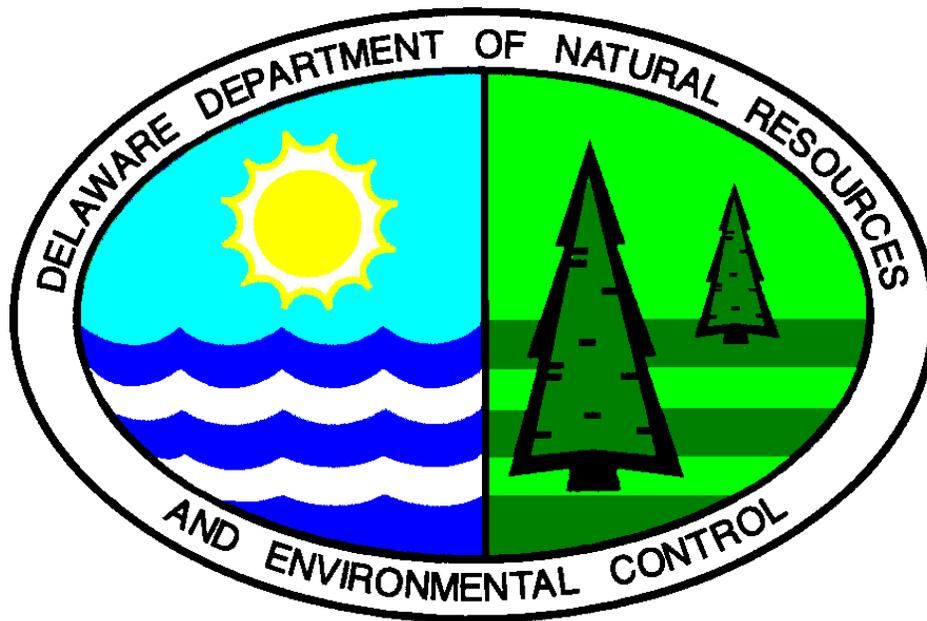


# PROPOSED PLAN OF REMEDIAL ACTION



## **DRAVO SHIPYARD**

Interim Action  
RDC/Harbor Associates Properties  
Wilmington, Delaware

DNREC Projects No. DE-1092 & DE-1096

August 1998

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

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## I. INTRODUCTION

In April and June 1998, the Department of Natural Resources and Environmental Control (“DNREC” or “Department”) under the authority granted by the Hazardous Substance Cleanup Act (“HSCA”) (7 Del. C., Ch. 91) reached an agreement with the Riverfront Development Corporation (“RDC”) and Harbor Associates to oversee environmental investigation, remediation activities, and redevelopment activities at the former Dravo Shipyard Site located on Madison Street in Wilmington, Delaware (Figures 1 and 2). The former Dravo Naval Shipyard is scheduled to be redeveloped into a catalogue outlet shopping mall, an exhibition center, and related facilities by the Riverfront Development Corporation of Delaware and the Harbor Associates, Inc.

The scope of this Proposed Plan of Remedial Action includes the area defined as an interim action by DNREC plus the 900 building location (i.e., site of the first outlet shopping mall building) and Phase V area (i.e., an area planned for future commercial building construction). Please, see Page 7 for the areas covered under the Interim Action). The scope of this Proposed Plan of Remedial Action is limited to the soil and subsoil for the project proposed remedial action plan. A subsequent investigation of the groundwater media shall be conducted as a separate operable unit for this project area.

This document is the Department’s Proposed Plan of Remedial Action for the Dravo Shipyard property as defined in Figure 2. This Proposed Plan is issued under provisions of the HSCA and the Regulations Governing Hazardous Substance Cleanup (“Regulations”). It presents the Department’s assessment of the potential unacceptable health and environmental risks posed by the Dravo Shipyard Site and plans for further action.

~~The Proposed Plan of Remedial Action includes public health, of the remedial alternatives, and compliance with applicable laws and regulations.~~

~~The Department with Section 112 of the Regulations. An opportunity for the other Proposed Plan in Department, after review and consideration of the comments received, shall issue a final plan of remedial action, which shall designate the selected remedial action.~~

## II. SITE DESCRIPTION AND HISTORY

### *Site Description*

The former Dravo Shipyard consists of approximately 120 acres, and is located southwest of the City of Wilmington business district. The Harbor Associates property encompasses

approximately 33 acres and is located on the western and southern portion of the former Dravo Shipyard Site. The RDC property encompasses approximately 14.5 acres and is located on the eastern portion of the former Dravo Shipyard Site. Contained within the former Dravo Shipyard Site is an underground utility vault system that runs along Madison Street, with arterials to the former naval shipyard buildings. The utility vaults are not currently in use. The total area described under this Proposed Plan of Remedial Action constitutes approximately 35 acres of land and is shown on Figure 2. The remaining portion of Dravo Shipyard acreage shall be investigated at a later date.

### *Site History*

The entire redevelopment area was historically the site of shipbuilding and other heavy industrial activities. Much of the area was reclaimed from marshland by filling with slag and other industrial waste products. Because of its previous industrial use, soil in the area has been impacted by environmental contaminants, including total petroleum hydrocarbons (TPH), heavy metals (lead, arsenic), polychlorinated biphenyls (PCBs) and polynuclear aromatic hydrocarbons (PAHs).

### III. INVESTIGATION RESULTS

A total of three environmental investigations have been performed on the site project area. In July and November 1997, DNREC performed two Brownfield Preliminary Assessment IIs. Soils throughout the property were found to contain significant amounts of organic and inorganic contaminants from historical operations at levels well above screening benchmarks. Primary contaminants of concern were found to be PAHs and Lead. Results indicated that relatively widespread PAH contamination of the shallow and deep soils to be present in the project area. Toxic Characteristics Leaching Procedures (TCLP) analysis indicated that one surface soil sample exceeded the regulatory level for Lead as a hazardous waste.

In June and July 1998, EA Engineering performed an Interim Action investigation. Samples were collected from 100 foot intervals in the excavated materials taken from the location of new utility trenches for the redevelopment of the exhibition center and in a 100 foot grid in areas not excavated for the initial utility trenches. The areas investigated under the 100 foot grid approach included the West Parking Lot (WPL), East Parking Lot (EPL), the Preliminary Portion of Biofiltration Swale for the project area, the Utility Vaults, the 900 Building Location and the Phase V Area (Figure 3). Several additional samples were collected from areas which contained obviously stained soils or free product. Samples were screened initially by the DNREC – SIRB mobile lab for Carcinogenic polynuclear aromatic hydrocarbons (CaPAH) using Ohmicron immunoassay kits and for Total metals, including arsenic, cadmium, chromium, lead, and mercury using an X-ray fluorescence instrument. Additional volatile and semivolatile screening was performed at DNREC-Division of Water Resources Environmental Services Laboratory (DNREC – ESS) and to Envirotech Research, Inc., Edison, New Jersey.

A total of 160 samples were collected during the utility trench excavation and subsequent 100 foot grid sampling. Fifty-nine samples were collected from the material excavated from the utility trenches. Eleven samples were collected from the WPL. Sixty-one samples were collected from the EPL/900 Building Area/Phase V area. Twenty-six samples were initially collected from the Biofiltration Swale area, and one additional grab sample was collected after the preliminary stormwater controls were installed. Two samples were collected from the utility vaults in the site area.

As a result of the mobile laboratory screening, a total of forty-three soil samples and one free product sample were submitted to Lancaster Laboratories and Envirotech Research for confirmatory analysis of select parts of the United States Environmental Protection Agency (US EPA) Target Analyte List (Inorganics) and Target Compound List (Organics) (TAL/TCL) and/or (Appendix A). TCLP analysis was also performed on selected samples exhibiting high concentrations of semivolatile organics and Lead. The specific parameters that were requested for laboratory confirmatory analysis are listed in Table 2-1. Samples were selected by EA and DNREC on the basis of moderate or high screening results (Table 3-1 through Table 3-34).

One area of free product was encountered in the footprint of the proposed 900 Building. Analytical results showed that the material that was encountered contained concentrations of PAHs greater than 300 parts per million, and has been identified as coal tar by the DNREC Analytical Chemist. Several other areas of stockpiled soils exceeded the reuse criterion. These soils were stockpiled in three areas, silt fenced and covered with plastic. All other confirmatory analytical results showed concentrations well below the reuse criterion shown in Table 1.

#### IV. REMEDIAL ACTION OBJECTIVES

According to HSCA regulation 8.4(1), during a remedial investigation, remedial action objectives must be established. For the Dravo Shipyard Site, soil and subsoil environmental media only, remedial action objectives were designed based on the following factors:

- the site is currently zoned as commercial and industrial land and numerous vacant lots and former industrial buildings are present.
- the future site use is expected to be paved roadway, asphalt parking lots, shopping centers and very limited open space.
- the site is adjacent to the Christina River.
- surrounding land uses are mixed, including warehousing, commercial and residential.
- soil at the site has been impacted by various chemical constituents. Based on the nature and extent of the contaminants, arsenic, lead, petroleum hydrocarbons, PAHs, PCBs and VOCs have been chosen as the primary contaminants of concern.
- The primary exposure pathways are inhalation, direct contact and incidental ingestion with/of impacted soil and erosional transport to the Christina River.

- The major risk associated with the site is potential human contact with impacted soil.

#### *Qualitative Remedial Objectives*

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

- Control potential human contact (dermal, inhalation and ingestion) with contaminated soil.
- Control potential contaminated soil erosion to the Christina River.
- Remove any free-phase petroleum products encountered during sampling or construction.

#### *Quantitative Remedial Objectives*

Based on the above qualitative remedial action objective, the following quantitative remedial action objectives for the soil and subsoil environmental media were developed:

- Prevent human contact with soil having an arsenic concentration greater than 60 mg/Kg.
- Prevent human contact with soil having a lead concentration greater than 400 mg/Kg.
- Prevent human contact with soil having a carcinogenic PAH concentration greater than 1 mg/Kg.
- Prevent human contact with soil having a PCB concentration greater than 0.5 mg/Kg.
- Prevent human contact with soil having a BTEX concentration greater than 10 mg/Kg.
- Prevent human contact with soil having a C5 through C8 Aliphatic Hydrocarbons concentration greater than 100 mg/Kg.
- Prevent human contact with soil having a C9 through C12 Aliphatic Hydrocarbons concentration greater than 1000 mg/Kg.
- Prevent human contact with soil having a C9 through C18 Aliphatic Hydrocarbons concentration greater than 1000 mg/Kg.
- Prevent human contact with soil having a C19 through C36 Aliphatic Hydrocarbons concentration greater than 2500 mg/Kg.
- Prevent human contact with soil having a C9 through C10 Aromatic Hydrocarbons concentration greater than 100 mg/Kg.
- Prevent release of contaminated sediment from the preliminary biofiltration swale to the Christina River in exceedance of the DNREC Uniform Risk Based Remediation Standards for protection of the environment.

The quantitative remedial action objectives are based on the DNREC “Final Draft Remediation Standards Guidance Under the Delaware Hazardous Substance Cleanup Act” (February 1998). These objectives are protective of potential human and environmental receptors.

## V. PROPOSED REMEDIAL ACTION PLAN

### *Potential Remedial Alternatives*

To accomplish the described remedial action objectives, three (3) potential remedial alternatives were reviewed for the soil and subsoil environmental media for the project area. These are listed below and discussed further in the following section:

1. Removal and selective reuse of excavated materials
2. Complete removal of excavated materials.
3. No further action.

### Alternative 1 (Presumptive Remedy): Removal and selective re-use of excavated materials.

Under this alternative, soil planned to be excavated for the redevelopment project will be handled in accordance with the findings of the samples collected in the 100 cubic meter grids, and sampling in the utility trenches at the 100 foot interval. Based on the analysis, the soil will be placed into one of four categories for either selective reuse during the redevelopment project or for testing and off-site disposal at an appropriate facility. These categories include:

- A** - Unlimited Contractor re-use Outside of Riverfront Redevelopment Area (This soil category has low or no concentration of contaminants which are at levels suitable for unrestricted residential use).
- B** - Construction Re-use within Redevelopment Project (and covered with a physical barrier material and clean fill)
- C** - Re-use Limited to under roadways, concrete or building foundations
- Z** - Off-Site Treatment or Disposal

In addition to the categories for selective re-use of contaminated soils at the site, the following shall also apply:

- provide deed restrictions for all project involved parcels for non-residential usage; and,

- require notification and approval from DNREC prior to any future intrusive activity in the project area.

With respect to the preliminary biofiltration swale, the swale shall serve temporarily as a storm water detention facility to trap contaminated sediment run-off from the redevelopment site during rain events. Upon further investigation/remediation/redevelopment activities for the next phases of the outlet shopping mall complex, the biofiltration swale shall be completed to incorporate:

- excavation of contaminated soil to either native fill or the groundwater table; and
- placement of a high density polypropylene liner at its base and on the side slopes

#### Alternative 2: Complete removal of excavated materials.

Under this alternative, all soil excavated for this redevelopment project will be removed, tested and disposed at appropriate off-site facilities. With this approach, approximately 613,067 cubic yards of excavated soil material would be transported through Wilmington for off-site disposal and an equal amount of clean fill would be transported back for use in this redevelopment project.

#### Alternative 3: No Further Action.

The no further action alternative will allow the redevelopment project to continue without further environmental related tasks or remediation. The contaminated soil will be left at the site and no remedial action will be conducted at the site.

## VI. EVALUATION OF REMEDIAL ALTERNATIVES

The remedial alternatives were evaluated in accordance with the criteria set forth in the HSCA Regulations. The application of these criteria are as follows;

**Protection of public health, welfare and the environment** - Alternatives 1 and 2 introduce a slight increased risk of exposure to construction workers who will be handling the soil material during implementation. The final project design is protective of public health, welfare and the environment. In Alternative 2, off-site disposal presents an additional short term exposure risk to a larger (residential and business) human population during off-site soil transportation due to potential dust releases, spills, or accidents. Alternative 3 does not offer any increased protection.

**Compliance with all applicable local, state and federal laws** - Alternatives 1 and 2 comply with all applicable local, state and federal laws. Alternative 3 does not comply with all applicable local, state and federal laws.

**Community acceptance** - Alternatives 1 and 2 are anticipated to be most acceptable to the community. Alternative 3 is not anticipated to be acceptable to the community. This criteria will be fully evaluated during the public comment period.

**Monitoring required** - Alternative 1 would require minimal monitoring and maintenance of the capped (with pavement, brick and/or soil) area. Alternative 3 would require subsequent sampling to determine if the concentrations of contaminants of concern were decreasing with time and/or not migrating off the site. Alternative 2 would not require any monitoring.

**Technical practicability** - Alternatives 1, 2 and 3 are technically practicable.

**Reduction in toxicity, mobility and volume** - Alternatives 1 and 2 would effectively reduce the toxicity, mobility and volume of the contaminated soil in the project area. Alternative 3 would not reduce toxicity, mobility or volume of the contaminated material.

**Long term effectiveness** - Alternatives 1 and 2 are effective in protecting public health, welfare and the environment over a long term period. Alternative 3 does not offer protection.

**Short term effectiveness** - Alternatives 1 and 2 are effective in protecting public health, welfare and the environment in the short term. Alternative 3 does not offer protection.

## VII. PROPOSED REMEDIAL ACTION PLAN

Based on the above criteria, Alternatives 2 and 3 (complete off-site disposal of all soils and no further action) are not considered viable alternatives. Alternative 2 (off-site disposal) may cause short term exposures to the public due to hauling large quantities of contaminated soil off-site. Further, there is little to no apparent increased protectiveness with Alternative 2, but there is a substantial increase in cost with Alternative 2. Alternative 3 (no further action) is not a viable alternative because it will not protect human health or the environment or comply with current laws.

Therefore, the most appropriate remedial action is Alternative 1 (removal and selective reuse of impacted soil). Alternative 1 will provide a cost effective means of meeting all the remedial objectives while satisfying the evaluation criteria. Alternative 1 will also remove the potential exposure pathway of human contact with impacted soil by isolating the source.

## VIII. INTERIM ACTION

In June 1998, excavation activities began with the installation of the utility trenches for the preliminary site work. Due to construction schedules, DNREC reached an agreement with RDC and Harbor Associates to oversee and complete an interim action at the First USA Riverfront Arts Center (Figure 2). The scope of the interim action included the installation of underground utility lines, construction of the EPL and WPL and the construction of a preliminary biofiltration swale as defined by Figures 2 and 3. A soil management and sampling plan for the Interim Action was implemented using the plans developed by DNREC for this site. Soils were reused or disposed of off site on the basis of presence or absence of contaminants of concern (Table 1).

On the basis of mobile and fixed laboratory analysis of soil samples, approximately 4000 tons of soil from the defined interim action areas was transported for disposal at TPS Technologies, Inc. in Baltimore, Maryland. Stockpiled soils that were transported either exceeded the “Z”

contamination criteria or, were inadvertently mixed with soils that exceeded the “Z” criterion as established in Table 1. Excavated soils that exceeded the RAOs but qualified as “A”, “B”, or “C” contaminated material have been placed under clean structural fill, stone and a minimum of 6 inches of asphalt paving or concrete. All utility trenches have been refilled with clean fill or select. Dust control and erosion control measures have been in place during all interim action activities. A preliminary biofiltration swale has been constructed. Excavated biofiltration swale material will be used as material under the building foundation during the construction of the 900 Building.

## IX. PUBLIC PARTICIPATION

The Department actively solicits public comments or suggestions on the Proposed Plan and welcome opportunities to answers questions. Please direct written comments to:

DNREC Site Investigation and Restoration Branch  
Attn: Ann L. Breslin  
391 Lukens Drive  
New Castle, DE 19720

The comment period begins August 5, 1998 and ends August 25, 1998. Comments and/or requests for a public hearing may be submitted in writing to Ann Breslin by the close of business (4:30 p.m.) on August 25, 1998 at the above referenced address.

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