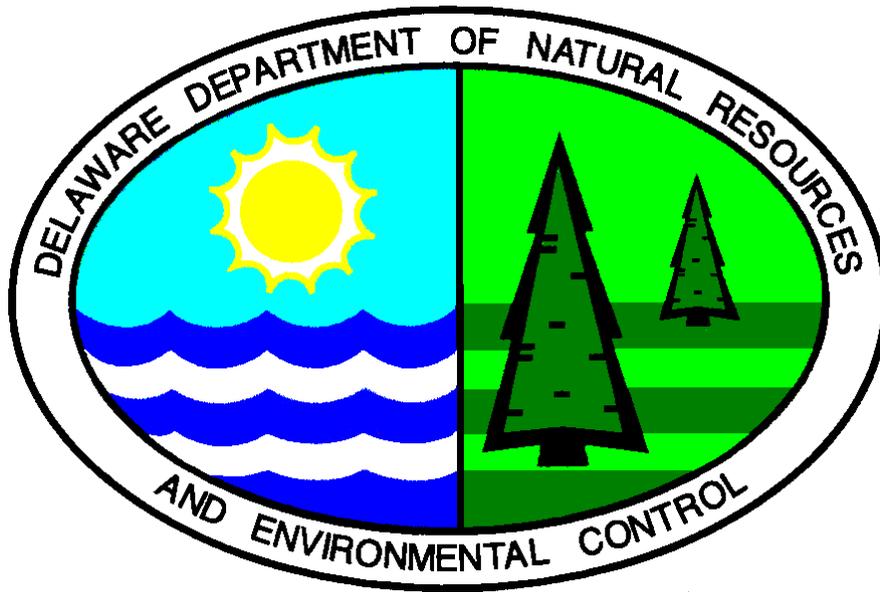


**FINAL PLAN OF REMEDIAL ACTION
FOR THE
RIVERWALK PHASE V & VI SITE
WILMINGTON, DELAWARE**



February 2000

**DNREC Project DE-1164
Project Officer: Paul W. Will**

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Division of Air and Waste Management
Site Investigation and Restoration Branch**

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I. INTRODUCTION

In May 1999, EA Engineering, Science and Technology, Inc. (“EA”) was contracted by Rummel, Klepper, & Kahl, LLP (“RK&K”) to conduct a remedial investigation/feasibility study (“RI/FS”) during the final design phases of a proposed concrete and brick walkway (“Riverwalk Phase V & VI”) to be constructed in conjunction with the on-going redevelopment of the Wilmington, Delaware Christina River riverfront. RK&K was contracted by the Riverfront Development Corporation of Delaware (“RDC”) and the Delaware Department of Transportation (“DelDOT”) to design the proposed walkway. The proposed walkway extends along the Christina River from the Sardo & Sons property to the location of the current Shipyard Shops.

The DNREC-SIRB conducted a Brownfield Preliminary Assessment II (“BPA II”) of this area during June 1–3, 1999. The DNREC validated the results of laboratory analyses resulting from that investigation and provided EA with a sample location map that was utilized in EA’s development of the RI/FS. DNREC determined that no additional sampling or testing needed to be performed by EA.

In September 1999, RDC entered into the DNREC-SIRB Voluntary Cleanup Program (“VCP”). RDC agreed to perform the RI/FS and any remediation of the project area. The objectives of the RI/FS were to identify potential sources of contamination within the limits of construction and develop remedial alternatives for the detected contamination that protect human health, welfare and the environment during and after construction of the pedestrian walkway.

The RI and the FS were completed in September 1999.

II. PURPOSE

This Final Plan of Remedial Action (“Final Plan”) is based on the RI/FS completed by EA, on behalf of RDC, and presents to the public the Department’s final selection of any remedial activities to occur at the Riverwalk Phase V & VI site. This Final Plan is issued under the provisions of the Delaware Hazardous Substance Cleanup Act, 7 Del. C. Chapter 91, (“HSCA”) and the Regulations Governing Hazardous Substance Cleanup (“Regulations”).

The Department provided the public with notice and opportunity to comment on the Proposed Plan in accordance with HSCA and Section 12 of the Regulations. The Final Plan, which designates the selected procedures and stipulations concerning current and future activities, the Proposed Plan, any comments received from the public, the Department’s responses to the comments, and all of the site documents forming the basis for the Proposed and Final Plans will constitute the remedial decision record required for issuing the Final Plan.

Included in Section II is a site description for the Riverwalk Phase V & VI Site. Section III provides a description of the investigation results. Section IV presents the Proposed and Final Plans of Remedial Action. Section V discusses public participation requirements and Section VI presents the Director’s declaration.

Site Description and History

The Riverwalk, Phase V & VI project area is located in the South Wilmington area of New Castle County, Delaware. The project is located adjacent to the northwest side of the Christina River and extends from the Big Kahuna Nightclub to the Shipyard Shops (Figure 1). The project area is approximately 0.75 miles south-southwest of downtown Wilmington. The immediate surrounding area is mainly a mix of commercial, industrial, and vacant land. Approximately 2,170 individuals reside within a 0.25 mile radius of the site. This information was obtained from the Preliminary Assessment (“PA”) of the Bell Alley/South Wilmington area (1996).

The project area was historically used for local industry, mainly related to building ships and railroad cars. The project area was never known as a residential area, but rather, it was set aside for commercial and industrial purposes. The surrounding land was historically reclaimed marshland that was filled with a variety of materials including slag, rubble, and other industrial debris.

In May 1999, EA Engineering, Science and Technology, Inc. (“EA”) was contracted by Rummel, Klepper, & Kahl, LLP (“RK&K”) to conduct a remedial investigation/feasibility study (“RI/FS”) during the final design phases of a proposed concrete and brick walkway (“Riverwalk”) to be constructed in conjunction with the on-going redevelopment of the Wilmington, Delaware Christina River riverfront.

III. INVESTIGATION RESULTS

As mentioned in Section I, the DNREC-SIRB conducted a Brownfield Preliminary Assessment II (“BPA II”) of this area during the period from June 1 – 3, 1999. DNREC has validated results of laboratory analyses from that investigation and provided a sample location map to EA for use in EA’s development of the RI/FS. No additional sampling or testing was performed by EA during the RI/FS.

DNREC-SIRB collected soil samples from 7 test pits surrounding the proposed Christina Pedestrian Riverwalk within the associated tax parcels owned by Ahmed Amer, Pettinaro, Inc., and Shipyard L.L.C (Figure 2). Sampling was conducted in June 1999 during the BPA II.

DNREC-SIRB conducted field screening of environmental samples in DNREC’s mobile field laboratory with a portable gas chromatography/mass spectroscopy (“GC/MS”), x-ray fluorescence (“XRF”), and immunoassay techniques. The samples were collected in accordance with procedures described in the approved Workplan of the DNREC-SIRB BPA II of the P&C Roofing, Inc. site. Confirmatory samples were sent to DNREC’s laboratory, a Delaware Certified HSCA laboratory, using Standard Operating Procedures for Chemical Analytical Programs (DNREC, 1997) for analyses. A subset of the prepared data was used by EA for the preparation of the RI/FS.

The soil samples were collected at depth from the test pits placed along the area of the future pedestrian Riverwalk. Existing foundations will be removed to accommodate future construction. The resulting data derived from the DNREC-SIRB BPA II was used to assess the

different management options for any excavated material that will be removed during construction, and also to assess if subsurface material, if left in place, would pose a threat to human health based on the Delaware Uniform Risk Based Remediation Standards Guidance (“URS”).

Total PAH was detected at concentrations ranging from 4.887 mg/kg to 44.19 mg/kg. Five samples exhibited a PAH concentration exceeding the URS for dibenzofuran. In two of the five samples, the laboratory detection limit for dibenzofuran exceeded the URS criteria. Two samples exhibited a PAH concentration exceeding the URS for benzo(a)anthracene, three samples exceeded the URS for benzo(b)fluoranthene, six samples exceeded the URS for benzo(a)pyrene and one sample exceeded the URS for indeno(1,2,3-cd)pyrene.

Arsenic was detected at concentrations ranging from 5.8 mg/kg to 18.5 mg/kg. Three samples and a duplicate exceeded the carcinogenic arsenic value of 0.4 mg/kg. Lead was detected at concentrations ranging from 4.2 mg/kg to 2,960 mg/kg. Two samples exceeded the lead URS value of 400 mg/kg. Two samples were submitted for Toxicity Characteristic Leaching Procedure (“TCLP”) extraction. The TCLP test models the conditions found in a municipal landfill, where materials are exposed to acidic leachates. Arsenic, barium, chromium, lead, and selenium were detected in one sample (TP-3d) in excess of URS values. None of the analytes detected were in concentrations above RCRA levels.

The site developer is planning to excavate the contaminated soil in the area for constructing the Riverwalk. Hence, the soil sample analytical results were compared to the DNREC Soil Reuse Criteria included in Figure 3 to determine how they could be managed.

The soil reuse plan shown in Figure 3 was developed by DNREC to provide guidance for the acceptable reuse of soil such that human health is protected. Category A material is considered acceptable for unlimited contractor reuse and can be replaced by a residential setting. Category B material is moderately impacted material that would be generally acceptable to place in a commercial or industrial setting if the material is covered with a geotextile marker fabric and clean fill placed over the marker fabric. Category C material may be reused onsite if the material is properly contained under an impermeable cap such as asphalt, concrete, or a building foundation. Category Z material may not be reused onsite and requires proper disposal offsite. No Category Z soils are present, therefore, no excavation of soils will take place as part of the remedy. The soil reuse classifications based on shallow soil sampling along the proposed walkway is included in Figure 4.

According to HSCA regulation 8.4(1) remedial action objectives must be established for all Plans of Remedial Action. The following considerations were taken into account in the development of the Qualitative and Quantitative Remedial Objectives for this site:

- The site will be developed into a pedestrian walkway, and
- The site is located adjacent to the Christina River.

The Qualitative Objectives for this site are:

- Prevent future site users from directly contacting the existing soil to an extent that would result in unacceptable risk,
- Prevent future construction workers from directly contacting existing soil to an extent that would result in unacceptable risk,
- Dispose offsite material with detected concentrations exceeding the DNREC decision criteria for onsite reuse, and
- Mitigate surface discharge and/or release of soil contaminants to the Christina River.

Based on these qualitative objectives, and the DNREC Soil Reuse Plan, the quantitative objectives that the DNREC-SIRB determined will meet the qualitative objectives include:

- Dispose offsite any excavated material that exhibited PCB concentrations exceeding 8 mg/kg and prevent human contact and stormwater contact to material exceeding 0.5 mg/kg PCB,
- Dispose offsite any excavated material that exhibited PAH concentrations exceeding 300 mg/kg and prevent human contact and stormwater contact to material exceeding 1.0 mg/kg PAH,
- Dispose offsite any excavated material that exhibiting lead concentrations exceeding 5,000 mg/kg and prevent human contact and stormwater contact to material exceeding 400 mg/kg lead, and:
- Dispose offsite any excavated material that exhibiting arsenic concentrations exceeding 500 mg/kg and prevent human contact and stormwater contact to material exceeding 3.0 mg/kg arsenic.

Consideration to the established qualitative/quantitative RAO's and cost of the remedy are evaluated in the selection of the remedial action for the site.

Three remedial alternatives were evaluated to address the RAOs. The alternatives for surface and sub-surface soils are as follows:

Alternative 1: No action. Do not redevelop the property.

Alternative 2: Containment of affected material: Remove exposure routes of residually impacted material (Category B and C) by placement of a geotextile marker fabric over Category B and C soils and clean fill placed over the marker fabric. Placement of a deed restriction that prohibits excavation greater than a depth of 1 foot in areas of concern identified on a property map without DNREC-SIRB approval (i.e. under outlying areas of the walkway). Develop an Operations and Maintenance Plan ("O&M") in order to periodically inspect the completed remedy.

Alternative 3: Excavation, removal of soil with detected concentrations exceeding Category A: Excavate and dispose offsite material exceeding the unrestricted reuse classification.

The details of each remedial alternative are conveyed in the EA FS for this project.

In January 2000, EA approached the Department and requested relief from using the marker fabric requirement for use in Alternative 2. EA indicated that the original intent of the marker fabric was to protect future construction workers from human health risks associated with soil to remain in place at the site. In order to receive a waiver for use of the marker fabric from the Department, EA was instructed to perform a human health risk assessment based on the calculated risks of exposure to total soil contaminant concentration values. Based on the risk assessment, carcinogenic and non-carcinogenic risks to construction workers from incidental ingestion of chemicals of concern (arsenic, thallium, iron and benzo(a)pyrene) in total soil and dermal contact were proven to be acceptable to the Department. Therefore, the previous requirement for the geotextile marker fabric contained in Alternative 2 has been waived and is no longer necessary. Please refer to EA's "Risk Assessment, Riverwalk Phase V & VI, Wilmington, DE February 2000" for a complete summary of the risk.

IV. PROPOSED AND FINAL PLANS OF REMEDIAL ACTION

Based upon the information and results of the investigation performed at the Riverwalk Phase V & VI property in Wilmington, Delaware, the DNREC-SIRB recommended plan of remedial action is modified without the geotextile marker fabric which was contained in the original Alternative 2. The modified Alternative 2 meets or exceeds all the criteria utilized in the evaluation of remedial alternatives that is conveyed in Subsection 8.5 of the Regulations and is the most cost effective remedy. Additional information regarding the evaluation of the remedial criteria is contained in the EA FS for the site

V. PUBLIC PARTICIPATION

The Department actively solicited public comments or suggestions on the Proposed Plan of Remedial Action and welcomed opportunities to answer questions. A Public Hearing on the Proposed Plan was not called for.

The public comment period for the Proposed Plan of Remedial Action began on October 13, 1999 and closed at the close of business (4:30p.m.) on November 3, 1999. The legal notice advertising the Proposed Plan appeared in the Delaware News Journal on October 14, 1999 (Figure 5). No comments were received by the close of business on November 3, 1999.

VI. DECLARATION

This Final Plan of Remedial Action for the Riverwalk Phase V & VI site is protective of human health, welfare and the environment and is consistent with the requirements of the Delaware Hazardous Substance Cleanup Act.

Denise Ferguson-Southard
Director, Division of Air and Waste Management

DATE

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FIGURE 1 SITE LOCATION MAP

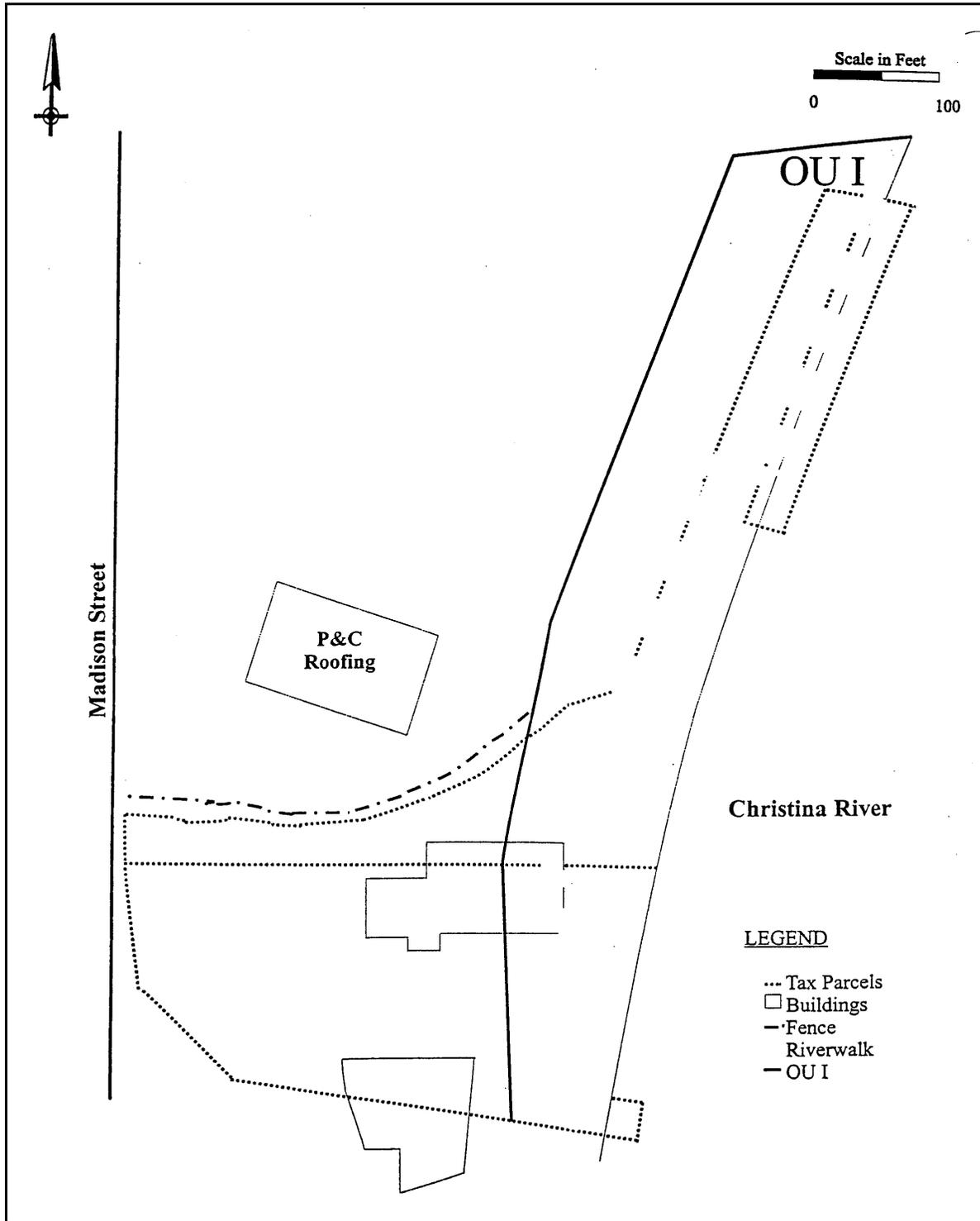


FIGURE 2 SITE LOCATIONS - RIVERWALK

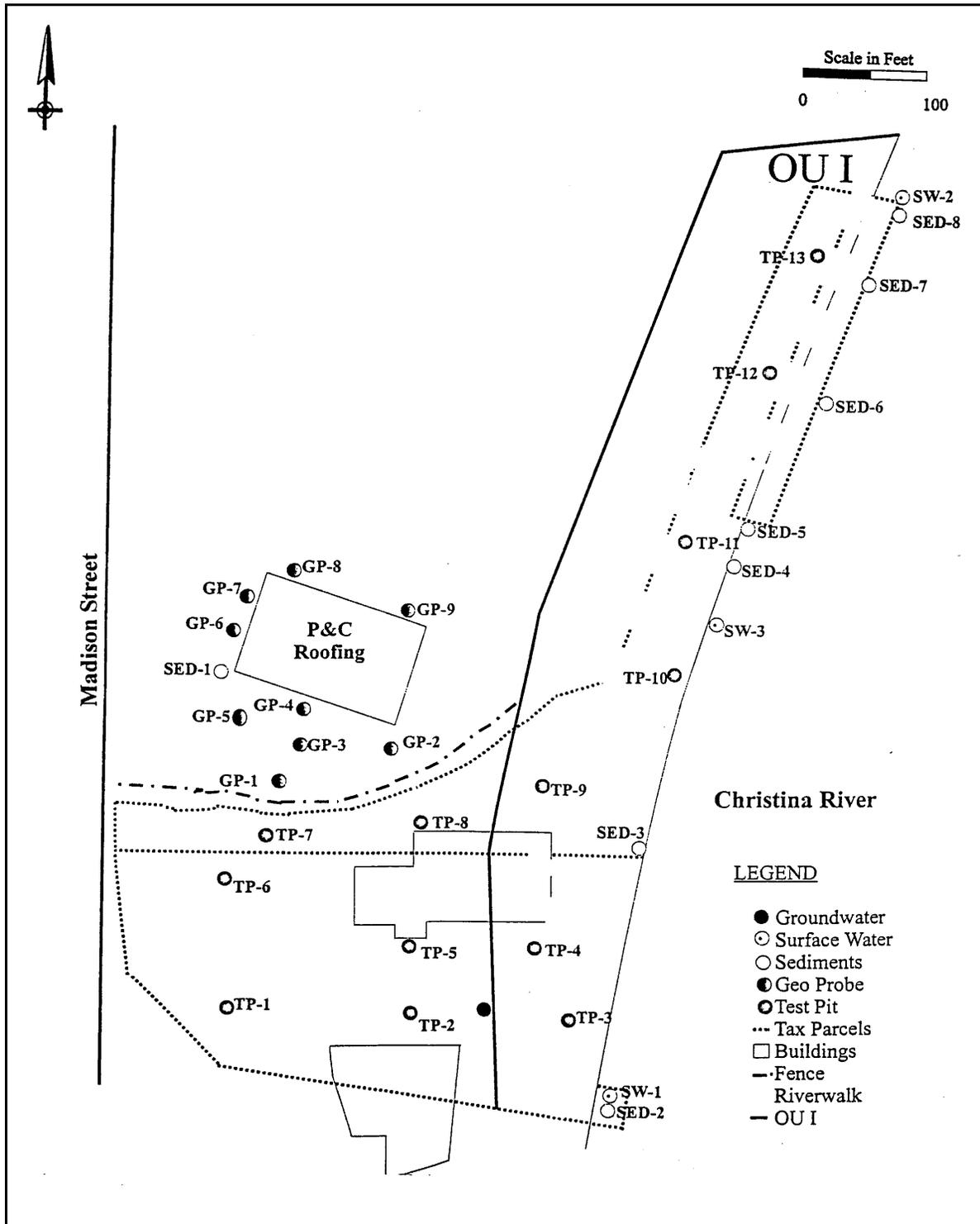


FIGURE 3 SOIL RE-USE LEVELS FOR INTERIM ACTION EXCAVATION MATERIAL MANAGEMENT
Christina River Pedestrian Walkway Phase V and VI – The Big Kahuna to Shipyard Shops, June 1999
 (Concentrations in mg/Kg)

Soil Category	A	B*	C	Z
Contaminant of Concern	Unlimited Contractor Re-Use	Construction Re-Use within Project Area	Re-Use Limited to Under Foundations of Building in Project Area	Off-Site Treatment or Disposal
Oily Soil or Free Product	none	None	none	Yes
Petroleum Hydrocarbons				**
C5 through C8 aliphatic hydrocarbons	100	500	500	
C9 through C12 Aliphatic hydrocarbons	1000	2500	2500	
C19 through C18 Aliphatic hydrocarbons	1000	2500	2500	
C19 through C36 Aliphatic hydrocarbons	2500	5000	5000	
C9 through C10 Aromatic hydrocarbons	100	500	500	
BTEX	<10	10 to 25	25 to 100	>100
C PAHs	<1	1 to 25	25 to 300	>300
PCBs	<0.5	0.5 to 3	3 to 8	>8
Arsenic	<3	3 to 100	100 to 500	>500
Lead	<400	400 to 1,500	1,500 to 5,500	>5,000

*Requires a Geotextile marker Fabric of a minimum quality of Amoco ACF 4508 or equivalent as determined by DNREC and a minimum on one foot fill over contaminated soil.

**Above 5,000 ppm for total TPH in soil.

FIGURE 4 AREAS OF DNREC-SIRB SOIL RE-USE CLASSIFICATION

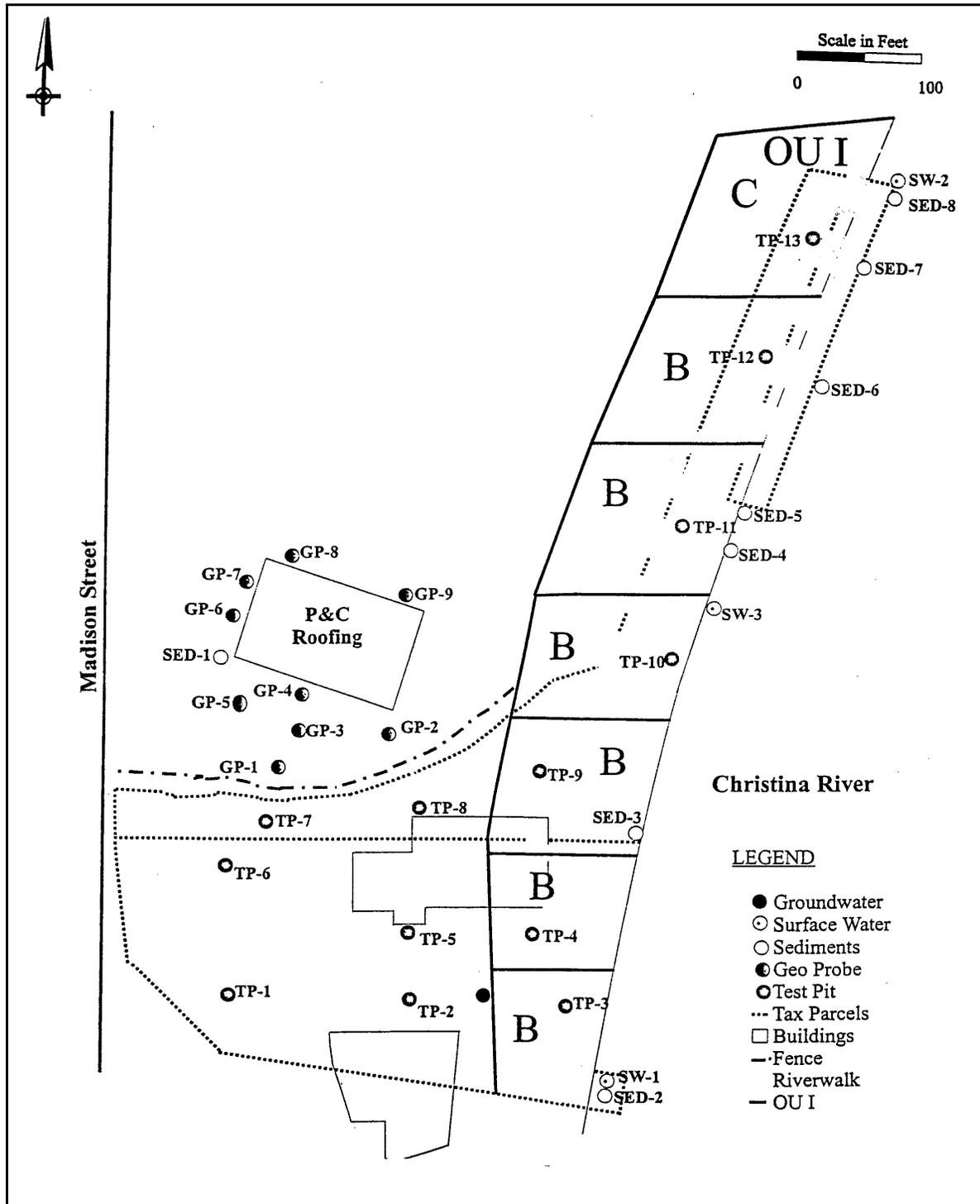


FIGURE 5 NEWS JOURNAL LEGAL NOTICE



DNREC-SIRB LEGAL NOTICE

**NOTICE OF PROPOSED PLAN OF REMEDIAL ACTION
FOR THE RIVERWALK PHASE V & VI SITE**

The Department of Natural Resources and Environmental Control (DNREC) announces the Proposed Plan of Remedial Action for the Riverwalk Phase V & VI Site. This property is located along the Christina River between the Kahuna and the Shipyard Shops, Wilmington, Delaware. This proposed Plan of Remedial Action is issued pursuant to the Hazardous Substance Cleanup Act, 7 Del. C. Chapter 91 (HSCA).

The Riverwalk Phase V & VI Site consists of an approximate 900 x 150-foot strip of land along the Christina River. The land was historically used for local industry, mainly related to building ships and rail cars. DNREC conducted a Brownfield Preliminary Assessment II (BPA II) of this property in 1999. Following the BPA II, a Remedial Investigation/Feasibility Study (RI/FS) was conducted and completed in September, 1999. The RI/FS revealed the presence of contaminants at the Site, including Arsenic, Polychlorinated Biphenyls (PCBs), Polycyclic Aromatic Hydrocarbons (PAHs), and Lead in exceedence of URS guidelines. The RI/FS took into account Qualitative and Quantitative Remedial Objectives.

Based on the results from the BPA II and the RI/FS, DNREC concludes that a remedial action is required to prevent contact with site soils and prevent erosion of soils into the Christina River. The Proposed Plan of Remedial Action for the Riverwalk Phase V & VI Site calls for the following:

- Dispose offsite excavated material that exhibited PCB concentrations exceeding 8 mg/kg and prevent human contact and stormwater contact to material exceeding 0.5 mg/kg PCB,
- Dispose offsite excavated material that exhibited PAH concentrations exceeding 300 mg/kg and prevent human contact and stormwater contact to material exceeding 1.0 mg/kg PAH,
- Dispose offsite excavated material that exhibiting lead concentrations exceeding 5,000 mg/kg and prevent human contact and stormwater contact to material exceeding 400 mg/kg lead, and
- Dispose offsite excavated material that exhibiting arsenic concentrations exceeding 500 mg/kg and prevent human contact and stormwater contact to material exceeding 3.0 mg/kt arsenic.

A copy of the Proposed Plan of Remedial Action for the Riverwalk Phase V & VI Site is available at the Wilmington Public Library and at the following location:

DNREC - Site
Investigation and
Restoration Branch
391 Lukens Drive
New Castle, DE 19720
(302) 395-2600

The Proposed Plan is also posted on DNREC-SIRB's website at [HTTP://SIRB.AWM.DNREC.State.DE.US](http://SIRB.AWM.DNREC.State.DE.US) under the subject "announcements."

DNREC invites written comments on this Plan. Members of the public may also request a public hearing on the Proposed Plan of Remedial Action pursuant to 7 Del. C. § 9112. The comment period begins on Thursday, October 14, 1999 and ends at 4:30 on Thursday, November 4, 1999. Comments and/or requests for a public hearing may be submitted in writing to Paul Will by the close of business (4:30 p.m.) on Thursday, November 4, 1999 at the above address. For additional information contact Paul Will at (302) 395-2652.

10/14-NJ (A-48660) (O-523646)