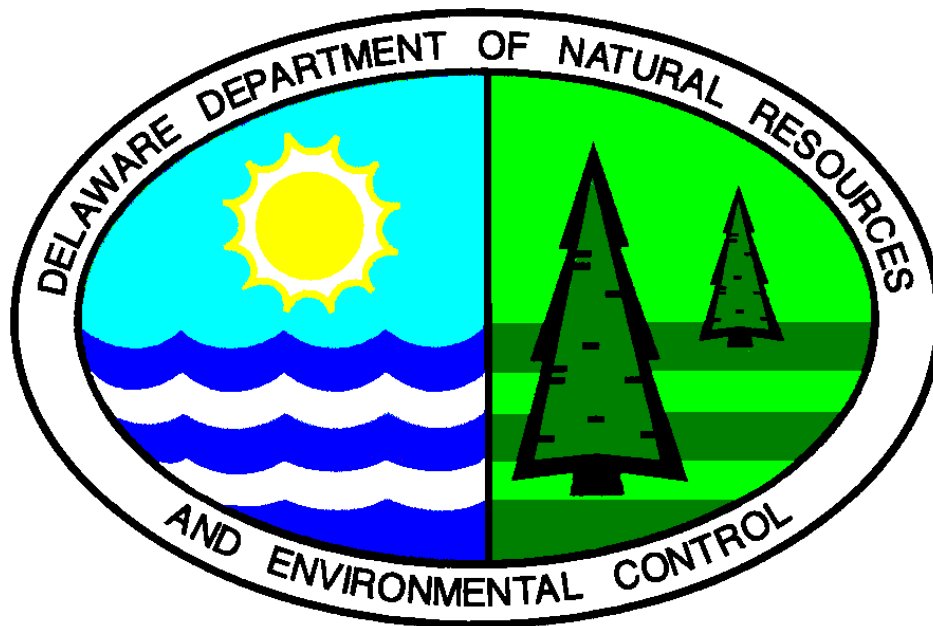


**FINAL PLAN OF REMEDIAL ACTION**

**FOR THE**

**Fifth and Church Streets Site**

**Wilmington, Delaware**



**June, 1998**

**DNREC Project DE-1082**

**Prepared by:**

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## **FIFTH AND CHURCH STREETS SITE: FINAL PLAN OF REMEDIAL ACTION**

### **I. INTRODUCTION**

In January 1997, The Mother Union AME Church (“the Church”), entered into a letter agreement with the Department of Natural Resources and Environmental Control (“DNREC” or “Department”) under the authority granted by the Hazardous Substance Cleanup Act (7 Del. C., Ch. 91) (“HSCA”). The parties agreed that DNREC would review environmental assessment documents pertaining to their property located at 50 Church Street, Wilmington, Delaware (Block 1086, Parcels 112 and 36) (the “Site” or “Property”). The Church had proposed the property as a building site for a new church structure. DNREC recommended that additional environmental evaluation should be performed concurrent with geotechnical study. In September 1997 additional soil samples were taken on the property. This investigation revealed a hitherto unknown area of petroleum hydrocarbon contamination in soil. After evaluation of the additional sampling, the Church and DNREC entered into a second agreement under the Voluntary Cleanup Program on October 16, 1997. The agreement covered the remedial investigation, feasibility study, remedial design, remedial action and any interim action which may be taken at the Site under HSCA.

The purpose of the remedial investigation was to evaluate the nature and extent of contamination at the Site, evaluate risks to the public and the environment associated with identified contamination, and to develop remedial alternatives for the Site. The selected remedial actions are incorporated into the construction of the church building.

This document is the Department’s Final Plan of Remedial Action for the property issued under the provisions of HSCA and the Regulations. It follows the Proposed Plan of Remedial Action which was presented to the public on May 4, 1998. The Proposed Plan summarized the Department’s assessment of the risk to public health and the environment posed by the Site and a comparison of the remedial alternatives. It also included information on the background and history of the property, the results of the previous investigations, the remedial action objectives and a review of the applicable local, state and federal regulations.

The Department provided public notice and a 20-day public comment period on the Proposed Plan in accordance with Section 12 of the Regulations. No comments were received during this period. The Department therefore issues this Final Plan of Remedial Action designating the selected remedial action.

### **II. SITE DESCRIPTION AND HISTORY**

The site occupies most of a city block bounded by Church Street, Fifth Street, Lord Street and Spruce Street in Wilmington. The 1-acre rectangular property is found on the United States Geological Survey (USGS) Wilmington South Quadrangle Topographic Map (7.5 minute series) at Latitude 39° 44’ 18” and Longitude 75° 32’ 34” (Figure 1).

The western end of the block is occupied by residences fronting on Spruce Street. Residences are also found along Lord and Fifth Streets. Property use on Church Street is commercial. The site is generally flat, sloping slightly toward the southwest. Its elevation is 25 feet above sea level.

Between 1865 and 1960, the property was occupied by tanning industry facilities. The last buildings to occupy the site were demolished in the late 1970's. Concrete slab and foundation structures were visible on the surface of the site until recently.

### **III. PREVIOUS INVESTIGATIONS**

In July 1986, Duffield Associates, environmental consultant to the Church, prepared a Phase I Environmental Site Assessment Report on the property. The Report noted the presence of semi-volatile hydrocarbons at reportable levels and the potential for significant lead contamination in soil. There was also a suspicious fibrous material found on the site and tentatively identified as containing asbestos.

### **IV. REMEDIAL INVESTIGATION**

Two phases of investigation occurred as part of the Remedial Investigation. Duffield Associates, on behalf of the Church, reported interim results of the first phase in October with a recommendation for additional sampling. The additional sampling was performed in November and results were reported in December 1997.

The October sampling event consisted of twenty test pits. Twenty-five samples of soil and debris were analyzed by X-Ray Induced Fluorescence (XRF) by DNREC. Six of these samples were split with Lancaster Laboratories for comparison to the XRF results and for speciation of the chromium. Samples of the fibrous material were included in this analysis. One test pit discovered the presence of a petroleum fuel product on the north side of the site near Lord Street.

Twenty-three (23) Geoprobe borings were made in November and soil samples were obtained. DNREC screened the soil samples using XRF methods for 18 inorganic contaminants. Two of the borings were converted to small diameter monitoring wells. Two ground water samples and five soil samples were sent to a laboratory for analysis of 23 inorganic contaminants by EPA methods. Twelve additional borings were performed in the vicinity of the hydrocarbon contamination near Lord Street. The purpose of these borings was to evaluate the extent of the free phase petroleum in this portion of the site. Samples from these borings were screened in the field with portable instruments for the presence of volatile organic compounds.

The locations of soil borings and ground water monitoring wells from both phases of investigation are indicated on Figure 2

### **V. RESULTS OF INVESTIGATION**

## Soils

Phase 2 performed in November was successful in determining the extent of the petroleum in soils along Lord Street. The petroleum product was identified as heavy fuel oil and will be considered in this Proposed Plan. However, two additional areas of petroleum contaminated soil were also discovered—one at the corner of Fifth and Church Streets (the southeast corner of the site) and one in the southwest corner of the site in a small drainage structure.

Upon further investigation by excavation in January 1998, the subsurface contamination in the southeast corner is associated with treated wood used to insulate the floor of a cooler box structure. The treated wood material is encased on all sides in concrete. The petroleum in the treated material does not affect soils immediately outside the concrete structure. The concrete floor of the cooler box containing the treated wood is approximately two feet below the bottom elevation of the new building's foundation footings and would therefore not be breached during construction. This area has been dropped from consideration in the remedial action. The extent of contamination associated with the cooler box is limited, the petroleum substance was apparently applied to the wood as treatment, and the treated wood is already encapsulated in concrete and will not be disturbed by future site activities.

Further investigation in the southwest corner of the site revealed about 485 cubic yards of subsurface soil significantly impacted by kerosene range hydrocarbons. This contamination is potentially significant and is addressed in this Final Plan of Remedial Action.

The expanded investigation also included surface and subsurface soils suspected of contamination by metals. Analyses for inorganics (heavy metals) by XRF methods and by EPA methods are not expected to agree exactly and, in this case, did not. Usually the laboratory results are 40 to 60 per cent lower than the XRF results. In order to make a direct comparison, Duffield calculated "correction factors" for the XRF results for lead, chromium and arsenic. Using this procedure, it appears that only arsenic is widespread on the site at a level that DNREC considers unacceptable for residential use. The level of arsenic is significantly below the acceptable concentration for non-residential use when compared to the USEPA Risk Based Concentration. The results of soils analysis for arsenic, chromium and lead are presented in Table 1.

Table 1. Inorganic contaminants in soil, November 1997

		Lead (mg/kg)	Chromium <sup>4</sup> (mg/kg)	Arsenic (mg/kg)
Lab Data	MW-2	274	227	5.8
	SB-2	261	386	38.6
	SB-8	658	335	51.5
	SB-11	8.1	24.2	4.8
	SB-18	157	206	157
Field Screening Data (corrected) <sup>1</sup>	Minimum	6	24	2
	Maximum	913	14561	668
	Mean	92	206	29
	95% Upper Confidence Level of Mean	176	1489	91
Comparative Concentrations (surface soil)	DNREC URS <sup>2</sup> (non-critical area, restricted use)	1000	5000	61
	EPA RBCs <sup>3</sup> (non-residential)	(not listed)	10000	610 <sup>5</sup>

Notes:

1. Correction factors calculated by Duffield Associates: Lead, 44%, Chromium, 41% and Arsenic, 63%.
2. The DNREC Uniform Risk Based Remediation Standard (URS) was adopted as guidance in February 1998.
3. The EPA Risk Based Concentrations (RBCs) are non-regulatory concentrations of contaminants that are used by the US EPA as guidance. They are listed here for comparison only.
4. Chromium III and compounds.
5. As a non-carcinogen.

The elevated levels of arsenic throughout the site are addressed in this Plan. Lead and chromium are present at the site at elevated levels in some samples, but the average concentrations are below the acceptable levels. All results obtained for concentrations of chromium with a valence of +6 are below DNREC’s Uniform Risk Standard. Based on lab and field analysis, no other inorganic contaminants present a concern.

The fibrous waste material referred to above in “Previous Investigations” was found in several locations in the subsurface. It has a high level of chromium and is now thought to be chromed leather shavings. This material is present on the site in limited quantity. It will be treated as contaminated soil.

**Groundwater**

Water samples from two monitoring wells were analyzed for the contaminants already found to be present in site soils—petroleum, chromium, lead and arsenic. The results show that the site has

contributed to significant arsenic contamination in the shallow ground water. There also appears to be site contribution to petroleum contamination (identified as Diesel Range Organics) in ground water. These results are summarized below.

Table 2. Groundwater Contamination, November 1997

	<b>Chromium (mg/l)</b>	<b>Lead (mg/l)</b>	<b>Arsenic (mg/l)</b>	<b>TPH <i>DRO</i><sup>1</sup> (mg/l)</b>
<b>MW-1</b>	< 0.030	< 0.10	0.467	1.1
<b>MW-2</b>	< 0.030	< 0.10	< 0.010	.58
<i>DNREC URS</i> For Groundwater	.018	.015	.001	.2 <sup>2</sup>

Notes:

1. Total Petroleum Hydrocarbons-Diesel Range Organics
2. C9 through C10 Aromatic Hydrocarbons

Elevated levels of Arsenic and Total Petroleum Hydrocarbons in ground water are addressed in the Proposed Plan.

### **Data Quality**

The analytical results from samples obtained for the Remedial Investigation were reviewed by the SIRB chemist. The analysis was conducted in accordance with the HSCA Standard Operating Procedure for Chemical Analytical Programs. There were no major deficiencies noted.

## **VI. REMEDIAL ACTION OBJECTIVES**

To summarize the results of investigations reported above, four areas of concern were identified:

1. Fuel oil contamination in soil along Lord Street.
2. Kerosene range petroleum contamination in 485 cubic yards of soil in the southwest corner of the site.
3. Elevated levels of arsenic in surface and subsurface soils throughout the site.
4. Contamination of shallow groundwater with arsenic and petroleum hydrocarbons.

According to 8.4(1) of the Regulations, during a remedial investigation, qualitative and quantitative remedial action objectives are established during the Remedial Investigations. These objectives are to be consistent with the HSCA statute and the Regulations but fit the specific site and areas of concern that have been identified. For the Fifth and Church Streets site, the significant findings are:

- The site has recently been an undeveloped, unfenced vacant lot. Until construction activity began, most of the site surface was covered with old concrete slabs, rubble and fill. The proposed future use of the site is a church and parking lot.

- Surrounding land uses are residential and commercial.
- The site overlies water-bearing geologic materials. These materials consist of unconsolidated sediments that have weathered from igneous and metamorphic rocks of the Wilmington Complex.
- Shallow groundwater contains arsenic and petroleum hydrocarbons at levels exceeding EPA risk-based concentration criteria for drinking water. Local groundwater in the area is not used as a drinking water supply and the area is served by a water utility.
- Some soil samples at the site contained notable concentrations of inorganics such as arsenic, lead, and chromium consistent with materials used in tanning.
- Two separate areas of contamination of subsurface surface soils by petroleum products have been identified.
- The primary contaminant migration pathways are inadvertent ingestion of soil and airborne migration of dust containing heavy metals. There is also potential exposure to petroleum products by anyone excavating the site.
- The future site use is planned to be commercial. The property will become a church with a parking lot. The footprint of the church will occupy approximately 6300 square feet.

### **Qualitative Remedial Action Objectives**

Based upon these findings, the Qualitative Remedial Action Objectives for the site are as follows:

1. Control potential human contact (dermal, ingestion and inhalation) with contaminated soil.
2. Control soil erosion and the subsequent transportation of contaminated soil.
3. Control air emissions from petroleum contaminated soil to concentrations below odor thresholds or health based criteria.
4. Control potential human contact (ingestion) with contaminated groundwater.

Based on these qualitative objectives, the Site is classified as “restricted use, non-critical water resource area” as defined in the “DNREC Remediation Standards Guidance”. Furthermore, the Site does not meet the criteria for application of ecological standards.

### **Quantitative Remedial Action Objectives**

Based on the above Qualitative Remedial Action Objectives, the following Quantitative Remedial Action Objectives were adopted from the “DNREC Remediation Standards Guidance”:

1. Prevent contact with soil that has an arsenic concentration greater than 61 mg/Kg.



2. Prevent contact with soil that has a petroleum hydrocarbon concentration greater than 500 mg/Kg.
3. Prevent ingestion of or contact with shallow groundwater that has an arsenic concentration greater than 1 ug/L or a petroleum hydrocarbon concentration greater than 200 ug/L.

## VII. EVALUATION OF POTENTIAL REMEDIAL ALTERNATIVES

### Initial Screening Criteria

The Regulations provide that remedial alternatives, including a “no action” alternative, are identified and evaluated against initial screening criteria identified in Section 8.5. The criteria are 1) protection of human health, welfare and the environment, and 2) acceptable and feasible engineering practice.

To accomplish the remedial action objectives, two potential remedial alternatives were identified for screening:

1. A Presumptive Remedy consisting of permanently capping the site with a building and paved parking area, deed restricting the property and placing a Groundwater Management Zone (GMZ) on the property.
2. No further action.

**Alternative 1: Permanent Capping, On-site Treatment of Petroleum Contaminated Soils, Deed Restriction, Groundwater Management Zone, Operations and Maintenance** would involve grading the site for building and parking lot construction under an appropriate health and safety plan. Soil excavation and off-site disposal of soils would be minimized. The foundation of the building would be designed as a “pile and beam” type to minimize excavation. The finished site would encapsulate the existing soils with concrete slab, asphalt paving or a minimum of two feet of clean fill. The fuel oil near Lord Street would be collected in a drain system and removed by periodic pumping. The kerosene contaminated soil in the southwest corner would be treated with a passive ventilation system to enhance its natural attenuation and prevent the accumulation of fumes in confined spaces. A contingency plan would be included to monitor the emissions from this vent system and treat them if necessary to protect public health and safety and to avoid nuisance odors.

In addition, the property owner would attach a deed restriction to the property limiting the use of the property to commercial purposes (including church use) only. A statement would be included in the deed restriction requiring prior DNREC approval for any excavation activities following the remediation. DNREC would place a Groundwater Management Zone (GMZ) on the property to prohibit the use of shallow groundwater at the site.

An important component of Alternative 1 would be an “Operation and Maintenance Plan” which would detail procedures to ensure the ongoing protectiveness of the remedial action. The Plan

would detail the operation and monitoring of the vent system and the passive collection system. It will include procedures to follow should excavation on the site (for example, a sewer line repair) become necessary. Copies of the land use restriction and groundwater management zone would also be included. The Plan will be subject to review and approval by DNREC.

According to the DNREC-commissioned Summary Report for the General Remedial Technology Cost Project; South Wilmington Area (TetraTech, 1995), Alternative 1 is an appropriate containment technology for soil contaminated with metals and petroleum products. It is also protective of public health, welfare and the environment. Thus Alternative 1 meets the two minimum criteria for further consideration.

**Alternative 2. No Further Action** or leaving the site as it is. The original pre-1998 condition of the site exposed neighborhood residents to surface soil with lead, arsenic and chromium contamination and potential of exposure to subsurface soils and shallow groundwater. This alternative is eliminated from further consideration because it does not meet the minimum screening criterion of protection of public health, welfare and the environment.

### **Further Evaluation Criteria**

The Regulations, Section 8.5 provide for further evaluation of remedies which meet the two minimum criteria. A comparison of Alternative 1 to the regulatory factors for further evaluation follows.

**Protection of public health, welfare and the environment by compliance with cleanup levels.** - Alternative 1 provides long term protection by physically isolating the site soils from the zone of casual human contact with engineered and institutional controls. In the meantime, it treats hydrocarbon contaminated soils. It therefore complies with “conditional cleanup levels” as defined in the Regulations, Section 9. Alternative 1 introduces an increased short term risk of exposure during implementation due to material handling and the potential for air emissions. This short term risk will be reduced by implementation of a Health and Safety Plan addressing both worker and public safety during construction activities.

**Compliance with all applicable local, state and federal laws** - Alternative 1 complies with applicable local, state and federal laws. Air emissions from the passive ventilation system are not expected to be significant enough to require a permit. However, emissions will be monitored and treatment will be implemented to meet permit requirements or human health and welfare concerns whichever are more conservative.

The proposed remediation of metals contaminated soil does not involve the generation, transportation, storage, treatment or disposal of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). The collection, transportation and disposal of material from the fuel oil collection system may require compliance with RCRA and will be addressed in the “Operations and Maintenance Plan” to be approved by DNREC. Construction activity at the site is permitted by the City of Wilmington.

**Community acceptance** - Alternative 1 is anticipated to be acceptable to the community. The site improvements will considerably reduce the current risks associated with the site, which are significant. The expansion of the parking lot as a remedial measure should also help alleviate any problems the surrounding neighborhood might have had with on-street parking during church services.

**Provision for Long Term Monitoring** - Alternative 1 requires monitoring of the fuel oil collection system and the passive ventilation system. There will also be a determination made in the future that the systems have reached the end of their useful lives and should be removed. The ventilation system will require additional monitoring for compliance with regulations governing air emissions and impacts on the health and welfare of the public in the surrounding neighborhood. The continued presence of contaminated soil under the parking lot will require heightened maintenance of the asphalt surface. Monitoring and maintenance will be covered in an “Operations and Maintenance Plan”.

**Technical practicability** – The components of Alternative 1 are collectively and individually technically feasible.

**Restoration time frame** – The encapsulation of contaminated soils in Alternative 1 will take several weeks to implement as the property is renovated. This is a reasonable timeframe. The collection of fuel oil with the passive drain system and the passive ventilation of the kerosene contaminated soil could continue for several years which is considered by DNREC to be reasonable for the risks associated with these two areas of concern.

**Reduction in toxicity, mobility and volume** - Alternative 1 would reduce mobility and minimize exposure to potentially toxic material. The volume and concentration of arsenic contaminated soil would generally remain the same or be slightly reduced if material is removed for off-site disposal. The volume of petroleum contaminated soil and its toxicity will be significantly reduced over time. The mobility of the fuel oil contamination will be completely controlled by the collection system. The mobility of the kerosene will increase as it is emitted to the air at a slow rate. If the rate and volume of emission is unacceptable, then treatment such as carbon filtration will be required to control its mobility.

**Long term effectiveness** - Alternative 1 is effective in the long term in protecting public health, welfare and the environment, and will be maintained by the implementation of the “Operation and Maintenance Plan” to be developed during remedial design. The church structure and parking lot are considered permanent amenities.

**Short term effectiveness** - Alternative 1 is protective of public health, welfare and the environment in the short term. Potential short-term risks from exposure to excavated materials will be minimized through the use of appropriate Health and Safety procedures, excavation and filling procedures and site access controls.

## **VIII. PROPOSED REMEDIAL ACTION PLAN AND PUBLIC PARTICIPATION**

Based on the above criteria, Alternative 1 (permanent capping with a building and paved parking lot, recovery of fuel oil through a drain and sump system, treatment of kerosene contaminated soil with a ventilation system, deed restriction, and GMZ) was the proposed remedial action for the property. A notice describing the Proposed Plan appeared in the *Wilmington News-Journal* on May 4, 1998. Copies of the Proposed Plan were sent to the office of the Mayor of Wilmington, to the site owner and its consultant. A resident of the neighborhood who serves as a block captain for the East Side Neighborhood Association was contacted about the Proposed Plan. No comments were received during the public comment period.

## **IX. INTERIM ACTIONS**

The remedial actions described in this Final Plan were largely completed as *interim actions* with DNREC oversight during site development prior to construction of the church building. The site owner undertook the interim actions with the knowledge that DNREC might make changes to the Proposed Plan based on information or concerns presented during the public comment period. Several important tasks remain to be completed to fulfill the Final Plan. DNREC will continue to oversee operations and maintenance activities until the remedial objectives are met.

## **X. DECLARATION**

This Final Plan of Remedial Action for the Fifth and Church Streets Site is protective of human health, welfare and the environment and is consistent with the requirements of the Delaware Hazardous Substance Cleanup Act.

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