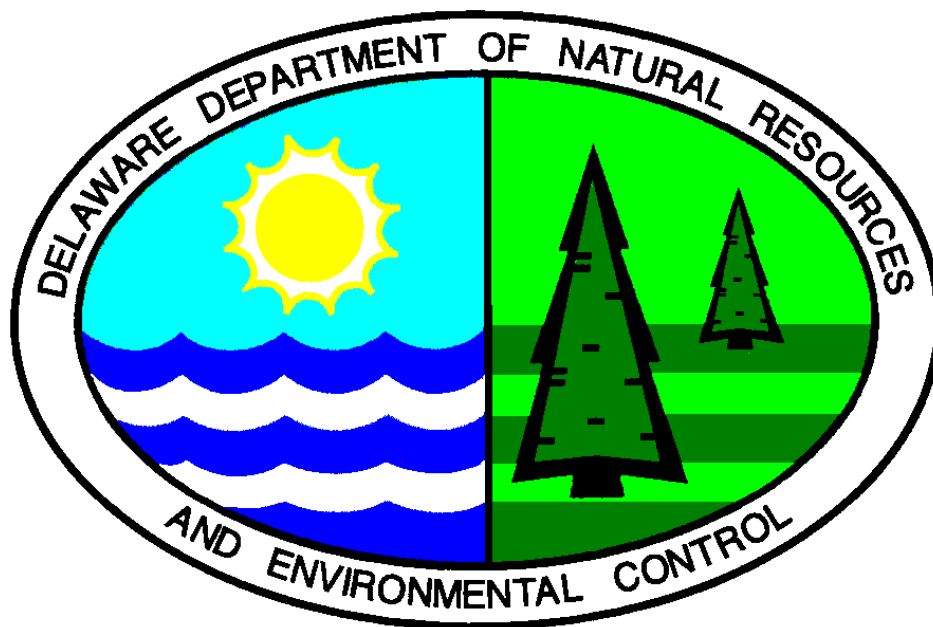


FINAL PLAN OF REMEDIAL ACTION

Lewes Coal Gas Site
Lewes, Delaware



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Delaware Department of Natural Resources and Environmental Control
Division of Air and Waste Management
Site Investigation & Restoration Branch
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DNREC Project No. DE-190

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Final Plan of Remedial Action Lewes Coal Gas Site

I. INTRODUCTION

The Department of Natural Resources and Environmental Control - Site Investigation and Restoration Branch (DNREC-SIRB) has extensively investigated the environmental condition at the former coal gasification plant in Lewes, Delaware (named the Lewes Coal Gas Site). The investigations were performed by the U.S. Environmental Protection Agency and its contractors or the DNREC-SIRB and its contractors.

This document is the Department's Final Plan of Remedial Action for the site. It is based on the results of the previous investigations and removal activities performed at the site. This Final Plan is issued under the provisions of the Delaware Hazardous Substance Cleanup Act ("HSCA") and the Regulations Governing Hazardous Substance Cleanup ("the Regulations").

The Department provided public notice and the opportunity to comment on the Proposed Plan in accordance with Section 12 of the Regulations. At the conclusion of the comment period, the Department issues this Final Plan of Remedial Action that designates the remedial action. The Proposed Plan, the comments received from the public, responses to the comments and the Final Plan will constitute the "Remedial Decision Record".

II. SITE DESCRIPTION AND HISTORY

The following background information was obtained from the investigation reports.

Site Setting

Lewes Coal Gas site is located in Lewes, Delaware, along Kings Highway in eastern Sussex County (Figure 1-1). The site consists of approximately 12 acres of land on four parcels of property, owned by two parties, Walter F. Carlsten and John Pagonis. The site can be located on the Lewes, Delaware USGS 7.5 minute topographic quadrangle, at latitude 380451 and longitude 750081 according to the Delaware DNREC Site Inspection report for the Lewes Coal Gas site. The area investigated is bounded to the north and west by the Delaware Coast Railroad line, to the south by Beach Plum Drive and residences, and to the east by Kings Highway.

There is minor topographical relief at the site. The site is essentially flat and bordered by a highway, railroad tracks, and a residential street. Residences surround the site.

The railroad tracks run northeast-southwest and are slightly higher than the surrounding grade. A ditch runs parallel to the railroad tracks on the northern side. A sewer easement appears to run eastward from the railroad tracks between two homes in the neighborhood to the north.

Most of the site is paved or covered with concrete or gravel, while the Carlsten property with residences is grassed. The site is easily accessible from all directions.

Surrounding land use consists of residential and business areas, beach and recreational areas, and Cape Henlopen State Park.

Site History

As of 1919, the Lewes Packing Company was operating on the eastern part of the site and expanded operations at the site in 1922. Prior use of the site is unknown. The 1922 Sanborn Fire Insurance map shows coal gas manufacturing structures attributed to the Lewes Gas Company present on the eastern portion of the site at that time. Deed records indicate the eastern half of the site (with the coal gas manufacturing structures present on it) was owned by Henlopen Gas Company from June 25, 1924, to August 12, 1926, and was owned by the Lewes & Rehoboth Gas Company from August 17, 1926, to April 21, 1932. None of these companies are currently in existence.

Coal for the plant was probably delivered to the site via railroad. Exact disposal location of the spent coal residue is unknown at this time. However, DNREC was concerned that the adjacent properties north of the railroad may have been used for disposal since the properties were vacant at the time the coal gas manufacturing facility was in operation.

An underground storage tank (UST) was removed from the Pagonis property on October 10, 1989. The 8,000-gallon heating oil UST was formerly located on the Pagonis property next to and northwest of the building that is mostly destroyed. In the late 1980s, the Lewes area experienced heavy rainfall and the Pagonis property and surrounding area were flooded. Flood conditions caused water to enter the UST on the Pagonis property, causing the UST to overflow, which in turn created an oil slick. The presence of the oil slick is what led to the discovery of the UST, which was subsequently removed. Staff of DNREC Underground Storage Tank and Superfund Branches oversaw the tank removal. Significant amounts petroleum contaminated soils were encountered during the drilling of a monitoring well (MW-3).

A Mobil gas station is adjacent to and south of the Pagonis property at the intersection of Kings Highway and Beach Plum Drive. The petroleum contamination at the Mobil station property is currently being remediated by the potentially responsible party (PRP) under the supervision of the DNREC Underground Storage Tank Branch. Soil and groundwater contamination at the site was found through a property audit.

The railroad line adjacent to the site has had several owners (Penn Central, DM&V, Conrail) based on the Sanborn Fire Insurance maps. Documentation and dates of ownership are unavailable. The last known owner of the railroad line is the Delaware Coast Railroad.

The railroad line is used by the Queen Anne Railroad as a tourist attraction, hence the railroad station erected in the railroad right-of-way on the Carlsten property. The Queen Anne Railroad operates seasonally through the spring, summer and into the fall. The majority of the Carlsten property surrounding the railroad station is paved and serves as customer parking. As noted above, the paving appears to be the floor and foundation of some of the packing/poultry processing buildings formerly existing at the site. The railroad line was constructed above the existing grade based on information from a CDM site walkover. The Queen Anne Railroad began operation in 1990.

Geologic Setting

The site lies in the Atlantic Coastal Plain Province which consists of a series of southeast-thickening, unconsolidated marine and estuarine sands, silts and clays of Jurassic through Tertiary age. Sediments of the coastal plain dip to the southeast at 10-30 feet per mile, with the older units dipping more steeply. Total thickness of the sedimentary sequence in the Cape Henlopen area is approximately 6,500 feet

The Lewes-Cape Henlopen area is immediately underlain by approximately 110-130 feet of Plio-Pleistocene deposits of the Columbia Group. The uppermost 20-30 feet of these sediments consists principally of white to buff, medium-coarse sands with scattered gravel of the Beaverdam Formation. Finer sands, silts and some clays interbedding with the sands predominate to a depth of approximately 50 feet, with the remaining section represented by off-white to gray, medium to coarse sands once again. The Pleistocene Omar Formation, omnipresent in southernmost Sussex County, is only locally present in the Lewes region (Apgar, 1991; Andres, 1987; Groot, et. al., 1990; Denver, 1983).

The water table aquifer in eastern Sussex County consists of the Columbia Group and the unconfined subcropping sands of the Manokin Aquifer, which provide up to 90% of the groundwater in the area (Sundstrom and Pickett, 1969). Locally, the lower Columbia sediments are semi-confined by laterally limited silt and clay beds. Most wells in the area are either extremely shallow (<30 feet) or screened below these silt and clay lenses. Transmissivity values taken from seven deeper wells in the Lewes-Rehoboth region exhibited a range from 45,000 to 135,000 gallons per day per foot of drawdown (Miller, 1971). Specific capacity for some of the large capacity wells in the Lewes-Rehoboth area yielded a range from 10-51 gpm/ft with yields up to 1,000 gpm reported in some locations (Andres, 1987).

The site is located in a rapidly developing area whose sole source of drinking water is groundwater. The municipal well field for the city of Lewes lies approximately 2 miles west of the site along Route 9, with five wells screened in the basal Columbia Group/Manokin Aquifer.

III. INVESTIGATION RESULTS

In the last nine years there have been nine (9) investigations performed at the site as well as an EPA removal action. These actions are described below.

Preliminary Assessment

DNREC conducted a Preliminary Assessment (PA) at the site in January 1989. The PA report provided information concerning responsible parties, characterization of potential hazards, and descriptions of hazardous conditions and incidents. The report concluded that the nature of the wastes generated and possibly disposed on site was not known and recommended that a medium priority site inspection should be conducted.

DNREC April 18, 1989 Field Trip

Due to concerns about the installation by the Lewes Board of Public Works of a new sewer line near the site, DNREC collected three soil samples on April 18, 1989, in the vicinity of the proposed new sewer line. The soil samples were collected from three locations, composited and analyzed for acid extractable organic compounds, base/neutral extractable compounds, and benzene, toluene, ethylbenzene, and xylene (BTEX). Coal gas related compounds were detected.

Site Inspection for Lewes Coal Gas

On June 6, 1989, DNREC conducted a site inspection at the Lewes Coal Gas site. The site inspection was deemed necessary by USEPA Region III and DNREC based on information obtained in the preliminary assessment of the site. The objective of the site inspection was to determine whether there was any potential for soil and/or groundwater contamination at the site. The DNREC Preliminary Assessment/Site Inspection (PA/SI) group collected soil samples from six onsite and one offsite locations and water samples from a town supply well and a monitoring well in the vicinity of the site. Soil samples detected compounds characteristics of coal gas plants.

Environmental Assessment, Phase 2, Subsurface Sampling and Laboratory Testing Program for Proposed Pump Station and Force Main Location

On December 1-2, 1989, ATEC Environmental Consultants conducted a Phase 2 Environmental Assessment at the site for the Lewes Board of Public Works. A soil boring program was conducted to investigate the possibility of contamination from the Lewes Coal Gas site and a recently removed underground storage tank. Soil borings were located near the boundaries of the Pagonis property in the areas of an existing and proposed utility easement.

Soil samples were collected from each of four soil borings that were advanced using a hand auger. One composite soil sample was made from the collected samples and analyzed for base neutral/acid extractables, benzene, toluene, ethylbenzene, and xylene (BTEX), and a fuel scan.

Analytical results revealed that no petroleum hydrocarbons, toluene, ethylbenzene, or xylenes were detected in the soil. There were concentrations of benzene, base/neutral/acid extractables and semivolatile compounds detected in the soil, but not above the quantitation limits.

Facility Evaluation

A total of 12 soil borings were installed at the Lewes Coal Gas site, Lewes, Delaware, on October 18-22, 1993. Four of the borings were completed as monitoring wells. The soil borings were installed to develop a characterization of the site and the monitoring wells were installed to assess the impact of past site activities on groundwater quality and to determine the direction of groundwater flow. It was during the installation of these wells that the heating oil tank was discovered. One well (MW-3) was installed adjacent to this tank. The soils were noticeably impacted by the fuel released from this tank.

The findings indicated that a need for risk reduction was needed at the site.

Remedial Investigation Phase 1A

On March 31, 1994, DNREC collected three soil samples from the Hartman property which is located at the corner of DeVries Circle and Kings Highway on the opposite side of the Conrail tracks for the site. The samples contained detectable levels of PAH compounds but may have been inherent in the fill material used in this area over the past decades or associated with the railroad.

Pre-Removal Sampling

In April, 1994 EPA conducted a pre-removal sampling event. Soil samples were collected from depths up to seven feet below ground surface on the Carlsten property. PAH compounds and several volatile organic compounds associated with gasoline were detected.

Remedial Investigation Phase 1B

In May 1994, DNREC collected three soil samples from properties in the Beach Plum Place residential development. One sample had detectable PAH levels but were below the laboratory quantitation limit.

Remedial Investigation Phase 1C

In January 1995, an environmental consultant performed soil sampling for a prospective purchaser of the Pagonis/Lester property. Four soil samples were collected and analyzed for volatile organic compounds and PAH compounds. A DNREC letter dated February 27, 1995 stated that the Pagonis/Lester property did not present a threat to the public health, welfare, or the environment. The letter also explained that the installation of monitoring wells may be necessary to assess the migration of contaminated groundwater onto the property.

Removal Action

In May 1995, EPA performed a removal action for contaminated soils at the Lewes Coal Gas Site. The majority of soil that exhibited visually contamination (free product coal tar) in the area of the former coal gas plant on the Carlsten property was removed. The houses on the property lifted from their foundations and moved. The foundations and contaminated soil was removed and the houses were replaced on new foundations. Post excavation sampling indicated that some PAH contamination remained at or below the water table.

Remedial Investigation

A Remedial Investigation was performed in July-August 1996. Activities included the installation of soil borings, installation of monitoring wells, collection of soil samples, sampling of site groundwater and the public water supply, and a field investigation of the potential drainage ways of the surface water. Seven of the nine soil samples indicated the presence of PAH compounds. Only three samples contained concentrations above the DNREC Residential Uniform Risk Remediation Standards for the ingestion of soil. Of these three samples, two are on the same parcel and visually contained coal ash and cinders similar to the adjacent railroad bed. DNREC had contacted the owners and offered to remove the ash and cinders and replace it with clean soil. The owners were asked to decide and contact DNREC with their decision. To date they have not. After repeated attempts to contact the owners, DNREC decided that the property 37 De Vries Circle is not included in this plan and may be addressed under separate actions. The third sample that exhibited the PAH compounds was collected next to a paved road. It was surmised that the compounds are present due to the road or a petroleum carrier used in lawn chemicals present in the owner's shed.

Nine monitoring wells and five City of Lewes public supply wells were sampled for benzene, toluene, ethylbenzene, xylenes, and PAH compounds. One well (MW-03) was not sampled due to it containing free product (less than one half inch). Groundwater concentrations have significantly reduced since the EPA removal action. However, two well samples (MW-01 and MW-05) collected from the area of the former coal gas facility contained petroleum related compounds. One of these wells (MW-05) exceeded the drinking water standard for benzene and well MW-01 exceeded drinking water standards for naphthalene. The public supply wells did not contain any detectable concentration of the selected analytes. It is concluded that the EPA Removal Action was sufficient to significantly reduce the risks posed by the site.

Free Product Characterization

One well (MW-03) contained free product. The product thickness was measured at less than one half inch and was sampled in order to be characterized. The analysis indicated that the product appeared to be #4 fuel oil. Considering that an underground fuel storage tank was found while installing this well, and that the product is characterized as fuel oil, the free product is considered to be from the storage tank and not coal tar products related to the site.

IV. REMEDIAL ACTION OBJECTIVES

According to HSCA regulation 8.4 (1) remedial action objectives must be established. The remedial action will be established utilizing the Qualitative and Quantitative Objectives and the following considerations:

- The site is a currently developed commercial center with a surrounding residential community;
- The groundwater at the site is not a current drinking water source and should remain unused. Drinking water is supplied by the City of Lewes;
- City of Lewes water supply wells will not be impacted by the site;
- The contaminated groundwater is not discharging directly to a surface water body;
- Fuel oil from an underground storage tank is present as free product on the water table; and
- Soil contaminants above DNREC soil standards are in the form of dry, immobile ash, but contact and erosion should be minimized.

Based on the qualitative objectives, the quantitative will be:

1. Treat and/or remove the non-aqueous phase fuel oil from the groundwater;
2. Placement of a Groundwater Management Zone at the site; and
3. Keep the soil covered whether by concrete, asphalt, or turf to reduce potential contact and erosion.

V. FINAL REMEDIAL ACTION PLAN

Three potential remedial actions were evaluated for their ability to accomplish the Remedial Action Objectives. These were:

1. No action.

2. Establishment of a Groundwater Management Zone, and ensuring that impacted soils remains covered.
3. Treatment of the non-aqueous phase fuel oil from the groundwater, establishment of a Groundwater Management Zone, and ensuring that impacted soils remains covered.

Alternative 1 was eliminated from consideration due to its lack of certainty for protection of human health and the environment. Alternative 2 has uncertainty in its long term effectiveness and protectiveness due to the free product in the area of the former underground storage tank. Therefore, the remedial action for the site is proposed to be Alternative 3, treatment of the non-aqueous phase fuel oil from the groundwater, establishment of a Groundwater Management Zone, and ensuring that impacted soils remains covered.

As mentioned previously, the free product is a fuel oil from an underground fuel storage tank. Therefore, the free product issue will be addressed by the DNREC Underground Storage Tank Branch which will determine and implement the most appropriate means for remediating the oil. Until the groundwater is returned to acceptable conditions for human use; i.e. meeting the applicable drinking water standards, a Groundwater Management Zone will be established to ensure that private wells are not installed on the site. In order to minimize erosion and contact with the soil, excavation activities should be conducted in accordance with the Delaware Erosion and Sediment Control Handbook. This includes minimizing exposure to bare soil and preserving existing vegetation when feasible.

VI. PUBLIC PARTICIPATION

The Department solicited public comments or suggestions on the Proposed Plan and welcomed opportunities to answer questions. The public comment period began on June 19, 1998 and closed on July 8, 1998. No comments or requests for a public meeting were received.

VIII. DECLARATION

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

Nicholas A. Di Pasquale
Director

Date