FINAL PLAN OF REMEDIAL ACTION

Deemer Steel Landfill (Former New Castle Steel Landfill)
New Castle, DE

DNREC Project No. DE-0045

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Delaware Department of Natural Resources and Environmental Control
Division of Air and Waste Management
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1.0 INTRODUCTION

The Deemer Steel Landfill (Former New Castle Steel Landfill) Site (Site) is located on the south side of Ninth Street east of Washington Street, in New Castle, Delaware (Figure 1). In July 2004, Buck Kennett Associates, LLC (Buck Kennett) entered into a Voluntary Cleanup Program (VCP) Agreement with the Department of Natural Resources and Environmental Control, Site Investigation and Restoration Branch (DNREC). Under the provisions of the Delaware Hazardous Substance Cleanup Act (HSCA), 7 Del. C. Chapter 91, Buck Kennett completed a Remedial Investigation and Feasibility Study (RI/FS) to evaluate the potential presence of contaminants in the soil associated with historic Site uses and to determine the potential risks posed to the public health, welfare, and the environment. The purpose of the RI/FS was to obtain sufficient detailed Site information to supplement the earlier studies conducted at the Site and develop an appropriate remedial approach. Buck Kennett contracted Brightfields, Inc. to perform the RI/FS of the Site.

The purpose of the RI/FS was to: 1) characterize the nature and extent of any soil, sediment, surface water and/or groundwater contamination at the Site, 2) evaluate risks to public health, welfare, and the environment associated with identified contamination, and 3) perform a FS that would identify and recommend a Remedial Action.

All work was performed during the RI/FS in a manner consistent with:

- Delaware Hazardous Substance Cleanup Act, 7 Del. C. Chapter 91, (July 1995);
- Standard Operating Procedures for Chemical Analytical Programs (April 1996);
- HSCA Guidance Manual (October 1994);
- VCP Guidance Manual (November 1995);
- Remediation Standards Guidance under the Delaware HSCA (December, 1999);
- USEPA Management of Investigation-Derived Wastes for Site Inspections (1991); and
- Requirements set forth by the DNREC.

As described in Section 12 of the Regulations, DNREC-SIRB provided notice to the public and an opportunity for the public to comment on the Proposed Plan of Remedial Action (Proposed Plan). At the comment period's conclusion, DNREC-SIRB did not receive any written or verbal comments to the Proposed Plan and is subsequently issuing this Final Plan of Remedial Action (Final Plan). The Final Plan designates the selected remedy for the Site. The Proposed Plan, the comments received from the public, DNREC-SIRB's responses to those comments, and the Final Plan will constitute the Remedial Decision Record.

This document is the Department's Final Plan of Remedial Action for the Site. It is based on the results of the previous investigations performed at the Site. This Final Plan is issued under the provisions of the HSCA and the Regulations Governing Hazardous Substance Cleanup (Regulations). It presents the Department's assessment of the potential health and environmental risk posed by the Site.

Section 2.0 presents a summary of the Site description, Site history and previous investigations of the Site. Section 3.0 provides a description of the previous investigation results. Section 4.0 describes the results of the Remedial Investigation. Section 5.0 presents a discussion of the Remedial Action Objectives. Section 6.0 presents the Final Plan of Remedial Action, Section 7.0 discusses public participation requirements, and Section 8.0 presents the Director's Declaration.

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Setting

The former Deemer Steel Landfill property is located approximately 2,000 feet north of the Delaware River in New Castle, Delaware (Figure 1). The site encompasses approximately 4 acres, including an approximately 3-acre landfill, and is bounded generally by Ninth Street to the north/northwest, railroad tracks to the southeast, an open parcel of land to the northeast and residential parcels along Washington Street to the southwest. The tax parcel # for the property is 21-014.00-500.

Surrounding land uses include primarily residential properties to the north, east, and west. The former Deemer Steel foundry (foundry) is located northwest of the site across Ninth Street. The former Deemer Steel foundry has been investigated through the DNREC Voluntary Cleanup Program and is identified as site numbers DE-1087, DE-1243 (OU-I), DE-1244 (OU-II), and DE-1245 (OU-III). Final Plans were completed in March 2002 for OU-I, OU-II and OU-III. OU-I has been developed into townhouses and a certificate of Completion of Remedy was issued in December 2002. OU-II and OU-III have been developed into an apartment complex and a Certificate of Completion of Remedy was issued in August 2005. The former Deemer Steel Landfill site is currently vacant.

2.2 Site and Project History

The former Deemer Steel foundry operated across Ninth Street from the landfill from the early 1900s until 1987. The three-acre landfill received foundry wastes from the Deemer Steel Casting Company since 1907. The waste included black sands, slag, coke, iron oxide scale, fine sand dust, and metal scrap. In 1955, an electric arc furnace was put into operation at the foundry, and in 1973 a baghouse dust system was installed to control furnace dust emissions. From 1973 to 1980, the baghouse dust was mixed with sand and spread over the disposal area at the landfill. The plant recycled the dust from 1980 until it closed in 1987. Sometime in the early 1990s, the buildings comprising the Deemer Steel Casting Company were razed.

Two former disposal areas (waste material from the foundry) were located on the landfill property. In previous reports, the two areas have been referred to as the "inactive" and "active" disposal areas (Figure 2). The landfill identifiers "inactive" and "active" were the result of a March 1982 site visit at which time the inactive portion of the site was no longer receiving waste materials and the active portion was operating area of the landfill. The landfill titles are not representative of current status of the site. The landfill has not received waste materials from the steel plant since it ceased operations in 1987, except for some stockpiled soils generated from the development of the former plant site located to the north of the landfill. The soil stockpiles were

approved by DNREC as part of the construction of the apartment complex on the former plant site.

The inactive disposal area is approximately 1.3 acres in size and bounded by a fence and parking area, railroad spur, and drainage channel to the east and an access roadway to the southeast. The active disposal area is approximately 1.75 acres in size and is separated from the inactive disposal area by a drainage channel. The remaining 0.95 acres of the property, located to the northwest, is a wooded area that was not used for waste disposal and remains undeveloped. In 1995, the active area was capped with a 20 mil geomembrane and clean fill material as part of a DNREC approved closure plan.

The Deemer Steel Landfill property was a National Priority List (NPL) site identified by the United States Environmental Protection Agency (EPA) as the New Castle Steel Plant (this designation only refers to the landfill site). In 1980, EPA regulations classified electric arc furnace (EAF) baghouse dust as a hazardous waste, K061, due to the concentrations of cadmium, chromium, and lead. The site was placed on the NPL in 1982 because of the potential for groundwater contamination. Since 1982, the EPA has determined that the type of baghouse dust generated by the operations at the Deemer Steel facility does not pose a serious health risk and therefore is no longer classified as a hazardous waste. Although metals associated with the site (arsenic, chromium, lead, cadmium, and nickel) may have entered soil, sediment, surface water, and groundwater, multiple studies by the EPA and DNREC have determined that the concentrations at the site were not threatening to human health or the environment and did not require cleanup actions under the existing land use. The site was de-listed from the NPL in March 1989.

3.0 INVESTIGATION RESULTS

3.1 Results of Previous Investigations

BrightFields reviewed existing environmental reports from the investigations performed at the former landfill site. Tables 1 through 13 summarize compounds detected in various media (soil, sediment, groundwater, and surface water) during these investigations. The following subsections reference each of these tables and describe the findings of each previous investigation. The investigations are organized chronologically from oldest to most recent. Portions of the summary text below are taken directly from DNREC's Site Inspection Report. The analytical results from samples collected on the property have been summarized and compared to the current DNREC HSCA Uniform Risk-Based Remediation Standards (URS) (December, 1999). All previous boring/excavation locations on the former landfill property are shown on Figure 2.

3.1.1 A Preliminary Assessment of New Castle Steel (Ecology and Environment, Inc., October 1981)

Ecology and Environment, Inc. performed an initial assessment of the property under contract to the EPA. Chemical analysis of the electric arc furnace baghouse waste showed that it contained lead, cadmium, and chromium concentrations that were higher than the allowable RCRA limits. The report also indicated that soil contamination may be present and recommended better site security.

3.1.2 Field Trip Report (DNREC, March 1982)

Ecology and Environment, Inc., the EPA Region III Field Investigation Team (FIT), and DNREC performed a joint site inspection in 1982 (FIT Project). Analytical results from six surface water samples and four soil/waste samples indicated that lead could potentially be leaching or migrating from the site into the surface water. (Table 1 and 2)

3.1.3 A Site Inspection of New Castle Steel (Ecology and Environment, Inc., July 1982)

Ecology and Environment, Inc., and DNREC also performed a joint sampling event in 1982. A toxicological assessment concluded that there was no indication of an imminent or severe adverse impact to public health or the environment. Lead was detected above Ambient Water Quality Criteria in surface water from the drainage channel to the south; however, Extraction Procedure (EP) toxicity tests of soil samples showed that lead was present substantially below the EPA maximum contaminant level (MCL) at that time. Ecology and Environment, Inc. recommended no further site investigation was required.

3.1.4 Hydrogeologic Report of Phase I Investigations at Deemer Steel Casting Company (Earth Data, Inc., June 1984)

Earth Data was contracted by Deemer Steel Casting Company to characterize the waste found in the disposal area and to perform a hydrogeologic study to evaluate the impact of the waste on the surface water or groundwater. Earth Data concluded that the average thickness of the fill ranged from 8 to 13 feet and is deposited directly onto the marsh sediments and that the material is not classified as hazardous. They also concluded that there had been no significant impact on the shallow saturated zone near the disposal areas. A thick layer of clay separates the shallow groundwater from the uppermost Potomac aquifer in the vicinity of the site and Earth Data found that there was no potential for groundwater contamination. Low levels of lead were found in surface water samples collected in a drainage channel at the site. This data is summarized in Tables 3 and 4.

3.1.5 A Field Trip Report for New Castle Steel (DRAFT) (NUS Corporation, Superfund Division, March 31, 1987)

NUS Environmental Corp. conducted soil sampling on the landfill areas to evaluate contaminant migration potential and to characterize the fill material from surface to depth. Eight surface samples were collected to assess the potential for air release of particulate material from the landfill using the Cowherd model. Twenty-one samples were obtained from 7 test pits (3 test pits in the "active" area and 4 in the "inactive" area). A total of 48 soil samples were analyzed for inorganic compounds and 5 samples for organic compounds. Analytical data from the investigation identified only iron and manganese above the EPA's Risk-based Concentrations (RBC) limits for unrestricted use.

3.1.6 Final Endangerment Assessment New Castle Steel Site, New Castle, Delaware (Versar, Inc., May, 1988)

Versar, Inc. prepared an endangerment assessment for the EPA in order to determine the magnitude and probability of actual or potential harm to public health, welfare, or the environmental by threatened or actual releases of hazardous substances from the New Castle Steel site. The report identified arsenic, cadmium, chromium, lead, and nickel as contaminants of concern based on screening data. Comparison of background concentrations and waste analyses with environmental samples collected from the site provided evidence that other contaminant sources besides the landfill waste were responsible for the concentrations found. However, nearly all of the concentrations of arsenic, cadmium, chromium, lead, and nickel detected in soil samples were within the typical concentration ranges found in urban, industrialized settings. The report recommended that area wetlands should be monitored because the average surface water sample lead concentrations exceeded the EPA's Ambient Water Quality Criteria (acute) for freshwater environments. The endangerment assessment conclusively identified no threat to human health at the New Castle Steel Site.

3.1.7 WIK 1990 Phase I ESA

WIK conducted a Phase I Environmental Site Assessment (ESA) on the Deemer property in December 1990 (WIK, 1990). This assessment included the parcels both north of Ninth Street and south of Ninth Street (foundry and landfill sites). Based on the history of the sites, discussions with State and Local agencies and the on-site inspection, WIK recommended that Phase II soil sampling be conducted to evaluate the potential for metals, polychlorinated biphenyls (PCBs), and organic compounds in the soil, surface water, and groundwater at both the foundry and landfill sites.

3.1.8 Five Year Review Report New Castle Steel Site, New Castle County, Delaware (US EPA, 1995)

Five–Year reviews are required to be conducted at sites where hazardous substances, pollutants or contaminants remain above concentrations that would allow for unrestricted use. The purpose of a Five-Year review is to assess whether remedial actions implemented at the site continue to be protective of human health and the environment. No remedial action was deemed necessary at the New Castle Steel site (landfill), but EPA elected to begin conducting Five-Year Reviews as a matter of policy.

EPA's contractor, CH2M Hill, conducted a Five-Year review and collected samples at the site during the week of July 5, 1993. Three groundwater, four surface soil, six sediment, and five surface water samples were collected. All samples were analyzed for Target Analyte List (TAL) metals and cyanide. Elevated levels of manganese and iron were detected in the groundwater. Surface soil sample concentrations were within industrial background concentrations and below human health risk-based concentrations in use at the time for industrial scenarios (Risk-Based Concentrations, USEPA Region III, 1994). Cadmium, copper, lead, manganese, silver, and zinc were identified as metals of potential concern in the surface water and sediment (USEPA Region III, 1995). This data is summarized in Tables 5 through 8.

The EPA recommended that residential development be restricted under existing conditions and precluded the use of shallow groundwater. Subsurface soil sampling prior to any residential or industrial development and closure of the site in accordance with the Delaware Solid Waste Disposal Regulations was also recommended.

3.1.9 Five Year Review Report New Castle Steel Site, New Castle County, Delaware (US EPA, 2001)

Representatives from EPA, DNREC, and the site owner visited the landfill in March 2001. Since the owner had closed the active area in accordance with the Delaware regulations in 1995, EPA recommended that the State proceed with closure of the inactive area. EPA stated that it will monitor the closure of the inactive area and will conduct no more five-year reviews once the inactive area has been closed (US EPA, 2001).

3.1.10 Site Inspection Report (DNREC, December 2002)

The DNREC-SIRB conducted a Site Inspection of the landfill property in July 2002 consisting of the excavation of test pits; the installation of 3 monitoring wells; and the collection of 2 sediment samples, 1 drum content sample, and 29 soil samples. The Site Inspection report was issued in December 2002. These data are summarized in Tables 9 through 13.

All soil samples were field screened using DNREC's mobile laboratory. Of the 29 soil samples collected and field screened, 12 were selected for confirmatory commercial laboratory analysis of inorganic and/or semivolatile organic compounds (SVOCs). Aluminum, arsenic, beryllium, cadmium, chromium, copper, iron, and manganese were detected at estimated concentrations above the unrestricted use URS. Estimated concentrations of arsenic and iron were above the restricted use URS. All other metals were below the URS. SVOCs were detected in the samples; however, with the exception of benzo(a)pyrene, no SVOC concentrations exceeded the restricted use URS. In addition, the drum contained material that appeared to be consistent with the materials deposited in the landfill.

DNREC installed 3 monitoring wells and attempted to install 2 other monitoring wells during the Site Inspection. Groundwater samples for analysis could not be obtained from the 3 wells installed during the Site Inspection because these wells were purged dry and did not recover due to local drought conditions at the time. Groundwater was encountered in the surficial fill and in the Holocene interbedded sands and silts directly beneath the fill; however, DNREC did not feel that the groundwater observed was predictable or present in such quantities to allow adequate volumes for sampling.

Two sediment samples were collected from the drainage channel that separates the active and inactive landfills. Both samples were screened at DNREC's mobile laboratory. One of these samples was selected for commercial laboratory confirmatory analysis for inorganics and semivolatile organics. The sample contained slightly elevated concentrations of copper, lead, nickel, and zinc, and SVOCs. The compounds found in the sediment sample were similar to the compounds found in site soil.

DNREC recommended further investigation of the wetlands to evaluate whether the landfill materials were migrating into the wetlands adjacent to the Delaware River. They also

recommended that the drum protruding from the east side of the landfill be removed and the materials consolidated into the landfill.

3.1.11 Wetlands Investigation Report (JCMECI, May 2004)

A wetland delineation was performed by James C. McCulley IV, Environmental Consultants, Inc. (JCMECI) in April 2004. Two wetland areas were identified: 1) within the drainage channel in the central portion of the study area, and 2) in a man-made pond located near the southeastern corner, the majority of which continues onto the adjacent property to the east.

4.0 REMEDIAL INVESTIGATION

Soil Sampling Scope of Work

To collect data to supplement the existing data sets, BrightFields:

- Advanced 12 hand auger borings and collected 12 shallow soil samples. The boring locations are shown on Figure 3.
- Analyzed all of the soil samples at DNREC-SIRB's laboratory for: VOCs, SVOCs, pesticides, PCBs, and metals.
- Analyzed four of the soil samples at STL Edison, a HSCA-certified lab, for: Target Compound List (TCL) SVOCs and Target Analyte List (TAL) metals according to Delaware HSCA Standard Operating Procedures (SOP).
- Validated the HSCA analytical data according to DNREC and USEPA guidelines.

Sediment Sampling Scope of Work

To evaluate data gaps in sediment quality in the wetland areas of the site, BrightFields:

- Performed a visual assessment of the wetlands to address DNREC concerns.
- Collected five sediment samples from the wetland areas. The sample locations are shown on Figure 3.
- Analyzed all of the samples at DNREC-SIRB's laboratory for: VOCs, SVOCs, pesticides/PCBs, and metals.
- Analyzed one of the samples at STL Edison for TCL SVOCs and TAL metals according to Delaware HSCA SOP.
- Validated the HSCA analytical data according to DNREC and USEPA guidelines.

Groundwater Sampling Scope of Work

Three monitoring wells (MW-5, MW-6 and MW-10) were installed during the 2002 DNREC Site Inspection. No groundwater samples were collected at the time because the wells did not recover after purging. These monitoring wells are still located on the property and are shown on Figure 3. In order to evaluate current environmental quality of the groundwater beneath the property, BrightFields:

- Collected groundwater samples from these three wells.
- Analyzed all of the samples at STL Edison in accordance with HSCA procedures for the TCL SVOCs and TAL metals (dissolved).
- Validated the HSCA analytical data according to DNREC and USEPA guidelines.

4.1 Soil Analytical Results

In the following discussions, the analytical results for soil samples were compared with the Delaware HSCA Remediation Standards (DNREC, 1999) URS for the protection of human health for surface and subsurface soil, in a non-critical water resource area, under restricted and unrestricted use scenarios.

4.1.1 Evaluation of Soil Screening Analytical Results

Twenty-nine soil screening samples were collected during the 2002 DNREC Site Investigation and thirteen soil screening samples were collected during the November 2004 Remedial Investigation. Samples were screened using X-Ray Fluorescence and the soil analytical screening data is summarized on Tables 9 and 14, and described in the following paragraphs.

Arsenic was detected above the Delaware background concentration of 11 mg/kg in 20 of the 42 soil samples. Analytes exceeding their respective unrestricted URS values were vanadium in 10 of 42 samples, manganese in 41 of 42 samples, iron in 42 of 42 samples, mercury in 3 of 42 samples, antimony in 13 of 42 samples, barium in 2 of 42 samples, chromium in 3 of 42 samples, copper in 2 of 42 samples, lead in 2 of 42 samples, zinc in 1 of 42 samples and cadmium in 3 of 42 samples. Only iron (7 of 42 samples), chromium (1 of 42 samples), lead (1 of 42 samples) and manganese (3 of 42 samples) were detected above the restricted use criteria. All other metals were either not detected or were detected below their DNREC URS criteria. Volatile organic compounds were noted in 1 of the 42 soil screening samples based on field screening and polycyclic aromatic hydrocarbons were noted in 25 of the 42 soil screening samples. Pesticides/PCBs were not detected in any of the 42 soil screening samples.

4.1.2 Evaluation of Soil HSCA Analytical Results

Six soil samples were submitted for TAL metals and cyanide analysis and eight soil samples were submitted for TCL SVOCs analysis according to Delaware HSCA SOP during the DNREC-SIRB Site Inspection (July, 2002). Four of the twelve hand auger soil samples collected in the November 2004 Remedial Investigation were selected to be analyzed at STL Edison for TAL metals and TCL SVOCs according to Delaware HSCA SOP. Soil HSCA

analytical data is summarized in Tables 11, 12, 16 and 17 and described in the following paragraphs.

Ten samples were analyzed for TAL metals. Arsenic was detected above the Delaware background concentration of 11 mg/kg in 2 of the 10 HSCA samples. Analytes detected above their respective unrestricted use criteria were iron in 9 of 10 samples, cadmium in 1 of 10 samples, chromium in 1 of 10 samples, copper in 1 of 10 samples, aluminum in 1 of 10 samples, and manganese in 8 of 10 samples. Iron was detected above the restricted use criteria of 61,000 mg/kg in 1 of the 10 HSCA samples. All other metals were either not detected or were detected below their DNREC URS criteria.

Six samples were analyzed for total cyanide. Total cyanide was not detected in any of the soil samples analyzed.

Twelve samples were analyzed for TCL SVOCs. Compounds exceeding their respective unrestricted use criteria were benzo(a)anthracene in 4 of 12 samples, benzo(b)fluoranthene in 5 of 12 samples, benzo(k)fluoranthene in 1 of 12 samples, dibenz(a,h)anthracene in 6 of 12 samples, benzo(a)pyrene in 9 of 12 samples and indeno(1,2,3-cd)pyrene in 3 of 12 samples. Compounds detected above their respective restricted use criteria were benzo(a)anthracene in 1 of 12 samples, benzo(b)fluoranthene in 1 of 12 samples, dibenz(a,h)anthracene in 2 of 12 samples, benzo(a)pyrene in 5 of 12 samples and indeno(1,2,3-cd)pyrene in 1 of 12 samples. All other SVOCs in these samples were either not detected or were detected below their respective DNREC URS criteria.

4.2 Sediment Analytical Results

In the following discussions, the analytical results for sediment samples were compared with the Delaware HSCA Remediation Standards (DNREC, 1999) URS for the protection of the environment.

4.2.1 Evaluation of Sediment Screening Analytical Results

Two sediment samples were collected during the DNREC-SIRB Site Inspection (July, 2002) and five sediment screening samples were collected during the November 2004 Remedial Investigation. Samples were screened using X-Ray Fluorescence and sediment screening analytical data is summarized on Tables 10 and 15, and described in the following paragraphs.

Analytes detected above their respective sediment criteria were cadmium in 1 of 7 samples, chromium in 3 of 7 samples, nickel in 4 of 7 samples, copper in 5 of 7 samples, arsenic in 3 of 7 samples, zinc in 4 of 7 samples, lead in 4 of 7 samples, mercury in 2 of 7 samples, silver in 1 of 7 samples and barium in 7 of 7 samples. All other metals were either not detected or were detected below their DNREC URS criteria.

Volatile organic compounds and Pesticides/PCBs were not detected in any of the 7 sediment screening samples. Polycyclic aromatic hydrocarbons were noted in 4 of the 7 sediment screening samples.

4.2.2 Evaluation of HSCA Sediment Analytical Results

One sediment sample collected during the DNREC-SIRB Site Inspection (July, 2002) was selected to be analyzed at a HSCA certified lab for TAL metals and cyanide, and TCL SVOCs analysis according to the Delaware HSCA SOP. One of the sediment samples collected in the November 2004 Remedial Investigation was selected to be analyzed at STL Edison for TAL metals and TCL SVOCs according to Delaware HSCA SOP. Laboratory HSCA analytical data is summarized in Tables 13 and 18 and described in the following paragraphs.

Iron, lead, nickel, copper and zinc were detected at estimated concentrations above their respective DNREC URS criteria in sample NCS-SED2 collected during the DNREC-SIRB Site Inspection (July, 2002). Barium, copper, lead, nickel and zinc were detected above their respective DNREC URS criteria from sample SED 2 collected during the November 2004 Remedial Investigation. All other metals were either not detected or were detected below their DNREC URS criteria. Total cyanide was not detected in the sediment sample analyzed. Benzo(a)anthracene, fluoranthene, phenanthrene, bis(2-ethylhexyl)phthalate, benzo(a)pyrene and chrysene were detected above their respective DNREC URS in sample NCS-SED2 collected during the DNREC-SIRB Site Inspection (July, 2002). Benzo(a)anthracene, fluoranthene, benzo(a)pyrene, phenanthrene and chrysene were detected above their respective DNREC URS from sample SED 2 collected during the November 2004 Remedial Investigation. All other SVOCs in these samples were either not detected or were detected below their respective DNREC URS criteria.

4.3 Groundwater Analytical Results

In the following discussions, the analytical results for groundwater samples were compared with the Delaware HSCA Remediation Standards (DNREC, 1999) URS for the protection of human health.

One groundwater sample was collected from each of the three existing wells (MW5, MW6 and MW10) during the November 2004 Remedial Investigation. These samples were analyzed for TAL metals and TCL SVOCs at STL Edison, a HSCA certified laboratory. The sample locations are shown on Figure 3. Groundwater analytical data is summarized on Table 19, and described in the following paragraphs.

Groundwater samples from all three of the wells contained iron and manganese at concentrations above their respective URS criteria. Chromium and lead were also detected in groundwater sample MW6-W001 at concentrations of 20.2μg/L and 15.3μg/L, respectively, which are above the URS criteria of 11μg/L and 15μg/L. No other metals were detected or they were detected below their DNREC URS criteria.

Phenanthrene, fluoranthene and pyrene were detected in groundwater sample MW6-W001 at estimated concentrations below their respective URS criteria. No other SVOCs were detected in the groundwater samples.

4.4 Soil Risk Assessment Results

For the purpose of the soil risk assessment, both shallow (0-2 feet) and deep (>2 feet) soil sample results were grouped together instead of being evaluated separately. This approach was used because both the surface and subsurface soil are all fill material, and it is anticipated that future site work may mix soil. A risk assessment was performed for all of the soil data collected from the Site. Appendix D of the RI/FS includes a map showing the sample locations used in this risk assessment. A summary of the 95% UCL values used in the risk calculations and the risk calculator output is also included in Appendix D of the RI/FS report.

Unrestricted Use

Under an unrestricted use scenario, the carcinogenic cumulative risk is 7.83×10^{-5} (7.83 in 100,000), which is above DNREC guidelines. The individual compounds that most significantly contribute to the carcinogenic risk are arsenic (40.2% of the total risk) and benzo(a)pyrene (36.8% of the total risk).

Evaluation of the non-carcinogenic cumulative risk results in a Hazard Quotient of 6.01, which is above DNREC guidelines. The individual compounds that most significantly contribute to the non-carcinogenic risk are iron (69.2% of the total risk) and manganese (15.0% of the total risk). Iron is a naturally-occurring compound in the minerals that compose rock and soil. It is also an essential element in human nutrition. Iron concentrations on the former Deemer Steel Landfill property soil ranged from 777 to 125,000 mg/kg. The mean iron concentration detected at the site is 43,658 mg/kg. Although the upper range suggests that the iron could be from an industrial fill source, the mean iron concentration detected at the site is within the typical eastern USA soil concentration range of 100 to 100,000 mg/kg (Dragun, 1991).

Because the US EPA has not published a consensus chronic reference dose (RfD) or cancer slope factor (CSF) for inorganic lead, it is not possible to calculate risk-based concentrations for this metal and, therefore, lead is not included in the DNREC calculator. The US EPA Office of Solid Waste directive recommends that soil levels less than 400 mg/kg (which is the same concentration used by DNREC for the unrestricted use criteria) are generally safe for residential use (USEPA, 2005). The mean lead concentration across the overall site is 114 mg/kg and the 95% UCL of the mean is 154 mg/kg.

Restricted Use

Under a restricted use scenario, the carcinogenic cumulative risk is 1.75×10^{-5} (1.75 in 100,000), which is above DNREC guidelines of 1.0×10^{-5}. The individual compounds that most significantly contribute to the carcinogenic risk are arsenic (40.1% of the total risk), benzo(a)pyrene (36.7% of the total risk) and dibenz(a,h)anthracene (12.6% of the total risk). The non-carcinogenic cumulative risk would result in a Hazard Quotient of 0.46, which is within DNREC's acceptable risk guidelines.
Because the US EPA has not published a consensus chronic reference dose (RfD) or cancer slope factor (CSF) for inorganic lead, it is not possible to calculate risk-based concentrations for this metal and, therefore, lead is not included in the DNREC calculator. The US EPA Office of Solid Waste directive recommends that soil levels less than 1,000 mg/kg (which is the same concentration used by DNREC for the restricted use criteria) are generally safe for commercial use (USEPA, 2005). The 95% UCL of the mean lead concentration across the site is 154 mg/kg, which is less than the restricted use evaluation criteria; therefore, the lead levels for this site are acceptable for restricted use.

4.5 Groundwater Risk Assessment Results

The calculated groundwater carcinogenic risk is 1.25×10^{-4} (1.25 in 10,000), which exceeds DNREC's risk guideline of 1 in 100,000 (DNREC, 1996). To actually achieve this risk, one would have to drink approximately one half gallon of water from directly beneath the site daily for 70 years. All of the carcinogenic risk is due to arsenic.

The assessment indicates that the groundwater non-cancer Hazard Quotient is 3.76, which is above the DNREC guideline of 1. Approximately 45.2% of the risk associated with drinking the groundwater is attributable to manganese and 29.8% of the risk is attributable to iron. Total dissolved iron and manganese are typically high in groundwater throughout the New Castle area (Woodruff, 1981 and DRBC, 1982).

Since the area is served by a public water supply, there is no current groundwater risk to human health.

5.0 REMEDIAL ACTION OBJECTIVES

As described in HSCA regulation 9.4:

> "Soil cleanup levels and the depth to which the cleanup levels will apply, shall be based on estimates of the facility use and the reasonable maximum exposure expected to occur under both current and future facility use conditions or may otherwise reasonably be determined by the Department to abate the threat to public health, welfare and the environment."

Remedial action objectives for the site have been established as per HSCA regulation 8.4(1) and, based on the following factors:

- The site is currently zoned as residential R-3 land and is vacant.
- The future site use is expected to be residential and covered by buildings, vegetation or pavement.
- Surrounding land uses are mixed, including manufacturing, commercial and residential.
- The site has been impacted by various chemical constituents. Based on the nature and extent of the contaminants, antimony, arsenic, iron, manganese, and PAHs are the primary contaminants of concern in soil. Barium, copper, lead, nickel, zinc, phenanthrene, fluoranthene, benzo(a)anthracene, chrysene and benzo(a)pyrene are the site contaminants of concern in sediment, and lead is the only contaminant of concern in groundwater.
- The primary exposure pathways are inhalation, direct contact with and incidental ingestion of impacted soil, and direct contact or ingestion of impacted surface water or sediment.

- Compound-specific remedial action objectives are based on a 10^{-5} cumulative risk factor or a Hazard Index of 1, as appropriate.

5.1 Qualitative and Quantitative Remedial Objectives

Based on the above factors, the following qualitative remedial action objectives were developed:

- Control potential human contact (dermal and ingestion) with contaminated soil.
- Control potential human contact (dermal and ingestion) with contaminated surface water and sediment (on-site drainage channel).
- Minimize soil migration to the surface water (on-site drainage channel).
- Reduce infiltration to groundwater.

Based on the above qualitative remedial action objectives, the following quantitative remedial action objectives were developed:

- Prevent contact with soil with contaminants having a cumulative risk of 1×10^{-5}.
- Allow unrestricted residential development of the parcel.

6.0 FINAL PLAN OF REMEDIAL ACTION

Based upon the information and results of the investigation performed at the Site and the Remedial Action Objectives, and the evaluation of remedial alternatives, DNREC-SIRB's Final Plan of Remedial Action for the Deemer Steel Landfill (Former New Castle Steel Landfill) Site will include the following:

- Capping the surface of the site with a building, paving, and/or a geotextile material or an approved barrier, and a minimum of 2 feet of topsoil and a protective vegetative cover as part of the site improvements.
- Institutional controls including the imposition of a Groundwater Management Zone and Restrictive Environmental Covenant to be approved by DAWM prohibiting use of groundwater at the site. The placement of an Environmental Covenant which (a) prohibits the installation of wells or the use of groundwater on the Site without the prior written approval of DNREC; (b) requires written approval from DNREC prior to any soil disturbing activities; and (d) requires written approval from DNREC prior to the repair, renovation or demolition of any building used to cap contaminated soils, or any other activity that may disturb contamination under the foot-print of the building or surrounding pavement.
- Prepare, submit to DNREC for approval, and implement an Operation and Maintenance (O&M) Plan to maintain the integrity of the soil barrier(s). Current and future owners of the property will be responsible for implementation of all aspects and costs of the approved remedy, including all requirements of the final plan, the approved O & M Plan, and adherence to the requirements and conditions

established in the Uniform Environmental Covenant for the site.

- Engineering controls to limit erosion into the stream including preserving and protecting the stream located on site by maintaining its integrity during site regrading. It may be incorporated into the Storm water and Erosion Control Plan for the Site with prior DNREC approval.

7.0 PUBLIC PARTICIPATION

The Department actively solicited public comments or suggestions on the Proposed Plan of Remedial Action and welcomed opportunities to answer questions. The comment period began on February 14, 2007, and concluded at the close of business (4:30 p.m.) on March 5, 2007. No written comments or requests for a public hearing were received by DNREC.

8.0 DECLARATION

This Final Plan of Remedial Action for the Deemer Steel Landfill (Former New Castle Steel) Site is protective of human health, welfare and the environment and is consistent with the requirements of the Delaware Hazardous Substance Cleanup Act.

Kathleen Skelly Benning for
James D. Werner
Director, Division of Air and Waste Management

3/8/07
Date

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TABLE 1
Soil Analytical Results - EP Toxicity
EPA Fit Project
March 1982

Sample ID Matrix Units	Limit for EP Toxicity	MC8776 Soil composite mg/L		MC8777 Soil composite mg/L		MC8808 Soil mg/L	
Arsenic	5.0	1.0	U	1.0	U	1.0	U
Barium	100	1.0	U	1.0	U	1.0	U
Cadmium	1.0	0.2		0.2	U	0.2	U
Chromium	5.0	1.0	U	1.0	U	1.0	U
Lead	5.0	1.9		1.0	U	1.0	U
Mercury	0.2	0.05	U	0.05	U	0.05	U
Selenium	1.0	0.2	U	0.2	U	0.2	U
Silver	5.0	1.0	U	1.0	U	1.0	U
Endrin	nca	0.002	U	0.002	U	0.002	U
Lindane	nca	0.04	U	0.04	U	0.04	U
Methoxychlor	nca	1.0	U	1.0	U	1.0	U
Toxaphene	nca	0.05	U	0.05	U	0.05	U
2,4-D	nca	1.0	U	1.0	U	1.0	U
2,4,5-TP Silvex	nca	0.1	U	0.1	U	0.1	U

* - Regulatory criteria for Chromium III.
nca - no criteria available
[t] - Delaware background concentration (DNREC, 2004)
U - Analyte not detected above indicated detection limit.

TABLE 2
Surface Water Analytical Results - PPL Inorganics
EPA Fit Project
March 1982

Sample ID Matrix Units	DNREC HSCA Surface Water URS (12/99) ug/L	MC-8770 Surface water ug/L		MC-8771 Surface Water ug/L		MC-8772 Surface Water ug/L		MC-8773 Surface Water ug/L		MC-8774 Surface Water ug/L		MC-8775 Surface Water ug/L	
Aluminum	87	**550**		200	U	**400**		**760**		**400**		**250**	
Chromium	11*	10	U	10	U	10	U	10	U	10	U	10	U
Barium	4	100	U	100	U	100	U	100	U	100	U	100	U
Beryllium	0.7	5	U	5	U	5	U	5	U	5	U	5	U
Cadmium	1	1	U	1	U	1	U	1	U	**5.1**		1	U
Cobalt	23	50	U	50	U	50	U	50	U	50	U	50	U
Copper	12	50	U	50	U	50	U	50	U	50	U	50	U
Iron	1,000	**1,900**		**6,300**		**12,000**		**3,400**		**2,400**		830	
Lead	3	**42**		**15**		**15**		**84**		**23**		5	U
Nickel	160	40	U	40	U	40	U	40	U	40	U	40	U
Manganese	80	**390**		**670**		**720**		**450**		**250**		**290**	
Zinc	110	14		63		12		15		18		10	U
Boron	2	100	U	**120**		**140**		100	U	**200**		100	U
Vanadium	19	200	U	200	U	200	U	200	U	200	U	200	U
Arsenic	3	10	U	10	U	10	U	10	U	10	U	10	U
Antimony	30	20	U	20	U	20	U	20	U	20	U	20	U
Selenium	0.4	2	U	2	U	2	U	2	U	2	U	2	U
Thallium	9	10	U	10	U	10	U	10	U	10	U	10	U
Mercury	1	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Tin	73	20	U	20	U	20	U	20	U	20	U	20	U
Silver	0.4	10	U	10	U	10	U	10	U	10	U	10	U

* - Regulatory criteria for Chromium IV.
Bold - concentration above URS standard.
U - Analyte not detected above indicated detection limit.

TABLE 3
Fill Material Analytical Results
Extraction Procedure Toxicity Test
Hydrogeologic Report of Phase I Investigations
May 1984

Sample Location Units	Limit for EP Toxicity mg/l	Inactive Disposal Area Composite of Fill Material mg/l		Active Disposal Area Composite of Fill Material mg/l	
Metals					
Arsenic	5.0	0.005	U	0.005	U
Barium	100	0.1	U	0.1	U
Cadmium	1.0	0.005	U	0.005	U
Chromium	5.0	0.01	U	0.01	U
Lead	5.0	0.02	U	0.02	U
Mercury	0.2	0.0011		0.005	U
Selenium	1.0	0.002	U	0.002	U
Silver	5.0	0.005	U	0.005	U
Aluminum	nca	0.5	U	0.05	U
Beryllium	nca	0.001	U	0.001	U
Boron	nca	NA		NA	
Cobalt	nca	0.03		0.03	
Copper	nca	0.005		0.005	U
Iron	nca	2.43		1.55	
Manganese	nca	10		1.95	
Nickel	nca	1.75		0.07	
Vanadium	nca	0.005	U	0.005	U
Zinc	nca	0.19		0.30	

NA - Results for boron were not published in report.
U - Analyte not detected above indicated detection limit.
nca - No criteria available.

TABLE 4
Groundwater and Surface Water Analytical Results
Hydrogeologic Report of Phase I Investigations
May 1984

Sample Name Matrix Units	DNREC HSCA URS for Groundwater ug/L	MW-1 Groundwater ug/L		MW-2 Groundwater ug/L		MW-3 Groundwater ug/L		MW-4 Groundwater ug/L		DNREC HSCA URS for Surface Water ug/L	SW-1 Surface Water ug/L		SW-2 Surface Water ug/L	
Arsenic	50	1	U	1		1	U	1	U	3	NA		NA	
Barium	2,000	38		34		59		11		4	NA		NA	
Cadmium	5	1	U	1	U	1		1	U	1	**2**		**1**	
Chromium	11**	1		5		3		2		11**	1	U	1	
Fluoride	220	110		**730**		120		**280**		nca	NA		NA	
Lead	15	3		1	U	**28**		**4**		3	**54**		**22**	
Mercury	2	1	U	1	U	1	U	1		1	NA		NA	
Nitrate-N	1,000	300		**1,200**		**5,000**		**2,000**		nca	NA		NA	
Selenium	50	1	U	1	U	1	U	1	U	0.4	NA		NA	
Silver	100	1	U	1	U	1	U	3		0.4	NA		NA	
Chloride	61	**12,500**		**72,000**		**28,000**		**115,000**		nca	NA		NA	
Iron	300	**630**		**8,300**		**2,450**		**17,400**		1,000	NA		NA	
Manganese	50	**3,200**		**2,700**		**760**		**3,200**		80	NA		NA	
Phenols	4,000	10	U	10	U	10	U	10	U	110	NA		NA	
Sodium	nca	50,000		90,000		40,000		100,000		nca	NA		NA	
Sulfate	nca	75,000		122,000		45,000		273,000		nca	NA		NA	
pH	-	6.15		5.95		5.8		4.7		-	NA		NA	
Specific Conductance*	-	368		790		275		795		-	NA		NA	
Total Organic Carbon	-	26,000		90,000		16,400		55,800		-	NA		NA	
Total Organic Halogen	-	28		51		12		73		-	NA		NA	

* - Specific Conductance units are umhos/cm.
** - Regulatory criteria for Chromium IV.
Bold - Concentration above URS.
NA - Not analyzed.
nca - No criteria available.
U - Analyte not detected above indicated detection limit.

TABLE 5
Soil Analytical Results - TAL Metals and Cyanide
Five-Year Review
July 1993

Sample ID	DNREC HSCA URS Unrestricted Use	DNREC HSCA URS Restricted Use	S-1		S-2		S-3		S-4	
Units	mg/kg	mg/kg	mg/kg		mg/kg		mg/kg		mg/kg	
Aluminum	7,800	200,000	3,190		4,760		1,040		1,950	
Antimony	3	82	7.8	U	8.0	U	7.3	U	7.4	U
Arsenic	11[t]	11[t]	6.3		10.1		2.8	L	3.9	L
Barium	550	14,000	40.6		39.7		49.8		27.5	
Beryllium	16	410	0.43	U	0.45	U	0.41	U	0.41	U
Cadmium	4	100	**10.6**		**6.3**		3.7		0.95	K
Calcium	nca	nca	1,090		1,830		959		1,610	
Chromium	270*	610*	34.3		22		10.5		11	
Cobalt	470	12,000	7.6		5.8		1.6	U	1.6	U
Copper	310	8,200	128		91.3		53.5		54.7	
Iron	2,300	61,000	**62,400**		**37,100**		**18,700**		**7,980**	
Lead	400	1,000	190		100		155		49.8	
Magnesium	nca	nca	648		944		338		574	
Manganese	160	4,100	**1,230**		**851**		**586**		**174**	
Mercury	10	610	0.11	U	0.11	U	0.1	U	0.1	U
Nickel	160	4,100	56		37		12.7	B	6.6	B
Potassium	nca	nca	97.1		216		77.1	U	148	
Selenium	39	1,000	6.5	U	6.7	U	0.61	U	6.2	U
Silver	39	1,000	1.3	U	1.3	U	1.2	U	1.2	U
Sodium	nca	nca	287	B	641	B	546	B	2,140	
Thallium	18	220	0.86	U	0.89	U	0.81	U	0.82	U
Vanadium	55	1,400	2.6	U	2.7	U	2.4	U	2.5	U
Zinc	2,300	61,000	189		111		193		108	
Cyanide	160	4,100	1.1	U	1.1	U	1.0	U	1.0	U

B - Not detected substantially above the level reported in laboratory or field blanks.
K - Analyte present. Reported value may be biased high. Actual value is expected to be lower.
L - Analyte present. Reported value may be biased low. Actual value is expected to be higher.
* - Regulatory criteria for Chromium IV.
Bold - Concentration above URS for unrestricted use.
Bold and Shaded - Concentration above URS for restricted use.
[t] - Delaware background concentration (DNREC, 2004).
U - Analyte not detected above indicated detection limit.
nca - No criteria available.

TABLE 6
Groundwater Analytical Results - TAL Metals and Cyanide
Five-Year Review
July 1993

Sample ID Units	DNREC HSCA Groundwater URS for Protection of Human Health ug/L	MW-1 ug/L Dissolved		MW-2 ug/L Dissolved		MW-3 ug/L Dissolved	
Aluminum	200	56.0	U	56.0	U	56.0	U
Antimony	6	36.0	U	36.0	U	36.0	U
Arsenic	50	3.0	U	3		3.0	U
Barium	2000	60.2		32.2		63.6	
Beryllium	4	2.0	U	2.0	U	2.0	U
Cadmium	5	3.0	U	6.8	B	2.1	B
Calcium	nca	18,500		27,400		8,430	
Chromium	11*	6.0	U	6.0	U	6.0	U
Cobalt	220	40.5		39.6		32.1	
Copper	1300	63.8	B	56.1	B	46.9	B
Iron	300	186	B	**9,210**		199	B
Lead	15	3.2	B	2.9	B	4.9	B
Magnesium	nca	10,400		32,600		11,500	
Manganese	50	**1,540**		**2,820**		**319**	
Mercury	2	0.20	U	0.20	U	0.20	U
Nickel	100	79.7	B	22.9	B	93.9	
Potassium	nca	5,730		380	U	4,620	
Selenium	50	2.0	U	2.0	U	2.0	U
Silver	100	6.0	U	6.0	U	6.0	U
Sodium	nca	42,400		86,900		24,000	
Thallium	2	4.0	U	4.0	U	4.0	U
Vanadium	26	12.0	U	12.0	U	12.0	U
Zinc	2000	557	J	135	B	1,080	J
Cyanide (total)	200	10	U	10	U	10	U

B - Not detected substantially above level reported in laboratory or field blanks
J - Analyte present. Reported value may not be accurate or precise.
* - Regulatory criteria for Chromium IV.
Bold - Concentration above URS.
U - Analyte not detected above indicated detection limit.
nca - No cirteria available.

TABLE 7
Sediment Analytical Results - TAL Metals and Cyanide
Five-Year Review
July 1993

Sample ID Units	DNREC HSCA Sediment URS mg/kg	SD-1 mg/kg		SD-2 mg/kg		SD-3 mg/kg		SD-4 mg/kg		SD-5 mg/kg		SD-6 mg/kg	
Aluminum	nca	1,030		1,520		10,400		5,590		16,800		1,360	
Antimony	2	8.9	U	8.7	U	14.2	U	17.6	U	20.5	U	8.6	U
Arsenic	8	0.74	U	4.6		**16.4**		4.1	L	**11.2**		0.72	U
Barium	20	11.1		20		**123**		**95.1**		**158**		6.4	
Beryllium	nca	0.49	U	0.48	U	1		0.98	U	1.1	U	0.48	U
Cadmium	1	0.74	U	3.1		**6.3**		**3.3**		8.2	B	0.72	U
Calcium	nca	6,820		5,100		2,920		1,890		2,120		411	B
Chromium	81*	9		12.9		25.5		16.6		42.4		1.4	U
Cobalt	nca	2.0	U	3.2		9.1		4.4		17.6		1.9	U
Copper	12	**13.3**	B	**49.9**		**76.9**		**74.3**		**213**		8.0	B
Iron	nca	5,200		19,700		29,500		21,200		43,500		2,120	
Lead	47	31.1		**49.7**		**373**		**162**		**420**		**49.2**	
Magnesium	nca	3,320		2,960		3,130		1,160		2,390		182	
Manganese	nca	68		385		467		382		298		56.6	
Mercury	0.2	0.12	U	0.12	U	0.20	U	0.25	U	0.28	U	0.12	U
Nickel	21	3.0	U	13.0	B	**33.1**		18.3	B	**60.5**		2.9	U
Potassium	nca	93.9	U	148		451		250		1,860		91.0	U
Selenium	nca	0.74	U	7.3	U	11.9	U	14.7	U	17.0	U	7.2	U
Silver	1	1.5	U	1.5	U	2.4	U	2.9	U	3.4	U	1.4	U
Sodium	nca	82.2	B	82.6	B	216	B	242	B	479	B	51.0	B
Thallium	nca	0.99	U	0.97	U	1.6	U	2.0	U	2.3	U	0.96	U
Vanadium	nca	3.0	U	2.9	U	33.2		5.9	U	43.9		3.1	
Zinc	150	39		72.1		**388**		**293**		**672**		9.8	B
Cyanide	0.1	1.2	U	1.2	U	2.0	U	2.5	U	2.8	U	1.2	U

B - Not detected substantially above the level reported in laboratory or field blanks.
L - Analyte present. Reported value may be biased low. Actual value is expected to be higher.
* - Regulatory criteria for Chromium III.
Bold - Concentration above URS.
U - Analyte not detected above indicated detection limit.
nca - No criteria available.

TABLE 8
Surface Water Analytical Results
Five-Year Review
July 1993

Sample ID Units	DNREC URS Surface Water URS ug/L	SW-1 ug/L Dissolved		SW-2 ug/L Dissolved		SW-4 ug/L Dissolved		SW-5 ug/L Dissolved		SW-6 ug/L Dissolved	
Aluminum	87	56.0	U	**167**		62.2		56.0	U	56.0	U
Antimony	30	36.0	U	36.0	U	**40.1**	K	36.0	U	36.0	U
Arsenic	3	**3.5**		**4.4**		3.0	U	3.0	U	**3.9**	
Barium	4	**59.4**		**43.2**		**106**		**77.4**		**39**	
Beryllium	0.7	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Cadmium	1	3.0	U	5.3	K	3.0	U	**4.1**	K	3.0	U
Calcium	nca	43,200		29,100		16,600		22,200		17,700	
Chromium	11*	6.0	U	6.0	U	6.0	U	6.0	U	6.0	U
Cobalt	23	8.0	U	8.0	U	8.0	U	8.0	U	8.0	U
Copper	12	**30.0**	B	**33.8**	B	**45.0**	B	**42.8**	B	**54.4**	B
Iron	1000	65.0	B	533		**6,440**		678		144	B
Lead	3	2.4	B	2.7	B	3.0	B	**3.4**	B	2.6	B
Magnesium	nca	24,200		13,400		5,690		8,360		5,320	
Manganese	80	**2,110**		**801**		**955**		**1,330**		**386**	
Mercury	0.003	0.20	U	0.20	U	0.20	U	0.20	U	0.20	U
Nickel	160	23.8	B	19.1	B	23.8	B	16.8	B	43.3	B
Potassium	nca	3,520		4,450		8,750		3,750		6,270	
Selenium	0.4	2.0	U	2.0	U	2.0	U	2.0	U	2.0	U
Silver	0.4	6.0	U	**8.1**	J	6.0	U	6.0	U	6.0	U
Sodium	nca	88,300		36,000		11,600		19,400		12,400	
Thallium	9	4.0	U	4.0	U	4.0	U	4.0	U	4.0	U
Vanadium	19	12.0	U	12.0	U	12.0	U	12.0	U	12.0	U
Zinc	110	98.6	B	56.7	B	50.2	B	62.1	B	51.2	B
Cyanide (total)	22	10	U	10	U	10	U	10	U	10	U

B - Not detected substantially above level reported in laboratory or field blanks
J - Analyte present. Reported value may not be accurate or precise.
K - Analyte present. Reported value may be biaed high. Actual value is expected to be lower.
* - Regulatory criteria for Chromium IV.
Bold - Concentration above URS.
U - Analyte not detected above indicated detection limit.

File Number: # 1068.05.21

TABLE 9
Soil Screening Analytical Results
DNREC SIRB Site Inspection
Deemer Steel Landfill
New Castle, Delaware

Sample ID	DNREC URS for Protection of Human Health Non-Critical Water Resource Area		NCS-MW5S	NCS-MW9S	NCS-MW9D	NCS-MW10D	NCS-MW7S	NCS-MW10S	NCS-MW6D
Sample Depth			Shallow	Shallow	Deep	Deep	Shallow	Shallow	Deep
Sample Date			July-02	July-02	July-02	July-02	July-02	July-02	July-02
Units	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Analyte	Unrestricted Use	Restricted Use							
Metals									
antimony	3	82	ND	ND	**3.92**	ND	ND	1.36	**3.49**
arsenic	11[t]	11[t]	**37.0**	7.97	**12.2**	7.74	**22.2**	6.74	4.25
barium	550	14,000	250	162	244	117	266	102	87.1
cadmium	4	100	ND	ND	ND	ND	ND	ND	0.767
calcium	nca	nca	12,500	23,300	4,850	5,300	5,070	15,700	2,560
chromium	270	610	216	89.9	198	65.3	143	71.0	128
cobalt	470	12,000	92.9	13.0	222	225	ND	93.6	88.1
copper	310	8,200	162	33.6	140	89.8	106	70.8	123
iron	2,300	61,000	**60,400**	**21,000**	**63,800**	**45,500**	**65,700**	**37,500**	**59,800**
lead	400	1,000	299	88.7	117	38.3	56.1	135	35.5
manganese	160	4,100	**3,780**	**1,190**	**2,090**	**17,100**	**2,550**	**930**	**2,310**
mercury	10	610	2.92	ND	ND	ND	ND	2.28	2.49
nickel	160	4,100	11.9	27.9	12.5	24.2	ND	28.0	18.9
selenium	39	1,000	4.22	ND	0.168	2.05	0.448	2.43	2.50
silver	39	1,000	ND	0.511	ND	ND	0.630	ND	1.11
thallium	18	220	ND	ND	2.81	0.356	ND	2.93	6.66
vanadium	55	1,400	9.74	17.4	19.5	7.72	ND	**58.0**	21.0
zinc	2,300	61,000	420	113	400	38.1	113	116	35.3
SVOCs	nca	nca	Low PAHs	Low PAHs	Low PAHs	ND	ND	ND	Low PAHs
VOCs	nca	nca	ND	ND	ND	ND	ND	ND	TPH
Pests/PCBs	nca	nca	ND	ND	ND	ND	ND	ND	ND

Bold - concentration exceeds unrestricted use
Bold and shaded - concentration exceeds both URS criteria
nca - no criteria available
[t] - Delaware background concentration (DNREC, 2002)
ND- Not detected

TABLE 9
Soil Screening Analytical Results
DNREC SIRB Site Inspection
Deemer Steel Landfill
New Castle, Delaware

Sample ID	DNREC URS for Protection of Human Health Non-Critical Water Resource Area		NCS-MW8S	NCS-SS1	NCS-MW8D	NCS-MW6S	NCS-TP1S	NCS-TP1D	NCS-TP2S	NCS-TP2D	NCS-TP3S
Sample Depth			Shallow	Shallow	Deep	Shallow	Shallow	Deep	Shallow	Deep	Shallow
Sample Date			July-02	July-02	July-02	July-02	July-02	July-02	July-02	July-02	July-02
Units	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Analyte	Unrestricted Use	Restricted Use									
Metals											
antimony	3	82	**4.95**	**4.70**	1.76	**11.7**	0.638	ND	ND	**6.01**	0.392
arsenic	11[t]	11[t]	**22.8**	**11.2**	1.37	10.9	**14.2**	4.19	**17.9**	**19.5**	6.49
barium	550	14,000	132	372	152	524	292	369	137	203	91.9
cadmium	4	100	ND	**4.97**	0.615	1.25	3.74	0.269	ND	ND	3.68
calcium	nca	nca	20,000	15,500	3,780	5,410	3540	4,410	4,420	5,360	3,960
chromium	270	610	100	152	76.8	**299**	88.7	51.6	208	199	241
cobalt	470	12,000	ND	55.0	123	82.6	38.0	ND	201	91.9	131
copper	310	8,200	114	202	45.0	82.0	108	8.00	109	109	74.2
iron	2,300	61,000	**41,600**	**56,000**	**33,500**	**44,700**	**20,100**	**17,600**	**55,300**	**50,400**	**83,200**
lead	400	1,000	202	276	40.5	129	252	29.6	110	98.4	63.7
manganese	160	4,100	**722**	**2,600**	**1,910**	**1,660**	**527**	104	**1,900**	**1,970**	**1,730**
mercury	10	610	ND	8.24	1.11	3.96	4.92	ND	**14.7**	4.74	ND
nickel	160	4,100	122	15.8	27.4	62.5	18.5	ND	21.2	45.5	40.3
selenium	39	1,000	ND	ND	2.79	3.12	1.80	**2.65**	2.62	1.93	0.888
silver	39	1,000	1.69	ND	1.72	ND	0.244	2.03	ND	ND	ND
thallium	18	220	ND	ND	1.93	ND	ND	ND	1.98	ND	ND
vanadium	55	1,400	**118**	**85.9**	ND	16.4	**67.5**	**57.2**	ND	32.3	10.8
zinc	2,300	61,000	292	949	88.4	187	433	41.9	172	204	99.4
SVOCs	nca	nca	PAH	ND	ND	PAH	PAH	PAH	ND	ND	PAH
VOCs	nca	nca	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pests/PCBs	nca	nca	ND	ND	ND	ND	ND	ND	ND	ND	ND

Bold - concentration exceeds unrestricted use
Bold and shaded - concentration exceeds both URS criteria
nca - no criteria available
[t] - Delaware background concentration (DNREC, 2002)
ND- Not detected

TABLE 9
Soil Screening Analytical Results
DNREC SIRB Site Inspection
Deemer Steel Landfill
New Castle, Delaware

Sample ID	DNREC URS for Protection of Human Health Non-Critical Water Resource Area		NCS-TP3D	NCS-TP4S	NCS-TP4D	NCS-TP5S	NCS-TP5D	NCS-TP6S	NCS-TP6D	NCS-TP7S	NCS-TP7D
Sample Depth			Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep	Shallow	Deep
Sample Date			July-02	July-02	July-02	July-02	July-02	July-02	July-02	July-02	July-02
Units	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Analyte	Unrestricted Use	Restricted Use									
Metals											
antimony	3	82	ND	**14.0**	**3.37**	ND	0.847	**3.94**	1.69	**5.30**	0.991
arsenic	11[t]	11[t]	4.23	**25.2**	10.6	7.83	0.142	**21.4**	2.23	7.90	**14.1**
barium	550	14,000	67.1	445	216	442	266	369	139	199	**1,150**
cadmium	4	100	ND	1.06	1.45	ND	0.787	0.304	0.621	ND	ND
calcium	nca	nca	3,050	18,200	2,320	5,920	4,110	23,500	3,380	5,580	5,980
chromium	270	610	63.9	85.5	**444**	48.6	67.1	98.8	51.0	139	80.0
cobalt	470	12,000	172	91.5	10.2	ND	105	ND	22.6	135	93.6
copper	310	8,200	122	74.2	106	25.4	45.9	67.4	64.1	195	103
iron	2,300	61,000	**70,600**	**33,900**	**49,600**	**27,200**	**30,400**	**34,900**	**22,500**	**121,000**	**30,800**
lead	400	1,000	31.6	102	177	87.1	67.8	141	103	54.3	30.8
manganese	160	4,100	**1,640**	**663**	**3,520**	**607**	**1,010**	**765**	**1,410**	**5,050**	**656**
mercury	10	610	4.36	ND	1.65	2.38	5.99	ND	1.09	ND	**18.8**
nickel	160	4,100	38.7	67.8	2.12	32.4	15.1	80.4	7.37	54.1	41.8
selenium	39	1,000	ND	1.26	ND	1.51	ND	1.89	0.756	0.964	2.06
silver	39	1,000	ND	0.625	ND	3.93	1.42	ND	1.29	3.05	ND
thallium	18	220	2.88	ND	5.98	ND	6.78	ND	ND	ND	ND
vanadium	55	1,400	17.2	**125**	0.318	44.4	13.8	**111**	ND	ND	ND
zinc	2,300	61,000	103	199	271	78.8	74.4	186	169	91.8	34.4
SVOCs	nca	nca	Low PAHs	Low PAHs	Low PAHs	Low PAHs	Low PAHs	Low PAHs	Low PAHs	ND	Low PAHs
VOCs	nca	nca	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pests/PCBs	nca	nca	ND	ND	ND	ND	ND	ND	ND	ND	ND

Bold - concentration exceeds unrestricted use
Bold and shaded - concentration exceeds both URS criteria
nca - no criteria available
[t] - Delaware background concentration (DNREC, 2002)
ND- Not detected

TABLE 9
Soil Screening Analytical Results
DNREC SIRB Site Inspection
Deemer Steel Landfill
New Castle, Delaware

Sample ID	DNREC URS for Protection of Human Health Non-Critical Water Resource Area		NCS-TP8S	NCS-TP8D	DRUM1	NCS-SS2
Sample Depth			Shallow	Deep		Shallow
Sample Date			July-02	July-02	July-02	July-02
Units	mg/kg		mg/kg	mg/kg	mg/kg	mg/kg
Analyte	Unrestricted Use	Restricted Use				
Metals						
antimony	3	82	**9.56**	**3.19**	ND	1.61
arsenic	11[t]	11[t]	**17.4**	**35.5**	**23.2**	**12.7**
barium	550	14,000	417	258	152	239
cadmium	4	100	1.62	3.71	3.47	0.810
calcium	nca	nca	17,300	4,340	22,700	6,760
chromium	270	610	72.7	**957**	**349**	56.9
cobalt	470	12,000	97.0	80.2	101	156
copper	310	8,200	102	216	**454**	20.2
iron	2,300	61,000	**33,700**	**69,700**	**194,000**	**15,400**
lead	400	1,000	117	**464**	147	117
manganese	160	4,100	**683**	**3,990**	**2,720**	**385**
mercury	10	610	ND	2.46	ND	ND
nickel	160	4,100	95.1	ND	45.3	12.8
selenium	39	1,000	3.10	ND	2.65	ND
silver	39	1,000	ND	1.80	ND	0.314
thallium	18	220	ND	2.16	ND	ND
vanadium	55	1,400	49.8	ND	ND	41.7
zinc	2,300	61,000	214	857	259	187
SVOCs	nca	nca	Low PAHs	ND	ND	ND
VOCs	nca	nca	ND	ND	ND	ND
Pests/PCBs	nca	nca	ND	ND	ND	ND

Bold - concentration exceeds unrestricted use
Bold and shaded - concentration exceeds both URS criteria
nca - no criteria available
[t] - Delaware background concentration (DNREC, 2002)
ND- Not detected

TABLE 10
Sediment Screening Analytical Results
DNREC SIRB Site Inspection
Deemer Steel Landfill
New Castle, Delaware

Sample ID Sample Depth Sample Date Units Analyte	DNREC URS for Protection of the Environment mg/kg	NCS-SED1 Shallow July-02 mg/kg	NCS-SED2 Shallow July-02 mg/kg
Metals			
antimony	2	1.67	ND
arsenic	8	1.07	**8.5**
barium	20	**203**	**142**
cadmium	1	ND	**2.470**
calcium	nca	8,890	16,700
chromium	81*	57.0	**85.1**
cobalt	nca	45.5	139
copper	34	**43.8**	**67.9**
iron	nca	23,600	38,800
lead	47	**91.7**	**95**
manganese	nca	1,010	639
mercury	0.2	ND	**7.4**
nickel	21	**30.0**	**32.6**
selenium	nca	3.22	ND
silver	1	**1.91**	ND
thallium	nca	ND	2.3
vanadium	nca	ND	63.9
zinc	150	**191**	**381**
SVOCs	nca	Low PAHs	ND
VOCs	nca	ND	ND
Pests/PCBs	nca	ND	ND

* - URS for chromium III
Bold - concentration exceeds URS
nca - no criteria available
[t] - Delaware background concentration (DNREC, 2002)
ND- Not detected

TABLE 11
Soil HSCA Analytical Results - TAL Metals and Cyanide
DNREC-SIRB Site Inspection
July 2002

Sample Number	DNREC HSCA URS for Soil		NCS-SS1		DRUM #1		NCS-MW8S		NCS-TP1S		NCS-TP4D		NCS-TP6D	
Matrix	Unrestricted Use	Restricted Use	Soil		Soil		Soil		Soil		Soil		Soil	
Units	mg/kg	mg/kg	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Aluminum	7,800	200,000	4,310	J	1,110	J	**12,200**	**J**	4,290	J	1,720	J	1,190	J
Antimony	3	82		UJ	**18.5**	**J**		UJ		UJ		UJ		UJ
Arsenic	11[t]	11[t]	4.8	J	20.7	J	10.6	J	3.8	J	4.4	J	5.5	J
Barium	550	14,000	117	J		UJ	124	J	98.3	J	127	J	61.3	J
Beryllium	16	410		UJ		UJ		UJ		UJ		UJ		UJ
Cadmium	4	100	3.7	J	7.7	J	1.2	J		UJ	2.5	J	2.4	J
Calcium	nca	nca	7,030	J	10,200	J	17,700	J		UJ	2,100	J	2,730	J
Chromium	270*	610*	50.9	J	**425**	**J**	36.3	J	10.5	J	48.8	J	26.3	J
Cobalt	470	12,000		UJ	34.4	J	12.3	J		UJ		UJ		UJ
Copper	310	8,200	131	J	**679**	**J**	104	J	38.7	J	108	J	133	J
Iron	2,300	61,000	**32,500**	**J**	192,000	J	**21,600**	**J**	**10,500**	**J**	**35,600**	**J**	**49,100**	**J**
Lead	400	1,000	188	J	38.2	J	152	J	156	J	209	J	85.8	J
Magnesium	nca	nca	4,150	J		UJ	8,800	J		UJ		UJ		UJ
Manganese	160	4,100	**1,350**	**J**	**1,630**	**J**	**517**	**J**	**169**	**J**	**2,120**	**J**	**711**	**J**
Mercury	10	610	0.34	J		UJ	0.25	J	2.1	J		UJ		UJ
Nickel	160	4,100	46.8	J	55.8	J	42.4	J		UJ	36.7	J	70.5	J
Potassium	nca	nca		UJ	4,000	J	2,910	J		UJ		UJ		UJ
Selenium	39	1,000		UJ	6.6	J		UJ		UJ	1.7	J	13.2	J
Silver	39	1,000		UJ		UJ		UJ		UJ		UJ		UJ
Sodium	nca	nca		UJ		UJ		UJ		UJ		UJ		UJ
Thallium	18	220		UJ	2.8	J		UJ		UJ		UJ		UJ
Vanadium	55	1,400	29.3	J		UJ	53.9	J		UJ		UJ		UJ
Zinc	2,300	61,000	590	J	62.9	J	205	J	236	J	320	J	168	J
Cyanide	160	4,100		UJ		UJ		UJ		UJ		UJ		UJ

[t] - Delaware background concentration (DNREC, 2004)
* - Regulatory criteria for Chromium VI.
Bold - Concentration above URS for unrestricted use.
Bold and Shaded - Concentration above URS for restricted use.
U - Analyte not detected above indicated detection limit.
J - Analyte present. Reported value may not be accurate or precise.
nca - No criteria available.

TABLE 12
Soil HSCA Analytical Results - SVOCs
DNREC-SIRB Site Inspection
July 2002

Sample Number	DNREC HSCA URS Non-Critical Water Resource Area (12/99)		DRUM1		NCS-MW10D		NCS-MW7S		NCS-SS1		NCS-SS2		NCS-TP2S		NCS-TP4D		NCS-TP6D	
Matrix	Unrestricted Use	Restricted Use	Soil		Soil		Soil		Soil		Soil		Soil		Soil		Soil	
Units	mg/kg	mg/kg	mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg		mg/kg	
Benzaldehyde	780	5,000		U		U		U		U	0.069	J		U		U		U
Naphthalene	160	4,100	0.037	J		U	0.300	JD		U		U		U		U	0.110	J
2-Methylnaphthalene	160	4,100	0.130	J		U	0.440	JD		U		U		U		U	0.090	J
Biphenyl	390	5,000		U		U		U		U	0.009	J		U		U		U
Acenaphthylene	nca	nca		U		U	0.550	JD	0.130	J		U		U		U		U
Dimethylphthalate	1,000	5,000		U		U		U	0.068	J		U		U		U		U
Acenaphthene	470	5,000	0.063	J		U	0.940	D		U		U		U		U		U
Dibenzofuran	31	820	0.069	J		U	0.850	D		U		U		U		U		U
Fluorene	310	5,000	0.047	J		U	1.1	D	0.110	J		U		U		U	0.070	J
Phenanthrene	1,000	5,000	0.320	J	0.370		11.0	D	0.970		0.330	J	5.0	D	0.077	J	0.260	J
Anthracene	1,000	5,000		U	0.080	J	2.5	D	0.170	J	0.062	J	0.65	JD		U		U
Carbazole	32	290		U		U	1.2	D	0.160	J		U		U		U		U
Fluoranthene	310	5,000	0.170	J	0.730		15.0	ED	1.8		0.630		8.5	D	0.083	J	0.077	J
Pyrene	230	5,000	0.180	J	0.990		12.0	D	1.9		0.740		10.0	D	0.072	J	0.063	J
Butylbenzylphthalate	930	5,000		U		U		U	0.280	J		U		U		U		U
Benzo(a)Anthracene	0.9	8	0.040	J	0.550		**5.8**	**D**	0.900		0.320	J	**3.0**	**JD**		U	0.046	J
Chrysene	87	780	0.053	J	0.720		6.0	D	1.2		0.430	J	4.0	D	0.062	J	0.049	J
bis(2-Ethylhexyl)phthalate	46	410	0.160	J	0.067	J	0.091	JD	0.310	J	0.350	J		U	0.110	J	0.067	J
Di-n-octylphthalate	160	4,100		U		U		U		U		U		U		U		U
Benzo(b)fluoranthene	0.9	8		U	0.810		**5.0**	**D**	**1.1**		0.370	J	**3.5**	**JD**	0.056	J		U
Benzo(k)fluoranthene	9	78		U	0.490		4.4	D	0.900		0.350	J	3.3	JD	0.040	J		U
Benzo(a)pyrene	0.09	0.8		U	**0.680**		5.1	D	0.990		**0.370**	**J**	3.6	JD		U		U
Indeno(1,2,3-cd)pyrene	0.9	8		U	0.530		**2.7**	**D**	0.660		0.250	J	**2.4**	**JD**		U		U
Dibenz(a,h)anthracene	0.09	0.8		U	**0.200**	**J**	0.920	D	**0.260**	**J**		U		U		U		U
Benzo(g,h,k)perylene	nca	nca		U	0.680		3.0	D	0.690		0.280	J	2.7	JD		U		U
All other SVOCs were not detected above laboratory detection limits.																		

Bold - Concentration exceeds DNREC URS Unrestricted Use limit.
Shaded - Concentration exceeds DNREC URS Restricted Use limit.
U - Analyte not present above laboratory detection limits.
J - Analyte present. Reported value may not be accurate or precise.
D - Concentrations reported from secondary dilution analysis
E - Concentration exceeds calibration range
nca - No criteria available

Table 13
Sediment HSCA Analytical Results TAL Inorganics and SVOCs
DNREC-SIRB Site Inspection
July 2002

Sample Number Matrix Units	DNREC HSCA Sediment URS mg/kg	NCS-SED2 Sediment mg/kg	
TAL INORGANICS			
Aluminum	nca	3,790	J
Calcium	nca	4,780	J
Chromium	81**	20.1	J
Copper	12	**37.5**	**J**
Iron	nca	16,600	J
Lead	47	**68.3**	**J**
Magnesium	nca	2,800	J
Manganese	nca	279	J
Nickel	21	**24.8**	**J**
Zinc	150	**213**	**J**
All other metals were not detected			
Cyanide	0.1		UJ
SVOCs			
Phenanthrene	0.5	**1.02**	
Anthracene	0.3	0.140	J
Carbazole	nca	0.150	J
Fluoranthene	0.8	**2.2**	
Pyrene	nca	2.4	
Benzo(a)Anthracene	0.1	**0.840**	
Chrysene	0.9	**1.5**	
bis(2-Ethylhexyl)phthalate	3	**3.5**	
Di-n-octylphthalate	1,000	0.150	J
Benzo(b)fluoranthene	4	1.4	
Benzo(k)fluoranthene	4	1.2	
Benzo(a)pyrene	0.1	**1.1**	
Indeno(1,2,3-cd)pyrene	0.8	0.730	
Dibenz(a,h)anthracene	nca	0.240	J
Benzo(g,h,k)perylene	nca	0.800	
All other SVOCs were not detected.			

[1] - Delaware background concentration (DNREC, 2004)

* - Regulatory criteria for Chromium VI.

Bold - Concentration above URS for unrestricted use.

Bold and Shaded - Concentration above URS for restricted use.

U - Analyte not detected above indicated detection limit.

J - Analyte present. Reported value may not be accurate or precise.

nca - No criteria available.

TABLE 14
Soil Screening Analytical Results
Former Deemer Steel Landfill RI/FS
November 2004

Sample ID Sample Depth Sample Date Units Analyte	DNREC URS for Protection of Human Health Non-Critical Water Resource Area mg/kg		SS1-S001 Shallow 11/23/04 mg/kg	SS2-S001 Shallow 11/23/04 mg/kg	SS3-S001 Shallow 11/23/04 mg/kg	SS4-S001 Shallow 11/23/04 mg/kg	SS4-S101 Shallow 11/23/04 mg/kg	SS5-S001 Shallow 11/22/04 mg/kg	SS6-S001 Shallow 11/22/04 mg/kg
	Unrestricted Use	Restricted Use							
Metals									
antimony	3	82	ND	ND	ND	ND	ND	ND	ND
arsenic	11[t]	11[t]	**15.8**	**20.6**	6.39	7.77	**17.5**	**18.2**	4.21
barium	550	14,000	343	418	241	209	175	326	310
cadmium	4	100	ND	ND	ND	ND	ND	ND	ND
calcium	nca	nca	4,910	4,743	2,773	2,576	2,213	3,714	5,401
chromium	270	610	95.1	77.8	38.1	50.3	53.5	95.1	85.9
cobalt	470	12,000	ND	101	ND	ND	ND	ND	ND
copper	310	8,200	56.1	56.3	74.0	95.1	119	107	77.0
iron	2,300	61,000	**23,830**	**28,464**	**24,669**	**30,794**	**34,128**	**35,648**	**40,909**
lead	400	1,000	194	179	40.7	83.5	140	134	60.0
manganese	160	4,100	**382**	**1,143**	**660**	**352**	**508**	**732**	**1,170**
mercury	10	610	ND	ND	ND	**10.1**	ND	ND	ND
nickel	160	4,100	21.6	36.1	10.9	ND	ND	ND	ND
selenium	39	1,000	ND	2.14	ND	ND	ND	ND	ND
silver	39	1,000	ND	ND	ND	ND	ND	ND	ND
thallium	18	220	ND	ND	ND	ND	ND	ND	ND
vanadium	55	1,400	ND	**70.8**	ND	ND	ND	ND	**70.2**
zinc	2,300	61,000	124	207	109	81.3	125	180	103
SVOCs	nca	nca	ND	PAH	PAH	ND	ND	PAH	Low PAHs < 1.0
VOCs	nca	nca	ND	ND	ND	ND	ND	ND	ND
Pests/PCBs	nca	nca	ND	ND	ND	ND	ND	ND	ND

Bold - concentration exceeds unrestricted use URS
Bold and shaded - concentration exceeds both URS criteria
nca - no criteria available
[t] - Delaware background concentration (DNREC, 2004)
ND- Not detected

TABLE 14
Soil Screening Analytical Results
Former Deemer Steel Landfill RI/FS
November 2004

Sample ID Sample Depth Sample Date Units	DNREC URS for Protection of Human Health Non-Critical Water Resource Area mg/kg		SS7-S001 Shallow 11/23/04 mg/kg	SS8-S001 Shallow 11/22/04 mg/kg	SS9-S001 Shallow 11/22/04 mg/kg	SS10-S001 Shallow 11/22/04 mg/kg	SS11-S001 Shallow 11/22/04 mg/kg	SS12-S001 Shallow 11/23/04 mg/kg
Analyte	Unrestricted Use	Restricted Use						
Metals								
antimony	3	82	ND	ND	ND	ND	ND	ND
arsenic	11[t]	11[t]	**14.3**	5.38	6.26	ND	10.6	5.67
barium	550	14,000	157	143	142	123	241	174
cadmium	4	100	ND	ND	**4.44**	ND	ND	ND
calcium	nca	nca	2,171	5,556	1,985	2,267	5,137	2,599
chromium	270	610	120	37.9	142	71.5	89.9	57.5
cobalt	470	12,000	ND	ND	ND	ND	ND	ND
copper	310	8,200	83.5	73.3	81.9	64.0	67.5	58.2
iron	2,300	61,000	**44,699**	**24,545**	**66,609**	**28,580**	**38,611**	**45,772**
lead	400	1,000	125.1	74.3	36.4	ND	77.5	37.9
manganese	160	4,100	**1,590**	**630**	**1,487**	**1,064**	**1,084**	**1,817**
mercury	10	610	ND	ND	ND	ND	ND	ND
nickel	160	4,100	ND	ND	33.1	ND	24.3	22.5
selenium	39	1,000	ND	ND	ND	ND	ND	ND
silver	39	1,000	ND	ND	ND	ND	ND	ND
thallium	18	220	ND	ND	ND	ND	ND	ND
vanadium	55	1,400	ND	ND	ND	ND	**60.2**	ND
zinc	2,300	61,000	127	70.9	63.8	113	119	39.6
SVOCs	nca	nca	PAH	ND	ND	PAH	PAH	ND
VOCs	nca	nca	ND	ND	ND	ND	ND	ND
Pests/PCBs	nca	nca	ND	ND	ND	ND	ND	ND

Bold - concentration exceeds unrestricted use URS
Bold and shaded - concentration exceeds both URS criteria
nca - no criteria available
[t] - Delaware background concentration (DNREC, 2004)
ND- Not detected

TABLE 15
Sediment Screening Analytical Results
Former Deemer Steel Landfill RI/FS
November 2004

Sample ID Sample Depth Sample Date Units Analyte	DNREC URS for Protection of the Environment mg/kg	SED1 Shallow 11/23/04 mg/kg	SED2 Shallow 11/23/04 mg/kg	SED3 Shallow 11/23/04 mg/kg	SED4 Shallow 11/23/04 mg/kg	SED5 Shallow 11/23/04 mg/kg
Metals						
antimony	2	ND	ND	ND	ND	ND
arsenic	8	**11.5**	**9.33**	3.50	ND	ND
barium	20	**227**	**271**	**134**	**66.4**	**23.3**
cadmium	1	ND	ND	ND	ND	ND
calcium	nca	15,196	14,106	8,407	1,172	1,229
chromium	81*	**95.0**	**96.4**	42.3	69.2	52.8
cobalt	nca	ND	ND	ND	ND	ND
copper	34	**91.7**	**71.7**	27.2	29.3	**40.3**
iron	nca	35,223	34,263	20,734	8,462	10,028
lead	47	**158**	**122**	36.6	46.0	26.1
manganese	nca	550	684	418	362	354
mercury	0.2	ND	**12.0**	ND	ND	ND
nickel	21	**57.4**	**44.8**	ND	ND	ND
selenium	nca	ND	ND	ND	ND	ND
silver	1	ND	ND	ND	ND	ND
thallium	nca	ND	ND	ND	ND	ND
vanadium	nca	79.7	79.3	ND	ND	ND
zinc	150	**573**	**349**	107	47.0	48.4
SVOCs	nca	PAH	PAH	PAH	ND	ND
VOCs	nca	ND	ND	ND	ND	ND
Pests/PCBs	nca	ND	ND	ND	ND	ND

* - URS for chromium III
Bold - concentration exceeds URS
nca - no criteria available
[t] - Delaware background concentration (DNREC, 2002)
ND- Not detected

TABLE 16
Soil HSCA Analytical Data - Organics
Former Deemer Steel Landfill RI/FS
November 2004

Sample ID Sample Date Sample Depth (feet) Units	DNREC URS Criteria for the Protection of Human Health Non-Critical Water Resource Area mg/kg		SS4-S001 11/22/2004 0-2 mg/kg		SS7-S001 11/22/2004 0-2 mg/kg		SS10-S001 11/22/2004 0-2 mg/kg		SS11-S001 11/23/2004 0-2 mg/kg	
	Unrestricted Use	Restricted Use								
SEMIVOLATILE										
2-Methylphenol	1,000	5,000	0.43	U	0.39	U	0.43	U	0.042	J
4-Methylphenol	390	5,000	0.43	U	0.015	J	0.043	J	0.49	J
2,4-Dimethylphenol	39	4,100	0.43	U	0.01	J	0.01	J	0.068	J
Naphthalene	160	4,100	0.43	U	0.058	J	0.08	J	0.58	J
2-Methylnaphthalene	160	4,100	0.43	U	0.04	J	0.055	J	0.35	J
Acenaphthylene	nca	nca	0.43	U	0.077	J	0.14	J	0.68	J
Acenaphthene	470	5,000	0.43	U	0.044	J	0.065	J	0.4	J
Dibenzofuran	31	820	0.43	U	0.037	J	0.084	J	0.52	J
Fluorene	310	5,100	0.43	U	0.048	J	0.087	J	0.47	J
Phenanthrene	1,000	5,000	0.076	J	0.73		1.1		9.1	
Anthracene	1,000	5,000	0.011	J	0.13	J	0.4	J	1.4	J
Carbazole	32	290	0.0088	J	0.076	J	0.097	J	1	J
Fluoranthene	310	5,000	0.14	J	1.3		1.5		16	
Pyrene	230	5,000	0.14	J	1.3		1.6		18	
Benzo(a)anthracene	0.9	8	0.1		**0.96**		0.83		12	
Chrysene	87	780	0.19	J	1.3		0.94		17	
bis(2-Ethylhexyl)phthalate	46	410	0.43	U	0.39	U	0.43	U	2.1	U
Benzo(b)fluoranthene	0.9	8	0.23		**1.2**		0.8		15	
Benzo(k)fluoranthene	9	78	0.15		1		0.78		**17**	
Benzo(a)pyrene	0.09	0.8	**0.15**		1.2		**0.71**		16	
Indeno(1,2,3-cd)pyrene	0.9	8	0.14		0.73		0.42		10	
Dibenz(a,h)anthracene	0.09	0.8	0.061		**0.31**		**0.16**		4	
Benzo(g,h,i)perylene	nca	nca	0.18	J	0.82		0.44		10	
All other SVOCs were not detected										

U - The compound was not detected at the indicated concentration.

J - The result is less than the quantitation limit but greater than zero, the concentration given is an approximate value.

Bold - Value exceeds unrestricted URS criteria

Shaded - Value exceeds both restricted and unrestricted URS criteria

nca - no criteria available

TABLE 17
Soil HSCA Analytical Data - Inorganics
Former Deemer Steel Landfill RI/FS
November 2004

Sample ID Sample Date Sample Depth (feet) Units	DNREC URS Criteria for the Protection of Human Health Non-Critical Water Resource Area mg/Kg		SS4-S001 11/22/2004 0-2 mg/kg		SS7-S001 11/22/2004 0-2 mg/kg		SS10-S001 11/22/2004 0-2 mg/kg		SS11-S001 11/23/2004 0-2 mg/kg	
	Unrestricted Use	Restricted Use								
METALS										
Aluminum	7,800	200,000	7,700		4,700		4,900		415	
Antimony	3	82	1.3	B	0.92	U	1	B	0.78	U
Arsenic	11[t]	11[t]	13		4.6		4.6		0.76	B
Barium	550	14,000	169		52.9		55.5		1.6	B
Beryllium	16	410	0.3	B	0.22	B	0.23	B	0.02	U
Cadmium	4	100	0.1	U	0.094	U	0.1	U	0.08	U
Calcium	nca	nca	3,170		1,180		2,320		199	B
Chromium	270*	610*	17.1		53		19		2	
Cobalt	470	12,000	5	B	9.6	B	6.4	B	0.7	U
Copper	310	8,200	102		79.7		34		0.62	U
Iron	2,300	61,000	**34,200**		**36,500**		**23,800**		777	
Lead	400	1,000	161		90.3		54.8		0.98	
Magnesium	nca	nca	381	B	427	B	1,250		95.7	B
Manganese	160	4,100	**471**		**1,470**		571		3	
Mercury	10	610	0.17		0.09		0.13		0.017	U
Nickel	160	4,100	10.4		20.8		15.4		0.78	U
Potassium	nca	nca	906	B	641	B	617	B	20.8	B
Selenium	39	1,000	3.7		1.1	U	1.2	U	0.94	U
Sodium	nca	nca	223	B	85	U	90.5	U	72.3	U
Vanadium	55	1,400	18.3		17.8		17.3		2.1	B
Zinc	2,300	61,000	83.5		90.2		75.6		1.2	B
All other Metals were not detected										

U - The compound was not detected at the indicated concentration.
[t] - Delaware background concentration (DNREC, 2004)
B - Reported value is less than the Reporting Limit but greater than the Instrument Detection Limit.
Bold - Value exceed unrestricted URS criteria
Shaded - Value exceeds both restricted and unrestricted URS criteria
* - regulatory criteria for Chromium VI
nca - no criteria available

Table 18
Sediment HSCA Analytical Results
Former Deemer Steel Landfill RI/FS
November 2004

Sample ID Sample Date Sample Depth (feet) Units	DNREC HSCA Sediment URS[1] mg/kg	SED 2 11/23/2004 Surface mg/kg	
METALS			
Aluminum	nca	6540	
Antimony	2	1.8	U
Arsenic	8	5.8	
Barium	20	**71**	B
Beryllium	nca	0.39	B
Cadmium	1	0.53	B
Calcium	nca	9750	
Chromium	81**	28.6	
Cobalt	nca	**9**	B
Copper	12	**53.2**	
Iron	nca	26700	
Lead	47	**98.8**	
Magnesium	nca	4010	
Manganese	nca	**410**	
Mercury	0.2	0.12	
Nickel	21	**44.2**	
Potassium	nca	658	B
Selenium	nca	2.2	U
Sodium	nca	391	B
Vanadium	nca	23.7	
Zinc	150	**230**	
All other Metals were not detected			
SEMIVOLATILES			
2-Methylphenol	0.01	1.5	U
4-Methylphenol	nca	0.042	J
2,4-Dimethylphenol	0.3	1.5	U
Naphthalene	0.4	1.5	U
2-Methylnaphthalene	nca	1.5	U
Acenaphthylene	nca	0.048	J
Acenaphthene	0.09	0.042	J
Dibenzofuran	0.4	0.031	J
Fluorene	0.1	0.049	J
Phenanthrene	0.5	**0.73**	J
Anthracene	0.3	0.086	J
Carbazole	nca	0.1	J
Fluoranthene	0.8	**1.6**	
Pyrene	nca	**1.7**	
Benzo(a)anthracene	0.1	**0.75**	
Chrysene	0.9	**1.2**	J
bis(2-Ethylhexyl)phthalate	3	**1.1**	J
Benzo(b)fluoranthene	4	**1.2**	
Benzo(k)fluoranthene	4	**1**	
Benzo(a)pyrene	0.1	**1**	
Indeno(1,2,3-cd)pyrene	0.8	0.62	
Dibenz(a,h)anthracene	nca	0.19	
Benzo(g,h,i)perylene	nca	0.66	J
All other SVOCs were not detected			

U - The compound was not detected at the indicated concentration.
[1] - Delaware background concentration (DNREC, 2004)
B - Reported value is less than the Reporting Limit but greater than the IDL.
Bold - Value exceeds URS criteria
J - The concentration given is an approximate value.
nca - no criteria available

TABLE 19
Groundwater HSCA Analytical Results
Former Deemer Steel Landfill RI/FS
November 2004

Sample ID Sample Date Depth of Screen (feet) Units	DNREC URS Criteria for Groundwater ug/L	MW5-W001 11/22/2004 7-12		MW6-W001 11/22/2004 7-12		MW10-W001 11/22/2004 6-11	
METALS							
Aluminum	200	77.4	U	126	B	77.4	U
Arsenic	50	3.5	U	5.6		3.5	U
Barium	2,000	32.6	B	124	B	118	B
Calcium	nca	58,300		2,920	B	88,300	
Chromium	11	2.8	U	**20.2**		2.8	U
Copper	1,300	3.3	B	6	B	3.1	U
Iron	300	**642**		**1,650**		**12,300**	
Lead	15	2.2	U	**15.3**		2.2	U
Magnesium	nca	19,300		5,810		20,700	
Manganese	50	**308**		**62.4**		**1,240**	
Potassium	nca	7,410		32,900		7,800	
Sodium	nca	52,900		952,000		37,900	
Vanadium	26	1.5	U	25.1	B	1.5	U
Zinc	2,000	96.8		23.7	B	5.8	U
All other Metals were not detected							
SEMIVOLATILE COMPOUNDS							
Phenanthrene	120	10	U	0.4	J	10	U
Fluoranthene	150	10	U	0.3	J	10	U
Pyrene	18	10	U	0.2	J	10	U
All other SVOCs were not detected							

U - The compound was not detected at the indicated concentration.
B - Reported value is less than the Reporting Limit but greater than the Instrument Detection Limit.
Bold - Value exceeds URS criteria
J - The result is less than the quantitation limit but greater than zero, the concentration given is an approximate value.
nca - no criteria available

TABLE 20
Contaminants of Concern
Based on Risk Assessment
Former Deemer Steel Landfill RI/FS

SOIL

Carcinogenic ($> 10^{-6}$ Risk)		Non-Carcinogenic (> 0.1 Hazard Quotient)	
Restricted	Unrestricted	Restricted	Unrestricted
Arsenic	**Arsenic**	**Iron**	**Antimony**
Benzo(a)pyrene	**Benzo(a)anthracene**		**Iron**
Dibenz(a,h)anthracene	**Benzo(a)pyrene**		**Manganese**
	Benzo(b)fluoranthene		Vanadium [1]
	Dibenz(a,h)anthracene		
	Indeno(123-cd)pyrene		

GROUNDWATER

Carcinogenic ($> 10^{-6}$ Risk)	Non-Carcinogenic (> 0.1 Hazard Quotient)
Arsenic [1]	Iron [2]
	Lead[3]
	Manganese [2]
	Vanadium [1]

Bold – Bold contaminants have been retained as potential contaminants of concern.

Contaminants were or were not retained for the following reasons:

1. – No sample contained a concentration of the contaminant above the applicable URS.
2. – Concentrations are within the normal background range.
3. – No risk can be calculated, lead retained due to concentrations above URS.

TABLE 21
Definition of Physical Properties That Affect Migration
Former Deemer Steel Landfill RI/FS

Property	Range	Qualitative	Source
Sorption-Soil adsorption coefficient (Koc)	< 10	very weakly sorbed	Little, 1989
	10-100	weakly sorbed	
	100-1000	moderately sorbed	
	1000-10,000	moderately to strongly	
	10,000-100,000	strongly sorbed	
	>100,000	very strongly sorbed	
Mobility-Based on a combination of solubility(s) (mg/L) and soil adsorption (Koc)	s > 3500 & Koc < 50	very high mobility	Fetter, 1988
	3500>s>850 & 50< Koc< 150	high mobility	
	800>s>150 & 150<Koc< 500	moderate mobility	
	150>s>15 & 500<Koc<2000	low mobility	
	15>s>0.2 & 2000<Koc<20,000	slight mobility	
	s<0.2 & Koc>20,000	immobile	
Volatility - Henry's Law Constant (H) (atm-m3/mol)	$H<3x10^{-7}$	nonvolatile	Little, 1989
	$3x10^{-7}<H< 10^{-5}$	low volatility	
	$10^{-5} <H < 10^{-3}$	moderate volatility	
	$10^{-3} <H<10^{-2}$	high volatility	
	$H>10^{-2}$	very high volatility	

These are the general guidelines used for classification. Some individual compounds may not follow these guidelines exactly. Various publications may have different values for the physical properties and no single source was used to determine the values used in this table.

TABLE 22
Physical Properties of Inorganic Compounds of Concern
Former Deemer Steel Landfill RI/FS

Mobility:

Relative Mobility	Environment		
	Oxidizing (pH 5 to 8)	Oxidizing (pH <4)	Reducing
High			
Moderate	Sb, As	Mn, Pb	Mn**
Low	Mn, Pb	As	Fe^{2+}
Immobile	Fe	Fe	Sb, Pb, As

From Rose et al., 1979.

*Mobile in slightly reducing conditions
** Mobile in acidic reducing conditions
*** Mobile at pH <2 and >8

Density: The inorganic cations and anions do not normally occur in nature in elemental form; they form compounds and the densities of these compounds vary based on the composition. Therefore, densities are not listed. Densities do not directly affect mobility.

Solubility: The solubility of cations and anions is determined by the compound formed. For example, barium is soluble in an environment where chloride is the dominant anion and immobile in the presence of sulfate.

Sorption: Most trace metal cations have low mobility in soil because they adsorb strongly on minerals (such as iron, manganese, and aluminum oxides and hydroxides) and organic material (or form insoluble precipitates as listed above). Anions (such as chloride and borate) are generally relatively mobile, except for a few strongly sorbed anions (such as cyanide and phosphate).

Volatility: With the exception some inorganics (such as mercury), inorganic compounds are non-volatile.

TABLE 23
Physical Properties of Organic Compounds of Concern
Former Deemer Landfill RI/FS

Chemical	Density (g/cc)	Solubility (mg/L)	Sorption	Relative Mobility	Volatility
Semivolatile Organic Compounds					
Indeno(1,2,3-cd)pyrene	--	0.06	VS	I	Non
Benzo(a)anthracene	1.27	0.01	VS	I	Low
Benzo(a)pyrene	1.35	0.004	VS	I	Low
Benzo(b)fluoranthene	--	0.001	VS	I	Mod
Dibenzo(a,h)anthracene	1.28	0.0005	VS	I	Non

Data generally compiled from (Montgomery, 1991) and (Oak Ridge Laboratory, 1989).

Sorption qualifiers: VW-very weakly sorbed, W-weak, M-moderate, MS-moderate to strong, S-strong, VS-very strong (See Table 21).

Mobility qualifiers: V-very high mobile, H-highly mobile, M-moderately mobile, L-low mobility, S-slight mobility, I-practically immobile (See Table 21).

-- Density has not been quantified

TABLE 24
Evaluation of Potential Remedial Alternatives
(Residential Soil)
Former Deemer Steel Landfill RI/FS

	Alternative 1	Alternative 2	Alternative 3
Evaluation Criteria	**Removal & Off-Site Disposal**	**In-Situ Capping**	**No Action**
Protective of Human Health and the Environment	Yes (Increased protection due to removal of all contaminated soil, but decreased protection due to on-site handling & transportation of contaminated soil through the nearby community)	Yes	No
Complies with Current Laws and Regulations	Yes	Yes	No
Acceptable to Community	Expected	Expected	No
Monitoring Requirements	No	Limited	Yes
Permanence	Permanent	Permanent	N/A
Technical Practicability	No (Less technically practicable on an incremental cost vs. protectiveness basis)	Yes	Yes
Restoration Time Frame	6 Months	Part of Redevelopment (6 - 9 Months)	N/A
Reduction of Toxicity, Mobility and Volume	Y, Y, Y	N, Y, N	N, N, N
Long Term Effectiveness	Yes	Yes	No
Short Term Effectiveness	Yes	Yes	No
Preliminary Cost Estimate	$4,000,000	$195,000	$40,000

NOTE: Costs exhibited above are order of magnitude estimates used to compare remedial alternatives.

Table 25
Cost Estimate for Soil Remedial Alternative 1
Complete Removal and Off-Site Disposal
Former Deemer Steel Landfill Property

Alternative 1
Complete Removal and Off-Site Disposal

Construction Items

		Unit		Rate		
Item 1	Mobilization	1	Lump Sum	$25,000.00	$	25,000
Item 2	Excavation	20400	CY	$24.25	$	494,700
Item 3	Non Hazardous Material Disposal	30600	Ton	$45.00	$	1,377,000
Item 4	Common Backfill - Placed	20400	CY	$22.50	$	459,000
Item 5	Water Treatment and Disposal - Excavation	2000000	Gallons	$0.25	$	500,000
Item 6	Sheeting/Shoring	10000	SF	$29.25	$	292,500
Item 7	Demobilization	1	Lump Sum	$23,500.00	$	23,500
				Sub Total	$	3,171,700
			Contingency	15%	$	475,755
			Construction Items Subtotal		$	3,647,455

Planning and Coordination

Project Percentage						
5.0%	Engineering, Design, plans and reporting				$	182,373
2.1%	Field Coordination	110	Days	$ 750.00	$	82,500
	Operation and Maintenance				$	-
0.7%	Project Management				$	26,487
	Subtotal				$	291,360
	15% Contingency				$	43,704
			Planning and Coordination Total		$	335,064

Option Total $ 3,982,519

Assumptions:
Replace all excavated soil with clean backfill.

No significant costs or other obligations for long-term stewardship (LTS) are indicated or anticipated since no residual contamination would be left requiring perpetual care.

Table 26
Cost Estimate for Soil Remedial Alternative 2
In-Situ Capping Integrated with Redevelopment
Former Deemer Steel Landfill Property

Alternative 2
In-Situ Capping Integrated with Redevlopment

Construction Items						
		Unit		Rate		
Item 1	Mobilization	1	Lump Sum	$15,000.00	$	15,000
Item 2	Soil Handling	2500	CY	$7.50	$	18,750
Item 3	Common Backfill - Placed	2500	CY	$22.50	$	56,250
Item 4	Demobilization	1	Lump Sum	$7,500.00	$	7,500
				Sub Total	$	97,500
			Contingency	15%	$	14,625
			Construction Items Subtotal		$	112,125

Planning and Coordination					
Engineering, Design, plans and reporting				$	25,000
Field Coordination (existing soil disturbance)	30	Days	$ 750.00	$	22,500
Operation and Maintenance*	30	Events	$ 500.00	$	15,000
Project Management				$	8,500
Subtotal				$	71,000
15% Contingency				$	10,650
		Planning and Coordination Total		$	81,650

Option Total	**$**	**193,775**

Assumptions:
Replace 1/3 of area with 2 ft of clean backfill, remainder will be capped by buildings or pavement.

*Operation and Maintenance activities include surface inspections to evaluate the integrity of the cap and the associated reporting. This cost estimate includes 15 surface inspection events (quarterly inspections for 1 year, biannually for 2 years, annually for 2 years, and 5 reinspections if needed) and 15 corresponding maintenance events.

Although no explicit cost estimate is included to address the inevitable long-term stewardship (LTS) obligations, these costs are expected to be a relatively minor incremental cost beyond the DNREC's overall LTS program needs.

Table 27
Cost Estimates for Soil Remedial Alternative 3
No Action
Former Deemer Steel Landfill Property

Alternative 3
No Action

	Construction Items	Unit		Rate		
Item 1	Mobilization	0	Lump Sum	$0.00	$	-
Item 2	Soil Handling	0	CY	$7.50	$	-
Item 3	Common Backfill - Placed	0	CY	$22.50	$	-
Item 4	Demobilization	0	Lump Sum	$7,500.00	$	-
				Sub Total	$	-
			Contingency	15%	$	-
			Construction Items Subtotal		$	-

Project Percentage	**Planning and Coordination**					
	Engineering, Design, plans and reporting				$	15,000
	Field Coordination	-	Days	$ 750.00	$	-
	Operation and Maintenance	30	events	$ 500.00	$	15,000
	Project Management				$	4,000
	Subtotal				$	34,000
	15% Contingency				$	5,100
			Planning and Coordination Total		$	39,100

Option Total **$ 39,100**

No costs for long-term stewardship (LTS) were calculated explicitly.

TABLE 28
Evaluation of Potential Remedial Alternatives
(Groundwater)
Former Deemer Steel Landfill RI/FS

	Alternative 1	Alternative 2	Alternative 3
Evaluation Criteria	**Institutional Controls and Limiting Infiltration Via Soil Cap**	**Institutional Controls**	**No Action**
Protective of Human Health and the Environment	Yes (More protective than Alternative 2 by limiting the amount of infiltration to the groundwater)	Yes, limited protection for the environment	No
Complies with Current Laws and Regulations	Yes	Yes	No
Acceptable to Community	Expected	Expected	No
Monitoring Requirements	No	No	No
Technical Practicability	Yes	Yes	Yes
Permanence	Permanent	Permanent	N/A
Restoration Time Frame	Part of redevelopment (6 months)	3 weeks	Immediate
Reduction of Toxicity, Mobility and Volume	N, Y, N	N, N, N	N, N, N
Long Term Effectiveness	Yes	Yes	No
Short Term Effectiveness	Yes	Yes	No
Preliminary Cost Estimate	$6,000	$6,000	$0

NOTE: Costs exhibited above are order of magnitude estimates used to compare remedial alternatives.

TABLE 29
Evaluation of Potential Remedial Alternatives
(Sediment)
Former Deemer Steel Landfill RI/FS

Evaluation Criteria	Alternative 1 Excavate Side Walls	Alternative 2 Engineering Controls	Alternative 3 No Action
Protective of Human Health and the Environment	Yes (Increased protection in terms of contamination reduction, but introduces increased risk of exposure to environment due to transportation of contaminated soil through the nearby community)	Yes	No
Complies with Current Laws and Regulations	Yes	Yes	No
Acceptable to Community	Expected	Expected	No
Monitoring Requirements	No	No	No
Technical Practicability	No (Less technically practicable on an incremental cost vs. protectiveness basis)	Yes	Yes
Permanence	Permanent	Permanent	N/A
Restoration Time Frame	6 weeks	Part of redevelopment (3 months)	Immediate
Reduction of Toxicity, Mobility and Volume	Y, Y, Y	N, Y, N	N, N, N
Long Term Effectiveness	Yes	Yes	No
Short Term Effectiveness	Yes	Moderate	No
Preliminary Cost Estimate	$177,000	$0	$0

NOTE: Costs exhibited above are order of magnitude estimates used to compare remedial alternatives.

Table 30
Cost Estimate for Sediment Remedial Alternative 1
Excavate Side Walls of Drainage Channel
Former Deemer Steel Landfill Property

Alternative 1
Excavate Side Walls of Drainage Channel

	Construction Items	Unit		Rate		
Item 1	Mobilization	1	Lump Sum	$2,500.00	$	2,500
Item 2	Excavation	40	CY	$24.25	$	970
Item 3	Non Hazardous Material Disposal	60	Ton	$45.00	$	2,700
Item 4	Common Backfill - Placed	0	CY	$22.50	$	-
Item 5	Water Treatment and Disposal - Excavation	50000	Gallons	$0.25	$	12,500
Item 6	Bank Stabilization	3300	SF	$29.25	$	96,525
Item 7	Demobilization	1	Lump Sum	$2,500.00	$	2,500
				Sub Total	$	117,695
			Contingency	15%	$	17,654
			Construction Items Subtotal		$	135,349

Project Percentage	**Planning and Coordination**					
5.0%	Engineering, Design, plans and reporting				$	25,000
4.3%	Field Coordination	10	Days	$ 750.00	$	7,500
	Operation and Maintenance				$	-
1.8%	Project Management				$	3,250
	Subtotal				$	35,750
	15% Contingency				$	5,363
			Planning and Coordination Total		$	41,113

Option Total $ 176,462

BrightFields, Inc.

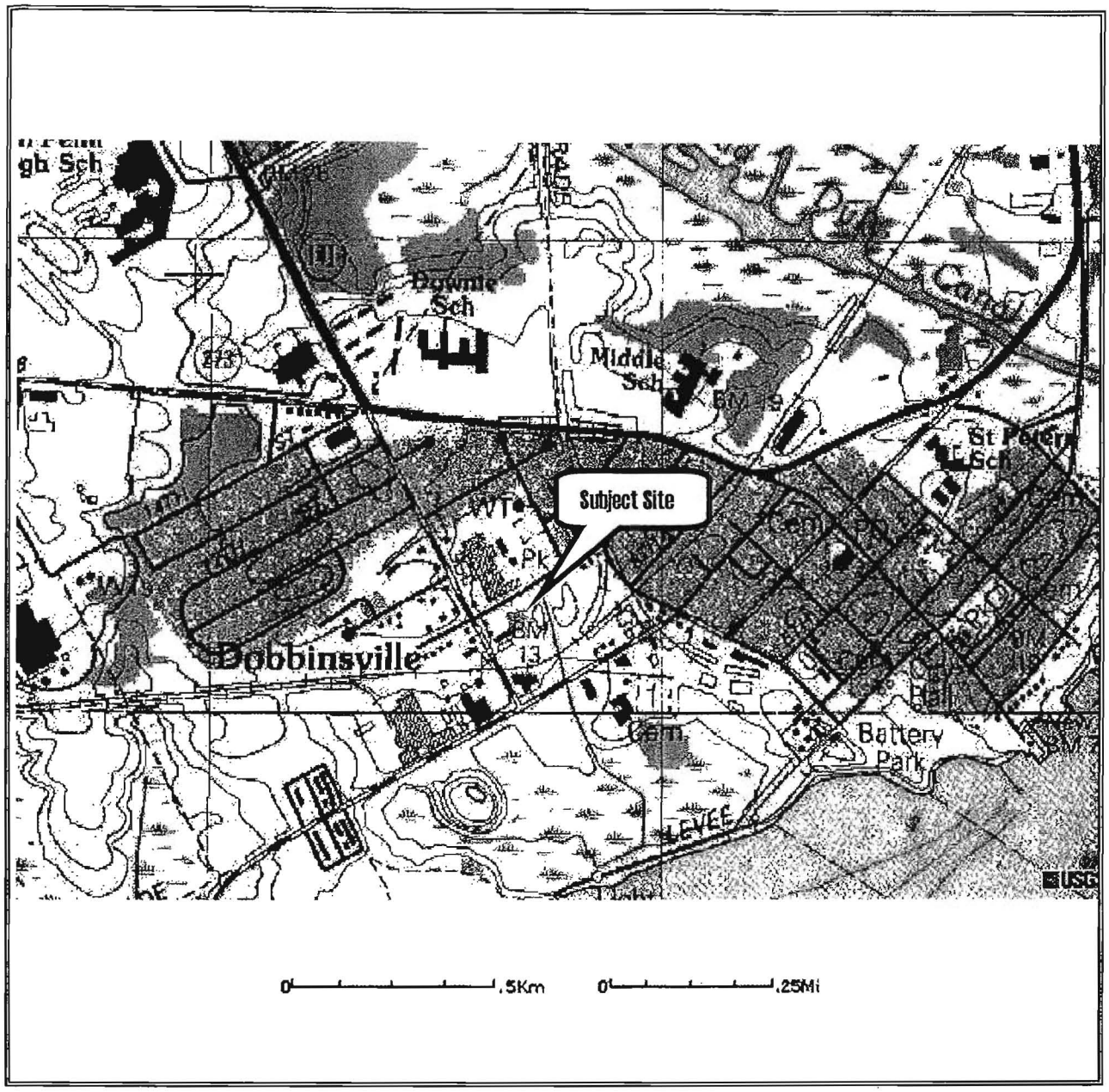


FIGURE 1

Site Location/Topographic Map

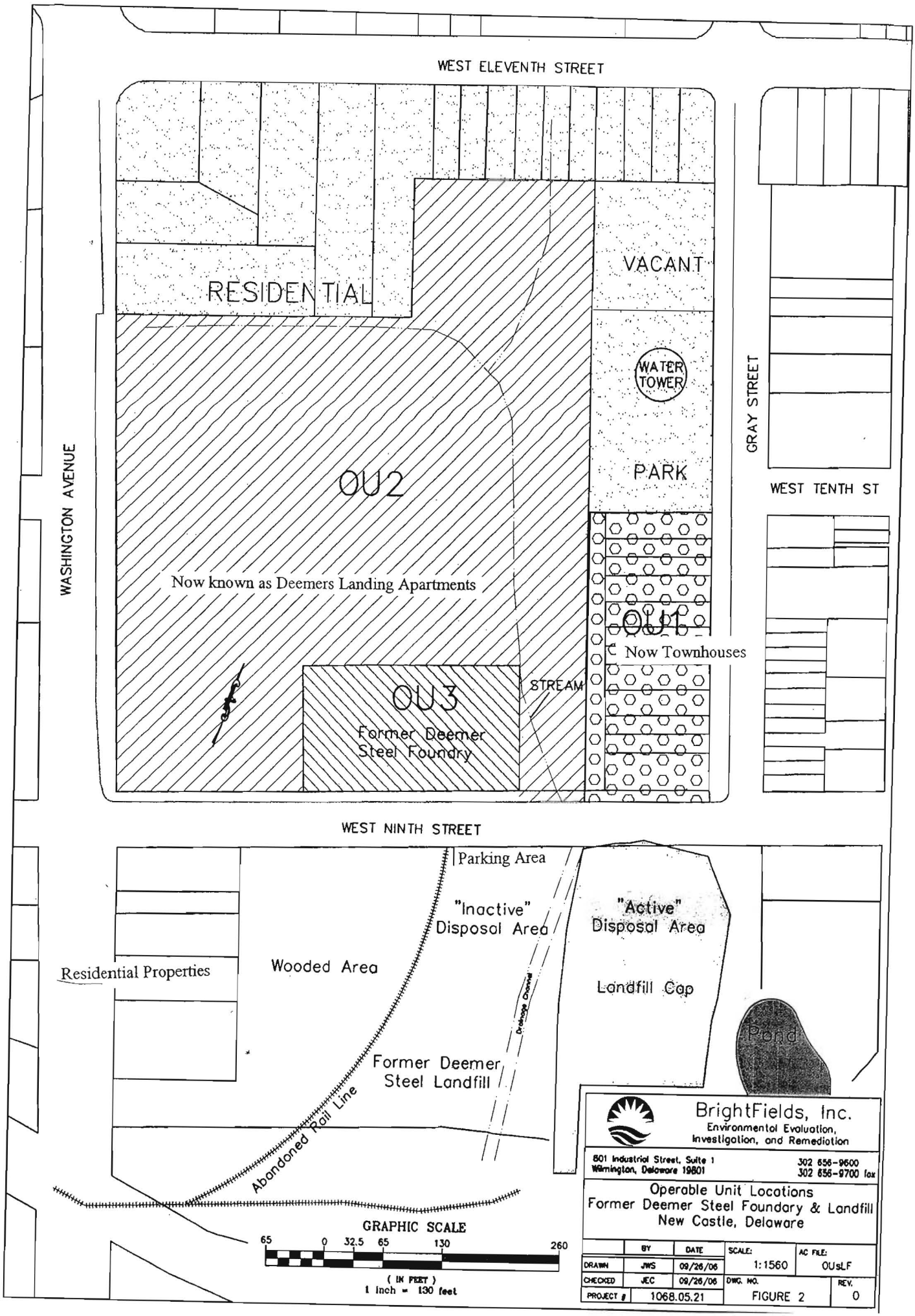
USGS Topo Map 1 Jul 1988 (downloaded from TerraServer 8/2/04)

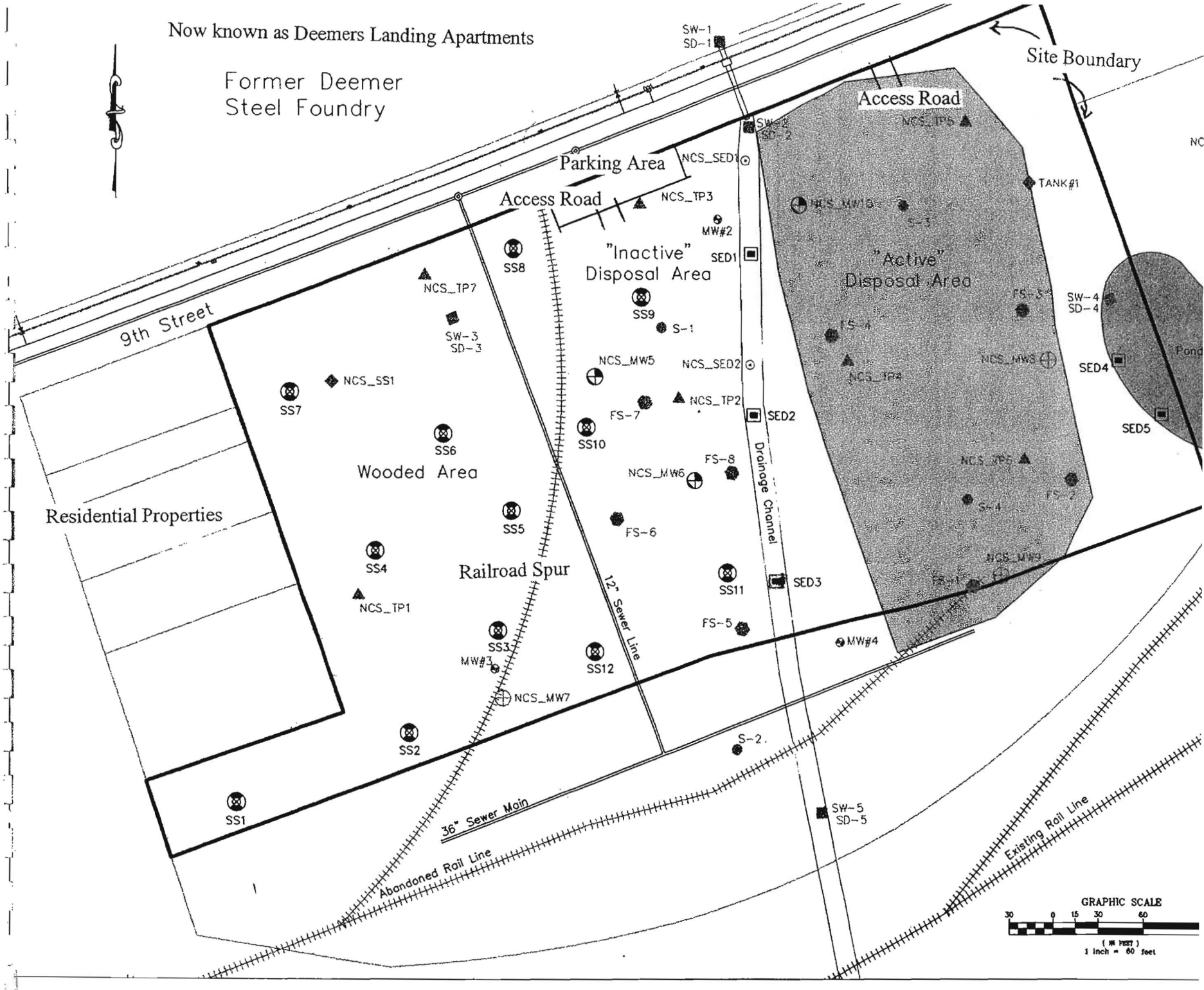
Former Deemer Steel Landfill

New Castle, Delaware

File: 1068.05.21

N


WEST ELEVENTH STREET
RESIDENTIAL
VACANT
WATER TOWER
PARK
GRAY STREET
WEST TENTH ST
WASHINGTON AVENUE
OU2
Now known as Deemers Landing Apartments
OU1
Now Townhouses
STREAM
OU3
Former Deemer Steel Foundry
WEST NINTH STREET
Parking Area
"Inactive" Disposal Area
"Active" Disposal Area
Residential Properties
Wooded Area
Landfill Cap
Drainage Channel
Pond
Former Deemer Steel Landfill
Abandoned Rail Line
GRAPHIC SCALE
65 0 32.5 65 130 260
(IN FEET)
1 inch = 130 feet
BrightFields, Inc.
Environmental Evaluation, Investigation, and Remediation
801 Industrial Street, Suite 1
Wilmington, Delaware 19801
302 656-9600
302 656-9700 fax
Operable Unit Locations
Former Deemer Steel Foundary & Landfill
New Castle, Delaware
BY DATE
DRAWN JWS 09/26/06
CHECKED JEC 09/26/06
PROJECT # 1068.05.21
SCALE: 1:1560
AC FILE: OUsLF
DWG. NO. FIGURE 2
REV. 0


Now known as Deemers Landing Apartments
Former Deemer
Steel Foundry
Site Boundary
Access Road
Parking Area
Access Road
"Inactive"
Disposal Area
"Active"
Disposal Area
Wooded Area
Railroad Spur
Residential Properties
9th Street
Drainage Channel
12" Sewer Line
36" Sewer Main
Abandoned Rail Line
Existing Rail Line
Pond
SW-1
SD-1
SW-2
SD-2
SW-3
SD-3
SW-4
SD-4
SW-5
SD-5
NCS_SED1
NCS_TP3
MW#2
SED1
SS8
NCS_TP7
SS9
S-1
NCS_MW5
NCS_SED2
NCS_SS1
SS7
NCS_TP2
SED2
FS-7
SS10
SS6
FS-8
NCS_MW6
SS5
FS-6
SS4
SS11
SED3
NCS_TP1
FS-5
SS3
MW#3
SS12
NCS_MW7
MW#4
S-2
SS2
SS1
NCS_TP5
TANK#1
NCS_MW15
S-3
FS-3
FS-4
NCS_TP4
NCS_MW8
SED4
SED5
NCS_TP6
FS-2
S-4
NCS_MW9
FS-1
GRAPHIC SCALE
30 0 15 30 60
(IN FEET)
1 inch = 60 feet