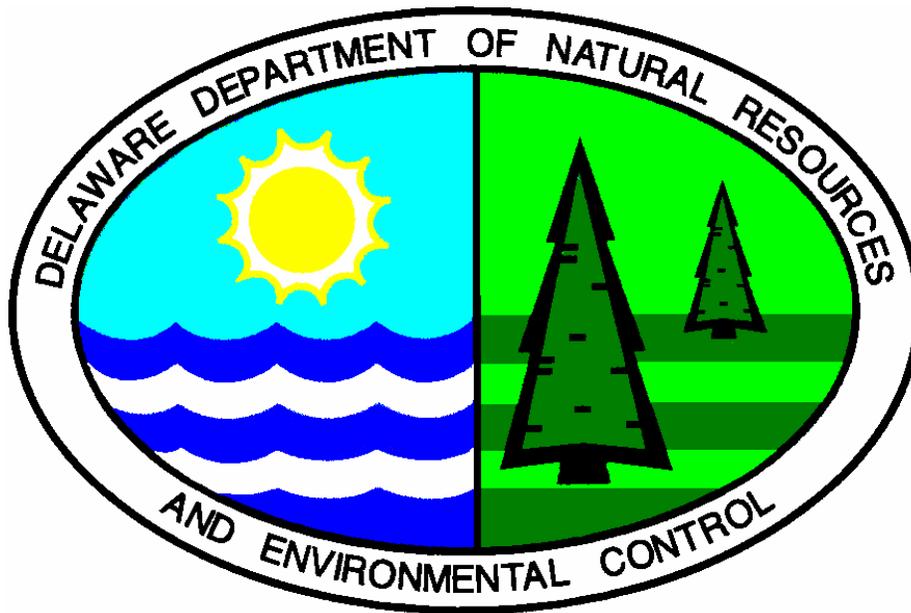


FINAL PLAN OF REMEDIAL ACTION

RIVERFRONT PARKING DECK (Wilmington Transit Center) Wilmington, Delaware

DE - 1091



October 2003

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

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1.0 INTRODUCTION

The Riverfront Parking Deck (site) is located in the City of Wilmington, in New Castle County, Delaware (Figure 1). It is bordered to the north by the Amtrak viaduct, to the east by French Street, to the south by Water Street, and to the west by Market Street. The owner of the site is the Delaware Department of Transportation (DelDOT). Six environmental investigations have taken place AT the site, some of which have included the adjacent property, Riverfront Park. During the investigation in 1998, the site and the Riverfront Park were collectively referred to as the "Market Street Property. Construction and development activities took place on the property and were completed in December 1998.

In order to determine the potential for environmental liability prior to the redevelopment of the site, the Department of Natural Resources and Environmental Control (DNREC or the Department) worked with DelDOT in a collaborative effort. Although DelDOT did not enter into DNREC's formal Voluntary Cleanup Program, DelDOT agreed to investigate the potential risks posed to the public health, welfare and the environment. DelDOT contracted WIK Associates, Inc. (WIK) to perform a Remedial Investigation (RI) of the site. The purpose of the RI was to: 1) collect additional information from the site and combine information from previous environmental investigations, 2) understand the nature and extent of any soil and/or groundwater contamination at the site, and 3) evaluate risks to public health, welfare and the environment associated with any identified contamination. DelDOT desires to obtain a Certification of Completion of Remedy (COCR) from DNREC upon completion of all required tasks.

This document is the Department's final plan of remedial action (final plan) for the site. It is based on the results of all previous investigations performed at the site. This final plan is issued under the provisions of the Hazardous Substance Cleanup Act, 7 Del. C. Chapter 91 (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. During the comment period of August 31, 2003 through September 22, 2003, DNREC received no comments on the proposed plan and subsequently issued this final 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.

Section 2 presents a summary of the site description, site history and previous investigations of the site. Section 3 provides a description of the remedial investigation results. Section 4 presents a discussion of the remedial objectives. Section 5 presents the proposed plan of remedial action. Section 6 discusses public participation requirements. Section 7, provides the Director of Air and Waste Management's declaration.

2.0 SITE DESCRIPTION AND HISTORY

The site is located in Wilmington, Delaware and is bordered to the north by the Amtrak viaduct, to the east by French Street, to the south by Water Street, and to the west by Market Street. Previously, the site served as a paved parking lot. The adjacent property, owned by the Riverfront Development Corporation (RDC), has been developed into a public park, the Tubman Garrett Riverfront Park.

There are no drinking water sources located within a 0.5 mile radius of the site. All surrounding properties receive water via the City of Wilmington public water supply. The Christina River, which is bordered by the Riverfront Park property to the southwest, is the closest surface water body to the site. Shallow groundwater is considered to flow under the site toward the Christina River. However, the area is tidally influenced, so groundwater is believed to continually flow between the site and the river.

2.1 Site and Project History

Historically, the site and surrounding property has been used for a variety of residential and commercial purposes. These include: homes, hotels, warehouses, coal yards, railroad spurs, and shipbuilding activities. Most recently, the site and surrounding property were developed to include a parking lot and park on the Riverfront. Construction activities on this project concluded in 1998.

3.0 INVESTIGATION RESULTS

DNREC conducted an extensive review of past investigations prepared for the site, as discussed below.

3.1 Geotechnical Engineering Survey

In April 1987, SITE Engineers, Inc. was contracted to conduct a preliminary geotechnical survey of the site and surrounding property in order to determine subsurface conditions. It was determined that fill material seemed to be present throughout the property.

3.2 Site Assessment

In June 1987, a site assessment of the site and surrounding property was conducted by Jason M. Cortell and Associates, Inc. (JMCA). At that time, the site was zoned residential/commercial. Property owned by the Penn Central Railroad is north/northeast of the property. An office building and a parking lot occupied the property to the west/southwest of the site.

JMCA conducted a split-spoon, subsurface soil (fill) sampling event on the site and surrounding property. This was done in order to determine if contamination existed from possible leakage of underground storage tanks. All samples were analyzed for the presence of metals and volatile organic compounds (VOCs). No VOCs were detected above the detection limit of 10 parts per billion (ppb) and the concentrations of metals detected were relatively low. WIK compared the results from the sampling event to the 1999 DNREC Uniform Risk-Based Remediation

Standards (URS) for restricted use (i.e., commercial or industrial). They were all either below the respective detection limits or below their respective DNREC URS values.

3.3 *Phase I Environmental Site Assessment*

In October 1993, WIK conducted a Phase I Environmental Site Assessment of the site and surrounding property. Solid waste, and both plastic and metal drums, were found on the property south of the site. WIK recommended that further investigation be performed in order to better characterize site conditions.

3.4 *Phase II Investigation*

WIK conducted a Phase II Investigation of the site and surrounding property in July and August of 1994. During the investigation, a magnetometer was used to determine the locations of any metal debris possibly buried in the subsurface. Subsequently, test pits were excavated at the locations where possible metal debris was detected. Test Pit #6 was located on the site. A total of four Geoprobe borings were completed on the site, with twenty completed on adjacent properties. One sample was collected from each boring. These samples were then analyzed for: total petroleum hydrocarbons (TPHs), VOCs, semi-volatile compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), and metals. When compared to the DNREC URS restricted use values for a non-critical water resource area, the results were all either below the respective detection limits or below DNREC URS for both unrestricted (i.e., residential) and restricted use.

3.5 *Phase I Environmental Assessment*

EA Engineering, Science, and Technology, Inc. (EA) was contracted by DelDOT to perform a Phase I Environmental Assessment of the site in March 1996. In addition to reviewing all existing records for the site and surrounding property, EA completed a soil vapor assessment. A total of 21 locations were successfully sampled out of 37 total locations attempted on the site. The results demonstrated the presence of methylene chloride, cis-1,2-dichloroethene, (TCA), trichloroethylene (TCE), carbon tetrachloride, and tetrachloroethylene (PCE) to be present, however, the concentrations were below the the lowest value obtainable using the specified analytical method, otherwise known as the method detection limit.

3.6 *Tank Removals*

Between June 1997 and February 1998, two 2,000 gallon tanks, four 1,000 gallon tanks, and one 630 gallon tank were discovered and subsequently removed from the site. As required by the DNREC Underground Storage Tank Branch (DNREC-UST), soil samples were taken and analyzed for Total Petroleum Hydrocarbon (TPH)-Gasoline Range Organics (GRO), TPH-Diesel Range Organics (DRO), and Benzene, Toluene, Ethyl Benzene, and Xylene compounds (BTEX). With the exception of one sample collected in 1998, in which the DNREC-UST standards for TPH-DRO and TPH-GRO was exceeded, the remainder of the samples contained contamination below applicable levels.

As a result of the excavation of soil that was determined to be either impacted from leaking underground storage tanks or structurally unsuitable for the construction of the surface parking lot in 1998, approximately 6,361 tons of soil were removed from the site. This material was thermally treated at Clean Earth of New Castle. In addition, there were 170 tons of railroad ties taken to Delaware Solid Waste Authority (DSWA) for disposal. The site was then backfilled with clean fill in order to complete the project.

During excavation activities on the site in October 2002, an additional 1,000 gallon UST was discovered and removed from its location under the supervision of DNREC-UST. Both shallow and deep soil samples were collected from the soil surrounding the tank and were analyzed for petroleum contamination. However, none of the results indicated concentrations above DNREC-UST standards. A No Further Action (NFA) letter was issued for the tank removal. The letter indicated that the owner must notify DNREC-UST, if any additional underground storage tanks were found on the site.

3.7 *Preconstruction Sampling*

Duffield Associates, Inc. (Duffield) drilled nine geotechnical borings on the site during June 2002 (Figure 2). WIK collected soil samples from three of those locations and sent them to STL Edison in Edison, New Jersey for analysis of Target Compound List (TCL) VOCs, SVOCs, pesticides and PCBs. In TB4-S001, aluminum, iron and manganese were found at concentrations of 13,800 mg/kg, 20,800 mg/kg, and 346 mg/kg, respectively. These exceed the DNREC restricted-use URS values for aluminum, iron and manganese of 7,800 mg/kg, 2,300 mg/kg, and 160 mg/kg, respectively. In TB7-S001, aluminum was found to be present at a concentration of 12,400 mg/kg, as well as, iron at a concentration of 15,300 mg/kg. In TB8-S001, aluminum, iron and manganese were found at concentrations of 14,500 mg/kg, 28,200 mg/kg, and 274 mg/kg, respectively. However, soils found in Delaware have been found to have background concentrations of manganese ranging from 60 – 350 mg/kg. While sample results indicated contaminant concentrations above the DNREC URS values for unrestricted use, there were no exceedances of DNREC URS values for restricted use (Tables 1 and 2).

3.8 *Additional Groundwater Sampling*

In March 1998, EA collected groundwater samples via four direct push borings on the current Riverfront Park property. These samples were analyzed for TCL VOCs, and TCL SVOCs because elevated levels of TPH-DRO and TPH-GRO were detected in soil samples taken on this property earlier. Analysis of one of the samples indicated the presence of concentrations of benzene and chloromethane that slightly exceeded the corresponding DNREC URS values.

In August 2002, DNREC requested additional groundwater data be collected in order to better characterize the site where the parking deck is to be located. The Groundwater Investigation Work Plan called for WIK to perform the following tasks:

- Collect one groundwater sample from each of three Geoprobe boring locations on the site; and
- Analyze the samples for full TAL and TCL parameters.

The samples were collected on August 30, 2002. The first Geoprobe boring (GW1-W01) was collected at a depth of between 12 and 16 feet below ground surface (bgs). The only contaminant with an elevated concentration that exceeded the corresponding URS value was manganese at 238 micrograms per liter ($\mu\text{g/L}$). The URS value for manganese in groundwater is 50 $\mu\text{g/L}$. GW2-W01, the sample collected at the second boring location, was collected at a depth of between 11 and 15 feet bgs. Trichloroethene (11 $\mu\text{g/L}$), tetrachloroethene (82 $\mu\text{g/L}$), iron (844 $\mu\text{g/L}$), and manganese (425 $\mu\text{g/L}$) were the contaminants in this sample detected at concentrations higher than the respective URS values. The corresponding URS values are: 5 $\mu\text{g/L}$ for trichloroethene, 5 $\mu\text{g/L}$ for tetrachloroethene, and 300 $\mu\text{g/L}$ for iron. Lastly, in sample GW3-W01, the following contaminants were present in concentrations exceeding respective URS values: vinyl chloride (9.0 $\mu\text{g/L}$), cis-1,2-dichloroethene (240 $\mu\text{g/L}$), trichloroethene (22 $\mu\text{g/L}$), tetrachloroethene (43 $\mu\text{g/L}$), iron (20,600 $\mu\text{g/L}$), and manganese (532 $\mu\text{g/L}$). The corresponding URS value for vinyl chloride is 2 $\mu\text{g/L}$, and for cis-1,2-dichloroethene is 70 $\mu\text{g/L}$. No semi-volatile organic compounds, pesticides, PCBs, or cyanide were detected in any of the samples (Table 3).

In response to a request from DNREC, WIK submitted an addendum to the October 2002 Groundwater Investigation Report outlining the Contaminant Mass Loading Calculations to the Christina River. These calculations were performed for the contaminants found to be in the groundwater collected from the site. The sample collected from GW3 was used to demonstrate the worse-case scenario. The results from these calculations were then compared to DNREC URS values for surface water (Table 4). There were no exceedances of the corresponding surface water quality URS values for any contaminant.

3.9 *Summary*

The following is a brief assessment of current soil and groundwater conditions at the site:

The results of pre-construction geotechnical soil borings completed in June 2002, indicated that concentrations of TCL VOCs, TCL SVOCs, pesticides, PCBs, metals and cyanide did not exceed corresponding restricted use URS values.

Results obtained from the August 2002 groundwater samples collected on the site indicated concentrations of trichloroethene, tetrachloroethene, vinyl chloride, cis-1,2-dichloroethene, iron and manganese that exceeded corresponding DNREC URS. Iron exceeded the URS for groundwater in GW2-W01 and GW3-W01 and manganese exceeded the URS in all three Geoprobe borings. It is important to note that iron and manganese are naturally occurring elements in Delaware's groundwater and their URS values found in DNREC's remediation standards guidance documents are based on National Secondary Drinking Water Regulations (NSDWR). NSDWRs are non-enforceable guidelines regulating contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor, or color) in drinking water, and do not pose a human health risk. However, the concentrations of iron and manganese detected in the groundwater samples collected on the site may be indicative of a leaching byproduct from biodegradation of chlorinated solvents and petroleum. Therefore, when evaluating risk posed by the groundwater, it is important to consider the impact these contaminants can potentially have on the Christina River.

3.10 Risk Evaluation

The results of pre-construction geotechnical soil borings completed in June 2002, indicated that concentrations of TCL VOCs, TCL SVOCs, pesticides, PCBs, metals and cyanide did not exceed corresponding restricted use URS values. However, elevated concentrations of aluminum, iron and manganese did, exceed unrestricted use URS values. The Site-Specific Risk Calculator was used to determine the risk posed by soil if the site were utilized for unrestricted use (Appendix A). The risk posed to human health and the environment by the contaminants present in the soil is a non-cancer risk of 1.42, which exceeds a Hazard Index of 1.0. However under a restricted use scenario, there was not risk from soils. Therefore, the only remedial action related to soils will be a deed restriction limiting the future use of the property to commercial or industrial use.

The Site Specific Risk Calculator was used for an evaluation of the risk posed by the contaminants present in the groundwater samples, GW01-W01, GW02-W01, and GW03-W01 (Appendix B). The results were based on the highest concentration of each contaminant which exceeded the corresponding URS in any of the three Geoprobe borings, and were shown to present a cumulative cancer risk greater than 1×10^{-5} . The calculated excess cancer risk posed was 5.62×10^{-4} , which exceeds the acceptable level of risk of 1×10^{-5} . The calculated non-carcinogenic risk posed was 5.93, which exceeds the Hazard Index of 1.00. The City of Wilmington is located within a groundwater management zone (GMZ), which prohibits the withdrawal of groundwater for drinking water purposes. This eliminates human exposure to the contaminated groundwater via consumption. Mass loading calculations of the constituents present in the groundwater migrating into the Christina River did not result in concentrations in surface water that exceeded the DNREC URS values for surface water. Therefore, it can be concluded that there is also no risk to the river due to contaminant loading from groundwater to surface water.

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 human exposure to groundwater contaminated with elevated levels of trichloroethene, tetrachloroethene, vinyl chloride, and cis-1,2-dichloroethene.
- Prevent human exposure to soils in an unrestricted use setting.

These objectives are consistent with the proposed use of the site as a parking deck, New Castle County zoning policies, state regulations governing water supply, and worker health and safety.

Quantitative objectives define specific levels of remedial action to achieve protection of human health and the environment. Based on the above qualitative objectives, the quantitative objectives will be to ensure that future site users do not drink groundwater that contains contaminants that exceed a 1×10^{-5} risk, and also to prevent human exposure to soils that present an increased cancer risk of 1×10^{-5} in an unrestricted land use setting. Soils did not exceed a 1×10^{-5} cancer risk for restricted use.

5.0 PROPOSED PLAN OF REMEDIAL ACTION

Based on DNREC's evaluation of the site information and the above remedial action objectives, the recommended actions for the site will include the following:

DelDOT shall place a deed restriction on the site, no later than ninety days following DNREC's adoption of the final plan. The deed restriction will:

- Prohibit the site from being developed for purposes other than an industrial/commercial use;
- Will prohibit the installation of any water wells on, or groundwater usage at the site without prior written approval of DNREC; and
- Will identify the site as located within the City of Wilmington groundwater management zone (GMZ), which is an internal DNREC document that restricts groundwater withdrawals at the site.

6.0 PUBLIC PARTICIPATION

The Department actively solicited public comments or suggestions on the proposed plan of remedial action. The public comment period began on August 31, 2003, and ended at the close of business on September 22, 2003. No comments were received during the public comment period.

7.0 DECLARATION

This final plan of remedial action for the Riverfront Parking Deck site 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

Date

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Figure 2: SOIL AND GROUNDWATER SAMPLING LOCATIONS

TABLE 1
Geotechnical Test Boring Environmental Sample Results
TCL VOCs, SVOCs and Pesticides/PCBs

J – concentration is estimated
U – compound was not detected above indicated laboratory detection limit

TABLE 2
Geotechnical Test Boring Environmental Sample Results
TAL Metals and Cyanide

Sample ID	DNREC URS for Protection of Human Health Non- Critical Water Resource Area (February 1999) RESTRICTED USE	DNREC URS for Protection of Human Health Non-Critical Water Resource Area (February 1999) UNRESTRICTED USE	TB4-S001		TB7-S001		TB8-S001	
			4'-6'		12'-14'		4'-6'	
Sample Depth			mg/kg		mg/kg		mg/kg	
Units	mg/kg	mg/kg	mg/kg		mg/kg		mg/kg	
TAL METALS								
Aluminum	200,000	7,800	13,800		12,400		14,500	
Antimony	82	3	0.93	U	0.94	U	0.87	U
Arsenic	11	11	3.8		1.2	B	5.5	
Barium	14,000	550	80.6		46.2	B	38.5	B
Beryllium	410	16	0.51		0.66		0.65	
Cadmium	100	4	0.096	U	0.097	U	0.089	U
Calcium	NA	NA	5,600		329	B	1,410	
Chromium	610*	270*	20.1		11.8		21.4	
Cobalt	12,000	470	6.1		4.4		7.4	B
Copper	8,200	310	14.4		8.5		13.3	
Iron	61,000	2,300	20,800		15,300		28,200	
Lead	1000	400	32.7		2.8		9.1	
Magnesium	NA	NA	1,660		566	B	2,580	
Manganese	4,100	160	346		73.3		274	
Mercury	610	10	0.08		0.02	U	0.021	U
Nickel	4,100	160	9.6		22.5		12.7	
Potassium	NA	NA	661	B	354	B	895	B
Selenium	1,000	39	0.93	U	0.94	U	2.2	U
Silver	1,000	39	0.17	U	0.17	U	0.16	U
Sodium	NA	NA	271	B	349	B	284	B
Thallium	220	18	1.1	U	1.1	U	0.98	U
Vanadium	1,400	55	36.1		26.7		42.4	
Zinc	61,000	2,300	31.7		21.1		36.5	
CYANIDE								
Cyanide	4,100	160	0.5	U	0.5	U	0.5	U

U – Compound was not detected above indicated laboratory detection limit

B – Reported value is less than the method detection limit, but greater than or equal to the instrument detection limit

NA – not available

* - URS for Chromium VI