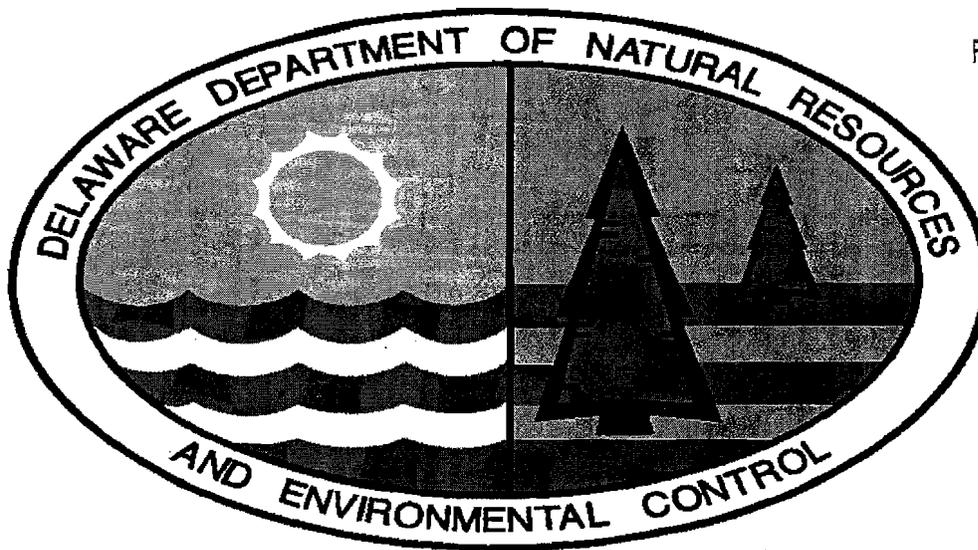


**FRAZIER'S PIT LANDFILL**  
**FINAL PLAN OF REMEDIAL ACTION**

SCANNED

JUN 2 2007

File # 0154  
139



**JUNE 1998**

**DNREC PROJECT DE 154**

**DEPARTMENT OF NATURAL RESOURCES AND  
ENVIRONMENTAL CONTROL**

**DIVISION OF AIR & WASTE MANAGEMENT**

**SITE INVESTIGATION & RESTORATION BRANCH**

## TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	SITE DESCRIPTION	1
III.	SITE HISTORY	1
IV.	PREVIOUS INVESTIGATIONS	2
V.	REMEDIAL INVESTIGATION	3
VI.	REMEDIAL GOALS	4
VII.	FINAL REMEDY	4
VIII.	PROPOSED PLAN AND PUBLIC PARTICIPATION	4
IX.	DECLARATION	4

## LIST OF FIGURES

FIGURE 1. - SITE LOCATION MAP	6
FIGURE 2. - SITE MAP	7

## **I. INTRODUCTION**

This Final Plan of Remedial Action ("Final Plan") is issued under the authority of the State of Delaware's Hazardous Substance Cleanup Act, 7 Del. C. Chapter 91 ("HSCA"). The purpose of the Final Plan is to present to the public the Department of Natural Resources and Environmental Control's (DNREC's) approach to manage the risks posed by the Frazier's Pit landfill to public health, welfare and the environment.

The City of Dover, as the potentially responsible party, completed a Remedial Investigation (RI) in February of 1998 under HSCA. The RI was performed pursuant to a scope of work that had identified data gaps from an Expanded Site Inspection (ESI). The RI concluded that, at the present time, the site poses no threat to human health, welfare and the environment. To ensure the site does not present a threat, the DNREC has determined that restrictions in the form of a deed restriction and ground water management zone be placed on the property.

## **II. SITE DESCRIPTION**

The Frazier's Pit landfill is located in Kent County, Delaware on the north side of the City of Dover. The site lies 200 yards west of Route 13 behind Walmart, Sam's Club and the Sheraton Hotel. A site location map is provided as Figure 1.

The site is roughly rectangular in shape and 15 acres in size. A site map is provided in Figure 2. Frazier's Pit landfill is a former landfill and waste staging area owned and operated by the City of Dover. At the present time, the site is relatively flat and grass-covered.

The site is bordered by commercial properties to the east, a wooded area to the south and the Fork Branch and its associated wetlands to the north and west.

## **III. SITE HISTORY**

The site was first used as a borrow pit and for the storage of materials and equipment in the late 1940's. In the 1950's, disposal of solid waste operations began. In 1973, the City of Dover purchased the site and continued the disposal operation.

The City of Dover began disposing solid waste at the site about 1950. The City disposed of tree waste, road waste, fly ash, sewage sludge, industrial waste and tires. Disposal continued until 1962 when the City closed the site.

In 1975, the City of Dover obtained a permit from the DNREC to store inert waste at the site. The permit was subsequently renewed and the City continued to use the site into the late 1980's or early 1990's to burn tree waste and for the temporary storage of discarded appliances.

#### IV. PREVIOUS INVESTIGATIONS

In 1986, a Preliminary Assessment (PA) was performed by DNREC. No environmental samples were collected during the PA.

The NUS Corporation conducted a Site Inspection (SI) in 1988. Surface water sediment and soil samples were collected for analysis. Low concentrations of organic compounds, namely chloroform, benzene, ethylbenzene and xylenes, were detected in soil samples. Chloroform was also detected in one of the sediment samples. Low concentrations of phenols, polynuclear aromatic hydrocarbons and polychlorinated biphenyls were detected in soil samples at the landfill. Pesticides were also detected in soil samples. In general, compounds found in surface soils did not exceed HSCA Remediation Standards. No organic compounds of concern were detected in any of the aqueous samples.

Concentrations of inorganic analytes were detected in soil samples on the landfill. Arsenic was the only analyte that exceeded the HSCA Remediation Standards. Arsenic was detected at 96 mg/kg. The HSCA Remediation Standard for arsenic in soil for a restricted use is 61 mg/kg. Aqueous samples revealed concentrations that exceed State of Delaware Surface Water Quality Standards (SWQS). Aluminum, cadmium, copper, iron, mercury, silver and zinc all exceeded the SWQS. NUS concluded that the concentrations reported presented no adverse impact on human health and the environment.

In 1993, the DNREC initiated an Expanded Site Inspection (ESI) to evaluate contaminant migration and allegations of waste disposal. The ESI involved installation of three monitoring wells, thirty-two test pits and collection of soil, sediment and surface water samples.

Test pits revealed waste that was consistent with the reported disposal practices. No obvious hazardous waste or waste oils were discovered. Samples were taken from five of the test pits. Analyses showed the presence of semi-volatiles and pesticides at concentrations below method detection limits. No volatile compounds were reported in the soil samples.

No inorganic analytes were detected at concentrations above the HSCA Remediation Standards for soil in the restricted use category.

Ground water revealed no organic contamination. Iron and manganese were detected above their respective Secondary Maximum Contaminant Levels (SMCL).

Dieldrin was detected in surface water. Several pesticides were found in the sediment samples. Dieldrin, 4,4-DDE, endrin, and 4,4-DDD were detected at concentrations that exceed at least one of the NOAA Screening Guidelines for sediments.

The inorganic analytes cyanide and lead were found at concentrations that exceed the SWQS.

Following the ESI, the DNREC prepared a Revised Toxicological Evaluation. The chief contaminants that drove the risk assessment were manganese in ground water, arsenic in soil and vanadium in sediment. In addition, the risk assessment concluded that the elevated presence of several inorganic analytes posed a potential ecological concern to the Fork Branch, St. Jones River and Silver Lake. The Revised Toxicological Evaluation concluded that the Site should not be used as a potable water supply, exposure to subsurface soils be restricted and that the site's impact on the Fork Branch and St. Jones River be further assessed.

## V. REMEDIAL INVESTIGATION

The Remedial Investigation (RI) was a multi-media sampling approach to determine whether or not the Site posed a risk to human health and the environment. The RI consisted of four rounds of ground water sampling, an assessment of the site's hydrogeology and sediment and surface water sampling.

A total of six monitoring wells are located at the Frazier's Pit landfill. Five wells monitor the Columbia aquifer and one well monitors the Cheswold aquifer. Each of these wells was sampled four times during the RI. During the ground water monitoring program, no semi-volatile compounds, cyanide, pesticides or PCBs were detected at concentrations above laboratory method detection limits. In addition, no inorganic compounds were detected at levels that exceed HSCA Remediation Standards. Iron and manganese were not included in the analytical program.

The hydrogeologic characterization identified several sources for the standing pools adjacent to the landfill. Although leachate seeps had been identified during previous visits to the Site, none were identified during the RI. The hydrogeologic characterization revealed that ground water from the Site discharges to the Fork Branch. It also concluded that the Site receives a large volume of surface water during storm events. Surface water flows across the Site and discharges to low lying areas west of the site. The hydrogeologic study showed a slight downward gradient in the Columbia aquifer. However, no ground water contamination was discovered in either aquifer.

In order to provide closure to the investigation, three sets of co-located sediment and surface water samples were collected from the seasonal standing pools adjacent to the west bank of the landfill. As demonstrated in the hydrogeologic characterization, the standing pools are believed to be a mixture of shallow ground water and surface water runoff. The results exceeded SWQS for copper, lead and zinc. These results are not considered significant for several reasons. First, the samples are not truly surface water samples since they were taken from impounded water bodies. Second, the surface water sample results are approximately one order of magnitude greater than the concentrations of those same compounds in ground water. The likely source for these contaminants is surface water runoff from off-site sources.

Sediment samples revealed pesticide contamination. Concentrations exceeded some NOAA Screening Guidelines for the pesticides gamma-chlordane, 4,4'-DDE and dieldrin. Again, the contaminants could not be attributed solely to the landfill and are not considered significant.

The RI recommended that the landfill's soil cover be repaired and improved in places. Exposed debris should be covered and the drainage swale that runs through the middle of the Site should be stabilized and improved. Also, shallow depressions in the soil cover should be filled with suitable material.

#### **VI. REMEDIAL GOALS**

The DNREC recommends a deed restriction be placed on the property prohibiting the disturbance of the soil cover. Furthermore, the DNREC recommends a ground water management zone "GMZ" be placed on the property restricting use of the ground water for potable water supply.

#### **VII. FINAL REMEDY**

The DNREC recommends that the recommendations put forth in the RI be implemented. These tasks include repair of the landfill's soil cap, filling of shallow depressions on the landfill surface and stabilization of the drainage swale that runs through the middle of the site. In addition, the DNREC believes that placing a deed restriction and GMZ on the property is protective of public health or welfare or the environment.

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

The DNREC drafted and issued a Proposed Plan of Remedial Action (Proposed Plan) in May, 1998. The notice of the Proposed Plan was published on May 24, 1998, in the News Journal and Delaware State News newspapers. The public comment period closed on June 15, 1998. No comments were received by the DNREC during the public comment period.

#### **IX. DECLARATION**

This Final Plan of Remedial Action for the Fraziers Pit landfill is protective of human health, welfare and the environment and is consistent with the requirements of the Delaware Hazardous Substance Cleanup Act.

 7/27/98  
Nicholas A. DiPasquale, Director  
Division of Air and Waste Management

JIG98060.doc  
DE-154 II B9

