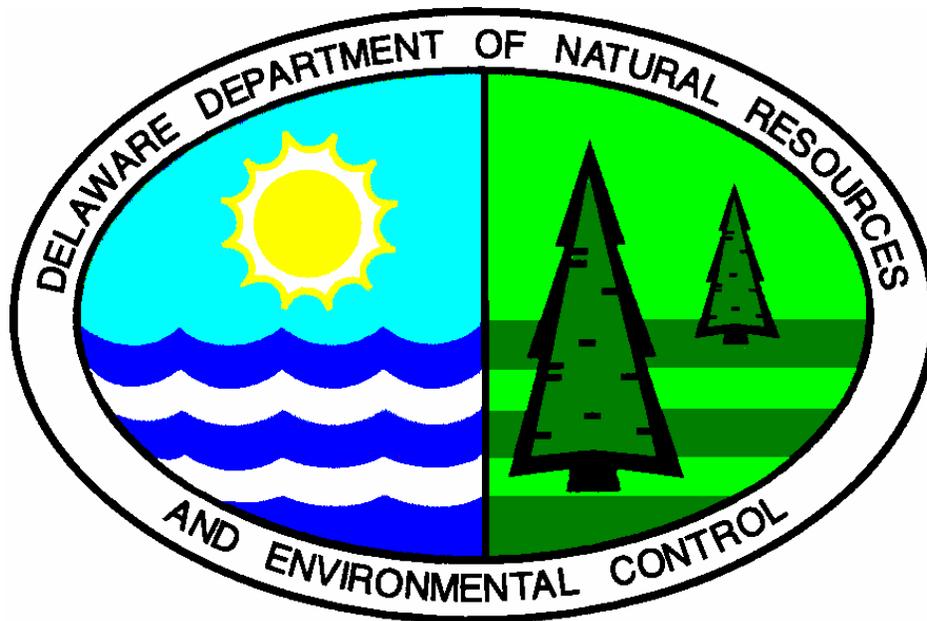


FINAL PLAN OF REMEDIAL ACTION

Peninsula Park, LLC Site
Operable Unit 2
Wilmington, DE

DNREC Project No. DE-1147



January 2003

Delaware Department of Natural Resources and Environmental Control
Division of Air and Waste Management
Site Investigation & Restoration Branch
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1.0 INTRODUCTION

The Peninsula Park, LLC Site Operable Unit 2 (site) is located on the East 7th Street Peninsula in Wilmington, Delaware (Figure 1). The site is bordered by Brandywine Creek to the north and east, Industrial Street to the south, and vacant land to the west. The site, formerly part of a 14-acre tract known as the Julian property, consists of approximately 11 acres of land that has been subdivided into 3 parcels. Bell Atlantic operates a switching station on Parcel 1. This parcel, which covers 6.09 acres, contains one building and is surrounded by a paved parking lot. Parcel 2 is 3.09 acres in size, and is partially covered by a building and a paved parking lot. The building is occupied by Tri State Carpet, a DuPont subsidiary. Parcel 3, also known as the Vet's Welding site, is 1.83 acres in size and is presently being developed.

Peninsula Park, LLC (Peninsula Park) desired to obtain a certification of completion of remedy. Therefore, they entered into the Department of Natural Resources and Environmental Control (DNREC) Voluntary Cleanup Program (VCP) in March 1999 under the provisions of the Delaware Hazardous Substance Cleanup Act, 7 Del. C. Chapter 91 (HSCA). Through a VCP Agreement, Peninsula Park agreed to investigate the potential risks posed by soil, groundwater and sediment to public health, welfare, and the environment. The soil at the site had been previously investigated as Operable Unit 1 (OU 1), and DNREC issued a final plan of remedial action for soil. Groundwater, surface water and sediment were to be addressed as a second operable unit. The owner contracted WIK Associates, Inc. (WIK) to perform a Groundwater and Sediment Investigation (GWSI) of the site. This investigation was conducted in March 2002 and the final report submitted to DNREC in July 2002.

The purpose of the GWSI was to: 1) collect additional information from the site to document existing groundwater and sediment conditions at the site; 2) delineate and determine the extent of potential contamination, and its possible migration and environmental impacts; and 3) determine the level of risk posed by the contaminants, and, based upon this analysis, evaluate remedial alternatives.

This document is DNREC's final plan of remedial action for Operable Unit 2 (OU 2) for the site. It is based on the results of the previous groundwater and sediment investigations performed at the site. This proposed 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 risks posed by the site.

As described in Section 12 of the Regulations, DNREC provided notice to the public and an opportunity for the public to comment on the proposed plan. At the comment period's conclusion, DNREC did not receive any verbal or written comments to the proposed plan. The final plan designates the selected remedy for the site. All previous investigations of the site, the proposed plan, and the final plan will constitute the Remedial Decision Record for the site.

Section 2 presents a summary of the site description and history. Section 3 provides a description of the remedial investigation results. Section 4 presents a discussion of the remedial action objectives. Section 5 presents the final plan of remedial action. Section 6 discusses public participation requirements. Section 7 presents the Director's Declaration.

2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Setting

The site consists of 11.01 acres of land located on the East 7th Street Peninsula in Wilmington, Delaware (Figure 1). The Brandywine Creek borders the site to the north and east, Industrial Street borders the site to the south, and vacant land borders the site to the west. The site has been subdivided into 3 parcels. Bell Atlantic operates a switching station on Parcel 1 (New Castle County tax parcel number 26-045.00-011). This parcel, which covers approximately 6.09 acres, contains one building and is surrounded by a paved parking lot. Parcel 2 (New Castle County tax parcel number 26-045.00-012), approximately 3.09 acres in size, is partially covered by a building that is occupied by Tri State Carpet, and a paved parking lot. Parcel 3 (New Castle County tax parcel number 26-045.00-021), is approximately 1.83 acres in size and is presently undeveloped. The surrounding land use generally consists of commercial and/or industrial use.

2.2 Site and Project History

The site, along with much of the E. 7th Street peninsula, was reportedly used by the City of Wilmington as a municipal landfill from the 1940s through 1960s. The peninsula was then overlain with ash from Wilmington's trash incinerators. Portions of the peninsula were also filled with various construction debris and fill material. Test pit and well boring logs indicated that the site is extensively filled with municipal garbage (up to 18 feet thick) and underlain by marsh deposits.

Previous investigations were conducted at the site between 1998 and in 2001 by DNREC and by Peninsula Park. Summary tables that compare the soil, groundwater, and sediment analytical results from these investigations to the DNREC Uniform Risk-Based Standards (URS) can be found in the Groundwater and Sediment Investigation Work Plan (WIK, 2001). All previous sample locations are shown on Figure 2.

Fall 1998 – DNREC conducted a Brownfield Preliminary Assessment (BPA) II for the E. 7th Street Peninsula-North Side, which included the 14 acres of the former Julian property. DNREC prepared a summary report for the North Side BPA II in January 1999. During the BPA II investigation on the former Julian property, DNREC installed one monitoring well, excavated seven test pits, and collected fourteen soil samples, one surface water sample, two sediment samples and one groundwater sample. The samples were analyzed for contaminants listed on the Target Analyte List (TAL) for metals and the Target Compound List (TCL) for volatile and semivolatile organic compounds (SVOCs).

April 1999 – EA Engineering (EA) submitted a Focused Feasibility Study for the former Julian property on behalf of Peninsula Park in order to evaluate remedial alternatives for the site.

January 2000 – The project closeout report for the Parcel 1, which was prepared by EA, was submitted to DNREC. The report summarized the soil handling activities that took place during the development of Parcel 1.

May 2000 - Pennoni Associates Inc. (Pennoni) submitted a Groundwater Investigation Work Plan to DNREC, which outlined the installation and sampling of two groundwater monitoring wells on the site.

October 2000 – DNREC performed additional soil and sediment sampling. DNREC advanced twelve Geoprobe[®] borings and collected twenty-four soil samples and four sediment samples from Parcel 2.

November/December 2000 - DNREC conducted an additional groundwater investigation of the Peninsula Park property. One monitoring well was installed on each parcel and then sampled to further characterize the groundwater.

December 2000 - DNREC issued a letter to Peninsula Park summarizing the sampling activities and preliminary results. Based on the additional characterization, DNREC required no further action in relation to the soil at Parcel 2.

February 2001 - DNREC provided validated results of the groundwater sampling to Peninsula Park. The chlorobenzene and 1,4-dichlorobenzene concentrations detected in the groundwater from VWMW-1, the monitoring well located on Parcel 3, exceeded their respective DNREC URS values for groundwater. The iron and manganese concentrations detected in all three monitoring wells and the lead concentration detected in one well also exceeded the respective DNREC URS values for groundwater.

March 2001 - DNREC requested further groundwater investigation on all three parcels to evaluate volatile organic compound (VOC) contamination, and required Peninsula Park to perform stream bank sediment sampling and a mass loading analysis of Brandywine Creek.

November 2001 - DNREC performed additional soil sampling on Parcel 3. Seven test pits were excavated on Parcel 3 and fourteen soil samples were collected.

March 2002 – WIK conducted the GWSI at the site.

July 2002 – WIK submitted the GWSI report to DNREC, which was approved on July 22, 2002.

3.0 INVESTIGATION RESULTS

During the GWSI, the following tasks were completed.

- One additional monitoring well was installed on Parcel 3.
- Groundwater samples from the newly installed monitoring well and from each of the three existing monitoring wells on the Peninsula Park property were collected.
- Four sediment samples were collected from the stream bank of Brandywine Creek.
- The location and elevation of all four monitor wells at the site was determined by surveying.

- The laboratory reports were validated to verify the data quality, in accordance with DNREC protocols.
- Mass loading analysis of groundwater contaminants to surface water (Christina River) was conducted.
- A report detailing the investigation and results, describing the nature and extent of contamination, migration potential, and environmental risks associated with the property, was prepared.

All samples were analyzed for contaminants listed on the TAL for metals and TCL for VOCs and SVOCs. In addition, groundwater samples were analyzed for total dissolved solids (TDS), total suspended solids (TSS), chloride, and carbon oxygen demand (COD). The analytical results were first compared to the DNREC URS in a non-critical water resource area, using the unrestricted (i.e., residential) use risk scenario as a screen in order to determine potential contaminants of concern (COCs). The chemical concentrations, which exceeded the unrestricted use DNREC URS values, were selected as COCs and included in a human health risk assessment and ecological risk assessment screening.

Groundwater Results

Four groundwater samples were taken during the GWSI. The sample locations are shown on Figure 2. Tables 1 and 2 contains the summary of the groundwater analytical data for VOCs, SVOCs, and TAL metals, the groundwater URS values for the analytes, and highlights the concentrations of analytes from groundwater samples that exceeded their groundwater URS values. Groundwater analytical data is also described briefly in the following paragraphs:

- VOCs (Table 1): Benzene, toluene, ethylbenzene, xylenes (BTEX), chlorobenzene and styrene were the only VOCs that were detected in the groundwater samples above the laboratory detection limits. Only chlorobenzene, detected at a concentration of 320 micrograms per liter ($\mu\text{g/L}$) in VWMW-1, exceeded the groundwater URS of 100 $\mu\text{g/L}$.
- SVOCs (Table 1): Groundwater samples from monitoring wells VWMW-1 and VWMW-2 contained several SVOCs such as 1,4-dichlorobenzene, and n-nitrosodiphenylamine that were reported at concentrations estimated to be above the instrument detection limits but less than the method detection limit. However, none of these SVOCs exceeded their groundwater URS values.
- Pesticides (Table 1): No pesticides were detected above the laboratory method detection limits in any of the samples.
- Polychlorinated biphenyls (PCBs) (Table 1): No PCBs were detected above the laboratory method detection limits in any of the samples.
- Metals (Table 2): All four of the groundwater samples contained metals such as arsenic, barium, calcium, chromium, iron, magnesium, manganese, potassium, and sodium. With the exception of iron and manganese, no TAL metals were detected above the groundwater URS values. All four of the groundwater samples contained manganese at concentrations up to 1,980 $\mu\text{g/L}$ and iron at concentrations up to 50,800 $\mu\text{g/L}$. Both the iron and manganese URS

values are based upon drinking water Secondary Maximum Contaminant Level standards of 300 µg/L and 50 µg/L, respectively, and represent non-enforceable aesthetic standards.

- Cyanide (Table 2): Cyanide was not detected above laboratory detection limits in any of the samples.
- Additional Parameters (Table 2): The groundwater samples were also analyzed for TDS, TSS, chloride, and COD. TDS ranged from 620 to 1,120 mg/L, which is above the EPA's Secondary Drinking Water Regulation (SDWR) of 500 mg/L. Chloride ranged from 16.5 to 380 mg/L, with only the sample from BAMW-1 exceeding the SDWR of 250 mg/L. TSS ranged from 26 to 141 mg/L and COD ranged from 32.3 to 130 mg/L. There are currently no applicable Drinking Water Regulations for TSS and COD.

Based on groundwater elevations measured in the wells, the groundwater flow direction is toward the southwest (toward the Christina River).

Sediment Results

Four sediment samples were collected from the bank of the Brandywine Creek during the GWSI. The sample locations are shown on Figure 2. Tables 3 and 4 contain a summary of the sediment analytical data for VOCs, SVOCs, and TAL metals, the DNREC sediment URS values for the analytes, and highlight the concentrations of analytes from sediment samples that exceeded their sediment URS values. Sediment analytical data is also described briefly in the following paragraphs:

- VOCs (Table 3): No VOCs were detected above the laboratory detection limits in any of the samples.
- SVOCs (Table 3): Concentrations of the following SVOCs were reported as estimated concentrations which exceeded the URS values for sediment: naphthalene (1 of 4 samples), fluorene (2 of 4 samples), and phenanthrene (2 of 4 samples). Concentrations of fluoranthene (3 of 4 samples), benzo(a)anthracene (all 4 samples), chrysene (2 of 4 samples), bis(2-ethylhexyl)phthalate (1 of 4 samples) and benzo(a)pyrene (all 4 samples) also exceeded the respective URS values for sediment. No other SVOCs were detected above the laboratory detection limits in any of the samples.
- Pesticides (Table 3): No pesticides were detected above the laboratory detection limits in any of the samples.
- PCBs (Table 3): Aroclor-1260 was detected at a concentration of 140 µg/kg in sample SED04-S001. This concentration is below the DNREC URS value for sediment of 63,000 µg/kg. No other PCBs were detected above the laboratory detection limits in any of the samples.
- Metals (Table 4): Aluminum, arsenic, barium, beryllium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, sodium, vanadium, and zinc were detected in the sediment samples. Arsenic (3 of 4 samples), barium (all 4 samples), chromium (3 of 4 samples), copper (all 4 samples), lead (all 4 samples), mercury (3

of 4 samples), nickel (all 4 samples) and zinc (all 4 samples) concentrations exceeded the URS. Other metals were not detected above the laboratory detection limits.

- Cyanide (Table 4): Cyanide was not detected above the laboratory detection limits in any of the samples.
- Additional Parameters (Table 4): The sediment samples were also analyzed for TOC and grain size.

3.1 Summary of Contaminants of Concern

The following paragraphs summarize the contaminants of concern in site sediment and groundwater based on an evaluation of regulatory exceedances and cumulative risk assessment. The Peninsula Park property is currently used for commercial purposes and is intended for commercial use in the future.

Based on the summary of regulatory exceedances, chlorobenzene, iron, and manganese are potential site COCs in groundwater. However, the iron and manganese URS values for groundwater are based on the EPA Secondary Drinking Water Regulations, which are aesthetic criteria rather than risk-based concentrations. A risk assessment was performed to evaluate the cumulative risk associated with ingestion of the groundwater at the site. The calculations were performed using the DNREC Site-Specific Standard Calculator for Multiple Analytes (DNREC, May 2000). This assessment indicates that the cumulative carcinogenic risk associated with site groundwater is 2.71 E-04 with arsenic contributing to 91.1% of this risk, and benzene and ethylbenzene contributing 4.43% and 4.13% of this risk, respectively. The assessment also indicates that the cumulative non-cancer Hazard Quotient associated with site groundwater is 30.97 with chlorobenzene and iron contributing 23.93% and 5.11% of this risk, respectively.

During the November 2000 sampling round, 1,4-dichlorobenzene was detected in groundwater from monitoring well VWMW-1 at a concentration of 540 µg/L and chlorobenzene was detected at a concentration of 120 µg/L. In March 2002, 1,4-dichlorobenzene was not detected in the groundwater while chlorobenzene was detected at a concentration of 320 µg/L. Under chemically reducing conditions (such as in a landfill), dichlorobenzene can degrade by dechlorination to chlorobenzene.

Groundwater modeling was performed using the Bioscreen model and the site-specific aquifer characteristics. The results of the Bioscreen modeling indicates that the chlorobenzene concentration in well VWMW-1 will be below the DNREC URS value of 100 µg/L within 3 years (i.e., March 2005). Additionally, the groundwater in the vicinity of the site is not used as a drinking water source. Further, this area is located in a groundwater management zone (GMZ), established for the City of Wilmington, where the use of groundwater is restricted by DNREC. Because there is no completed pathway for groundwater ingestion at the site, groundwater does not pose a risk to human health or the environment under current and anticipated future use scenarios.

Based on the summary of regulatory exceedances, heavy metals (arsenic, barium, chromium, copper, lead, mercury, nickel, and zinc) and semivolatiles (anthracene, benzo(a)anthracene, benzo(a)pyrene), bis(2-ethylhexyl)phthalate, fluoranthene, fluorene, naphthalene, and

phenanthrene) are considered potential COCs in sediment. Similar COCs have been detected in sediment from several properties located upstream of the Peninsula Park site.

Due to the site's location along the Brandywine Creek and the Christina River, it was necessary to assess what potential impacts, if any, the site could pose to the environmental health of the river. Groundwater loading values were calculated to evaluate the possible effects of groundwater discharge into the Christina River, approximately 600 feet to the southwest of the site. Loading values for all organic and metallic analytes detected in groundwater during both RI investigations were calculated based upon the measured groundwater flow rate at the site and the flow rate of the Christina River. The results of these calculations have been summarized in Table 5. Based upon these calculations, it was determined that there are no exceedances of Delaware's Surface Water Quality Standards by the discharge of site groundwater into the Christina.

4.0 REMEDIAL ACTION OBJECTIVES

According to Section 8.4 (1) of the Regulations, site-specific remedial action objectives (RAOs) must be established for all plans of remedial action. The Regulations provide that DNREC set objectives for land use, resource use and cleanup levels that are protective of human health and the environment.

Qualitative objectives describe in general terms what the ultimate result of the remedial action, if necessary, should be. The following qualitative objectives are determined to be appropriate for the site:

- Prevent exposure to impacted media by future site users;
- Minimize potential exposure to site COCs for construction workers at the site; and
- Continue the use of public water for all purposes to the site and surrounding community.

These objectives are consistent with the current use of the site for commercial use in an urban setting, New Castle County zoning policies, state regulations governing water supply and worker health and safety.

Based on the qualitative objectives, the quantitative objectives are:

1. Prevent human exposure to groundwater contaminants that would result in a carcinogenic risk exceeding 1×10^{-5} or a hazard index of 1.
2. Prevent ingestion of groundwater contaminated above DNREC groundwater URS values.
3. Prevent discharge of contaminated groundwater above Delaware Surface Water Quality Standards (DSWQS).

Based on the results of the GWSI and all previous site investigations, no further action was proposed by WIK because the compounds and concentrations detected in the sediments are consistent with documented conditions in the Brandywine Creek sediment. Furthermore,

groundwater beneath the site is not used as a drinking water source, the site is controlled by DNREC through a GMZ, and the groundwater does not appear to be discharging to surface water in excess of the DSWQS.

5.0 FINAL PLAN OF REMEDIAL ACTION

Based on DNREC's evaluation of the remedial investigations and the current land use, DNREC has determined that The remedy conveyed in the proposed plan should be adopted as the final plan, and shall be implemented. The final plan consists of the following:

1. Performance of semi-annual groundwater monitoring for a period of no less than 3 years for COCs that have exceeded their respective URS in groundwater.
2. Placement of a deed restriction on the property: a) limiting the site to non-residential uses; b) prohibiting any digging, drilling, excavating, grading, constructing, earth moving, or any other land disturbing or demolishing activities on the property without the prior written approval of DNREC; and c) prohibiting the installation of any water well on, or use of groundwater at, the site without the prior written approval of DNREC. In addition, noting on the deed that the site is a part of the Wilmington GMZ.

6.0 PUBLIC PARTICIPATION

The Department actively solicited public comments or suggestions on the Proposed Plan of Remedial Action and welcomed opportunities to answer questions.

The twenty day comment period began on December 23, 2002, and ended at the close of business on January 13, 2003. No written or verbal comments were received during the comment period.

7.0 DECLARATION

This final plan of remedial action for the Peninsular Park, LLC Site Operable Unit 2 is protective of human health, welfare and the environment and is consistent with the requirements of the Delaware Hazardous Substance Cleanup Act.

John Blevins
Director, Division of Air and Waste Management

Date

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Figures 1 & 2 from Groundwater & Sediment Investigation Report

Prepared by WIK Associates, Inc., July 2002.

Figure 1: Site Location/Topographic Map

Figure 2: Sampling Locations

**Tables 1, 2, 3, 4 & 5 from Groundwater and Sediment Investigation
Report**

Prepared by WIK Associates, Inc., July 2002

Table 1: Groundwater Analytical Data Summary – VOCs, SVOCs, and Pesticide/PCBs

Table 2: Groundwater Analytical Data Summary – Metals and Wet Chemistry

Table 3: Sediment Analytical Results - VOCs, SVOCs, and Pesticide/PCBs

Table 4: Sediment Analytical Results Metals and Wet Chemistry

Table 5: Estimated Loadings of Contaminants in Groundwater to the Christina River