper Sand not included in the current monitoring program
- ▼ Well screened in UPA Lower Sand included in the current monitoring program
- ▼ Well screened in UPA Lower Sand not included in the current monitoring program
- ◆ Well screened across UPA Upper Sand and Lower Sand included in the current monitoring program
- ◆ Well screened across UPA Upper Sand and Lower Sand not included in the current monitoring program
- Well screened in Columbia Aquifer included in the current monitoring program
- Well screened in Columbia Aquifer not included in the current monitoring program
- 1,4-Dioxane Isoconcentration Contour (Inferred)
- 14 - 1,4-Dioxane Concentrations (ug/L)
- \* Indicated data provided by Artesian Water Company
- ug/L = Micrograms per Liter

**REFERENCE**

Base data from New Castle County Delaware, Department of Land Use, "eParcel View Map" web site GIS data download. Data acquired 01/18/2012.

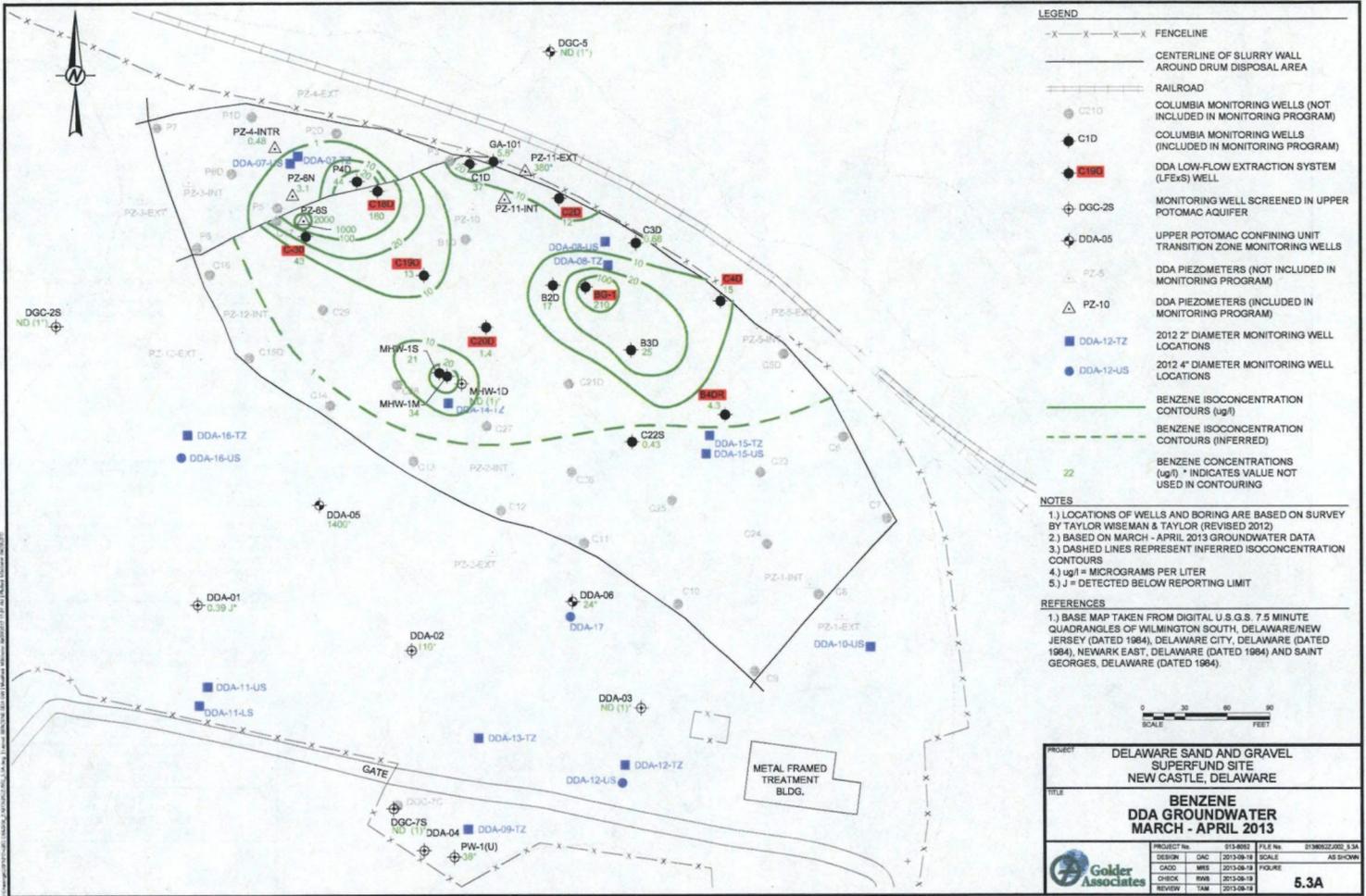


<b>FIGURE 5.2D</b>	PROJECT No.	0136052C007
	FILE No.	0136052C007
	REV. 0	SCALE AS SHOWN
	DESIGN	TWJ 01/26/2012
	CHECK	RMB 03/02/2013
	REVISION	TWJ 03/02/2013

**1,4-DIOXANE  
UPA DOWNGRAIENT OF  
WELL PW-1(U)  
MARCH - APRIL 2013**

**Delaware Sand and Gravel  
Superfund Site  
New Castle, Delaware**





- LEGEND**
- X-X-X-X- FENCELINE
  - CENTERLINE OF SLURRY WALL AROUND DRUM DISPOSAL AREA
  - RAILROAD
  - C1D COLUMBIA MONITORING WELLS (NOT INCLUDED IN MONITORING PROGRAM)
  - C1D COLUMBIA MONITORING WELLS (INCLUDED IN MONITORING PROGRAM)
  - C1D DDA LOW-FLOW EXTRACTION SYSTEM (LFE)S WELL
  - ⊕ DGC-2S MONITORING WELL SCREENED IN UPPER POTOMAC AQUIFER
  - ⊕ DDA-05 UPPER POTOMAC CONFINING UNIT TRANSITION ZONE MONITORING WELLS
  - △ PZ-5 DDA PIEZOMETERS (NOT INCLUDED IN MONITORING PROGRAM)
  - △ PZ-10 DDA PIEZOMETERS (INCLUDED IN MONITORING PROGRAM)
  - DDA-12-TZ 2012 2" DIAMETER MONITORING WELL LOCATIONS
  - DDA-12-US 2012 4" DIAMETER MONITORING WELL LOCATIONS
  - BENZENE ISOCONCENTRATION CONTOURS (ug/l)
  - - - BENZENE ISOCONCENTRATION CONTOURS (INFERRED)
  - 22 BENZENE CONCENTRATIONS (ug/l) \* INDICATES VALUE NOT USED IN CONTOURING

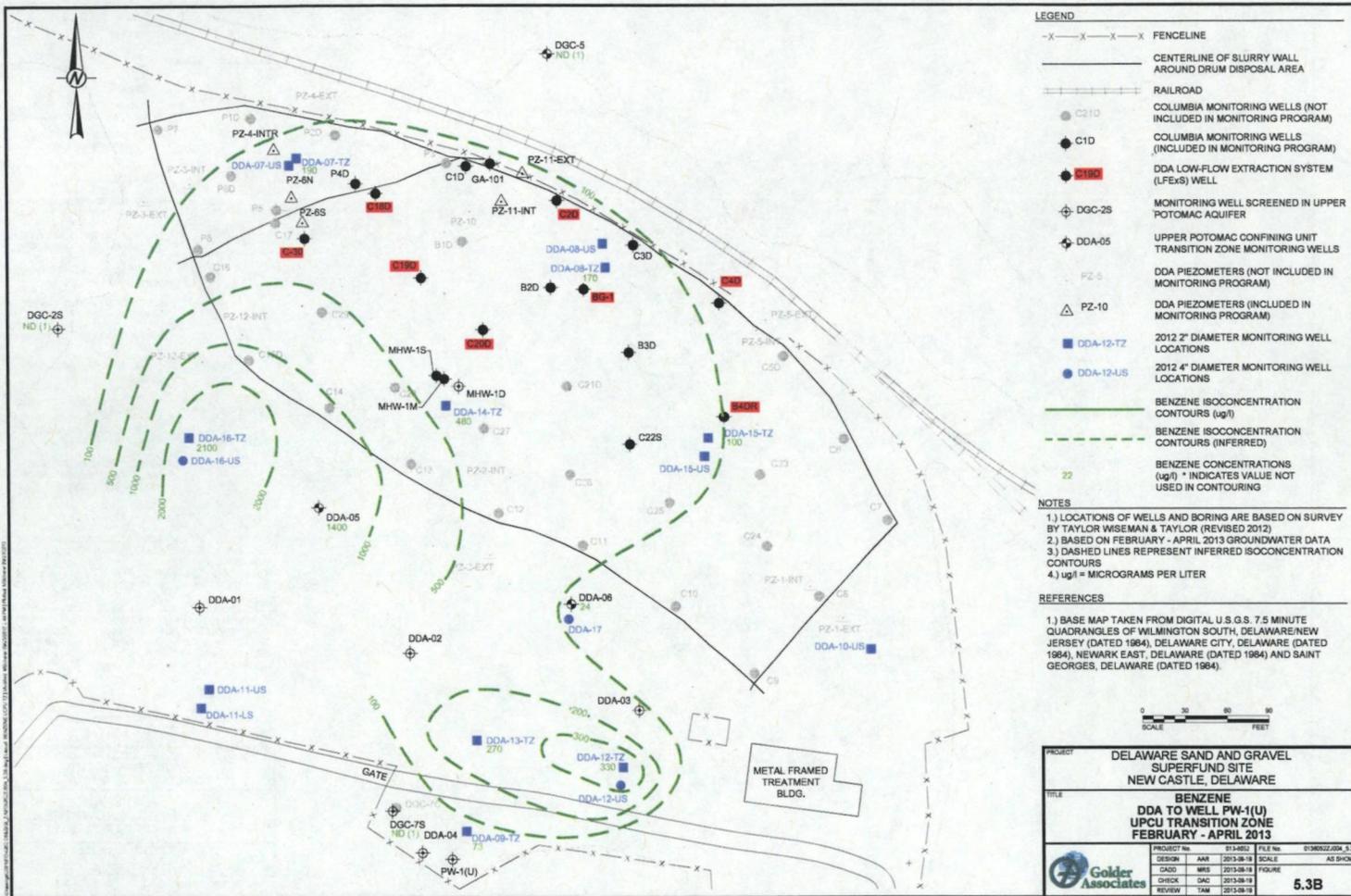
- NOTES**
- 1.) LOCATIONS OF WELLS AND BORING ARE BASED ON SURVEY BY TAYLOR WISEMAN & TAYLOR (REVISED 2012)
  - 2.) BASED ON MARCH - APRIL 2013 GROUNDWATER DATA
  - 3.) DASHED LINES REPRESENT INFERRED ISOCONCENTRATION CONTOURS
  - 4.) UG/L = MICROGRAMS PER LITER
  - 5.) J = DETECTED BELOW REPORTING LIMIT

- REFERENCES**
- 1.) BASE MAP TAKEN FROM DIGITAL U.S.G.S. 7.5 MINUTE QUADRANGLES OF WILMINGTON SOUTH, DELAWARE/NEW JERSEY (DATED 1984), DELAWARE CITY, DELAWARE (DATED 1984), NEWARK EAST, DELAWARE (DATED 1984) AND SAINT GEORGES, DELAWARE (DATED 1984).



PROJECT	DELAWARE SAND AND GRAVEL SUPERFUND SITE NEW CASTLE, DELAWARE			
TITLE	BENZENE DDA GROUNDWATER MARCH - APRIL 2013			
PROJECT No.	013-0003	FILE No.	0130003.DWG_33A	
DESIGN	DAC	2013-08-18	SCALE	AS SHOWN
CADD	MRS	2013-08-19	PLOTTED	
CHECK	WMS	2013-08-19		
REVIEW	TAM	2013-08-19		<b>5.3A</b>





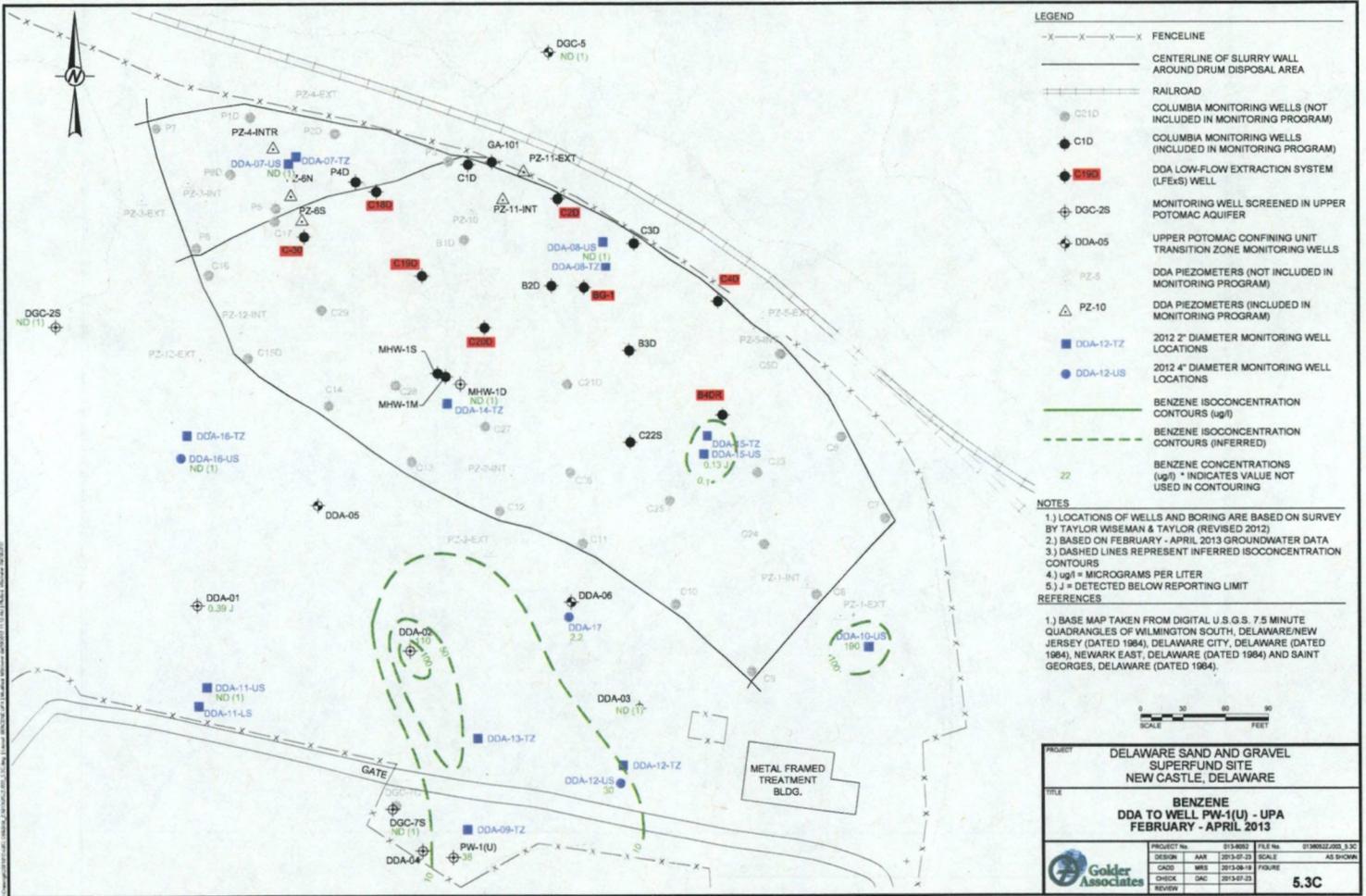
- LEGEND**
- X-X-X-X-X- FENCELINE
  - CENTERLINE OF SLURRY WALL AROUND DRUM DISPOSAL AREA
  - RAILROAD
  - C210 COLUMBIA MONITORING WELLS (NOT INCLUDED IN MONITORING PROGRAM)
  - C1D COLUMBIA MONITORING WELLS (INCLUDED IN MONITORING PROGRAM)
  - C180 DDA LOW-FLOW EXTRACTION SYSTEM (LFEs) WELL
  - ⊕ DGC-2S MONITORING WELL SCREENED IN UPPER POTOMAC AQUIFER
  - ⊕ DDA-05 UPPER POTOMAC CONFINING UNIT TRANSITION ZONE MONITORING WELLS
  - △ PZ-5 DDA PIEZOMETERS (NOT INCLUDED IN MONITORING PROGRAM)
  - △ PZ-10 DDA PIEZOMETERS (INCLUDED IN MONITORING PROGRAM)
  - DDA-12-TZ 2012 2" DIAMETER MONITORING WELL LOCATIONS
  - DDA-12-US 2012 4" DIAMETER MONITORING WELL LOCATIONS
  - BENZENE ISOCONCENTRATION CONTOURS (ug/l)
  - - - BENZENE ISOCONCENTRATION CONTOURS (INFERRED)
  - 22 BENZENE CONCENTRATIONS (ug/l) \* INDICATES VALUE NOT USED IN CONTOURING

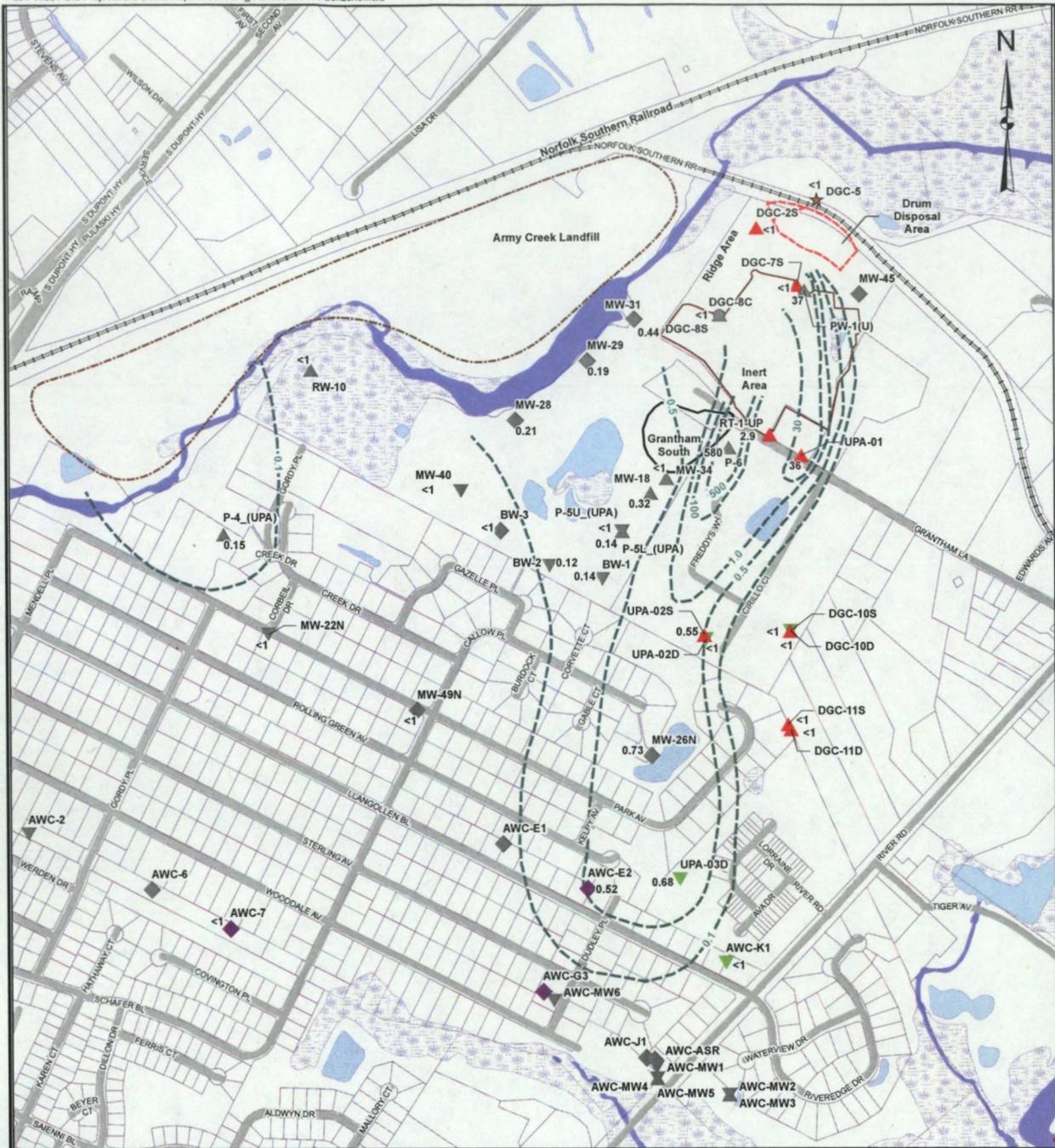
- NOTES**
- 1.) LOCATIONS OF WELLS AND BORING ARE BASED ON SURVEY BY TAYLOR WISEMAN & TAYLOR (REVISED 2012)
  - 2.) BASED ON FEBRUARY - APRIL 2013 GROUNDWATER DATA
  - 3.) DASHED LINES REPRESENT INFERRED ISOCONCENTRATION CONTOURS
  - 4.) ug/l = MICROGRAMS PER LITER

- REFERENCES**
- 1.) BASE MAP TAKEN FROM DIGITAL U.S.G.S. 7.5 MINUTE QUADRANGLES OF WILMINGTON SOUTH, DELAWARE NEW JERSEY (DATED 1984), DELAWARE CITY, DELAWARE (DATED 1984), NEWARK EAST, DELAWARE (DATED 1984) AND SAINT GEORGES, DELAWARE (DATED 1984).



PROJECT	DELAWARE SAND AND GRAVEL SUPERFUND SITE NEW CASTLE, DELAWARE		
TITLE	BENZENE DDA TO WELL PW-1(U) UPCU TRANSITION ZONE FEBRUARY - APRIL 2013		
PROJECT No.	013-002	FILE No.	0106022.00A_5.3B
DESIGN	AMR	2013-08-18	SCALE AS SHOWN
DRAWN	MRS	2013-08-18	FIGURE
CHECK	DKC	2013-08-18	
REVIEW	TAM	2013-08-18	<b>5.3B</b>



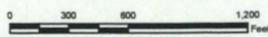


**LEGEND**

- ★ Well screened in UPCU Transition Zone included in the current monitoring program
- ▲ Well screened in UPA Upper Sand included in the current monitoring program
- ▲ Well screened in UPA Upper Sand not included in the current monitoring program
- ▼ Well screened in UPA Lower Sand included in the current monitoring program
- ▼ Well screened in UPA Lower Sand not included in the current monitoring program
- ◆ Well screened across UPA Upper Sand and Lower Sand included in the current monitoring program
- ◆ Well screened across UPA Upper Sand and Lower Sand not included in the current monitoring program
- Well screened in Columbia Aquifer included in the current monitoring program
- Well screened in Columbia Aquifer not included in the current monitoring program
- - - Benzene Isoconcentration Contours (Inferred)
- <1 Benzene concentrations (ug/L)
- ug/L = Micrograms per Liter

**REFERENCE**

Base data from New Castle County Delaware, Department of Land Use, "eParcel View Map" web site GIS data download. Data acquired 01/18/2012.



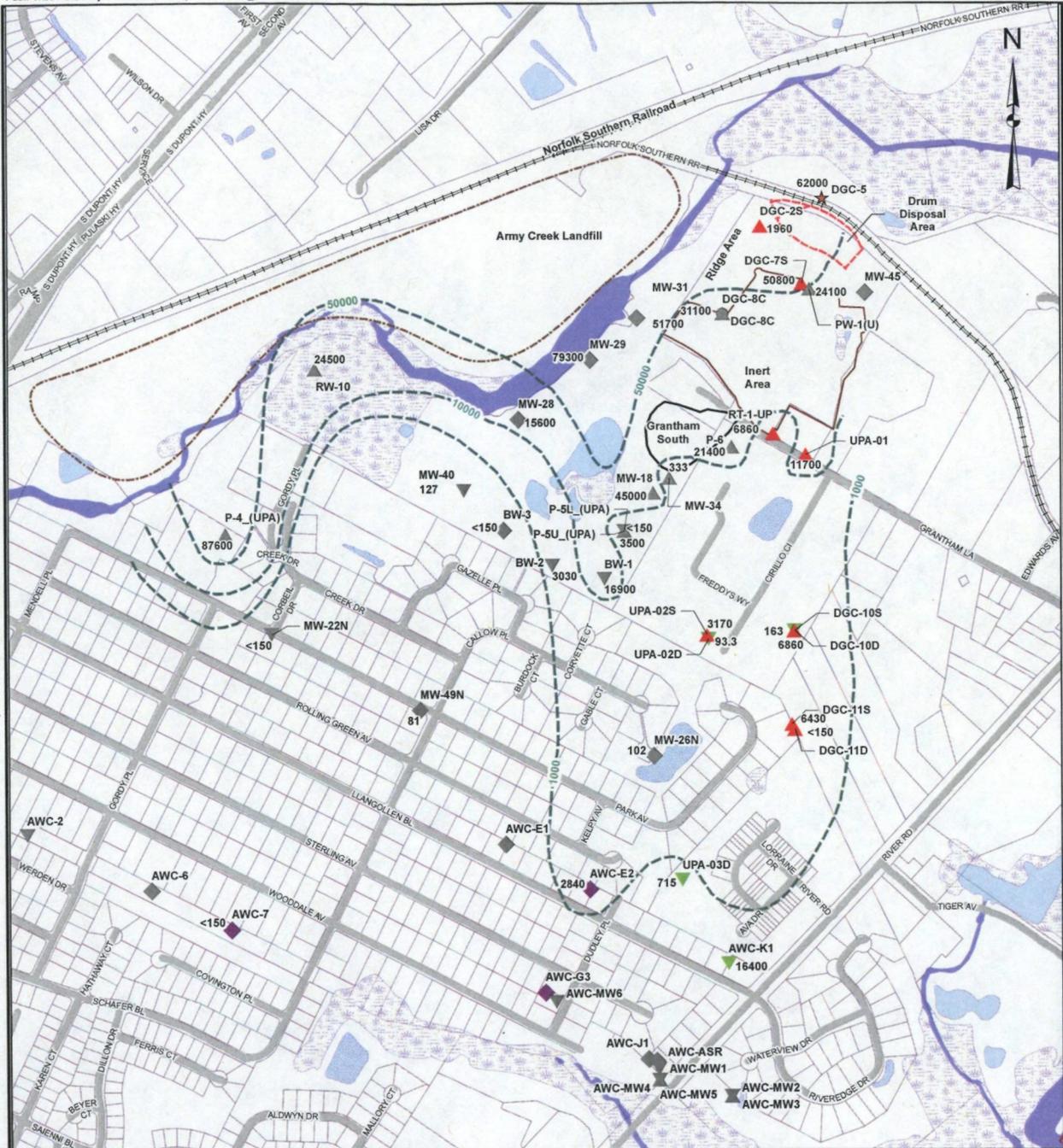
**FIGURE 5.3D**

PROJECT No.	013-0692-007
FILE No.	0130692_009
REV. 0	SCALE: AS SHOWN
DATE	01/18/2012
CHECK	RWB
DATE	02/20/13
REVIEW	TAM
DATE	02/20/13

**BENZENE  
UPA DOWNGRADEMENT OF  
WELL PW-1(U)  
MARCH - APRIL 2013**

**PROJECT**  
**Delaware Sand and Gravel  
Superfund Site  
New Castle, Delaware**



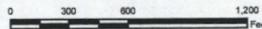


**LEGEND**

- ★ Well screened in UPCU Transition Zone included in the current monitoring program
- ▲ Well screened in UPA Upper Sand included in the current monitoring program
- ▲ Well screened in UPA Upper Sand not included in the current monitoring program
- ▼ Well screened in UPA Lower Sand included in the current monitoring program
- ▼ Well screened in UPA Lower Sand not included in the current monitoring program
- ◆ Well screened across UPA Upper Sand and Lower Sand included in the current monitoring program
- ◆ Well screened across UPA Upper Sand and Lower Sand not included in the current monitoring program
- Well screened in Columbia Aquifer included in the current monitoring program
- Well screened in Columbia Aquifer not included in the current monitoring program
- - - Dissolved Iron Isoconcentration Contour (Inferred)
- <150 Dissolved Iron Concentration (ug/L)
- \* Indicates datapoint not used in contouring
- ug/L = Micrograms per Liter

**REFERENCE**

Base data from New Castle County Delaware, Department of Land Use, "eParcel View Map" web site GIS data download. Data acquired 01/18/2012.



**FIGURE 5.7**

PROJECT No.	013-8002-007
FILE No.	0138002_007
REV. 0	SCALE AS SHOWN
DESIGN	TMM 07/20/09
GIS	CSB 9/30/09
CHECK	RMB 9/30/09
REVIEW	TMM 9/30/09

**IRON (DISSOLVED)  
UPA DOWNGRADEMENT OF  
WELL PW-1(U)  
MARCH - APRIL 2013**

**PROJECT**  
**Delaware Sand and Gravel  
Superfund Site  
New Castle, Delaware**



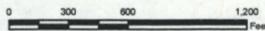


**LEGEND**

- ★ Well screened in UPCU Transition Zone included in the current monitoring program
- ▲ Well screened in UPA Upper Sand included in the current monitoring program
- ▲ Well screened in UPA Upper Sand not included in the current monitoring program
- ▼ Well screened in UPA Lower Sand included in the current monitoring program
- ▼ Well screened in UPA Lower Sand not included in the current monitoring program
- ◆ Well screened across UPA Upper Sand and Lower Sand included in the current monitoring program
- ◆ Well screened across UPA Upper Sand and Lower Sand not included in the current monitoring program
- Well screened in Columbia Aquifer included in the current monitoring program
- Well screened in Columbia Aquifer not included in the current monitoring program
- Dissolved Manganese Isoconcentration Contour (Inferred)
- <15 Dissolved Manganese Concentration (ug/L)
- \* Indicates datapoint not used in contouring
- ug/L = Micrograms per Liter

**REFERENCE**

Base data from New Castle County Delaware, Department of Land Use, "eParcel View Map" web site GIS data download. Data acquired 01/18/2012.



<b>FIGURE 5.8</b>	PROJECT No.	013-0692-007
	REV. 0	SCALE: AS SHOWN
	DATE	07/20/2012
	CHECK	9/20/2013
	DATE	9/20/2013
	DATE	9/20/2013

**MANGANESE (DISSOLVED)  
UPA DOWNGRADIENT OF  
WELL PW-1(U)  
MARCH - APRIL 2013**

PROJECT  
**Delaware Sand and Gravel  
Superfund Site  
New Castle, Delaware**



## Appendix H: Effluent Sampling Data<sup>13</sup>

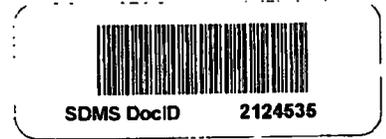
	14-Apr-10	11-Oct-10	4-Apr-11	3-Oct-11	3-Apr-12	1-Oct-12	18-Mar-13	30-Sep-13	24-Mar-14	30-Sep-14
Analyte	EQ-EFF-2010-01	EQ-EFF-2010-002	EQ-EFF-2011-04	EQ-EFF-100311	EQ-EFF-2012-01	EQ-EFF-2012-02	EQ-EFF-2013-01	EQ-EFF-2013-02	EQ-EFF-2014-01	EQ-EFF-2014-02
<b>Total Toxic Organics (TTO)</b>	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
1,1-dichloroethane	2.0 U	1.2 J	0.7 J	0.59 J	0.58 J	0.13 U	0.37 J	0.13 U	0.40 J	0.13 U
1,2-dichlorobenzene	42	11 U	12	25	7.9 J	7.1 J	9.2 J	8.4 J	2.6 U	3.1 J
1,2-dichloroethane	1.7 J	1.0 U	2.0 U	3.2	2.1	3.1	2.7	1.4	3.4	1.5
1,2-trans-dichloroethylene	2.0 U	1.0 U	2.0 U	1.0 U	0.13 U					
1,1,1-trichloroethane		0.62 J	2.0 U	1.0 U	0.06 U	0.060 U	0.060 U	0.060 U	0.060 U	0.060 U
1,2,4-trichlorobenzene	1.0 U	1.1 U	1.0 U	1.0 U	0.29 U	0.26 U	0.27 U	0.26 U	0.27 U	0.26 U
1,4-dichlorobenzene	10 U	11 U	10 U	3.8 J	2.8 U	2.5 U	2.6 U	2.5 U	2.6 U	2.5 U
2,4-dimethylphenol		4.6 J	10 U	6.5 J	3.8 U	3.4 U	3.5 U	3.4 U	3.5 U	2.6 U
acenaphthene	10 U	11 U	10 U	10 U	3.0 U	2.7 U	2.8 U	2.7 U	0.84 U	2.7 U
alpha-BHC	0.21 U	0.02 U	0.02 U	0.020 U*	0.0061 U	0.0062 U	0.018 U	0.018 U	0.017 U	0.017 U
benzene	61	150	58	54	76	25	36	51	39	15
benzo(b)fluoranthene									0.66 J	0.26 U
beta-BHC	0.21 U	0.02 U	0.02 U	0.020 U*	0.01 U	0.010 U	0.033 U	0.032 U	0.033 U	0.032 U
bis (2-chloroethyl) ether	1.0 U	20	20	15	13	7	9.5	14	9.7	13
bis (2-ethylhexyl) phthalate		2.9 J	10 U	10 U	2.2 U	2.0 U	2.0 U	2.0 U	2.1 U	2.0 U
chlorobenzene	8.5	10	19	63	36	31	41	54	5.9	45
diethyl phthalate	10 U	11 U	10 U	10 U	3.3 U	2.9 U	3.0 U	2.9 U	3.0 U	2.9 U
ethylbenzene	23	10	18	22	29	6	11	13	11	2.7
naphthalene	10 U	11 U	10 U	10 U	3.0 U	2.7 U	2.8 U	2.7 U	24.84 U	2.7 U
phenol	10 U	8 J	10 U	10 U	1.7 J	2.9 J	0.83 U	0.82 U	0.84 U	0.81 U
tetrachloroethene									0.17 J	0.10 U
toluene	130	460	190	150	180	62	130	110	110	55
trichloroethylene	0.92 J	3.5	1.6 J	0.98 J	0.61 J	0.55 J	0.37 J	0.64 J	0.62 J	0.24 J
vinyl chloride	1.0 U	2.0 U	2.0 U	0.27 J	0.14 U					
<b>Total Toxic Organics (TTO) ug/l</b>	<b>264.5</b>	<b>653.5</b>	<b>317.0</b>	<b>332.2</b>	<b>336.1</b>	<b>134.1</b>	<b>230.2</b>	<b>243.4</b>	<b>179.0</b>	<b>132.2</b>
<b>Total including J values ug/l</b>	<b>267.12</b>	<b>670.82</b>	<b>319.3</b>	<b>344.34</b>	<b>346.89</b>	<b>144.65</b>	<b>240.14</b>	<b>252.44</b>	<b>180.85</b>	<b>135.54</b>
<b>Metals (ICP)</b>	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Arsenic	7.0	5.0 U	5.2	5.0 U	8.1	5.6	4.2 U	4.3 J	3.7 U	6.7
Cadmium	5.0 U	5.0 U	5.0 U	5.0 U	0.89 U	0.89 U	0.89 U	0.89 U	1.7 U	1.7 U
Chromium	10.0 U	10.0 U	10.0 U	10.0 U	4.4 U	4.4 U	4.4 U	4.4 U	5.3 U	5.3 U
Copper	77.9	25.0 U	25.0 U	25.0 U	8.9 U	8.9 U	8.9 U	8.9 U	7.8 U	7.8 U
Lead	14.0	3.8 J	5.0 U	5.3	2.5 U	2.5 J	2.5 U	2.5 U	4.8 U	4.8 U
Molybdenum	20 U	20.0 U	2 J	20.0 U	3.8 U	3.8 U	3.8 U	3.8 U	4.0 U	4.0 U
Nickel	83.2	21.4 J	47.5	35.9 J	18.3 J	14.7 J	17.9 J	20.6 J	14.1 J	18.1 J
Selenium	5.0 U	5.0 U	5.0 U	5.0 U	7.1	3.9 U	3.9 U	3.9 U	6.9	5.0 U
Zinc	78.7	30.0 U	9.6 J	30.0 U	6.8 J	10.3 J	7.0 J	5.3 U	8.9 U	8.9 U
Mercury (CVAA)	0.20 U	0.20 U	0.20 U	0.20 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
<b>General Chemistry</b>	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
Ammonia	2.4	1.7	2.2	2.9	1.7	1.8	1.4	1.5	1.2	0.53
Cyanide, Total	0.01 U	0.01 U	0.01 U	0.010 U	0.01 U	0.0024 J	0.0066 J	0.0040 U	0.0040 U	0.0055 J
BOD	9.4	6.0 U	6.0 U	6.0 U	3.5 J	2.5 J	1.7 U	1.8 J	3.3	2.0
Total Suspended Solids	50.0	19	11	40.0	12.0	25	33.0	43.0	22.0	40.0

<sup>13</sup> From DS&G Remedial Trust's February 2015 Quarterly Operating, Maintenance and Monitoring Report, 4th Quarter 2014.

**Appendix I: Recorded Notice of Institutional Controls for Property Owned by New Castle County**



DEPARTMENT OF SPECIAL SERVICES



Via Federal Express

June 30, 2008

Ms. Debra Rossi  
EPA Project Coordinator  
United States Environmental Protection Agency  
Region III  
1650 Arch Street  
Philadelphia, PA 19103

**RE: Delaware Sand and Gravel Superfund Site**

Dear Debbie:

Pursuant to the Unilateral Order issued to New Castle County ("County") (Docket No. CERC-03-2007-0054-DC) on March 30, 2007 and later amended on May 13, 2008, the County has complied with Section VII. (C)(1), *Obligations Regarding Successors-in-Interest*, by recording the Notice of Institutional Controls, Access, and Obligations Regarding Successors-in-Interest ("Notice") that was attached to the amended order as Exhibit 3. Per the terms of Sections VII (C)(1) and VIII (A)(1), two copies of the Notice are attached for your use. Furthermore, two copies have been forward to State Remedial Project Manager, John Cargill of DNREC.

Sincerely,

*Michael D. Harris*

Michael D. Harris  
Environmental Compliance Manager

Attachment

CC : John Cargill, with attachment (2 copies)  
George Weiner with attachment  
Dorey Cole with attachment

Tax Parcel No.: 10-035.00-056

20080626-0044294  
Pages: 24 F: \$6.00  
06/26/08 02:18:20 PM  
720080028443  
Michael E. Kozikowski  
New Castle Recorder NISC

Prepared by: U.S. Environmental  
Protection Agency, Region III  
1650 Arch Street  
Philadelphia, PA 19103

Return to: General Manager  
Department of Special Services  
187-A Old Churchmans Road  
New Castle, DE 19720

**EXHIBIT 3**

**NOTICE OF INSTITUTIONAL CONTROLS, ACCESS, AND OBLIGATIONS  
REGARDING SUCCESSORS-IN-INTEREST**

This Notice of Institutional Controls, Access, and Obligations regarding Successors-in-Interest ("Notice") is made this \_\_\_\_ day of \_\_\_\_\_ 2008, by New Castle County, DE ("Owner" or "Respondent"), having an address of 87 Reads Way, New Castle, DE 19720.

WHEREAS, Owner is the owner of a portion of the Delaware Sand and Gravel ("DS&G") Superfund Site ("Site"), a former sand and gravel quarry converted into an industrial waste landfill comprising approximately twenty-seven (27) acres and located approximately two (2) miles southwest of the City of New Castle, Delaware. Maps identifying the relevant tax parcel number and Owner's portion of the Site ("Respondent's Site Property" or "Property") (as defined herein)) are attached hereto as Appendix A. That tax parcel number is T.M.P. 10-035.00-056. Owner's portion of the Site is outlined with solid black lines on the first page of Appendix A. The Site is bordered to the east by railroad tracks and on the west and north by Army Creek, which discharges into the Delaware River approximately one (1) mile to the east. Public roads near the Site include Grantham Lane, which runs through the Site, and Route 9 to the east.

WHEREAS, "hazardous substances," as that term is defined in Section 101(14) of the

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Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. § 9601(14), were disposed of within four distinct disposal areas at the Site. Disposal took place at the Site between approximately 1959 and 1976.

WHEREAS, pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the Site on the CERCLA National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on September 8, 1983, at 48 Fed. Reg. 40650.

WHEREAS, on April 22, 1988, EPA issued a Record of Decision ("ROD") for the Site, on which the State concurred. Notice of the ROD was published in accordance with Section 117(b) of CERCLA, 42 U.S.C. § 9617(b). The ROD describes the Remedial Action ("RA") which EPA selected for the Site. In recognition of the area-specific conditions defined by the Remedial Investigation/Feasibility Study, the ROD provided for specific remedial activities for each area and Site groundwater. Those areas were the Drum Disposal Area, the Ridge Area, the Inert Area, and the Grantham South Area.

WHEREAS, the Grantham South Area is a two-acre landfill containing debris and mixed chemical waste.

WHEREAS, the Inert Area is an eleven-acre landfill containing debris and mixed chemical wastes buried to depths of twenty (20) to thirty-five (35) feet.

WHEREAS, the RA selected in the ROD for the Grantham South and Inert Areas called for, among other things, the installation of perimeter fencing; the installation of a multi-layer cap; and the installation of a gas venting system.

WHEREAS, the RA selected in the ROD for groundwater called for, among other things, the recovery and treatment of contaminated groundwater; the discharge of treated water to the

Army Creek; and monitoring of groundwater.

WHEREAS, based on new information developed during preliminary design activities and promising advances in a developing innovative technology, EPA and the State determined that the RA selected in the ROD should be amended.

WHEREAS, on September 30, 1993, EPA issued a ROD Amendment ("ROD Amendment") for the Site, on which the State concurred. The ROD Amendment modified the RA selected in the ROD for the Drum Disposal, Ridge, and Inert Areas, calling for, among other things, deed restrictions for those portions of the Site.

WHEREAS, the ROD Amendment did not modify the RA selected in the ROD for the Grantham South Area or for groundwater.

WHEREAS, on June 14, 1995, the United States District Court for the District of Delaware entered a consent decree ("Consent Decree") which was signed by the United States on behalf of EPA, the State, and by thirty-one (31) settling defendants ("Work Defendants"). The Consent Decree called for performance of the remedial design/remedial action set forth in the ROD Amendment and reimbursement of a portion of EPA's past and future response costs at the Site. The Consent Decree also required the Work Defendants to conduct operation and maintenance for the disposal areas at the Site, including the Grantham South and Inert Areas. The Consent Decree did not, however, require the Work Defendants to implement the deed restrictions as described in the ROD Amendment. The Work Defendants did not, nor do they now have, a property interest in the Site, and therefore cannot implement the deed restrictions as described in the ROD Amendment.

WHEREAS, the Work Defendants are conducting operation and maintenance for the

disposal areas, including the Grantham South and Inert Areas.

WHEREAS, on July 8, 2003, EPA issued an Explanation of Significant Differences ("ESD") which modified the deed restriction portion of the ROD Amendment. The ESD provided additional language clarifying that the institutional controls restricting use of the land which would interfere with the protectiveness, integrity, and implementation of the RA be extended to the Grantham South Area, and that the restriction on installing drinking water wells be extended to the entire Site since all of the groundwater underlying the Site is contaminated. The ESD also described additional mechanisms available to implement the deed restriction portion of the ROD Amendment. In doing so, the ESD changed the term "deed restrictions" to the more general term "institutional controls." Institutional controls are non-engineering measures, usually legal controls, intended to limit human activity in such a way as to prevent or reduce exposure to hazardous substances. The ESD is attached hereto as Appendix B.

WHEREAS, EPA issued its third Five-year Review Report ("FYR Report") for the Site on September 21, 2005. The FYR Report recommended the implementation of institutional controls on Respondent's Site Property.

WHEREAS, on March 30, 2007, EPA issued Owner a unilateral administrative order, Docket No. CERC-03-2007-0054-DC ("Order"), pursuant to Section 106(a) of CERCLA, 42 U.S.C. § 9606(a). In the Order, EPA found that the Owner was a person who owns a portion of the Site, as the term "owner" is defined at Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and is therefore liable pursuant to Sections 107(a)(1) of CERCLA, 42 U.S.C. § 9607(a)(1). In the Order, EPA determined, pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606, that actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the

ESD, may present an imminent and substantial endangerment to the public health or welfare or the environment.

WHEREAS, on \_\_\_\_\_, EPA issued its First Amendment to the March 2007 Order ("Order Amendment") in which it found that the Respondent is a unit of local government which acquired title to the Property involuntarily through condemnation proceedings by virtue of its function as sovereign and is therefore excluded from the definition of "owner or operator" by Section 101(20)(D) of CERCLA, 42 U.S.C. § 9601(20)(D), and is therefore not liable pursuant to Section 107(a)(1) of CERCLA, 42 U.S.C. § 9607(a)(1).

WHEREAS, EPA has determined that in order to implement the ESD, the activities required by the Order must be performed.

WHEREAS, the Order limits the Owner's use of the Site. The portion of the Site owned by the Owner is referenced in the Order as Respondent's Site Property. The Respondent's Site Property is outlined within solid black lines on the first page of the maps attached hereto as Appendix A.

WHEREAS, in addition to the activities detailed above and those required by the Order, additional Response Actions (as set forth in Section VII.D of the Order) may need to be implemented at the Site.

WHEREAS, the Order uses the following terms also used herein:

"Constructed Remedy" shall mean the physical structures and systems constructed at the Grantham South and Inert Areas of the Site as part of the RAs selected in the ROD and the ROD Amendment. The Constructed Remedy was completed, or is being completed, by the Work Defendants under the Consent Decree and by EPA. The Constructed Remedy includes, but is not

limited to: an engineered low-permeability cap constructed at the Grantham South Area; a multi-layer cap constructed at the Inert Area; all supporting features at the Grantham South and Inert Areas, including ingress/egress roadways thereof, along with associated gas vents, pipes, drainage ditches and channels; perimeter security fencing; and a 10-foot buffer zone around these features.

"Response Action" shall mean all activities as defined by Section 101(25) of CERCLA, 42 U.S.C. § 9601(25).

"Respondent's Site Property" or "Property" shall mean the following areas of the Site owned by the Respondent which is set forth in the maps attached hereto as Appendix A: a portion of the Grantham South Area and the perimeter security fence; a portion of the perimeter security fence surrounding the Inert Area; a portion of the security fence which restricts access to the Temporary Area at the Site; and a ten (10)-foot buffer zone around all of these features. These areas are outlined within solid black lines on the first page of the maps attached hereto as Appendix A.

"Site" shall mean the Delaware Sand and Gravel Superfund Site, a "facility" as defined in Section 101(9) of CERCLA, 42 U.S.C. § 9601(9). The Site includes Respondent's Site Property. The Site is depicted on the first page of the maps attached hereto as Appendix A.

"Work" shall mean those activities the Work Defendants are required to perform under the Consent Decree.

"Work Defendants" shall mean the thirty-one (31) settling defendants under the Consent Decree.

WHEREAS, the Order requires the Owner (a) to comply with use restrictions concerning the Site; (b) to provide access to the Respondent's Site Property for the purpose of implementing

the ROD, the ROD Amendment, the ESD, and additional Response Actions; and (c) to provide certain notifications to EPA and potential successors-in-interest should the Owner convey an interest in all or a portion of the Respondent's Site Property.

**DECLARATION OF INSTITUTIONAL CONTROLS, ACCESS, AND OBLIGATIONS REGARDING SUCCESSORS-IN-INTEREST**

NOW, THEREFORE, intending to fulfill the terms of the Order, the Owner files this Notice so that the Respondent's Site Property is subject to the advisory set forth below.

1. **Purpose:** It is the purpose of this instrument to recite the Order's requirement that the Owner (i) comply with use restrictions concerning the Site set forth in Paragraph 2, immediately below; (ii) provide access to the Respondent's Site Property for the purpose of implementing the ROD, the ROD Amendment, the ESD, and additional Response Actions set forth in Paragraph 3, below; and (iii) to provide certain notifications to EPA and potential successors-in-interest should the Owner convey an interest in all or a portion of the Respondent's Site Property set forth in Paragraph 4 below.

2. **Restrictions on use:** The following advisory applies to the use of the Site:

A. Commencing on the effective date of the Order, and thereafter, the Order requires the Owner to refrain from using the Site in any manner that could

1. compromise or adversely affect the effectiveness and protectiveness of the Constructed Remedy and all additional Response Actions undertaken in accordance with Section VII.D of the Order that involve Respondent's Site Property.

2. interfere with, obstruct, or disturb the performance, support, or supervision of (i) the Work conducted or being conducted pursuant to the Consent Decree or (ii) all additional

Response Actions undertaken in accordance with Section VII.D of the Order. In addition, unless (i) required for implementation of the Work under the Consent Decree and/or required for implementation of additional Response Actions undertaken in accordance with Section VII.D of the Order that involve Respondent's Site Property (ii) or otherwise determined to be necessary by EPA, the Order requires the Respondent to refrain from all use of Respondent's Site Property, unless at least forty-five (45) days prior to any proposed use Respondent submits to EPA for review and approval a plan for Respondent's safe use of such area ("Safe Use Plan"). The Order requires that the Owner not commence any activities on Respondent's Site Property prior to Respondent's receipt of EPA approval of Respondent's Safe Use Plan, or any portion thereof. In addition, the Order requires that the Owner comply with the terms of the EPA-approved Safe Use Plan, or EPA-approved portion thereof.

B. The Order requires the Owner not to install, or allow to be installed, any public or domestic drinking water supply wells on the Respondent's Site Property.

3. Provision of Access: The following advisory applies to the provision of access to Respondent's Site Property:

Commencing on the effective date of the Order, and thereafter, the Order requires the Owner to provide EPA, the State, and their authorized representatives (including the Work Defendants, and EPA's, the State's, and the Work Defendants' contractors) with access at all reasonable times to Respondent's Site Property for the purpose of conducting any activity related to implementation of the ROD, the ROD Amendment, the ESD, or all additional Response Actions undertaken in accordance with Section VII.D of the Order including, but not limited to, the following activities:

- A. Verifying any data or information submitted to EPA or the State;
- B. Conducting investigations relating to contamination at or near the Respondent's Site Property, including the collection of environmental samples;
- C. Assessing the need for, planning, or implementing additional Response Actions at or near the Respondent's Site Property;
- D. Implementing the Work under the Consent Decree;
- E. Assessing the Work Defendants' compliance with the Consent Decree, and
- F. Determining whether the Respondent's Site Property or other property is being used in a manner that is prohibited or restricted by the Order.

4. Provision of certain notifications to EPA and potential successors-in-interest: The following advisory applies to the provision of certain notifications to EPA and potential successors-in-interest required by the Order regarding conveyance by the Owner of an interest in all or a portion of Respondent's Site Property:

A. With respect to Respondent's Site Property, the Order requires the Owner to record this Notice with the Recorder of Deeds of New Castle County, State of Delaware, and any other office where land ownership and transfer records are maintained for Respondent's Site Property. The Order requires the recording to be done in such manner as shall be effective to bring the Notice to the attention of any person examining or researching the state and/or quality of the title to the real property constituting Respondent's Site Property or searching for any encumbrances, covenants, easements, liens, restrictions, or other limitations relating to such Property. The Order requires such recording to be made in the Grantor/Grantee and Lot/Block indices of the Land Records for Respondent's Site Property. The Order requires that, thereafter, each deed, title, or

other instrument of conveyance for property executed by the Owner regarding Respondent's Site Property, or any portion thereof, shall contain a notice stating that the property is subject to the Order and any lien held by EPA pursuant to Section 107(1) of CERCLA, 42 U.S.C. § 9607(1), and shall reference the recorded location of this Notice, the Order, and any restrictions applicable to the property under the Order. The Order requires that the Owner not modify or release this Notice without prior written approval of EPA. In accordance with Section VII.A of the Order, the Order requires the Owner to provide EPA with a copy of this recorded Notice within ten (10) days of recording this Notice.

B. At least thirty (30) days prior to any change in control or the conveyance of any interest in Respondent's Site Property, including, but not limited to, fee interests, leasehold interests, easements, land use interests, licenses, and mortgage interests, the Order requires the Owner to give the grantee(s) or transferee(s)-in-interest a written description of the requirements set forth in Section VII.A, B, and C of the Order. At least thirty (30) days prior to such conveyance, the Order also requires the Owner to give written notice to EPA and the State of the proposed conveyance, including the name(s), address(es), and telephone number(s) of the grantee(s) or transferee(s)-in-interest, and the date on which notice of the requirements of Section VII.A, B, and C of the Order were given to the grantee(s). In addition, the Order requires the Owner to provide EPA with copies of all agreement(s) or contract(s), including, but not limited to, indemnification agreement(s) or contract(s), executed in connection with such transfer(s) or change(s), within five (5) days of the effective date of such agreement(s).

C. In the event that the Owner conveys less than a fee simple absolute interest in all or a portion of Respondent's Site Property, the Order provides that the Owner's obligations under

the Order, including, but not limited to, its obligation to provide access to and restrict use of Respondent's Site Property, pursuant to Section VII of the Order, shall continue to be met by the Owner with respect to any such conveyance. The Order provides that in no event shall such a conveyance release or otherwise affect the Owner's obligation to comply with all provisions of the Order, absent the prior written consent of EPA.

D. In the event that the Owner files for bankruptcy or is placed involuntarily in bankruptcy proceedings, the Order requires the Owner to notify EPA within three (3) working days of such filing.

5. No Public Access and Use: This instrument does not grant to the general public any right of access or use to any portion of the Property.

6. Notice requirements: The Owner is required to include in any instrument conveying any interest in any portion of the Property including, but not limited to, deeds, leases, and mortgages, a Disclosure which is in substantially the following form:

THE INTEREST CONVEYED HEREBY IS SUBJECT TO A NOTICE OF INSTITUTIONAL CONTROLS, ACCESS, AND OBLIGATIONS REGARDING SUCCESSORS-IN-INTEREST AND THE TERMS, CONDITIONS, AND RESTRICTIONS CONTAINED THEREIN, DATED \_\_\_\_\_ THE NOTICE OF INSTITUTIONAL CONTROLS, ACCESS, AND OBLIGATIONS REGARDING SUCCESSORS-IN-INTEREST WAS RECORDED ON \_\_\_\_\_ IN THE RECORDER'S OFFICE IN THE NEW CASTLE COUNTY COURTHOUSE, NEW CASTLE COUNTY, DELAWARE IN BOOK \_\_\_\_\_, PAGE \_\_\_\_\_.

Within thirty (30) days of the date any such instrument of conveyance is executed, Owner shall provide EPA with a certified true copy of said instrument and, if it has been recorded in the public land records, its recording reference.

7. Notice to Parties: Any notice, demand, request, consent, approval, or communication that

either EPA or Owner desires or is required to give to the other shall be in writing and shall either be served personally or sent by first class mail, postage prepaid, addressed as follows:

To Owner:

County Attorney  
New Castle County  
87 Reads Way  
New Castle, DE 19720

To EPA:

Debra Rossi (3HS23)  
EPA Project Coordinator  
United States Environmental Protection Agency,  
Region III  
1650 Arch Street  
Philadelphia, PA 19103  
RE: Delaware Sand & Gravel Site

and

Cynthia Nadolski (3RC43)  
Senior Assistant Regional Counsel  
United States Environmental Protection Agency,  
Region III  
1650 Arch Street  
Philadelphia, PA 19103  
RE: Delaware Sand & Gravel Site

IN WITNESS WHEREOF, New Castle County, the Grantor herein, has executed the foregoing Declaration this 23 day of June, 2008

Robert J. Richards  
Witness

Christopher Coen  
NEW CASTLE COUNTY

STATE OF DELAWARE

:SS.

NEW CASTLE COUNTY

BE IT REMEMBERED that on this 23 day of June A.D. 2008,  
personally came before me, the Subscriber, Notary Public for the State and County aforesaid, New Castle County, Declarant in the foregoing Notice of Institutional Controls, Access and Obligations Regarding Successors-in-Interest, and it acknowledged this Declaration to be its duly authorized act and deed.

GIVEN under my Hand and Seal of office of day and year aforesaid.

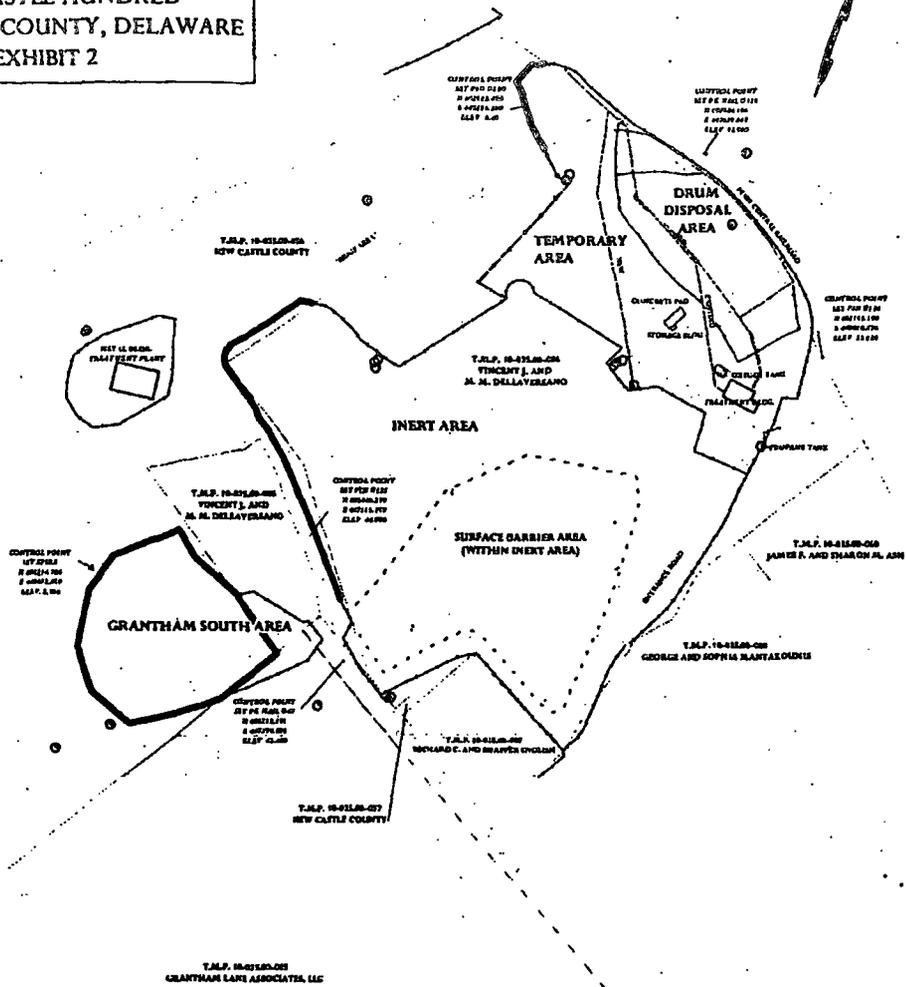
Janet D. Deluca  
Notary Public



1/27/2011  
My Commission Expires

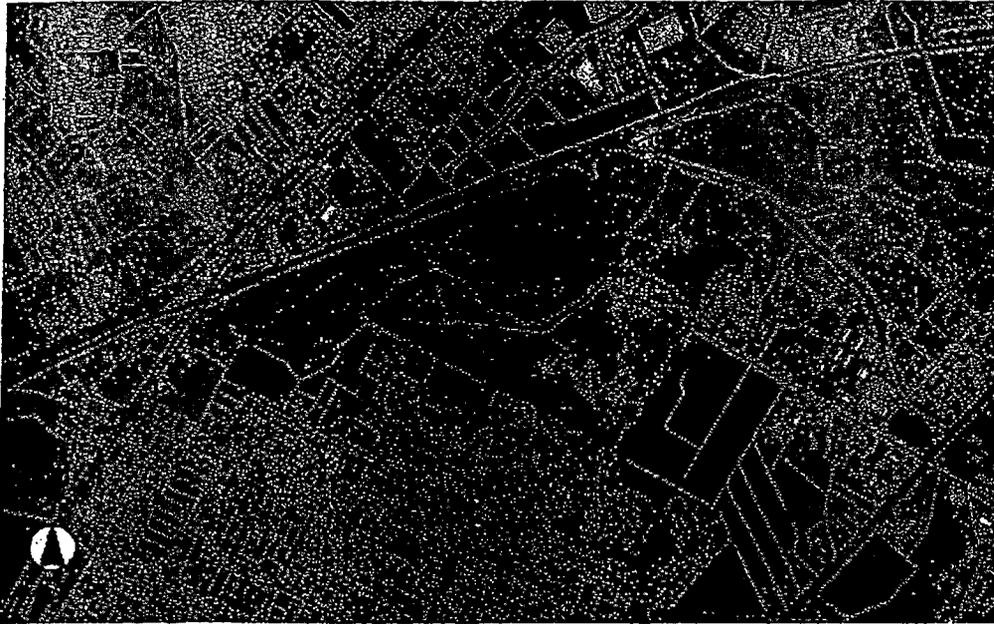
**APPENDIX A**  
**MAPS OF DELAWARE SAND AND GRAVEL SUPERFUND SITE**

**DELAWARE SAND & GRAVEL  
NEW CASTLE HUNDRED  
NEW CASTLE COUNTY, DELAWARE  
EXHIBIT 2**



- - - Fence Line
- Pipe
- Building
- - - Surface Barrier Area
- Slurry Wall
- - - Approximate Property Line
- Respondent's Site Property
- Monitor/Recovery Well

US EPA Region 3 GIS Team 4-24-2018 M Frank GEN1953 Map 1354



**APPENDIX B**  
**JULY 8, 2003 EXPLANATION OF SIGNIFICANT DIFFERENCES**  
**DELAWARE SAND AND GRAVEL SUPERFUND SITE**

**EXPLANATION OF SIGNIFICANT DIFFERENCES  
DELAWARE SAND AND GRAVEL SITE - NEW CASTLE, DELAWARE**

**I. INTRODUCTION**

**Site Name:** Delaware Sand and Gravel Superfund Site

**Site Location:** New Castle, New Castle County, Delaware

**Lead Agency:** U.S. Environmental Protection Agency,  
Region III ("EPA" or the "Agency")

**Support Agency:** Delaware Department of Natural Resources and Environmental Control  
("DNREC")

**Statement of Purpose**

A Record of Decision ("ROD") for the Delaware Sand and Gravel Superfund Site ("Site") was signed on April 22, 1988 and was modified by the issuance of a Record of Decision Amendment on September 30, 1993 ("1993 ROD Amendment"). The ROD, as modified by the 1993 ROD Amendment, is collectively referred to herein as the "Amended ROD." The Amended ROD delineates the remedial action selected to address contaminated groundwater, buried wastes and contaminated soils at the Site. The remedy selected in the Amended ROD (the "Selected Remedy") required the construction of temporary and permanent engineered structures to assist in the treatment of buried wastes or to physically contain the hazardous substances within respective disposal areas. The 1993 ROD Amendment also called for the implementation of institutional controls to prevent future use of the property that could compromise the effectiveness of the Selected Remedy and the installation of the drinking water wells. However, EPA and DNREC believe that it is appropriate to issue an Explanation of Significant Differences ("ESD") to provide additional language clarifying that the institutional controls restricting deleterious land uses are to extend to the Grantham South area, and that the restriction on installing drinking water wells needs to include the entire Delaware Sand and Gravel property as the underlying ground water is contaminated.

This ESD has been prepared to provide the public with an explanation of the nature of the modification to the institutional controls component of the 1993 ROD Amendment, to summarize the information that supports this modification, and to affirm that the revised remedy complies with the statutory requirements of CERCLA Section 121, 42 U.S.C. § 9621. The modification described below is "significant," as defined by 40 C.F.R. § 300.435(c)(2)(i) of the National Oil and Hazardous Substance Pollution Contingency Plan ("NCP"), and, therefore, requires preparation of this ESD. This modification to the Amended ROD does not fundamentally alter the basic features of the Selected Remedy with respect to scope, performance, or cost, but clarifies and expands the application of institutional controls at the Site.

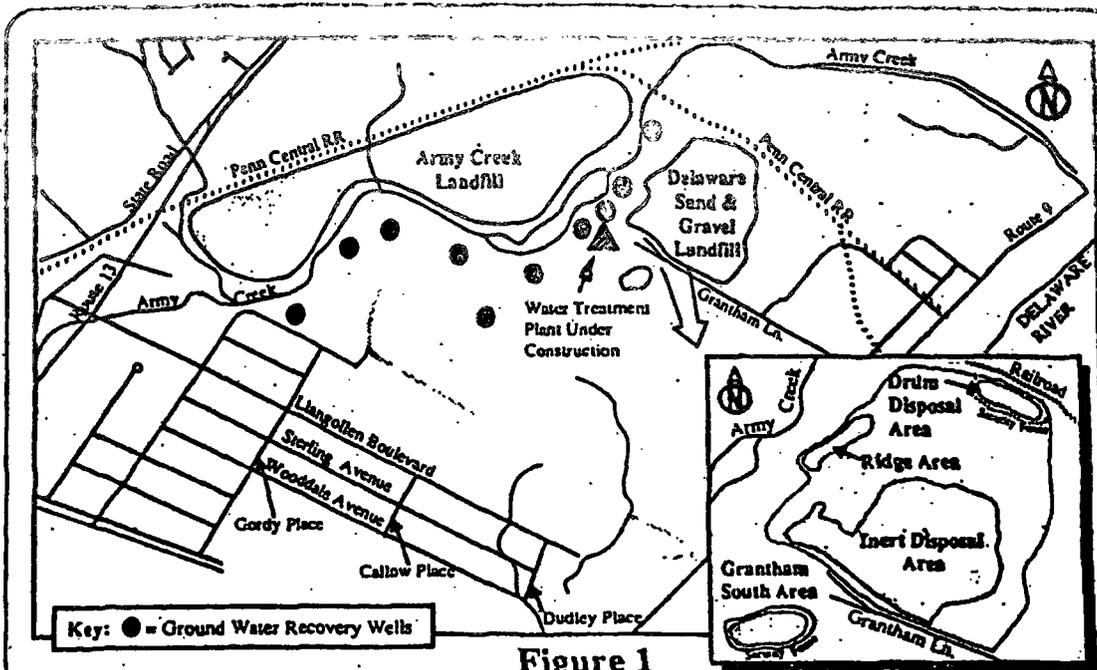


Figure 1

### *Delaware Sand & Gravel Landfill Disposal Areas*

**The Drum Disposal Area:** The Drum Disposal Area occupies approximately three quarters of an acre and is located south of the railroad tracks. This area was originally a pit where drums containing liquids and sludges, including perfume, plastics, paint, and petroleum, from various industrial processes were disposed. The majority of drum contents were organics and inorganic solids.

**The Inert Disposal Area:** The Inert Disposal Area is topographically the highest waste disposal area on site and occupies nearly 11 acres. Field investigations suggest that nearly one half million cubic yards of construction rubble and scattered chemical wastes were deposited in this disposal area.

**The Ridge Area:** The Ridge Area runs parallel to Army Creek occupying approximately half an acre. The Ridge Area was used primarily for surface storage of drums and large storage tanks containing inorganic and organic sludges and solids.

**The Grantham South Area:** The Grantham South Area is located on two acres on the southern side of Grantham Lane. An estimated 73,400 cubic yards of construction rubble and scattered chemical wastes were deposited in a layer nearly 35 feet thick.

Therefore, a ROD amendment is not required in this matter. This ESD is issued in accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. § 9617(c), as amended ("CERCLA"), and 40 C.F.R. § 300.435. This ESD is incorporated into the Administrative Record for the Site.

Copies of the Administrative Record are available at the following locations:

Delaware DNREC  
391 Lukens Drive  
New Castle, DE 19720  
(302) 395-2600  
Hours: Monday – Friday,  
8:00 a.m. to 4:30 p.m.

U.S. EPA Region III - 6<sup>th</sup> Floor Docket Room  
Ms. Anna Butch  
1650 Arch Street  
Philadelphia, PA 19103  
(215) 814-3157  
Hours: Monday – Friday, 8:30 a.m. to 4:30 p.m.

## II. SUMMARY OF THE SITE HISTORY, SITE CONDITIONS, AND SELECTED REMEDY

The Delaware Sand & Gravel Landfill Superfund Site ("DS&G" or "Site") is a former sand and gravel quarry comprised of 27 acres and located approximately two miles southwest of the City of New Castle. Approximately 550,000 cubic yards of industrial wastes and construction debris, including at least 7,000 drums, were disposed of within four distinct disposal areas on the DS&G property (see the enlarged area of Figure 1 and associated discussion for further information about each disposal area). The Site is bordered to the east by tracks of the Penn Central Railroad and on the west and north by Army Creek, which discharges into the Delaware River approximately one mile to the east. Public roads adjacent to the Delaware Sand & Gravel Site are Grantham Lane to the south and Route 9 to the east. The Site is adjacent to and southeast of another Superfund site, Army Creek Landfill, which was a municipal and industrial waste disposal site owned and operated by New Castle County.

The Amended ROD consists of the following major components:

### Grantham South Area

- Construction of an impermeable, multi-layer landfill cap to minimize infiltration of precipitation through buried waste material
- Perimeter fencing

### Drum Disposal Area

- Construction of a slurry wall surrounding the Drum Disposal Area to isolate buried drums and contaminated soil

- De-watering the interior of the slurry wall; on- or offsite treatment and disposal of extracted water
- Excavation of wastes buried within the Drum Disposal Area
- Treatment and/or disposal of drummed materials and highly contaminated soils
- Treatment of soils within the containment area using soil vapor extraction and bioremediation (bioventing)
- Construction of a multi-layer landfill cap to minimize infiltration of precipitation
- Perimeter fencing
- Deed restriction established to prevent installation of drinking water wells on the property and to prevent future uses of the property that could compromise the effectiveness of the Selected Remedy

#### **Ridge Area**

- Removal of existing surficial debris
- Excavation of surface soils exceeding soil cleanup standards (see Table 2 in the 1993 ROD Amendment)
- Treatment of the excavated soil with the material within the Drum Disposal Area
- Backfilling with clean soil, regrading and construction of a soil cover.

#### **Inert Area**

- Removal of existing surficial debris
- Construction of a multi-layer landfill cap
- Perimeter fencing
- Deed restriction established to ensure that the containment components are not compromised by future use of the property.

#### **Site-Wide Ground Water Plume Management and Environmental Monitoring**

- Continued recovery of contaminated ground water

- Treatment of recovered contaminated ground water prior to discharge to Army Creek
- Monitoring of ground water, air and adjacent wetlands

As of the issuance of this ESD most of the active construction has been completed at the four discrete disposal areas. The impermeable caps have been installed over the Grantham South and Inert Areas, contaminated soils have been removed from the Ridge Area, the buried drums have been removed and the bioventing system is operating to treat contaminated soil at the Drum Disposal Area. Ground water is being recovered and treated prior to being discharged to the Army Creek.

### III. DESCRIPTION OF SIGNIFICANT DIFFERENCE AND THE BASIS FOR THOSE DIFFERENCES

The 1993 ROD Amendment was written in such a manner as to inadvertently omit a requirement to establish institutional controls at the Grantham South disposal area. The RCRA Subtitle-C multilayered landfill cap has been constructed over the Grantham South disposal area and is operational and functional. The long-term effectiveness of the constructed remedy at the Grantham South disposal area depends on the integrity of the impermeable cap. Accordingly, by operation of this ESD, institutional controls will be implemented at the Grantham South Area to ensure that the Selected Remedy is not compromised by future use of the property.

In addition, the 1993 ROD Amendment was written in such a manner as to place the language describing the requirement to restrict the installation of drinking water wells in the section addressing the Drum Disposal Area. Although the Drum Disposal Area is a major source of contamination in the ground water beneath the Delaware Sand and Gravel Site, the intent of the institutional control is to prevent exposure to contaminated ground water. The ground water beneath the entire site is contaminated with hazardous substances above health-based concentrations. Accordingly, by operation of this ESD, EPA modifies the Amended ROD to make clear that restrictions on installation of drinking water wells is to be implemented Site-wide.

#### What Are Institutional Controls?

Institutional controls are non-engineering measures, usually legal controls, intended to limit human activity in such a way as to prevent or reduce exposure to hazardous substances. In this case, EPA expects that notices will be filed with the New Castle County Recorder of Deeds to notify the public and prospective purchasers of the Site that it is on the National Priorities List and that hazardous substances are present there. The title notice will specify the restrictions on use of the Site. Restrictions on use of the Site may also be accomplished through administrative orders or judicial consent decrees.

Finally, through this ESD, EPA is adding additional available mechanisms to implement the restrictions included in the revised remedy.

The 1993 ROD Amendment used the phrase "deed restriction" in describing the restrictions to be placed on the Site. EPA now believes that this reliance on restrictions being filed with public land records is too narrow. Accordingly, this ESD is changing the term "deed restrictions" to the more general term "institutional controls." Institutional controls are non-engineering measures, usually legal controls, intended to limit human activity in such a way as to prevent or reduce exposure to hazardous substances.

<b>Description of Proposed Remedy Modifications<sup>1</sup></b>	
<b>Institutional Controls in 1993 ROD Amendment</b>	<b>Institutional Controls in this ESD</b>
Deed restrictions shall be placed by the Site property owner to prevent any future use of the Inert or Drum Disposal Areas that could compromise the effectiveness of the Selected Remedy.	Institutional controls shall be established to prevent any future use of the Grantham South, Inert or Drum Disposal Areas that could compromise the effectiveness of the Selected Remedy.
Deed restrictions shall be placed by the Site property owner to prevent installation of drinking water wells at the Drum Disposal Area of the Site.	Institutional controls shall be established to prevent the installation of drinking water wells at the Delaware Sand and Gravel Site.

This modification to the Selected Remedy does not fundamentally alter the basic features of the Selected Remedy with respect to scope, performance, or cost. The modification does incrementally expand the scope of land use institutional controls to include the Grantham South disposal area. The modification also incrementally expands the restriction on installation of drinking water wells to include the entire Site. The long-term effectiveness (i.e., performance) of the Selected Remedy will be enhanced by providing greater assurance that the containment strategy being implemented at the Grantham South disposal area will remain uncompromised by potentially harmful land uses. The enhanced institutional controls will not have an appreciable impact to the cost of the Selected Remedy. EPA has made the determination that a modification to the Amended ROD requiring the enhanced institutional controls discussed above is warranted to ensure the protection of human health, safety and welfare, and the environment.

#### **IV. PUBLIC PARTICIPATION**

This ESD will become part of the Administrative Record File for the Site. The

---

<sup>1</sup> All components of the Selected Remedy other than institutional controls remain unchanged by this ESD.

Administrative Record also includes the April 22, 1988 ROD, the 1993 ROD Amendment and all documents that formed the basis for EPA's selection of the cleanup remedy for the Site. The Administrative Record is available for public review at the locations listed in Section I of this ESD.

Questions or comments on EPA's actions can be directed to:

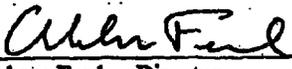
Philip Rotstein  
Remedial Project Manager  
U.S. EPA, Region III  
1650 Arch Street (3HS23)  
Philadelphia, PA 19103  
(215) 566-3232

#### V. SUPPORT AGENCY REVIEW

In accordance with 40 C.F.R. § 300.435(c)(2), EPA has notified the Delaware DNREC of the modification to the institutional controls component of the Selected Remedy described in this ESD. Delaware DNREC concurs with the issuance of this ESD.

#### VI. AFFIRMATION OF STATUTORY DETERMINATION

Considering the change that has been made to the institutional controls component of the Selected Remedy under this ESD, EPA and DNREC believe that the remedy remains protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to this remedial action, and is cost-effective. In addition, the revised remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable at this Site.

  
Abraham Ferdas, Director  
Hazardous Site Cleanup Division

7/8/03  
Date

**Appendix J: Recorded Notice of Institutional Controls for Property Owned by Grantham Lane Associates**

# Grantham Lane Assoc., LLC

761 Grantham Lane New Castle, De 19720  
 PHONE (302) 998-8486 FAX (302) 998-9208



SDMS DocID 2073403

## LETTER OF TRANSMITTAL

TO Debra Rossi - US EPA Region III  
1650 Arch Street  
Philadelphia, PA 19103

DATE	10/30/06	JOB NO	758 Glane
ATTENTION	Debra Rossi		
RE	Administrative Order		

GENTLEMEN:

WE ARE SENDING YOU THE FOLLOWING ITEMS:

- ATTACHED
- CHANGE ORDER  PLANS  SHOP DRAWINGS  SPECIFICATIONS  SAMPLES
- COPY OF LETTER  PRINTS  PURCHASE ORDER  \_\_\_\_\_

COPIES	DATE	NO.	DESCRIPTION
Two	10/20/06		Recorded Notice of Institutional Controls, Access, and Obligations

THESE ARE TRANSMITTED as checked below:

- FOR APPROVAL  APPROVED AS SUBMITTED  RESUBMIT \_\_\_\_\_ COPIES FOR APPROVAL
- FOR YOUR USE  APPROVED AS NOTED  SUBMIT \_\_\_\_\_ COPIES FOR DISTRIBUTION
- AS REQUESTED  RETURN FOR CORRECTIONS  RETURN \_\_\_\_\_ CORRECTED PRINTS
- FOR REVIEW AND COMMENT  \_\_\_\_\_
- FOR BIDS DUE \_\_\_\_\_  RETURN PRINTS WHEN FINISHED

REMARKS

COPY TO

Mr. John Cargill

SIGNED:

*if enclosures are not as noted, kindly notify us at once*

20061025-0101289  
Pages: 28 F: \$317.00  
10/23/06 03:09:56 PM  
T20060079200  
Michael E. Kozikowski  
New Castle Recorder MISC

EXHIBIT 7

Prepared By  
Return To:  
US Environmental Protection  
Agency, Region III  
1650 Arch Street  
Philadelphia, PA 19103

Assessment Parcel Number: 10-035.00-005

Address: 758 Grantham Lane, New Castle, DE 19720

Prepared by: U.S. Environmental Protection Agency, Region III  
1650 Arch Street  
Philadelphia, PA 19103

RECEIVED

**NOTICE OF INSTITUTIONAL CONTROLS, ACCESS, AND OBLIGATIONS  
REGARDING SUCCESSORS-IN-INTEREST**

This Notice of Institutional Controls, Access, and Obligations regarding Successors-in-Interest ("Notice") is made this 20th day of October 2006, by Grantham Lane Associates, LLC ("Owner" or "Respondent"), having an address of 758 Grantham Lane, New Castle, DE 19720.

WHEREAS, Owner is the owner of a portion of the Delaware Sand and Gravel Superfund Site ("Site"), a former sand and gravel quarry converted into an industrial waste landfill comprising approximately 27 acres and located approximately two miles southwest of the City of New Castle, Delaware. A legal description of Owner's portion of the Site is attached hereto as Appendix A. The Site is bordered to the east by railroad tracks and on the west and north by Army Creek, which discharges into the Delaware River approximately one mile to the east. Public roads near the Site include Grantham Lane which runs through the Site and Route 9 to the east. The Site and the Owner's portion of the Site thereof are more particularly depicted on the map attached hereto as Appendix B.

WHEREAS, "hazardous substances," as that term is defined in Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), were disposed of within four distinct disposal areas at the Site.

Disposal took place at the Site between approximately 1959 and 1976.

WHEREAS, pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, EPA placed the Site on the CERCLA National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on September 8, 1983, 48 Fed. Reg. 40650.

WHEREAS, on April 22, 1988, EPA issued a Record of Decision ("ROD") for the Site, on which the State concurred. Notice of the ROD was published in accordance with Section 117(b) of CERCLA, 42 U.S.C. § 9617(b). The ROD describes the Remedial Action ("RA") which EPA selected for the Site. In recognition of the area-specific conditions defined by the Remedial Investigation/Feasibility Study, the ROD provided for specific remedial activities for each area and Site groundwater. Those areas were the Drum Disposal Area, the Ridge Area, the Inert Area and the Grantham South Area.

WHEREAS, the Grantham South Area is a two-acre landfill containing debris and mixed chemical waste. The RA for the Grantham South Area called for, among other things, the installation of perimeter fencing; the installation of a multi-layer cap; and the installation of a gas venting system.

WHEREAS, the RA selected in the ROD for ground water called for, among other things, the recovery and treatment of contaminated ground water, the discharge of treated water to the Army Creek, and monitoring of ground water.

WHEREAS, based on new information developed during preliminary design activities and promising advances in a developing innovative technology, EPA and the State determined that the RA selected in the ROD should be amended.

WHEREAS, on September 30, 1993, EPA issued a ROD Amendment ("ROD

Amendment”) for the Site, on which the State concurred. The ROD Amendment modified the RA selected in the ROD for the Drum Disposal, Ridge and Inert Areas, calling for, among other things, deed restrictions for those portions of the Site.

WHEREAS, the ROD Amendment did not modify the RA selected in the ROD for the Grantham South Area or for groundwater.

WHEREAS, the ROD Amendment called for restrictions to be placed by the Site property owner on the deed to the Site to (1) ensure that future use of the property would not compromise the containment component of the Inert Area, the treatment system or containment components of the Drum Disposal Area; and (2) prevent the installation of drinking water wells in areas affecting the Drum Disposal Area.

WHEREAS, the plume of contaminated ground water originating from the Site has commingled with the plume of contaminated ground water originating from the adjacent Army Creek Landfill Superfund Site. The Army Creek Landfill is a former landfill owned and operated by New Castle County. In recognition of this circumstance, the pump and treat ground water response action addressing ground water contamination emanating from the two contiguous Superfund Sites is being implemented collectively pursuant to a series of cost sharing agreements. New Castle County has taken the lead regarding the operation and maintenance of the collective ground water response actions which consist of including ground water recovery wells, the ground water treatment system and monitoring the effectiveness of the strategy with ground water monitoring wells.

WHEREAS, on June 14, 1995, the United States District Court for the District of Delaware entered a consent decree (“Consent Decree”) which was signed by the United States on

behalf of EPA, the State and by thirty-one settling defendants (“Work Defendants”). The Consent Decree called for performance of the remedial design/remedial action set forth in the ROD Amendment and reimbursement of a portion of EPA’s past and future response costs at the Site. The Consent Decree also required the Work Defendants to conduct operation and maintenance for the areas requiring remedial action called for in the ROD and ROD Amendment. The Consent Decree did not, however, require the Work Defendants to implement the deed restrictions as described in the ROD Amendment. The Work Defendants did not, nor do they have a property interest in the Site, and therefore cannot implement the deed restrictions as described in the ROD Amendment.

WHEREAS, EPA conducted the RA for the Grantham South Area between 1989 and 1991 pursuant to the ROD. The Work Defendants are conducting operation and maintenance for the Grantham South Area and are participating in the ground water pump and treat response action with New Castle County through a cost sharing agreement. The Work Defendants have completed, or are completing, the Constructed Remedy (as defined herein) and are continuing to implement the remainder of the remedial action and operation and maintenance set forth in the ROD and the ROD Amendment, except for the deed restrictions as described in the ROD Amendment.

WHEREAS, in January 2001, New Castle County agreed to undertake limited additional response activities to further define the source(s) and extent of contamination in the Columbia and Upper Potomac aquifers at the Army Creek Landfill Superfund Site and the Delaware Sand & Gravel Superfund Site. EPA approved New Castle County’s *Investigation of Contamination in Columbia Formation and Upper Potomac Aquifers Work Plan for Army Creek Superfund Site*

("Work Plan") on October 16, 2001. In accordance with the Work Plan, New Castle County installed two ground water monitoring wells, C-6 and P-6, on Respondent's Site Property (as defined herein) in January and February of 2002.

WHEREAS, EPA determined that the description of the deed restriction portion of the ROD Amendment should be clarified. Accordingly, on July 8, 2003 EPA issued an Explanation of Significant Differences ("ESD") which modified the deed restriction portion of the ROD Amendment. The ESD provided additional language clarifying that the institutional controls restricting use of the land which would interfere with the protectiveness, integrity and implementation of the Remedial Action be extended to the Grantham South Area, and that the restriction on installing drinking water wells be extended to the entire Site since all of the groundwater underlying the Site is contaminated. The ESD also described additional mechanisms available to implement the deed restriction portion of the ROD Amendment. In doing so, the ESD changed the term "deed restrictions" to the more general term "institutional controls." Institutional controls are non-engineering measures, usually legal controls, intended to limit human activity in such a way as to prevent or reduce exposure to hazardous substances. The ESD is attached hereto as Appendix C.

WHEREAS, EPA issued its third Five-year Review Report ("FYR Report") for the Site on September 21, 2005. The FYR Report recommended the implementation of institutional controls on Respondent's Site Property (as defined herein).

WHEREAS, on July 19, 2006, EPA notified the Work Defendants and New Castle County of the need for additional response actions to address ground water contamination in the Potomac aquifer in the vicinity of monitoring well P-6.

WHEREAS, on \_\_\_\_\_, EPA issued Owner a unilateral administrative order. Docket No. CERC-03-2006-0298DC ("Order"), pursuant to Section 106(a) of CERCLA, 42 U.S.C. § 9606(a). In the Order EPA found that the Owner was a person who owns a portion of the Site, as the term "owner" is defined at Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and is therefore liable pursuant to Sections 107(a)(1) of CERCLA, 42 U.S.C. § 9607(a)(1). In the Order EPA determined, pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606, that actual or threatened releases of hazardous substances from the Site, if not addressed by implementing the ESD, may present an imminent and substantial endangerment to the public health or welfare or the environment.

WHEREAS, EPA has determined that in order to implement the ESD, the activities required by the Order must be performed.

WHEREAS, the Order limits the Owner's use of the Site. That portion of the Site owned by the owner is referenced in the Order as Respondent's Site Property. The Respondent's Site Property is outlined within black solid lines on the map attached hereto as Appendix B.

WHEREAS, in addition to the activities detailed above and those required by the Order, additional Response Actions (as defined herein) may need to be implemented at the Site.

WHEREAS, the Order uses the following terms also used herein:

"Constructed Remedy" shall mean the physical structures and systems constructed on the Site as part of the RA selected in the ROD and ROD Amendment. The Constructed Remedy was completed, or is being completed, by the Work Defendants under the Consent Decree, by New Castle County through cost sharing agreements and by EPA. The Constructed Remedy includes, but is not limited to: an engineered low-permeability cap constructed at the Grantham South

Area, and all supporting features including the ingress/egress roadways thereof, along with associated gas vents, pipes, drainage ditches and channels; ground water monitoring and extraction wells; perimeter security fencing; utilities such as electric, water and sewer; and a 10-foot buffer zone around these features.

"Response Action" shall mean all activities as defined by Section 101(25) of CERCLA, 42 U.S.C. § 9601(25).

"Respondent's Site Property" or "Property" shall mean the following portions of the Site located on property owned by the Respondent which is described in the deed appended hereto as Appendix A: A portion of the Grantham South Area and the perimeter security fence; ground water monitoring and extraction wells; and a ten-foot buffer zone around all of these features. These areas are set forth within solid black lines on the map attached to this Notice as Appendix B.

"Site" shall mean the Delaware Sand and Gravel Superfund Site, a "facility" as defined in Section 101(9) of CERCLA, 42 U.S.C. § 9601(9). The Site includes Respondent's Site Property. The Site is depicted on the map attached hereto as Appendix B.

"Work" shall mean those activities the Work Defendants are required to perform under the Consent Decree and the ground water response actions being implemented by New Castle County in accordance with cost sharing agreements.

W. "Work Defendants" shall mean the thirty-one settling defendants under the Consent Decree. For the purpose of Section VII.B (Access to Respondent's Site Property) of the Order, Work Defendants shall also include New Castle County and its contractors implementing the ground water response actions pursuant to cost sharing agreements.

WHEREAS, the Order requires the Owner (a) to comply with use restrictions concerning the Site; (b) to provide access to the Respondent's Site Property for the purpose of implementing the ROD, the ROD Amendment, the ESD and additional Response Actions; and (c) to provide certain notifications to EPA and potential successors-in-interest should the Owner convey an interest in all or a portion of the Respondent's Site Property.

DECLARATION OF INSTITUTIONAL CONTROLS, ACCESS, AND OBLIGATIONS  
REGARDING SUCCESSORS-IN-INTEREST

NOW, THEREFORE, intending to fulfill the terms of the Order, the Owner files this Notice so that the Property is subject to the advisory set forth below.

1. Purpose: It is the purpose of this instrument to recite the Order's requirement that the Owner (i) comply with use restrictions concerning the Site set forth in Paragraph 2 immediately below; (ii) provide access to the Respondent's Site Property for the purpose of implementing the ROD, the ROD Amendment, the ESD and additional Response Actions set forth in Paragraph 3 below; and (iii) to provide certain notifications to EPA and potential successors-in-interest should the Owner convey an interest in all or a portion of the Respondent's Site Property set forth in Paragraph 4 below.

2. Restrictions on use: The following advisory applies to the use of the Site:

A. Commencing on the effective date of the Order, and thereafter, the Order requires the Owner to refrain from using the Site in any manner that could

1. compromise or adversely affect the effectiveness and protectiveness of the Constructed Remedy and all additional Response Actions undertaken in accordance with Section

VII.D of the Order that involve Respondent's Site Property.

2. interfere with, obstruct, or disturb the performance, support, or supervision of (i) the Work conducted or being conducted pursuant to the Consent Decree or (ii) all additional Response Actions undertaken in accordance with Section VII.D of the Order. In addition, unless (i) required for implementation of the Work under the Consent Decree and or required for implementation of additional Response Actions undertaken in accordance with Section VII.D of the Order that involve Respondent's Site Property (ii) or otherwise determined to be necessary by EPA, the Order requires the Respondent to refrain from all use of Respondent's Site Property, unless at least forty-five (45) days prior to any proposed use Respondent submits to EPA for review and approval a plan for Respondent's safe use of such area ("Safe Use Plan"). The Order requires that the Owner not commence any activities on Respondent's Site Property prior to Respondent's receipt of EPA approval of Respondent's Safe Use Plan, or any portion thereof. In addition, the Order requires that the Owner comply with the *terms of the EPA-approved Safe Use Plan, or EPA-approved portion thereof.*

B. The Order requires the Owner not to install, or allow to be installed, any public or domestic drinking water supply wells on the Respondent's Site Property.

3. Provision of Access: The following advisory applies to the provision of access to Respondent's Site Property:

Commencing on the effective date of the Order, and thereafter, the Order requires the Owner to provide EPA, the State, and their authorized representatives (including the Work Defendants, and EPA's, the State's and the Work Defendants' contractors) with access at all reasonable times to Respondent's Site Property for the purpose of conducting any activity related

to implementation of the ROD, the ROD Amendment, the ESD, or all additional Response Actions undertaken in accordance with Section VII.D of the Order including, but not limited to, the following activities:

- A. Verifying any data or information submitted to EPA or the State;
- B. Conducting investigations relating to contamination at or near the Respondent's Site Property, including the collection of environmental samples;
- C. Assessing the need for, planning, or implementing additional Response Actions at or near the Respondent's Site Property;
- D. Implementing the Work under the Consent Decree;
- E. Assessing the Work Defendants' compliance with the Consent Decree; and
- F. Determining whether the Respondent's Site Property or other property is being used in a manner that is prohibited or restricted by the Order.

4. Provision of certain notifications to EPA and potential successors-in-interest: The following advisory applies to the provision of certain notifications to EPA and potential successors-in-interest required by the Order regarding conveyance by the Owner of an interest in all or a portion of Respondent's Site Property:

- A. With respect to Respondent's Site Property, the Order requires the Owner to record this Notice with the Recorder of Deeds of New Castle County, State of Delaware, and any other office where land ownership and transfer records are maintained for Respondent's Site Property. The Order requires the recording to be done in such manner as shall be effective to bring the Notice to the attention of any person examining or researching the state and or quality of the title to the real property constituting Respondent's Site Property or searching for any

encumbrances, covenants, easements, liens, restrictions, or other limitations relating to such Property. The Order requires such recording to be made in the Grantor/Grantee and Lot Block indices of the Land Records for Respondent's Site Property. The Order requires that, thereafter, each deed, title, or other instrument of conveyance for property executed by the Owner regarding Respondent's Site Property, or any portion thereof, shall contain a notice stating that the property is subject to the Order and any lien held by EPA pursuant to Section 107(1) of CERCLA. 42 U.S.C. § 9607(1), and shall reference the recorded location of this Notice, the Order and any restrictions applicable to the property under the Order. The Order requires that the Owner not modify or release this Notice without prior written approval of EPA. In accordance with Section VII.A of the Order, the Order requires the Owner to provide EPA with a copy of this recorded Notice within ten (10) days of recording this Notice.

B. At least thirty (30) days prior to any change in control or the conveyance of any interest in Respondent's Site Property, including, but not limited to, fee interests, leasehold interests, easements, land use interests, licenses and mortgage interests, the Order requires the Owner to give the grantee(s) or transferee(s)-in-interest a written description of the requirements set forth in Section VII.A, B and C of the Order. At least thirty (30) days prior to such conveyance, the Order also requires the Owner to give written notice to EPA and the State of the proposed conveyance, including the name(s), address(es) and telephone number(s) of the grantee(s) or transferee(s)-in-interest, and the date on which notice of the requirements of Section VII.A, B and C of the Order were given to the grantee(s). In addition, the Order requires the Owner to provide EPA with copies of all agreement(s) or contract(s), including but not limited to indemnification agreement(s) or contract(s), executed in connection with such transfer(s) or



provide EPA with a certified true copy of said instrument and, if it has been recorded in the public land records, its recording reference.

7. Notice to Parties: Any notice, demand, request, consent, approval, or communication that either EPA or Owner desires or is required to give to the other shall be in writing and shall either be served personally or sent by first class mail, postage prepaid, addressed as follows:

To Owner:

Lewis Pritzkur, Esquire  
Gangi & Pritzkur, P.A.  
712 West Street  
Wilmington, DE 19801

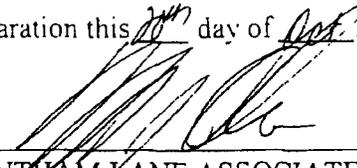
To EPA:

Debra Rossi (3HS23)  
EPA Project Coordinator  
United States Environmental Protection Agency,  
Region III  
1650 Arch Street  
Philadelphia, PA 19103  
RE: Delaware Sand and Gravel Superfund Site

and

Michael A. Hendershot (3RC43)  
Senior Assistant Regional Counsel  
United States Environmental Protection Agency,  
Region III  
1650 Arch Street  
Philadelphia, PA 19103  
RE: Delaware Sand and Gravel Superfund Site

IN WITNESS WHEREOF, Grantham Lane Associates, LLC, the Grantor herein, has executed the foregoing Declaration this 20<sup>th</sup> day of Oct., 2006

  
\_\_\_\_\_  
GRANTHAM LANE ASSOCIATES, LLC

STATE OF DELAWARE

:SS.

NEW CASTLE COUNTY

BE IT REMEMBERED that on this 20<sup>th</sup> day of Oct A.D. 2006 personally came before me, the Subscriber, Notary Public for the State and County of Delaware, Michael J. Cirillo, Authorized Member of aforesaid/Grantham Lane Associates, LLC. Declarant in the foregoing Notice of Institutional Controls, Access, and Obligations Regarding Successors-in-Interest, and it acknowledged this Declaration to be its duly authorized act and deed.

GIVEN under my Hand and Seal of office the day and year aforesaid.

  
\_\_\_\_\_  
Notary Public

10<sup>th</sup> November 2008  
\_\_\_\_\_  
My Commission Expires

EXHIBIT 6

20030228-0026056  
Pages: 3 F: \$38.00  
02/28/03 04:38:32 PM  
T28030017682  
Michael E. Kozikowski  
New Castle Recorder DEE

Parcel No. 10-035.00-005

File No. D-03.53

PREPARED BY/RETURN TO:  
Lewis H. Pritzkur, Esquire  
Gangi & Pritzkur, P.A.  
712 West Street  
Wilmington, Delaware 19801

D E E D

THIS DEED, Made this 27<sup>th</sup> day of February, 2002.

BETWEEN, PETRILLO BROTHERS, INC., a Delaware corporation,  
party of the first part,

A N D

GRANTHAM LANE ASSOCIATES, LLC, party of the second part.

WITNESSETH, That the party of the first part, for and in consideration of the sum of TEN AND NO/100 (\$10.00) DOLLARS, lawful money of the United States of America, and other good and valuable consideration, the receipt whereof is hereby acknowledged, hereby grants and conveys unto the said party of the second part, its successors and assigns,

ALL that certain lot, piece or parcel of land, situate in New Castle Hundred, New Castle County, Delaware, being located on the Southerly side of Grantham Lane, and being more particularly bounded and described as follows, to wit:

BEGINNING at a stake in the Southerly side of Grantham's Lane, at 45.00 feet wide, and leading into the River or Hamburg Road, and also a common corner for lands now or formerly of Frank H. Long; thence by lands now or formerly of Frank H. Long and along line of lands now or formerly of Keen, South 37 degrees, 50 minutes, 00 seconds West, 1,253.00 feet to a point in line of lands now or formerly of H. S. McComb; thence along line of lands now or formerly of H. S. McComb, North 55 degrees, 28 minutes, 00 seconds West, 1,052.50 feet to a point, a common corner for lands now or formerly of Nicola Caruso; thence along line of lands now or formerly of Nicola Caruso, North 37 degrees, 12 minutes, 00 seconds East, 1,305.40 feet to a point in the aforesaid Southerly side of Grantham's Lane; and thence thereby, South 53 degrees, 00 minutes, 00 seconds East, 1,043.00 feet to the point and place of Beginning. Be the contents thereof what they may.

SAID PROPERTY being more particularly bounded and described in accordance with a legal description prepared by McBride & Ziegler, Inc., Land Surveyors, Planners, Engineers, Newark, Delaware, dated November 22, 2002, as follows, to wit:

BEGINNING at a point in the Southerly side of Grantham Lane, at 45.00 feet wide, a common corner for lands now or formerly of Carolyn J. and Budd P. M. Gordon and the herein described property; thence from said Beginning point, along the common division line for lands now or formerly of Carolyn J. and Budd P. M. Gordon, lands now or formerly of Outten, LLC, lands now or formerly of Carmen A. Mangini, lands now or formerly of James E. and Mary T. McDaniel, lands now or formerly of David M. Stewart

3 2/

and lands now or formerly of John Purcell, South 30 degrees, 55 minutes, 40 seconds West, 1,248.87 feet to a point in line of lands now or formerly of George M. and Sharyn L. Holmberg; thence thereby, in part, along the common division line for lands now or formerly of Parkway Gravel, Inc., lands now or formerly of Eric D. and Denise R. Barnett and lands now or formerly of Albert Jr. and Kathleen Campbell, North 62 degrees, 20 minutes, 55 seconds West, 1,055.80 feet to a point, a common corner for lands now or formerly of New Castle County; thence thereby, North 31 degrees, 07 minutes, 40 seconds East, 1,301.45 feet to a point in the aforesaid Southerly side of Grantham Lane; and thence thereby, South 55 degrees, 29 minutes, 45 seconds East, 1,050.65 feet to the point and place of Beginning. Containing within the aforesaid metes and bounds, 30.804 acres of land, be the same more or less.

SUBJECT, however, to all enforceable covenants, conditions, easements, reservations, restrictions and limitations of record, this reference to which shall not be construed to reimpose the same in the event that the same or any of the same have expired.

SUBJECT, further, however, to the payment of such annual sewer service charges as may be established by New Castle County from time to time.

BEING the same lands and premises which Denny A. Petrillo and Carmela M. Petrillo, husband and wife, and Charles A. Petrillo and Mary A. Petrillo, husband and wife, by Indenture dated June 19, 1969, and recorded in the Office for the Recording of Deeds, in and for New Castle County, in Deed Record C, Volume 82, Page 201, did grant and convey unto Petrillo Brothers, Inc., a Delaware corporation, party of the first part herein, in fee.

PROPERTY ADDRESS- 758 Grantham Lane  
New Castle, Delaware 19720

TAX PARCEL NUMBER- 10-035.00-005

GRANTEE MAILING ADDRESS- 314 Bay West Boulevard  
Suite D  
New Castle, Delaware 19720

IN WITNESS WHEREOF, Petrillo Brothers, Inc. has caused its name by Jean P. Waddill, its President to be hereunto set, and the common and corporate seal of the said corporation to be hereunto affixed, duly attested by its Secretary, this 27<sup>th</sup> day of February, 2003.

Sealed and Delivered  
in the Presence of:

PETRILLO BROTHERS, INC.

By: Jean P. Waddill  
President

Attest: Jean P. Waddill  
Secretary

Corporate Seal



APPENDIX B  
[MAP OF DELAWARE SAND AND GRAVEL SUPERFUND SITE AND RESPONDENT'S  
SITE PROPERTY PORTION THEREOF]



APPENDIX C  
[JULY 8, 2003 EXPLANATION OF SIGNIFICANT DIFFERENCES  
DELAWARE SAND AND GRAVEL SUPERFUND SITE]

**EXPLANATION OF SIGNIFICANT DIFFERENCES  
DELAWARE SAND AND GRAVEL SITE - NEW CASTLE, DELAWARE**

**I. INTRODUCTION**

Site Name: Delaware Sand and Gravel Superfund Site

Site Location: New Castle, New Castle County, Delaware

Lead Agency: U.S. Environmental Protection Agency,  
Region III ("EPA" or the "Agency")

Support Agency: Delaware Department of Natural Resources and Environmental Control  
("DNREC")

**Statement of Purpose**

A Record of Decision ("ROD") for the Delaware Sand and Gravel Superfund Site ("Site") was signed on April 22, 1988 and was modified by the issuance of a Record of Decision Amendment on September 30, 1993 ("1993 ROD Amendment"). The ROD, as modified by the 1993 ROD Amendment, is collectively referred to herein as the "Amended ROD." The Amended ROD delineates the remedial action selected to address contaminated groundwater, buried wastes and contaminated soils at the Site. The remedy selected in the Amended ROD (the "Selected Remedy") required the construction of temporary and permanent engineered structures to assist in the treatment of buried wastes or to physically contain the hazardous substances within respective disposal areas. The 1993 ROD Amendment also called for the implementation of institutional controls to prevent future use of the property that could compromise the effectiveness of the Selected Remedy and the installation of the drinking water wells. However, EPA and DNREC believe that it is appropriate to issue an Explanation of Significant Differences ("ESD") to provide additional language clarifying that the institutional controls restricting deleterious land uses are to extend to the Grantham South area, and that the restriction on installing drinking water wells needs to include the entire Delaware Sand and Gravel property as the underlying ground water is contaminated.

This ESD has been prepared to provide the public with an explanation of the nature of the modification to the institutional controls component of the 1993 ROD Amendment, to summarize the information that supports this modification, and to affirm that the revised remedy complies with the statutory requirements of CERCLA Section 121, 42 U.S.C. § 9621. The modification described below is "significant," as defined by 40 C.F.R. § 300.435(c)(2)(i) of the National Oil and Hazardous Substance Pollution Contingency Plan ("NCP"), and, therefore, requires preparation of this ESD. This modification to the Amended ROD does not fundamentally alter the basic features of the Selected Remedy with respect to scope, performance, or cost, but clarifies and expands the application of institutional controls at the Site.

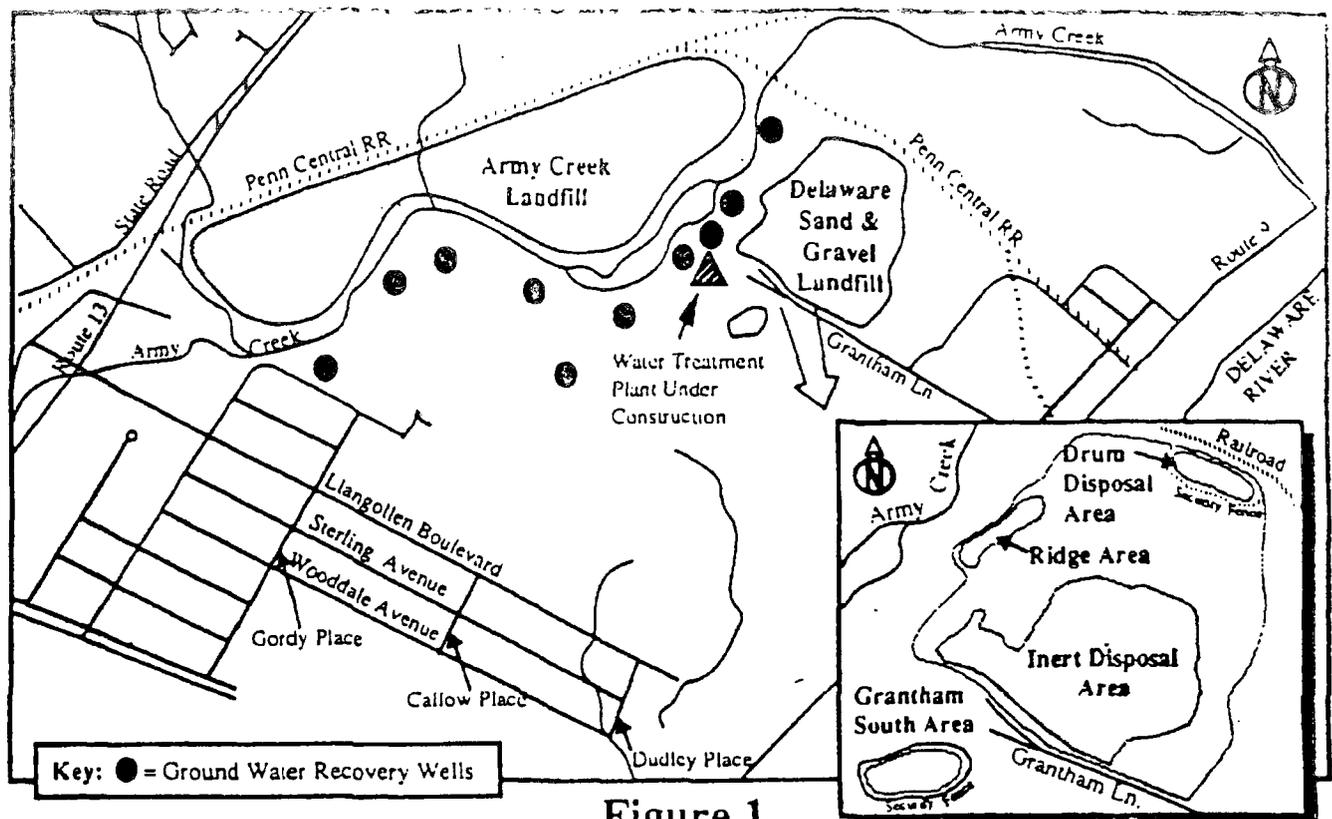


Figure 1

### Delaware Sand & Gravel Landfill Disposal Areas

**The Drum Disposal Area:** The Drum Disposal Area occupies approximately three quarters of an acre and is located south of the railroad tracks. This area was originally a pit where drums containing liquids and sludges, including perfume, plastics, paint, and petroleum, from various industrial processes were disposed. The majority of drum contents were organics and inorganic solids.

**The Inert Disposal Area:** The Inert Disposal Area is topographically the highest waste disposal area on site and occupies nearly 11 acres. Field investigations suggest that nearly one half million cubic yards of construction rubble and scattered chemical wastes were deposited in this disposal area.

**The Ridge Area:** The Ridge Area runs parallel to Army Creek occupying approximately half an acre. The Ridge Area was used primarily for surface storage of drums and large storage tanks containing inorganic and organic sludges and solids.

**The Grantham South Area:** The Grantham South Area is located on two acres on the southern side of Grantham Lane. An estimated 73,400 cubic yards of construction rubble and scattered chemical wastes were deposited in a layer nearly 35 feet thick.

Therefore, a ROD amendment is not required in this matter. This ESD is issued in accordance with Section 117(c) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. § 9617(c), as amended ("CERCLA"), and 40 C.F.R. § 300.435. This ESD is incorporated into the Administrative Record for the Site.

Copies of the Administrative Record are available at the following locations:

Delaware DNREC  
391 Lukens Drive  
New Castle, DE 19720  
(302) 395-2600  
Hours: Monday – Friday,  
8:00 a.m. to 4:30 p.m.

U.S. EPA Region III - 6<sup>th</sup> Floor Docket Room  
Ms. Anna Butch  
1650 Arch Street  
Philadelphia, PA 19103  
(215) 814-3157  
Hours: Monday – Friday, 8:30 a.m. to 4:30 p.m.

## II. SUMMARY OF THE SITE HISTORY, SITE CONDITIONS, AND SELECTED REMEDY

The Delaware Sand & Gravel Landfill Superfund Site ("DS&G" or "Site") is a former sand and gravel quarry comprised of 27 acres and located approximately two miles southwest of the City of New Castle. Approximately 550,000 cubic yards of industrial wastes and construction debris, including at least 7,000 drums, were disposed of within four distinct disposal areas on the DS&G property (see the enlarged area of Figure 1 and associated discussion for further information about each disposal area). The Site is bordered to the east by tracks of the Penn Central Railroad and on the west and north by Army Creek, which discharges into the Delaware River approximately one mile to the east. Public roads adjacent to the Delaware Sand & Gravel Site are Grantham Lane to the south and Route 9 to the east. The Site is adjacent to and southeast of another Superfund site, Army Creek Landfill, which was a municipal and industrial waste disposal site owned and operated by New Castle County.

The Amended ROD consists of the following major components:

### **Grantham South Area**

- Construction of an impermeable, multi-layer landfill cap to minimize infiltration of precipitation through buried waste material
- Perimeter fencing

### **Drum Disposal Area**

- Construction of a slurry wall surrounding the Drum Disposal Area to isolate buried drums and contaminated soil

- De-watering the interior of the slurry wall: on- or offsite treatment and disposal of extracted water
- Excavation of wastes buried within the Drum Disposal Area
- Treatment and/or disposal of drummed materials and highly contaminated soils
- Treatment of soils within the containment area using soil vapor extraction and bioremediation (bioventing)
- Construction of a multi-layer landfill cap to minimize infiltration of precipitation
- Perimeter fencing
- Deed restriction established to prevent installation of drinking water wells on the property and to prevent future uses of the property that could compromise the effectiveness of the Selected Remedy

#### **Ridge Area**

- Removal of existing surficial debris
- Excavation of surface soils exceeding soil cleanup standards (see Table 2 in the 1993 ROD Amendment)
- *Treatment of the excavated soil with the material within the Drum Disposal Area*
- Backfilling with clean soil, regrading and construction of a soil cover.

#### **Inert Area**

- Removal of existing surficial debris
- Construction of a multi-layer landfill cap
- Perimeter fencing
- Deed restriction established to ensure that the containment components are not compromised by future use of the property.

#### **Site-Wide Ground Water Plume Management and Environmental Monitoring**

- Continued recovery of contaminated ground water

- Treatment of recovered contaminated ground water prior to discharge to Army Creek
- Monitoring of ground water, air and adjacent wetlands

As of the issuance of this ESD most of the active construction has been completed at the four discrete disposal areas. The impermeable caps have been installed over the Grantham South and Inert Areas, contaminated soils have been removed from the Ridge Area, the buried drums have been removed and the bioventing system is operating to treat contaminated soil at the Drum Disposal Area. Ground water is being recovered and treated prior to being discharged to the Army Creek.

### **III. DESCRIPTION OF SIGNIFICANT DIFFERENCE AND THE BASIS FOR THOSE DIFFERENCES**

The 1993 ROD Amendment was written in such a manner as to inadvertently omit a requirement to establish institutional controls at the Grantham South disposal area. The RCRA Subtitle-C multilayered landfill cap has been constructed over the Grantham South disposal area and is operational and functional. The long-term effectiveness of the constructed remedy at the Grantham South disposal area depends on the integrity of the impermeable cap. Accordingly, by operation of this ESD, institutional controls will be implemented at the Grantham South Area to ensure that the Selected Remedy is not compromised by future use of the property.

In addition, the 1993 ROD Amendment was written in such a manner as to place the language describing the requirement to restrict the installation of drinking water wells in the section addressing the Drum Disposal Area. Although the Drum Disposal Area is a major source of contamination in the ground water beneath the Delaware Sand and Gravel Site, the intent of the institutional control is to prevent exposure to contaminated ground water. The ground water beneath the entire site is contaminated with hazardous substances above health-based concentrations. Accordingly, by operation of this ESD, EPA modifies the Amended ROD to make clear that restrictions on installation of drinking water wells is to be implemented Site-wide.

#### **What Are Institutional Controls?**

Institutional controls are non-engineering measures, usually legal controls, intended to limit human activity in such a way as to prevent or reduce exposure to hazardous substances. In this case, EPA expects that notices will be filed with the New Castle County Recorder of Deeds to notify the public and prospective purchasers of the Site that it is on the National Priorities List and that hazardous substances are present there. The title notice will specify the restrictions on use of the Site. Restrictions on use of the Site may also be accomplished through administrative orders or judicial consent decrees.

Finally, through this ESD, EPA is adding additional available mechanisms to implement the restrictions included in the revised remedy.

The 1993 ROD Amendment used the phrase "deed restriction" in describing the restrictions to be placed on the Site. EPA now believes that this reliance on restrictions being filed with public land records is too narrow. Accordingly, this ESD is changing the term "deed restrictions" to the more general term "institutional controls." Institutional controls are non-engineering measures, usually legal controls, intended to limit human activity in such a way as to prevent or reduce exposure to hazardous substances.

<b>Description of Proposed Remedy Modifications<sup>1</sup></b>	
<b>Institutional Controls in 1993 ROD Amendment</b>	<b>Institutional Controls in this ESD</b>
Deed restrictions shall be placed by the Site property owner to prevent any future use of the Inert or Drum Disposal Areas that could compromise the effectiveness of the Selected Remedy.	Institutional controls shall be established to prevent any future use of the Grantham South, Inert or Drum Disposal Areas that could compromise the effectiveness of the Selected Remedy.
Deed restrictions shall be placed by the Site property owner to prevent installation of drinking water wells at the Drum Disposal Area of the Site.	Institutional controls shall be established to prevent the installation of drinking water wells at the Delaware Sand and Gravel Site.

This modification to the Selected Remedy does not fundamentally alter the basic features of the Selected Remedy with respect to scope, performance, or cost. The modification does incrementally expand the scope of land use institutional controls to include the Grantham South disposal area. The modification also incrementally expands the restriction on installation of drinking water wells to include the entire Site. The long-term effectiveness (i.e., performance) of the Selected Remedy will be enhanced by providing greater assurance that the containment strategy being implemented at the Grantham South disposal area will remain uncompromised by potentially harmful land uses. The enhanced institutional controls will not have an appreciable impact to the cost of the Selected Remedy. EPA has made the determination that a modification to the Amended ROD requiring the enhanced institutional controls discussed above is warranted to ensure the protection of human health, safety and welfare, and the environment.

#### **IV. PUBLIC PARTICIPATION**

This ESD will become part of the Administrative Record File for the Site. The

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<sup>1</sup> All components of the Selected Remedy other than institutional controls remain unchanged by this ESD.

Administrative Record also includes the April 22, 1988 ROD, the 1993 ROD Amendment and all documents that formed the basis for EPA's selection of the cleanup remedy for the Site. The Administrative Record is available for public review at the locations listed in Section I of this ESD.

Questions or comments on EPA's actions can be directed to:

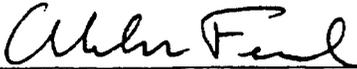
Philip Rotstein  
Remedial Project Manager  
U.S. EPA, Region III  
1650 Arch Street (3HS23)  
Philadelphia, PA 19103  
(215) 566-3232

#### V. SUPPORT AGENCY REVIEW

In accordance with 40 C.F.R. § 300.435(c)(2), EPA has notified the Delaware DNREC of the modification to the institutional controls component of the Selected Remedy described in this ESD. Delaware DNREC concurs with the issuance of this ESD.

#### VI. AFFIRMATION OF STATUTORY DETERMINATION

Considering the change that has been made to the institutional controls component of the Selected Remedy under this ESD, EPA and DNREC believe that the remedy remains protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to this remedial action, and is cost-effective. In addition, the revised remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable at this Site.

  
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Abraham Ferdas, Director  
Hazardous Site Cleanup Division

7/8/03  
Date

## Appendix K: Gas Monitoring Well Map<sup>14</sup>

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<sup>14</sup> From DS&G Remedial Trust's March 2014 Supplemental Site Characterization, Revision 1.

