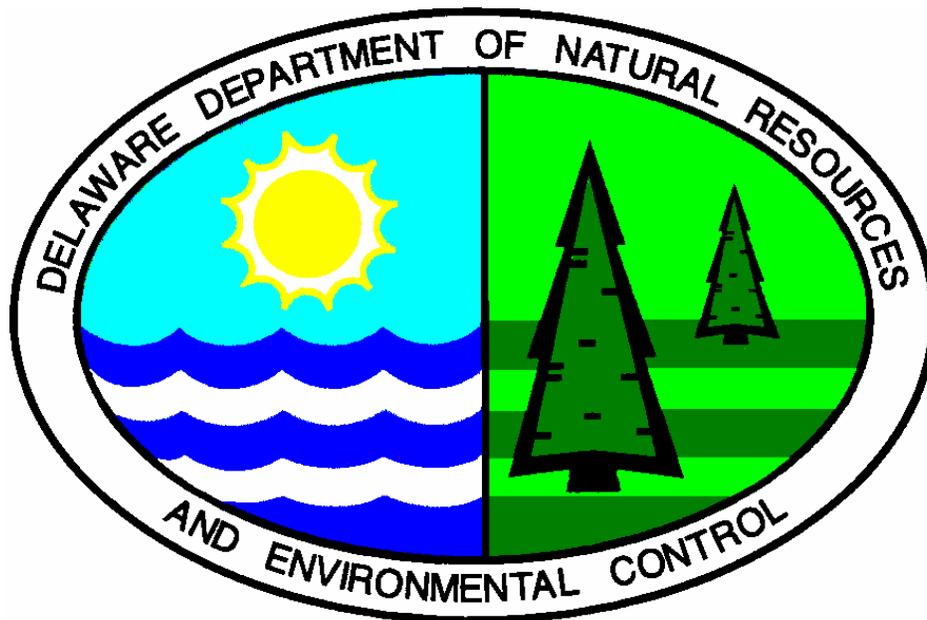


FINAL PLAN OF REMEDIAL ACTION

9 Vandever Avenue/Delaware Job Corps
Wilmington, DE

DNREC Project No. DE 1241



May 2002

Delaware Department of Natural Resources and Environmental Control
Division of Air and Waste Management
Site Investigation & Restoration Branch
391 Lukens Drive
New Castle, Delaware 19720

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1.0. INTRODUCTION

The 9 Vandever Avenue/Delaware Job Corps site (site) is located on the northeast corner of Vandever Avenue and Buena Vista Street in Wilmington, Delaware. The site is bordered on the south by Vandever Avenue and on the north by 22nd Street. The 2.21-acre site is currently vacant with the sole structure on the site being a boiler chimney. The State of Delaware - Department of Administrative Services, the owner of the site, wanted to obtain a certification of completion of remedy. Therefore, they entered into the Department of Natural Resources and Environmental Control (DNREC's) Voluntary Cleanup Program (VCP) under the provisions of the Delaware Hazardous Substance Cleanup Act (HSCA), 7 Del. C. Chapter 91. Through a VCP Agreement, the owner agreed to investigate the potential risks posed to the public health, welfare, and the environment at the site. The owner contracted EA Engineering, Science, Technology, Inc. (EA) to perform a remedial investigation (RI) and feasibility study (FS) of the site.

The purpose of the RI and FS was to: 1) collect additional information from the site to refine site knowledge from previous investigations; 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 (final plan) 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 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 written or verbal comments to the proposed plan. A public hearing was held on May 9, 2002 at the Carvel State Building auditorium in Wilmington, DE. The Department addressed all general comments at the hearing. The final plan designates the selected remedy for the site. All previous investigations of the site, the proposed plan, the final plan and the record of the public hearing 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 7.0 presents the Director's Declaration.

2.0. SITE DESCRIPTION AND HISTORY

2.1 Site Setting

The site is located on the northeast corner of Vandever Avenue and Buena Vista Street in Wilmington, Delaware (Figures 1 & 2). The site is bordered on the south by Vandever Avenue and on the north by 22nd Street. The site consists of 2.21 acres of land (New Castle County tax parcel number 26-022.30.409). The site is currently vacant with the sole structure on the site being a boiler chimney. The surrounding land use is densely commercial and residential. The State of Delaware and the United States Department of Labor are in the process of constructing a non-residential Job Corps Center with

a recreational facility on the subject property. The proposed Job Corps Center will include a building, a fenced in basketball court, a childcare center with a playground, parking lots, and landscaped areas.

2.2 *Site and Project History*

Qore Property Sciences, through a review of historical aerial photographs, United States Geologic Survey topographic maps, historical Sanborn fire insurance maps and city directories, investigated the historical use of the site. The documentation shows that the site was a textile mill and clothing manufacturing plant from the 1880s through the 1990s. The historical uses of this area of Wilmington were leather works, shipbuilding, lumberyards, coal companies, and carriage works.

The Department of Administrative Services of the State of Delaware acquired the property in March 1999 and entered into a VCP Agreement in November 2001 with DNREC to perform this RI. The objectives of the RI were to evaluate potential risks to human health, welfare and the environment posed by the site.

3.0 INVESTIGATION RESULTS

Previous investigations were conducted at the site in 1999 and in 2000. Qore Property Sciences conducted an environmental site assessment (ESA) of the site including a Phase I ESA in April 1999. Batta Environmental Associates, Inc. conducted a Tier 1 Investigation (Tier 1) of the site in October 2000 and removed an underground storage tank in July 2000. Duffield Associates, Inc. conducted a geotechnical evaluation (GE) of the site in March 2000.

The Tier 1 and the GE provided some insight into the types and levels of contaminants that are present on the site and confirmed that the site consists of fill material intermixed with sand and clay. The fill material contains red crushed brick, gravel, cinders, ash, slag, concrete, and other materials. During the investigations, it was determined that the fill material was present from 0 to 15 feet below grade with an average thickness of 8.5 feet. EA conducted a facility evaluation (FE) in May 2001 and the RI at the site in December of 2001.

During the FE, EA collected twenty soil samples from ten soil boring locations with groundwater samples collected at three of the locations. During the RI in December 2001, EA installed eight temporary monitoring wells to determine the groundwater flow direction at the site and collected three additional groundwater samples.

The samples were analyzed for contaminants listed on the Target Analyte List (TAL) and the Target Compound List (TCL). The analytical results were first compared to the DNREC Uniform-Risk Based Remediation Standards (URS) in a non-critical water resource area, using the unrestricted use (i.e., residential use) risk scenario as a screen in order to determine potential contaminants of concern (COCs). Those chemicals whose concentrations exceeded the unrestricted use URS were selected as COCs and included in a human health risk assessment and ecological risk assessment screening.

Soil Results

There were no volatile organic compounds (VOCs), pesticides, or polychlorinated biphenyls (PCBs) detected above the unrestricted use URS values in any of the surficial soil samples, which were taken between 6 inches and 2 feet below ground surface (bgs), or in any of the subsurface soil samples, which were taken between 6 feet and 20 feet bgs, at any of the ten soil boring locations. However, two surficial and three subsurface soil samples from five of the RI soil boring locations contained one or

more polynuclear aromatic hydrocarbons (PAHs) at concentrations exceeding their respective unrestricted and/or restricted use (i.e., commercial use) URS values. Table 1 contains the summary of the soil analytical data for semivolatile organic compounds (SVOCs) including the PAHs, the restricted and unrestricted use URS values for the analytes, and highlights the concentrations of analytes from samples that exceeded either, or both, URS values.

Benzo(a)pyrene was the only PAH that exceeded both the unrestricted use URS value of 0.09 mg/kg, as well as the restricted use URS value of 0.80 mg/kg at all five soil boring locations with concentrations ranging up to 19 mg/kg.

All of the other PAHs detected in surficial soil samples at concentrations in exceedance of their respective restricted and unrestricted URS values were found in soil boring SB-1, which is located in the vicinity of the boiler chimney. Those PAHs included benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. The same four PAHs were also detected above their unrestricted use URS values in soil boring locations SB-3, SB-8 and SB-9.

Two surficial and two subsurface soil samples from four of the RI soil boring locations contained one or more TAL metals at concentrations in exceedance of their respective restricted and unrestricted use URS values. Table 2 contains the summary of the soil analytical data for TAL metals, the restricted and unrestricted use URS values for the analytes, and highlights the concentrations of analytes from samples that exceeded either or both URS values.

Arsenic was the only metal that exceeded both its restricted use URS value of 0.4 mg/kg and its unrestricted use URS value of 4 mg/kg with a concentration of 63.8 mg/kg. This exceedance was reported from soil boring location SB-8, which is also located in the vicinity of the boiler chimney.

The other metals that were detected in the soil samples above their unrestricted use URS values were aluminum, antimony, iron, and vanadium. They were reported in soil boring locations SB-1, SB-2 and SB-8.

Groundwater Results

The results of the RI identified several VOCs, SVOCs, and metals at concentrations exceeding the respective groundwater URS values from the eight groundwater samples taken during the FE and RI at the site.

Seven of the samples contained VOCs, which exceeded the URS for groundwater. For example, 1,1-dichloroethene was detected in four samples at concentrations up to 12 micrograms per liter ($\mu\text{g}/\text{l}$) that exceeded the groundwater URS of 0.04 $\mu\text{g}/\text{l}$. Table 3 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 URS values.

With the exception of naphthalene, all of the SVOCs that were detected in samples in excess of their respective groundwater URS were found in temporary well point GW-2. Those SVOCs included 2-methylnaphthalene, acenaphthene, dibenzofuran, fluorene, and phenanthrene.

Seven of the groundwater samples contained manganese at concentrations up to 3,090 $\mu\text{g}/\text{l}$ while four of the groundwater samples contained iron at concentrations up to 4,510 $\mu\text{g}/\text{l}$. Both the iron and manganese URS values are based upon drinking water Secondary Maximum Contaminant Level standards of 300 $\mu\text{g}/\text{L}$ and 50 $\mu\text{g}/\text{L}$, respectively, and represent non-enforceable aesthetic standards.

Four of the samples contained barium in concentrations up to 450 µg/l, which exceeds the groundwater URS for barium of 200 µg/l.

Risk Assessment

A human health risk assessment was performed on surface soil, subsurface soil, and groundwater at the site assuming a restricted use risk setting and development of the site with buildings including a child daycare facility, parking areas, and recreational areas. The risk assessment was performed to evaluate the potential for risks to human health from exposure to contaminants in soil or groundwater at or originating from the site. Qualitative and quantitative assessments of potential human health risks posed by the site were conducted in accordance with the DNREC guidance, U.S. Environmental Protection Agency guidance and the approved project work plan.

Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, aluminum, antimony, arsenic, iron, and vanadium were identified as COCs in surface soil at the site. With the exception of antimony, these same COCs were also identified in the subsurface soil at the site.

Aluminum, antimony, arsenic, barium, iron, manganese, acenaphthene, dibenzofuran, fluorene, 2-methylnaphthalene, naphthalene, phenanthrene, 1,1,2-trichloroethane, 1,1-dichloroethene, benzene, chloroform, tetrachloroethene, trichloroethene, and vinyl chloride were identified as COCs in groundwater under the site.

Risks to daycare children and Job Corps workers were not quantified for the following reasons: 1) the exposure pathways of surface soil or subsurface soil to these receptors will be eliminated by covering the site by hardscape, parking lots or buildings and removing surface soil to an approximate depth of 18 inches from areas not covered by the aforementioned and replacing it with clean fill borrow material; and 2) the site is serviced by public water supply and a Groundwater Management Zone (GMZ) restricts groundwater use in Wilmington. Therefore, exposure to site groundwater (at a depth of 10 – 12 feet bgs) to daycare children and Job Corps workers is not expected.

However, under current and future conditions, construction/excavation workers could be exposed to surface soil, subsurface soil, and groundwater. Therefore, the risks to construction workers were quantified for exposure to a combination of surface soil and groundwater and subsurface soil and groundwater. Risks from incidental soil ingestion, dermal contact with soil, and inhalation of COCs in construction dust were quantified for surface soil and subsurface soil separately. Groundwater risks were quantified for the incidental ingestion of groundwater, dermal contact with groundwater, and the inhalation of volatiles emanating from groundwater and added to either surface or subsurface soil risks.

Acceptable cancer risks (2×10^{-6}) were found for subsurface soil and groundwater construction worker exposures, considering the DNREC remediation standard of 10^{-5} . Once target organs were considered, noncancer risks for subsurface soil and groundwater exposures to construction workers were below the DNREC remediation standard of a hazard index (HI) of 1.0.

A cancer risk level of 1.4×10^{-5} was found for construction worker exposure to surface soil and groundwater. The primary contributors to this cancer risk were arsenic (4×10^{-6}) and benzo(a)pyrene in surface soil (6.7×10^{-6}). These risks are being driven by surface soil samples SB-8 (arsenic at 64 mg/kg) and SB-1 (benzo(a)pyrene at 19 mg/kg). These samples are located in the vicinity of the standing boiler chimney, and surface soil in this area would be removed during construction and replaced with clean borrow fill. Consequently, these risks will be ameliorated by this action. Once target organs were considered, noncancer risks were not greater than the DNREC HI of 1.0.

Groundwater loading values were calculated to evaluate the possible effects of groundwater discharge into the Brandywine Creek, 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 Brandywine Creek. Based upon these calculations, it was determined that there were no exceedances of Delaware's Surface Water Quality Standards by the discharge of site groundwater into the Brandywine.

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 surrounding community.

These objectives are consistent with the current use of the site as 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 soils and groundwater contaminated by VOCs, PAHs, and metals that would result in a carcinogenic risk exceeding 1×10^{-5} or a HI of 1.0 by stabilizing, containing or removing soil with COCs greater than the DNREC unrestricted use URS criteria.
2. Prevent ingestion of groundwater contaminated by VOCs, PAHs, and metals above DNREC groundwater URS values.
3. Prevent discharge of groundwater contaminated by VOCs, PAHs, and metals above Delaware Surface Water Quality Standards.

5.0 FINAL PLAN OF REMEDIAL ACTION

Based on the information and results of the investigation performed at the site and the remedial action objectives, 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. Development of a soil management plan to identify the areas of the site, the depth and the disposition of soils to be disturbed during excavation and construction activities.
2. Removal and replacement of 12 inches or more of soil from the areas of site where no building or hardscape will be located based on the site development plan, dated September 21, 2000 (or any subsequent revisions), and the soil management plan.

3. Placement of at least six inches of topsoil and seeding in with grass in those areas that will not be covered by buildings or hardscape.
4. Placement of a cap and cover consisting of buildings and hardscape as shown on the site development plan.
5. Placement of a deed restriction on the property: a) limiting the site to non-residential uses; b) requiring written approval from DNREC prior to any repair, renovation or demolition of the existing structures on the property, or any paved surfaces; c) prohibiting any digging, drilling, excavating, grading, constructing, earth moving, or any other land disturbing activities on the property without the prior written approval of DNREC; and d) prohibiting the installation of any water well on, or use of groundwater at, the site without the prior written approval of DNREC. In addition, the site will remain 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-five (25) day comment period began on April 16, 2002, and ended at the close of business on May 6, 2002. A public hearing was held on the proposed plan at the Carvel State Building auditorium in Wilmington, DE on May 9, 2002 to present the Department's proposed plan to the public. No written comments or verbal comments were received during the comment period and no comments about the proposed plan were made at the public hearing. The Hearing Officer's Report, dated May 13, 2002, was incorporated in Secretary's Order No. 2002-A-0034 dated May 17, 2002. Therefore, Secretary's Order No. 2002-A-0034 adopted the proposed plan of remedial action as the final plan of remedial action.

7.0 DECLARATION

This final plan of remedial action for the 9 Vandever Avenue/Delaware Job Corps 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 Remedial Investigation Report

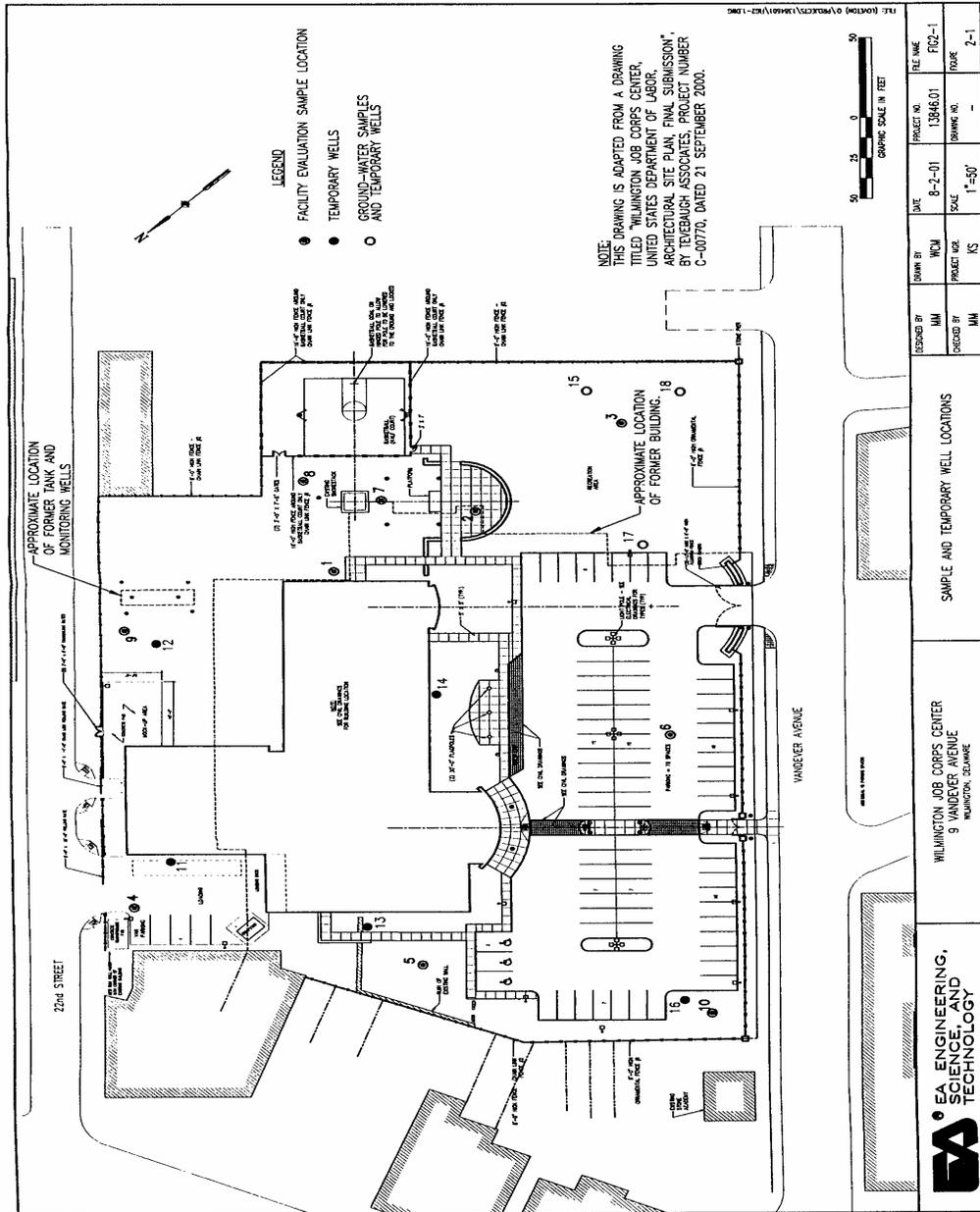
Prepared by EA, Inc., December 2001.

Figure1:SiteLocation/TopographicMap



Figure 1-1. Site location map showing the RI/FS area, 9 Vandever Avenue, Wilmington, DE. (Source:ADC Map, New Castle County, DE, 8th Edition)

Figure 2: Sampling Locations



Tables 1, 2, & 3 from Remedial Investigation Report

Prepared by EA, Inc., March 2002

Table 1: Soil Analytical Summary SVOCs

Table 2: Soil Analytical Summary Metals

Table 3: Ground Water Analytical Summary VOCs, SVOCs & Metals