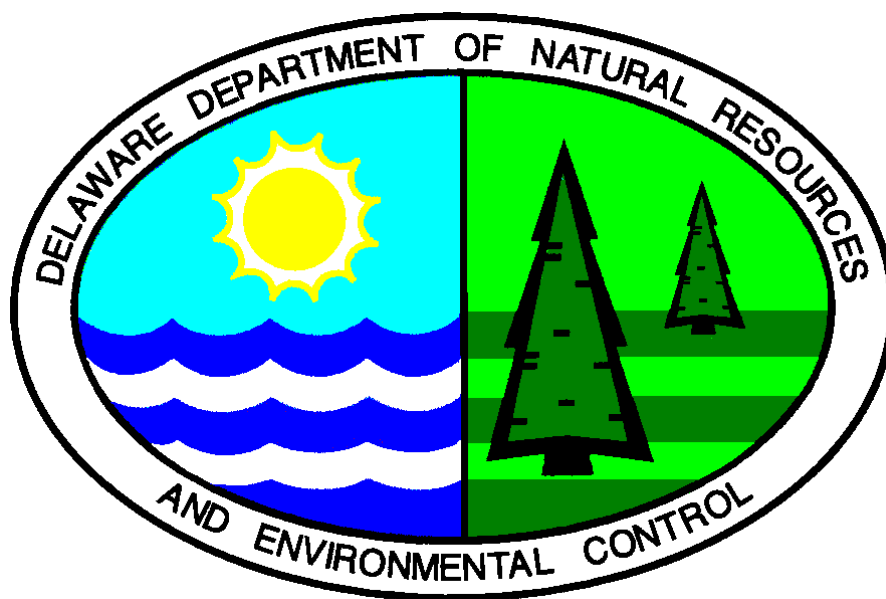


# AMENDED FINAL PLAN OF REMEDIAL ACTION

For the

**Potts Property Site  
Wilmington, Delaware**



**August 2000**

DNREC Project DE-0169

**Prepared by:**

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

## TABLE OF CONTENTS

<b>1.0 INTRODUCTION .....</b>	<b>1</b>
<b>2.0 SITE DESCRIPTION AND HISTORY .....</b>	<b>1</b>
<b>3.0 THE RELATIONSHIP BETWEEN THE HALBY AND POTTS PROPERTY SITES</b>	<b>2</b>
<b>4.0 REMEDIAL INVESTIGATION .....</b>	<b>3</b>
4.1 SOIL AND GROUNDWATER .....	3
4.2 CHRISTINA RIVER .....	4
<b>5.0 SITE RISK EVALUATION.....</b>	<b>4</b>
5.1 APPLICABLE STANDARDS .....	4
5.1.1 Soil, Groundwater and Sediment .....	4
5.1.2 Surface Water .....	5
5.2 RISKS ASSOCIATED WITH IMPACTS OF CONTAMINATION ON SOIL AND GROUNDWATER .....	6
5.3 RISKS ASSOCIATED WITH POTENTIAL IMPACTS ON THE CHRISTINA RIVER .....	6
<b>6.0 REMEDIAL ACTION OBJECTIVES .....</b>	<b>7</b>
6.1 QUALITATIVE OBJECTIVES .....	7
6.2 QUANTITATIVE OBJECTIVES .....	7
<b>7.0 EVALUATION OF POTENTIAL REMEDIAL ALTERNATIVES.....</b>	<b>7</b>
7.1 CONTAMINATED SOIL (OTHER THAN PETROLEUM PRODUCT) .....	7
7.1.1 Screening Criteria .....	7
7.1.2 Further Evaluation .....	8
7.2 EVALUATION OF POTENTIAL REMEDIAL ALTERNATIVES FOR PETROLEUM PRODUCT IN SUBSURFACE SOILS	11
<b>8.0 REMEDIAL PLAN.....</b>	<b>11</b>
<b>9.0 PUBLIC PARTICIPATION.....</b>	<b>12</b>
9.1 PUBLIC MEETINGS .....	12
9.2 PUBLIC COMMENT AND RESPONSES ON THE ORIGINAL PROPOSED PLAN .....	12
9.2.1 Comments from Eastern Environmental Law Center, March 23, 1999 .....	12
9.2.2 Comments from "Wilmington Waterfront Watch" February 19, 1999. ....	14
9.3 AMENDED PROPOSED PLAN .....	15
<b>10.0 DECLARATION .....</b>	<b>15</b>

## FIGURES

1. Site Area Sketch
2. Halby Site Selected Remedy
3. Estimated Extent of Free Petroleum Product
4. Potts Property: Proposed Extent of Cover and Capping

## TABLES

Table 1. Comparison of Remedial Alternatives for Site Soils

**ATTACHMENT:** Evaluation of Impacts on the Christina River

## 1.0 INTRODUCTION

In 1996, the Department of Natural Resources and Environmental Control (DNREC or the Department) entered into a Consent Decree with Port Contractors, Inc. and The Pyrites Company, Inc. (known hereinafter as the potentially responsible parties or PRP's) under the authority granted by the *Hazardous Substance Cleanup Act (HSCA)* 7 Del. C., Chapter 91. The PRP's agreed to design and perform a Remedial Investigation and Feasibility Study (RI/FS) of the site known as the Potts Property with oversight by DNREC. F. A. Potts and Company was also issued a notice of liability by the Department but did not participate in the Consent Decree. In May 1997, Bethlehem Steel was noticed as an additional PRP.

The final report of the RI/FS was submitted to DNREC in September 1998. The study has been performed in accordance with the Delaware Regulations Governing Hazardous Substance Cleanup (Regulations), Hazardous Substance Cleanup Act Guidance Manual, the Delaware Standard Operating Procedures for Chemical Analytical Program, July 1994, and the Consent Decree. It has been approved by DNREC.

The *Proposed Plan of Remedial Action* for the Potts Property Site was issued for public comment on February 6, 1999. The public comment period was extended beyond the minimum regulatory requirement to March 24. Several written comments were received and are included with the Department's responses in **Section 9** of this document. The original Final Plan was signed on March 24, 1999.

In June 2000 the responsible parties proposed to substitute a 1-foot layer of compacted crushed stone for the asphalt or concrete pavement on a ten-acre parcel of the site. The responsible parties indicate that the compacted crushed stone surface will be more readily maintained when the parcel is used for trailer parking. The Department has determined that the crushed stone surface, described herein as a "low permeability cover" is as protective of human health and the environment as the asphalt pavement of the original Final Plan. There are no other differences between the Amended and the original Final Plans.

In summary, the Amended Final Plan for the remediation of the Site includes a passive collection system to contain and remove petroleum contamination from the subsurface and a soil or low permeability cover over the entire Site to prevent contact with contaminated surface soils and reduce migration of contamination to the Christina River. The remedial measures will be coordinated with pending action by the US EPA at the Halby Superfund Site.

## 2.0 SITE DESCRIPTION AND HISTORY

The Potts Property Site comprises approximately 66 acres on Christina Avenue near the Port of Wilmington and just east of the I-495 bridge over the Christina River. The site is roughly rectangular in shape and is bounded by a Conrail line on the southwest and the Christina River on the northeast. Christina Avenue divides the site into two parcels. The Lobdell Canal, about 1200 feet long, forms the southeastern boundary of the site. (See Figure 1.)

The ground surface at the site is relatively flat. The elevation is approximately five feet above mean sea level. Earthen berms 5 to 10 feet in height have been constructed along the riverbank

and elsewhere on the site. A tidal marsh occupies approximately eight acres in the southwest corner of the site and is fed by a drainage ditch extending along the railroad tracks. Historical photos indicate that virtually all of the Potts Property was tidal wetlands before extensive filling which began prior to 1915. The wetlands and drainage ditches now total about fourteen acres.

The Lobdell Canal was constructed in the mid-1880's. Apparently some material from the canal was placed on the Potts Property.

Land use in the area is predominantly heavy industrial. However, there are two residences on Terminal Avenue approximately two hundred feet from the Potts Property. The location of the residences is shown on Figure 2. There is a residential neighborhood near the intersection of I-495 and Terminal Avenue approximately 2,500 feet to the west of the site. All residences are served by the public water supply.

Historically, several industrial facilities have operated on the site and in the immediate area. The Halby Superfund Site, the former location of a chemical production facility, is immediately adjacent to the Potts Property on the southwest. Features of the Halby Site are shown on Figure 2. The Pyrites Company, Inc. operated an ore refining facility on the Potts Property from 1916 to 1974. The Lobdell Car and Wheel Company operated a railroad wheel manufacturing plant immediately southeast of the Potts Property from 1881 to the 1940's.

The ore refining facility was demolished over a period of time ending in the 1970's. Since then, the Potts Property has been used for parking and materials storage. Most notably, large quantities of petroleum coke in unconfined piles were stored in two different areas of the site until 1997. Presently, a concrete rubble recycler operates between Christina Avenue and the Conrail tracks. A pallet wood recycler also began operation on the parcel between the Christina Avenue and Christina River. At this writing, the business owner is under an enforcement action to cease operations and remove woodpiles.

### **3.0 THE RELATIONSHIP BETWEEN THE HALBY AND POTTS PROPERTY SITES**

Plans for the Halby Site, located immediately to the southwest of the Potts Property, are documented in the "Record of Decision" (ROD) issued by the US EPA in March 1998. The EPA has been involved in the investigation of the Halby Site since 1984. During this time, the EPA successfully eliminated immediate risks caused by the chemical production and storage facilities and carbon disulfide contaminated soil on the Halby Site. In general, the objective of the EPA's remedial plan is to restore the Halby Site to use as an industrial facility while controlling the remaining health and environmental risks through a combination of removal, containment and institutional controls.

The investigations performed by EPA suggested that some contaminants, notably arsenic in soils, originated at the industrial operations formerly located on the Potts Property or the adjacent Lobdell plant. Apparently, waste material containing elevated levels of arsenic was used for fill on part of the Halby Site. The chemical production facilities located on the Halby Site contributed to arsenic contamination too, however. The highest concentrations of arsenic on the Halby site are thought to have originated with the chemical plant on the Halby Site.

As part of its project, the EPA investigated the presence of arsenic in the soil of residential neighborhoods and a public park near the Halby and Potts sites. The Halby remedial plan includes the removal of a small area of arsenic contaminated soil on a residential lot adjacent to the Halby Site. No elevated levels of arsenic were found in the other residential areas.

The chemical production facilities located on the Halby Site discharged liquid waste to a lagoon located immediately to the east of the Conrail tracks and adjacent to the Potts Property. The lagoon drained to the Christina River via a network of ditches and natural wetland areas on Potts. Thus, substances originating from the Halby Site contaminated the Potts Property. As part of its investigation, the EPA performed extensive sampling of water and sediment in ditches and marsh areas. The EPA remedial plan for the Halby site includes removing sediment from ditches on the north side of the Potts Property, and filling approximately 7 acres of contaminated Potts Property wetlands. The hydraulic function of the existing wetlands will be replaced with an engineered system using surface grading, storm water retention, and outfall structures. Federal law requires the creation or enhancement of wetlands offsite to compensate for the natural wetlands lost on the site through this remedial action. Due to the environmentally degraded condition of the on-site marsh and its surroundings, the off-site creation of wetlands, preferably within the Christina River watershed, will provide a wetland habitat of better ecological function and value.

Since the EPA's ROD addresses the wetlands area of the Potts Property, this area will not be addressed under HSCA. However, construction for the remediation of the Potts Property must be compatible with the storm water management system to be designed as part of the Halby project. Figure 2 shows the EPA's selected remedy including back filling wetlands and paving on the Halby Site.

The EPA's remedial plan for the Halby Site also addressed groundwater impacted by site related contaminants. It includes institutional controls (implemented by DNREC) to prevent the placement of water supply wells which might be contaminated. It also acknowledges that groundwater from the Halby Site apparently moves beneath the Potts Property toward the Christina River. Impact to the river from this groundwater contamination will therefore be addressed as part of the remedial plan for the Potts Property site.

## **4.0 REMEDIAL INVESTIGATION**

### **4.1 Soil and Groundwater**

Duffield Associates, consultant to the PRPs, performed the Remedial Investigation of the Potts Property, under a work plan approved by DNREC. The investigation began in July 1996 and consisted of three phases. For the first and second phases, sixty-four soil samples were taken from 9 soil borings and 19 test pits. Eight temporary wells were constructed and sampled; three permanent wells constructed for the Halby Site project were also sampled.

The first two phases of investigation were designed to determine the extent and character of soil and groundwater contamination by substances associated with the known past activities on the Site. Surface and sub-surface soil samples were analyzed for metals (arsenic, lead, cobalt, copper, calcium, beryllium, iron, manganese, mercury, nickel, selenium, thallium, zinc, and cadmium), semi-volatile organic compounds (SVOCs) and volatile organic compounds (VOCs) including benzene, ethylbenzene, toluene and xylene.

During the collection of subsurface samples, a thin layer of petroleum product was discovered on the southwest side of Christina Avenue. Consequently, a third phase of investigation was begun to determine the source and extent of this contamination. Thirty-one soil samples were taken from 28 test pits. Figure 3 shows the estimated extent of the petroleum contamination.

#### 4.2 Christina River

DNREC supplemented the Duffield RI Report with its own evaluation of site impacts on the Christina River. It is attached to the *Final Plan* and provides more detail than the summary here.

The Duffield RI Report evaluated the migration of dissolved metals in shallow ground water at the Potts Property to the Christina River. In order to assess the potential impact on the Christina River from shallow groundwater at the Potts Property Site, based on the data obtained from the RI, site parameters regarding the movement of groundwater from the site to the river, precipitation, runoff, infiltration, and the hydrogeological characteristics of the fill material were estimated. The resulting “worst case” calculation of contaminant loading to the river was combined with the flow rate of the river at low flow conditions to estimate the concentrations of select metals in the river water.

Groundwater contaminated by the Halby Site also reaches the Christina River. The potential contaminant contribution from Halby was not included in the RI report. DNREC has estimated the impact to the Christina using groundwater data from the Halby Site investigation.

Impacts to the river can also be evaluated by sampling river water and sediment. The analysis of water indicates current impact on river water quality both of the site and other sources. Analysis of sediment samples reveals the history of contaminant discharges to the river. Direct sampling of river water and sediment was not part of the Remedial Investigation performed by Duffield Associates. However, DNREC has been able to assemble adequate data from other studies to evaluate current water and sediment quality conditions.

### 5.0 SITE RISK EVALUATION

Environmental and health impacts of contamination present on the site were evaluated by comparing the concentrations of chemicals present on the site to standards developed or recognized by DNREC. These standards were developed to provide consistency among the level of contamination at a site, the degree of cleanup needed and the long-term use of the property. Applicable standards for the Potts Property Site risk evaluation are described below.

#### 5.1 Applicable Standards

##### 5.1.1 Soil, Groundwater and Sediment

The screening standard for site soils and groundwater is from the **Remediation Standards Guidance** (DNREC, February 1998). Application of this guidance requires the development of objectives related to the long-term use of the site and the suitability of site ground and surface water as drinking water supplies.

The proposed long-term use of the Potts Property is as an industrial site. This is consistent with its current zoning and surrounding land uses. This risk evaluation then assumes that future exposure to site contaminants by human beings will be in an occupational setting. Therefore, the “restricted use” *Uniform Risk Standard* (URS) would be applicable. Furthermore, since the Potts Property will be included in a “Groundwater Management Zone” developed as an institutional control for the Halby Superfund Site and the Christina River does not serve as a drinking water supply, the URS for “Non-Critical Water Resource Area” would apply.

The **Remediation Standards Guidance** contains a URS list for contaminant concentrations in sediment. Sediments in the lower Christina River are commonly contaminated with zinc and arsenic from a variety of sources. The concentrations frequently exceed the URS screening level. Therefore, the evaluation of sediment contamination considered informal guidance developed by the US National Oceanic and Atmospheric Administration (NOAA) and published in 1991. The guidance uses two thresholds of chemical concentration--the Effects Range-Low (ER-L) and the Effects Range-Median (ER-M) to identify three ranges of potential adverse biological effects. At concentrations below the ER-L, no effects are apparent. Between the ER-L and the ER-M, adverse effects are possible. Above the ER-M, adverse effects are probable. The guidance cautions that the measurement of adverse effects is subjective and the threshold values do not represent official NOAA standards. In addition, the guidance was developed from a number of studies including marine and estuarine conditions as well as relatively fresh water conditions like the Christina River.

#### 5.1.2 Surface Water

The applicable standards for evaluation of surface water are found in **Surface Water Quality Standards** (DNREC, 1993). The Standards designate desired beneficial uses of streams in the state and establish chemical specific “surface water quality criteria” (SWQC) depending on that designation and other stream characteristics. The criteria are for the protection of aquatic life (further broken down into fresh and marine water and acute and chronic effects) and for the protection of health of humans consuming fish and/or water. The Christina River at the Potts Property is designated for the following uses:

- Industrial water supply;
- Secondary contact recreation (wading, boating, fishing);
- Fish, aquatic life and wildlife;
- Agricultural water supply.

The Department does not expect that it will be used for primary contact recreation (swimming), public water supply, nor is it designated to be of exceptional recreational or ecological significance. Fish from this part of the Christina may be consumed by recreational or subsistence fishermen. However, the criteria for Potts Property related substances (which are inorganic) are generally lower for protection of aquatic life rather than of human health. Therefore, the criteria for the protection of aquatic life would apply.

There are several substances at the Potts and Halby Sites for which there are no SWQCs. In some of these instances, comparison has been made to “lowest observable effect levels” established as guidance by NOAA.

## 5.2 Risks Associated with Impacts of Contamination on Soil and Groundwater

Arsenic is widespread on the site and present at concentrations that warrant concern in an industrial land use setting. In nine borings, surface soil samples were analyzed for arsenic, lead and other metals. The average concentration of arsenic was 226 milligrams/kilogram (mg/kg) compared to the relevant URS of 61 mg/kg. Of 28 total surface soils sampled from both borings and test pits, eight exceeded the 610 mg/kg level (ten times the URS). The Remedial Investigation report states that no general patterns were observed in the distribution of arsenic in surface soils. Arsenic in sub-surface soils is present at somewhat higher concentrations than surface soil. The average of samples taken in borings is 244 mg/kg.

The applicable URS for lead is 1000 mg/kg. Two samples of surface soil substantially exceed this level. Lead is elevated above background levels throughout the site. Other inorganics do not appear to contribute to human health risks at the site.

The third phase of the Remedial Investigation focused on petroleum product contamination in subsurface soil on the western portion of the site between Christina Avenue and the Conrail tracks. A layer of phase separated petroleum product varying in thickness from a sheen to about 1 inch was found to be present over an area approximately 100 by 400 feet. The petroleum product was identified as weathered No. 2 fuel oil, motor oil or lubricating oil and may have come from a tank or other vessel that was buried with the fill material.

Groundwater samples taken from the Columbia and the Upper Potomac aquifers showed widespread contamination by site related organic and inorganic chemicals. The Groundwater Management Zone established as part of the EPA's Halby Superfund project has eliminated the risk to human health by restricting use of this water.

## 5.3 Risks Associated with Potential Impacts on the Christina River

None of the river water samples available exhibited exceedence of the relevant Surface Water Quality Criteria of the State of Delaware. Samples taken in the Lobdell Canal and the I-495 drainage ditches exhibit exceedences of the criteria for copper, zinc and lead. Ammonia is also present at significant levels in the canal and ditch water although there is no SWQC for ammonia.

The site as well as other upstream sources has apparently affected sediment in the Christina River. Sediment samples taken by the EPA for the Halby Site from the wetlands, ditches, Lobdell Canal, and three samples in the Christina River all exceed the URS for zinc, arsenic, and copper. They are also found to exceed the Effects Range-Low in the river near the site for arsenic, lead, zinc and copper. The three sediment samples taken in the Lobdell Canal exceeded the Effects Range-Low for zinc and Effects Range-Median for copper. The extent of exceedences of the Effects Range-Median is limited to the canal. This has lead DNREC to conclude that sediment contamination in the canal is not a significant impact on the river. The Army Corps of Engineers dredges the Port of Wilmington to maintain the channel depth. The dredged area extends to the Lobdell Canal. Samples taken from the dredged area show a significant reduction in sediment contamination. **See the attachment for more detail.**



## **6.0 REMEDIAL ACTION OBJECTIVES**

The Regulations require that objectives to be clearly established for actions taken under HSCA. Objectives should consider current and potential land use, resource use, proximity of human populations, use of surrounding properties, and the level of contamination of surrounding properties. Qualitative objectives describe in general terms the ultimate result of remedial action. Quantitative objectives define specific levels of remedial action to achieve protection of public health, welfare, and the environment. The following objectives have been established by DNREC and are also consistent with the EPA's objectives for the Halby Site.

### **6.1 Qualitative Objectives**

- To restore the Potts Property for industrial use as is consistent with its zoning and the surrounding land uses.
- Limit exposure to site soils contaminated by metals or petroleum products.
- Eliminate or reduce impacts to the river from contaminated site soils through soil loss, erosion, infiltration, and discharge.

### **6.2 Quantitative Objectives**

- Eliminate exposure of workers on the site to soil with concentrations of arsenic greater than 38 mg/kg or lead greater than 1000 mg/kg. (The proposed cleanup level has been selected to be consistent with that established by the EPA for the Halby Site. Arsenic at 38 mg/kg in surface soil corresponds to an increased lifetime cancer risk of 1 in 10,000 according to EPA's guidance.)
- Eliminate the mobility of petroleum product beyond its present boundaries.
- Reduce the discharge of contaminated shallow groundwater to the Christina River by 75% (as projected by the method described in the RI Report by Duffield Associates).

Note that components of the EPA remedial action will significantly reduce the migration of contaminated sediments from the site to the Christina River and Lobdell Canal.

## **7.0 EVALUATION OF POTENTIAL REMEDIAL ALTERNATIVES**

### **7.1 Contaminated Soil (other than Petroleum Product)**

#### **7.1.1 Screening Criteria**

To meet the remedial objectives for site soils, the following remedial alternatives were screened for contaminated surface and subsurface soil:

- No action;
- Containment with capping or covering;
- Removal and off-site disposal.

Initial screening of remedial alternatives under HSCA (Section 9 of the Regulations) is based on (1) Effectiveness in meeting cleanup levels for the protection of public health, welfare and the environment, and, (2) Acceptable engineering practices (applicability, feasibility, reliability, and cost effectiveness).

The no action alternative is not effective in meeting the cleanup levels and was therefore eliminated from further consideration.

Containment of site soils is an acceptable engineering practice and is potentially effective in meeting cleanup levels. It also meets the objective of reducing the discharge of shallow contaminated groundwater to the river. It is retained for further consideration.

Removal and off-site disposal of fill material from the entire site (approximately 700,000 cubic yards in volume) would meet clean-up levels, but would involve inapplicable or infeasible engineering practices including demolition of site buildings, arranging for disposal of the material and replacing with clean fill. The cost of disposal (estimated at \$35 million) and clean fill replacement (\$9.8 million) render this alternative not cost effective. However, removal and off-site disposal of the free phase petroleum product is a potentially feasible and effective engineering practice.

#### 7.1.2 Further Evaluation

After screening remedial approaches to soil contamination at the site, only the containment option appears to be protective, applicable, feasible and reliable.

According to the HSCA Regulations, after the initial screening is performed, an evaluation shall be conducted of the remaining alternatives using the following criteria:

1. Protectiveness
2. Compliance with all applicable local, state, and federal laws and regulations
3. Community acceptance
4. Provision for monitoring the success of the alternative
5. Technical feasibility
6. Ability to be implemented
7. Practicability from a cost standpoint
8. A reasonable restoration time frame
9. Reduction of toxicity, mobility and volume
10. Long term effectiveness
12. Short term effectiveness

Four forms of containment--Alternatives A through D--will be compared using the twelve- (12) HSCA criteria. Common to all of them is the interruption of the exposure pathway by placing material between the contamination and site workers. The remedial alternatives are briefly described below and compared with the criteria on Table 1.

A. Clean fills and topsoil

This alternative consists of the removal and disposal of the existing site vegetative cover and placement of clean fill material and a 4-inch topsoil layer on the site. The quantities of fill material would be dictated by the final grade. The new fill and topsoil would reduce risk by isolating the site contaminants from future site workers. A vegetative cover would be maintained to control erosion. Four inches of topsoil is considered the minimum topsoil cover to support a robust community of turf grasses.

B. Permeable fabric and clean fill

This alternative would involve removal of the existing vegetative cover as above and installation of a synthetic filter fabric, clean fill and a 4 inch topsoil layer on the site. As in alternative A, the thickness of the layer of clean fill would be determined by the final grades. The permeable fabric layer would result in containment of the contaminants below the liner and would prevent direct human contact with contaminated soils. The liner would server as a marker between the clean soil cover and the contaminated soil. However, some controls would have to be instituted to maintain the integrity of the liner.

C. Impermeable liner and clean fill

For this alternative, site vegetation would be removed as above. Layers of sand approximately 6 inches deep would be placed on the surface of the site. An impermeable liner similar to the type of liner used in sanitary landfills would cover the sand layer. The liner would be seamed water tight and topped with clean fill and topsoil. The impermeable liner would prevent not only contact between workers and contaminated soils, but also percolation of precipitation through the contaminated soil. Drainage would be collected in a perimeter drain system with appropriately sized retention structures.

D. Low permeability cap

In this alternative, existing site vegetation would be removed and the surface graded. The surface would be prepared with stone or other suitable base material and the surface would be paved with asphalt, concrete or compacted crushed stone. (The pavement section material and thickness would be determined during the detailed design stage.) Drainage would be collected in a perimeter drain system with appropriately sized retention structures designed to be compatible with the drainage system installed at the Halby Site. Like the impermeable liner discussed above, the cap would prevent contact between workers and contaminated soils.

Table 1. Comparison of Remedial Alternatives for Site Soils

<b>HSCA Criteria</b>	<b>Alternative A.</b> Clean fill and top soil	<b>Alternative B.</b> Permeable fabric and clean fill	<b>Alternative C.</b> Impermeable liner and clean fill	<b>Alternative D.</b> Low permeability cap
<b>Protectiveness</b>	Meets minimum requirement for protectiveness	Protective	Protective	Protective
<b>Compliance with applicable requirements</b>	Compliant	Compliant	Compliant	Compliant
<b>Community Acceptance</b>	Potentially acceptable	Potentially acceptable	Potentially acceptable	Acceptability more likely
<b>Monitoring</b>	Required	Required	Required	Required
<b>Feasibility</b>	Feasible	Feasible	Potential problems with tying in liner to existing buildings	Feasible
<b>Implementation</b>	Easiest implementation	Implementable	Implementable but significantly more difficult than <i>B.</i> (liner tie-in and drainage).	Implementable but additional design and construction for water drainage.
<b>Cost (sq/ft)</b>	\$.85	\$2.00	\$4.00	\$2.50
<b>Time Frame</b>	Fastest—6 months construction time	Longer design and construction	Longest design and construction	Somewhat shorter design period than <i>C.</i>
<b>Reduction of toxicity, mobility and volume</b>	Minimal reduction in mobility, no reduction in toxicity or volume	Some reduction in mobility, no reduction in toxicity or volume	Significant reduction in mobility, no reduction in toxicity or volume	Significant reduction in mobility, no reduction in toxicity or volume
<b>Long term effectiveness</b>	Potential for damage caused by surface or intrusive activities	Potential for damage caused by surface or intrusive activities	Potential for damage caused by surface or intrusive activities	Readily designed for anticipated loads
<b>Short term effectiveness</b>	Effective	Effective	Effective	Effective

## 7.2 Evaluation of Potential Remedial Alternatives for Petroleum Product in Subsurface Soils

Three potential remedies for the areas of petroleum products in subsurface soils are:

- No action;
- Passive collection using absorbent or vacuum technologies;
- Active collection using pumping well(s) and product collection equipment.

The “No Action” remedy does not meet the remedial objectives discussed above or the requirements of HSCA.

Both active and passive collection potentially meet the screening criteria of effectiveness in providing protection for human health and the environment and in use of acceptable engineering practices. Both are well-established technologies and would potentially meet the HSCA criteria. Passive approaches would take a longer time to complete but the start-up costs would be somewhat less than active approaches. Duffield estimates that the installation costs of a passive system would be \$40,000. Duffield has proposed additional monitoring of the area of contamination prior to design and implementation of a collection system.

## 8.0 REMEDIAL PLAN

Based on the remedial objectives and the evaluation criteria of HSCA, the DNREC adopts a remedy for the Site consisting of the following:

- The first is a low permeability cover consisting of asphalt, concrete or crushed stone paving over most of the site (Alternative D). Some limited areas--approximately 35% of the surface area--will receive a clean-fill and topsoil cover (Alternative A) rather than paving. The proposed extent of the paved area is shown in Figure 4. The estimated cost of the combination cap and soil cover is \$2,970,000.
- The second component of the remediation will be a recovery system for subsurface petroleum product to be designed based on further investigation. The collection system may be either active or passive depending on the results of monitoring. The system will however significantly reduce the volume of petroleum on the site and prevent further migration of any petroleum left in the soil.
- A ground water management zone covering the Potts Property has already been established as part of the Halby Superfund Site remediation. This will prevent the installation of drinking water supply wells drawing potentially contaminated ground water. Additional institutional controls on activities on the property including building construction, excavation, maintenance of the cap and recovery system will be implemented by the PRPs and enforced by the Department. The institutional controls will be noted on the deed to the property. Procedures for conducting controlled activities will be detailed in an Operations and Maintenance Plan which will be part of the proposed remedial action.

## 9.0 PUBLIC PARTICIPATION

### 9.1 Public Meetings

Prior to publishing the original Proposed Plan, the DNREC held two informational meetings with the City of Wilmington administrative staff and elected officials. Representatives of citizens groups were also represented.

A public meeting was held on February 18 1999, at the William “Hicks” Anderson Community Center. In response to a request made at that meeting, an additional public meeting was held on March 9 at Neighborhood House.

Release of the Proposed Plan and the public meetings were publicized in advertisements in the Wilmington News Journal and in flyers distributed in the residential areas near the Site. Radio Station WILM aired an interview with DNREC and announced the first meeting.

### 9.2 Public Comment and Responses on the original Proposed Plan.

#### 9.2.1 Comments from Eastern Environmental Law Center, March 23, 1999

1. What is the status of the investigation to determine the source and extent of the petroleum product that was discovered at the southwest side of Christina Ave?

*The extent of the subsurface petroleum product area was determined in a series of 28 test pits (designated PTP1 through PTP-28 in the Duffield RI Report) dug on June 4,5, and 6, 1997. While this effort was adequate to establish that free product is present and to estimate its extent, additional investigation will be required to design a recovery system. The pre-design investigation may consist of small diameter shallow monitoring wells which can be tested with an interface probe to determine the presence and thickness of free product. Such wells could be installed before or after the cap/cover is constructed.*

2. Are there any water lines running through the Site and if so, how will they be re-routed?

*There is reportedly a water main along Christina Avenue and a supply line to the office building. There are no plans to re-route the lines. Contaminated soil would only come in contact with the inside of a water line if it should break. In that event, the line would be flushed to remove soil and debris after it is repaired. As part of the Final Plan, a deed restriction will be placed on the Potts Property Site that requires notification of DNREC prior to excavation for construction or utility purposes.*

3. What is the water related impacts to the river with respect to contaminants? Have these been factored into the Plan?

*Impacts of Potts/Halby related contaminants on the Christina River are discussed in the **Attachment** to the Final Plan. Water quality sample results are summarized in Table*

*A4. Contaminants of potential concern appear to be the heavy metals. No PCBs have been found in extensive sampling of soil on both sites for the Halby RI. Organic*

*substances of concern including thiocyanate and carbon disulfide at Halby and Potts have not been found in the river water samples. An exception is ammonia which was detected in SW-10, 11 and 12. The concentrations of ammonia present in river water are not thought to be significant and may be occurring naturally. By far the most impacted water sample was taken from the Lobdell Canal location—SW-10. The concentration of zinc in that sample (filtered) was 117 ug/L while the relevant water quality criterion (fresh, chronic) is 58.9 ug/L.*

*The impact of site contaminants on river sediment is more obvious and is probably due in part to past releases from the site. However, there does not appear to be any contamination in river sediment that is exclusive to Potts and Halby.*

*The cap/cover remedy recommended for the Potts and Halby sites will prevent human contact with contaminated soils and also reduce the discharge of contaminated water to the river. So, in that sense, water related impacts have been factored into the Proposed Plan.*

4. How will the contaminant sources being released be integrated into the Piedmont Whole Basin Management Plan for the State of Delaware?

*Management plans for the Christina and other watersheds in Delaware include the identification and cleanup of sites like Halby Chemical and Potts Property. The DNREC Watershed Assessment Section is responsible for determining the total maximum daily load for particular water bodies in the State.*

5. What are other sources of contaminants that exist within the water shed?

*The question is very general. Literally hundreds of contamination sources exist in the water shed. Small business, factories, petroleum storage facilities, underground tanks, landfills, farms, abandoned industrial sites, septic systems, tire piles and salvage yards, salt piles, dredge disposal areas, and recycling facilities are all potential sources. The “Piedmont Basin Preliminary Assessment” describes and itemizes known sources on pages 111 to 135.*

6. With respect to #5 above, what kind of model is being used to assess the background levels?

*Please see the discussion of surface water quality trends beginning on page 19 of “Piedmont Basin Preliminary Assessment Report”. Its conclusions are based on analysis of 22 parameters from 34 stations in the watershed. The closest monitoring station to the Potts/Halby site is the Route 13 3<sup>rd</sup> Street Bridge in Wilmington, approximately two miles upstream from the site. In this study, contamination trends are related to water quality criteria rather than natural background levels.*

7. What is the status of the Piedmont contaminant source database? If completed, what is the significance of the collective ground water discharge relative to the total daily load to the River?

*The site index database has not been completed, but the “Piedmont Basin Preliminary Assessment Report” contains much of the information identifying contaminant sources that will eventually be listed in the database.*

8. Does the site lie within a flood plain? If so, what plans have been developed to deal with flooding of this area.

*Part of the site lies within the hundred-year flood plain. Presently, flooding of this area could carry contaminated soil to the wetlands and river. The remedy will reduce this mechanism of transport.*

9. EELC understands that the Agency for Toxic Substances and Disease Registry has been conducting interviews with citizens who may have been exposed to hazardous substances released by the Halby and Potts sites since the 1950s. Has there been any evaluation of the employees of the Port of Wilmington or any of the surrounding communities for any human health effects related to exposure to the pollutants identified in the Plan?

*The Potts HSCA project did not include health screening of Port of Wilmington employees. To evaluate the potential for past human exposure to site contaminants, the EPA Halby project did include sampling surface soils in nearby residential communities and public parks. The results indicated that those soils do not contain elevated levels of site related contaminants except in the residential lot on Terminal Avenue which is directly adjacent to the Halby site.*

#### 9.2.2 Comments from “Wilmington Waterfront Watch” February 19, 1999.

1. Remedial Action Concerns: The age of the Halby RI (1988) Army Corps of Engineers (1994) Table A-4 Water Quality (1995) Sediment Quality Studies (Table A-5). We feel that a current testing of surface water and sediment by DNREC or EPA at SW 10, 11, 12, S-1, Sediment 22-23-17 would show a clear picture of conditions at the site and the impact to the river. As the Army Corps of Engineers may soon be involved in dredging operations their involvement in sampling would be questioned.

*In response to the concerns raised in this comment, DNREC met with representatives of the Wilmington Waterfront Watch and Wilmington River-City Committee, Inc. to discuss the issue of impact on the Christina River. As a result of this meeting, DNREC agreed to perform additional sediment sampling in the river. The field effort will consist of nine surface sediment samples and one field duplicate. Three transects shall be established across the river: upstream of the I-495 bridge, directly across from the Potts Property site and downstream of the discharge from the dredge disposal site. This single sampling event is not anticipated to result in a clear determination of the contaminant contribution from the Potts Property Site because there are many other sources of the same contaminants on the Christina. However, it will give a “snap shot” picture of current sediment quality in this stretch of the river.*

*The Army Corps of Engineers performs maintenance dredging in the Wilmington ship channel every eight months under a permit issued by DNREC. At this writing, the Corps*



*is in compliance with its permits requirements. The permits require extensive sampling of the elutriate from the dredged material that discharges to the river. The Corps has also sampled sediment and river water up and down stream from the dredged area and performed toxicity testing. DNREC believes that, on balance, the dredging is beneficial environmentally because, while it does cause a temporary increase in turbidity, it removes contaminated sediment from the riverbed.*

2. We feel that one more meeting should be held before the March deadline, our choices are Rose Hill Community Center, The Neighborhood House, 7: PM time frame.

*An additional public meeting was held at Neighborhood House on March 9.*

### 9.3 Amended Proposed Plan

The Amended Proposed Plan was advertised in the *Wilmington NewsJournal* on June 28, 2000. The public comment period closed on July 18, 2000. No comments on the Amended Proposed Plan were received.

## 10.0 DECLARATION

**This Amended Final Plan of Remedial Action for the Potts Property 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  
Department of Natural Resources and Environmental Control