

STATE OF DELAWARE

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL SITE INVESTIGATION AND RESTORATION BRANCH

PROPOSED PLAN OF INTERIM REMEDIAL ACTION



December 2004

Soil and Water Conservation Dredge Operation Facility

**Lewes, Delaware
1295**

DNREC Project No. DE-1295

INTRODUCTION

The Delaware Department of Natural Resources and Environmental Control (DNREC), Division of Soil and Water Conservation, Dredge Operations Facility (site) is a former seafood processing plant approximately 9.5 acres in size located on Pilottown Road in Lewes, Sussex County, Delaware. The site consists of Tax Parcel #3-35-4-5. The site location is shown in Figure 1.

In order to investigate the potential risks posed to public health, welfare and the environment at the site, DNREC contracted with Tetra Tech, Inc. to perform a remedial investigation (RI), interim response actions (IRAs), and a feasibility study (FS) of the site pursuant to the Delaware Hazardous Substance Cleanup Act (HSCA).

The objectives and the accomplishments of the RI and subsequent environmental activities were as follows:

- Document existing environmental conditions at the site. This was accomplished in the RI by collecting soil, sediment, and groundwater samples to investigate the impact that historic uses of the property and the surrounding lands may have had on the property.
- Identify source(s) of contaminants, if present.

- Preparing a statement of relative risk based on the RI data, which would describe the impact of any environmental contaminants present given the potential use of the site.
- Evaluate whether remedial action(s) may be required at the site, and if they are, how they can be integrated with the site redevelopment and construction plan.
- Complete interim response actions as approved by DNREC.

This document is the Department's proposed plan of interim remedial action which contains the Department's proposed interim remedial alternatives for the site. Interim Response Actions (IRA) are proposed at the site in order to properly manage, handle and dispose of soil found to be significantly impacted by chlorinated pesticides prior to the issuance of DNREC's Proposed and Final Plans of Remedial Action at a later date.

ORGANIZATION AND CONTENTS OF THE PROPOSED PLAN

DNREC issues this proposed plan of interim remedial action under the provisions of HSCA and the Regulations Governing Hazardous Substance Cleanup (Regulations). The plan presents an initial DNREC assessment of the health and environmental risks posed by the site and the selection of interim remedial actions in order to mitigate selected risks at the site.

In accordance with HSCA, DNREC hereby provides notice to the public and an opportunity for the public to comment on this plan. At the comment period's conclusion, DNREC will review and consider all of the comments received and then DNREC will issue a final plan for interim remedial action at the site. The final plan will designate the selected interim actions for the site. All prior investigations of the site, the interim action proposed plan, and the comments received from the public, DNREC's responses to those comments, and the final interim action plan will constitute the remedial decision record.

DNREC's proposed interim remedy is preliminary and a final decision will not be made until all of the comments are considered. The final interim remedy selected could differ from the proposed interim remedy based on DNREC's response to comments.

The final plan of interim remedial action will contain a description of the following site information:

- A summary of the procedures, analytical results, interim response actions and conclusions of the Remedial Investigation,
- A discussion of objectives,
- A summary of the risk assessment results, and
- A plan for the site's future use and maintenance.

SITE DESCRIPTION

The Delaware Department of Natural Resources and Environmental Control, Division of Soil and Water Conservation Dredge Operations Center site is a former seafood and clam processing plant

approximately 9.5 acres in size located on Pilottown Road in Lewes, Delaware. The site consists of Tax Parcel #3-35-4-5. The site location is shown in Figures 1 and 2.

The site is bordered by the Broadkill River to the northeast, Pilottown Road to the southwest, the University of Delaware to the east and a commercial/light industrial complex to the west.

The site is essentially flat. There are several large buildings and concrete pads (former building footprints) present on the site, including the remains of the former wastewater treatment plant. Numerous pieces of heavy equipment, boats, barges and other vehicles are located throughout the site.

Based on the data collected during the RI, and geologic literature for the area, the stratigraphy of the site can be divided into four basic units (surface to depth) as follows:

- Medium silty sands with much shell and some minor fill containing wood and metal
- Marsh Deposits (Holocene)
- Columbia Group (Pleistocene) – Omar and Beaverdam Formations
- Chesapeake Group – Bethany, Manokin and St. Mary's Formations

The sands range in thickness from two to eight feet and overlie the native marsh deposits.

The Holocene-aged marsh deposits are gray, black, or brown stiff clay and silt containing organic vegetation, and are underlain by the Pleistocene Columbia Formation.

Groundwater was encountered at depths ranging from three to six feet below ground surface (bgs) in the borings and test pits completed across the site.

Groundwater beneath the site is expected to flow generally from southwest to northeast toward the Broadkill River and may be tidally influenced.

The site is relatively flat and is situated along the lower Broadkill River just west of the Roosevelt Inlet. Ground surface elevations ranged from approximately 2.5 ft to 7.0 ft above mean sea level (msl). Surface water drainage discharges through two routes as follows: overland flow to the Broadkill River or to the wetlands on the south side of the site; or it is routed through stormwater catch basins and conveyances and then to the Broadkill River or the wetlands.

SITE HISTORY

According to deed records for the site, prior to August 1951 the site was designated as public and vacant lands. In 1951, the property was leased to The Doxsee Company, Inc. and was used as a seafood processing plant until approximately 1987. Between 1988 and 1992, the site was used for research and development of a wave-powered desalinization system and the research, development, and testing of salt water pumps.

The following investigation reports and information were reviewed during this investigation.

- Environmental Site Assessment – Level 1, Doxsee Site – CABA Associates, Inc., October 1994
- Remedial Investigation / Feasibility Study Work Plan – Doxsee Site – Tetra Tech, Inc., February 2004
- Preliminary Results of the Remedial Investigation / Feasibility Study – Doxsee Site – Tetra Tech, Inc., Summer 2004
- Preliminary Risk Calculation (Deborah Heffernan, using the EPA April 2004 Risk-based Concentration (RBC) Table)

PRELIMINARY REMEDIAL INVESTIGATION RESULTS

Tetra Tech conducted several activities at the site during the autumn of 2003 and winter 2003-2004. Included during this period was the sampling of numerous buckets, drums, and fuel pods inside the structures at the site. Contents of these containers included used oils, lubricants, used gasoline, use antifreeze, and water contaminated with oil and gas. Following analysis and characterization, these materials were removed off-site and disposed of at an approved facility.

Following the removal of the used oil and other liquids, Tetra Tech and their subcontractor, ECG Industries, Inc., arranged for and conducted an inventory of small containers at the site, including materials deemed unusable, outdated, or unidentified. Once these materials were inventoried, they were over packed and removed off-site for shipment and disposal at an approved facility.

Tetra Tech then prepared an RI work plan for the field investigation. The site was divided into six areas due to its size and the number of potential source areas (Figures 3 – 8). They are described below:

Area 1 – this area encompassed recent grading and clearing, piles of dredge pipe, wood piling and scrap metal and other materials, an alleged battery storage area (BSA), a stained soil area around a number of 55-gallon drums (SSD) and the location of the excavated containers.

Area 2 – this area encompassed recent clearing, and waste piles.

Area 3 – this area included a loading dock sump and sump discharge, diesel fuel storage tank, and stormwater drain discharge.

Area 4 – this area included the former wastewater treatment plant, concrete WWTP ponds and various debris.

Area 5 – this area included the area along the Broadkill River and the location of a former aboveground fuel oil storage tank.

Area 6 – this area included the portion of the site near the entrance gate, a former tank storage area, and a former transformer area.

The Waste Area Delineation and subsurface evaluation began with a magnetometer (EM) and ground penetrating radar (GPR) survey of the site. Following the EM and GPR surveys, test pit excavations were used to explore and sample the anomalies and the other potential source area for buried containers or other waste materials. Direct push soil borings were utilized in some parking areas, driveways and areas where test pitting was impracticable. After subsurface exploration of potential source areas was conducted, test pitting and direct push soil borings were conducted in a grid pattern across accessible areas of the site for general site characterization. Sediment samples were then collected along the shoreline of the Broadkill River at low tide.

The following summary of findings was prepared based on the data collected during the RI:

Soil

Boring and test pit logs indicate that the soils at the site are comprised of sands with a high percentage of shell, ranging in thickness from one (1) foot to six (6) feet and are underlain by dark grey silty marsh deposits. Approximately seventy-four (74) soil samples were analyzed at either the DNREC Division of Water Resources laboratory or Severn Trent Laboratories in Edison New Jersey for Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), TCL pesticides/polychlorinated biphenyls (PCBs), and Target Analyte List (TAL) metals and cyanide.

Major Findings

Preliminary results of the analysis indicate the presence of chlordane and other chlorinated pesticides in shallow surface soils (0 to 12") and in some deeper soils (18" to 30") in areas of historical use at the site.

Area 1

Battery storage/disposal area - Chlordane was detected in five out of six shallow soil samples collected in this area, ranging in concentration from 890 ug/kg in sample BSA-2 to 9,900 ug/kg in sample BSA-5. Other compounds detected in the shallow BSA samples included 4,4'-DDE (four out of six samples, 19 ug/kg to 460 ug/kg); 4,4'-DDT (one out of six samples, 160 ug/kg); 4,4'-DDD (three out of six samples, 42 ug/kg to 140 ug/kg); heptachlor epoxide (six out of six samples, 22 ug/kg to 380 ug/kg); heptachlor (one out of six samples, 24 ug/kg); dieldrin (one out of six samples, 24 ug/kg) and methoxychlor (one out of six samples, 12 ug/kg). Heptachlor (11 ug/kg to 19 ug/kg) was also detected in three out of six deeper soil samples in the BSA.

Stained soil/drum storage area – Chlordane was detected in six out of six shallow soil samples in the SSD, ranging in concentration from 460 ug/kg in sample SSD-6 to 25,000 ug/kg in sample SSD-1. Other compounds detected in the shallow SSD samples included 4,4'-DDE (one out of six samples, 200 ug/kg); 4,4'-DDD (four out of six samples, 28 ug/kg to 900 ug/kg); heptachlor epoxide (six out of six samples, 15 ug/kg to 610 ug/kg); heptachlor (one out of six samples, 740 ug/kg) and dieldrin (one out of six samples, 200 ug/kg).

Compounds detected in the deeper soils in the SSD area included chlordane in one out of six soil samples (120 ug/kg); 4,4'-DDE (two out of six samples, 67 ug/kg to 84 ug/kg); 4,4'-DDD (one out of six samples, 21 ug/kg); 4,4'-DDT (two out of six samples, 19 ug/kg to 48 ug/kg); heptachlor epoxide (four out of six samples, 19 ug/kg to 49 ug/kg); endosulfan (one out of six samples, 14 ug/kg) and beta-BHC (one out of six samples, 40 ug/kg).

Also detected in the SSD area were several polycyclic aromatic hydrocarbons (PAHs), including benzo(a)pyrene, in at least one shallow and one deep soil sample. Maximum benzo(a)pyrene concentrations were 280 ug/kg in shallow soils and 140 ug/kg in deep soils.

Area 2

There were no significant analytical findings from soil samples collected in Area 2.

Area 3

Diesel fuel storage tank - Chlordane was detected in four out of four shallow soil samples collected in this area, ranging in concentration from 740 ug/kg in sample DFST-2 to 89,000 ug/kg in sample DFST-1. Other compounds detected in the shallow DFST samples included 4,4'-DDE (two out of four samples, 11 ug/kg to 170 ug/kg); heptachlor epoxide (four out of four samples, 25 ug/kg to 3,100 ug/kg); dieldrin (two out of four samples, 13 ug/kg to 24 ug/kg). Chlordane (160 ug/kg) was also detected in one of the deeper soil samples in the DFST area.

Also detected in the DFST area was naphthalene (shallow – 2,500 ug/kg, deep – 1,400 ug/kg), 2-methylnaphthalene (shallow – 3,900 ug/kg), xylene (deep - 560 ug/kg), cyanide (shallow - 590 ug/kg), butylbenzylphthalate (shallow – 3,200 ug/kg) and aroclor-1260 (shallow - 140 ug/kg).

Loading dock sump and sump discharge - Chlordane was detected in the sump sediments at a concentration of 890 ug/kg and in the sump discharge area at a concentration of 2,580 ug/kg. Bis(2-ethylhexyl)phthalate was detected in the sump sediments at 12,000 ug/kg and several PAHs were found at low concentrations in both the sump and the discharge areas.

Stormwater drain and drain discharge - Chlordane was detected in the stormwater discharge area at a concentration of 880 ug/kg. Di-n-octylphthalate was detected in the sample at 1,500 ug/kg and several PAHs were found at low concentrations.

Area 4

In the area around the former wastewater treatment plant, concrete WWTP ponds, and various debris piles there were minimal analytical findings from soil samples. Low levels of PAHs and bis(2-ethylhexyl)phthalate were noted, and one detection of cyanide at a concentration of 1,000 ug/kg was seen in TP-419.

Area 5

Former aboveground fuel oil storage tank - Chlordane was detected in two out of four shallow soil samples collected in this area, ranging in concentration from 1,400 ug/kg in sample FASTA-1 to 2,000 ug/kg in sample FASTA-2. Other compounds detected in the shallow FASTA samples

included 4,4'-DDD (one out of four samples, 37 ug/kg); heptachlor (two out of four samples, 20 ug/kg to 79 ug/kg); heptachlor epoxide (two out of four samples, 18 ug/kg to 43 ug/kg); dieldrin (one out of four samples, 19 ug/kg).

Chlordane (1,400 ug/kg) was also detected in one of the deeper soil samples in the FASTA area. Other compounds in the deeper soil samples included 4,4'-DDD (one out of four samples, 77 ug/kg); 4,4'-DDT (one out of four samples, 45 ug/kg); benzo(a)pyrene (one sample, 2,800 ug/kg); and cyanide (one sample, 610 ug/kg).

Area 6

Former tank storage area and a former transformer area - Chlordane was detected in six out of six shallow soil samples collected in this area, ranging in concentration from 850 ug/kg in sample OTA-3 to 11,000 ug/kg in sample OTA-1. Other compounds detected in the shallow OTA samples included 4,4'-DDD (three out of six samples, 95 ug/kg to 310 ug/kg); 4,4'-DDE (three out of six samples, 22 ug/kg to 110 ug/kg); heptachlor epoxide (two out of six samples, 60 ug/kg to 100 ug/kg); gamma-BHC (Lindane) (one sample, 31 ug/kg) and cyanide (five out of six samples, 850 ug/kg to 3,000 ug/kg).

Chlordane (1,600 ug/kg) was also detected in one of the deeper soil samples in the OTA area. Other compounds in the deeper soil samples included 4,4'-DDD (two out of six samples, 15 ug/kg to 180 ug/kg); 4,4'-DDE (two out of six samples, 14 ug/kg to 61 ug/kg); and dieldrin (one out of six samples, 44 ug/kg).

The table below lists the maximum concentrations of the primary compounds detected in site soils and a comparison to the soil screening criteria used to evaluate them. Soil screening criteria are the DNREC Uniform Risk-Based Standards (URS) for restricted (industrial) and unrestricted (residential) use, and the USEPA Region III Risk-Based Concentrations (RBC) for residential and industrial soils.

Maximum Detections of Contaminants of Concern in Soils

| Compound | Maximum Detection - Soils ug/kg | RBC Resid. ug/kg | RBC Indus. ug/kg | URS Unres. ug/kg | URS Restr. ug/kg |
|--------------------|---------------------------------------|------------------------|------------------------|------------------------|------------------------|
| Chlordane | 89,000 | 1,800 | 8,200 | 2,000 | 16,000 |
| Heptachlor | 740 | 140 | 640 | 100 | 1000 |
| Heptachlor Epoxide | 3,100 | 70 | 310 | 70 | 600 |
| Dieldrin | 200 | 40 | 180 | 40 | 40 |
| 4,4'-DDT | 160 | 1,900 | 8,400 | 2,000 | 17,000 |
| 4,4'-DDD | 900 | 3,500 | 12,000 | 3,000 | 24,000 |
| 4,4'-DDE | 460 | 1,900 | 8,400 | 2,000 | 17,000 |
| Benzo(a)pyrene | 2,800 | 87 | 390 | 90 | 800 |

Bolded – Exceedance of screening criteria

RBC – Risk-based Concentration, USEPA, J. Hubbard, 10/19/04

URS – Uniform Risk-based Standard, DNREC 12/99

Chlordane, heptachlor, heptachlor epoxide, dieldrin, and benzo(a)pyrene were detected in site soil above the Delaware Uniform Risk-Based Remediation Standards (URS) values for unrestricted use and are potential contaminants of concern based on these exceedances.

Chlordane, heptachlor epoxide, dieldrin and benzo(a)pyrene were detected in site soils above the restricted use (commercial) URS and were considered potential site contaminants of concern for the risk calculations.

The preliminary cumulative risk calculations indicate that exposure to the site soil may pose an unacceptable carcinogenic and non-carcinogenic risk under the unrestricted and restricted use scenarios.

Four samples were submitted to the laboratory for Toxic Characteristic Leaching Protocol (TCLP) analysis for chlordane. Samples submitted ranged from low and medium to the highest concentration of chlordane detected. Laboratory analysis indicated that none of the samples submitted exceeded the regulatory limits for chlordane to be considered a hazardous waste.

PROPOSED PLAN FOR INTERIM RESPONSE ACTIONS

Interim Response Actions are proposed at the site in order to properly manage, handle, and dispose of soil found to be significantly impacted by chlorinated pesticides.

REMEDIAL ACTION OBJECTIVES

The Regulations provide that DNREC set objectives for land use, resource use, and cleanup levels that are protective of human health and the environment. The following qualitative objectives are determined to be appropriate for the site:

Control potential human exposure (dermal, inhalation and ingestion) to contaminated soil.

Control potential contaminated soil erosion and subsequent overland transport of contaminated surface water to the Broadkill River.

These objectives are consistent with the planned development of the site and the surrounding land and development plans for the City of Lewes, zoning policies, state regulations governing water supply, and worker health and safety.

Based on the above qualitative remedial action objectives, the following quantitative remedial action objectives (RAO) based on unrestricted use were developed:

Prevent human exposure to soil or other media having a cumulative risk factor greater than 1×10^{-5} and/or a hazard index of 1, or as based on DNREC URS tables. This includes but is not limited to the following:

1. Prevent human exposure to soil having a chlordane concentration greater than the unrestricted URS for chlordane of 2.0 milligrams per kilogram (mg/kg).
2. Prevent human exposure to soil having a heptachlor concentration greater than the unrestricted URS for heptachlor of 0.10 mg/kg.
3. Prevent human exposure to soil having a heptachlor epoxide concentration greater than the unrestricted URS for heptachlor epoxide of 0.07 mg/kg.
4. Prevent human exposure to soil having a dieldrin concentration greater than the unrestricted URS for dieldrin of 0.04 mg/kg.

Manage and mitigate environmental risks, as they occur during the building construction and redevelopment process, in accordance with the DNREC-approved, site-specific Soils Management Plan (SMP) and the site-specific Health and Safety Plan (HASP). This will include, but is not limited to, removal of any underground storage tanks (USTs) and petroleum-impacted soil, if discovered, in accordance with DNREC's Tank Management Branch (TMB) regulations.

RISK EVALUATION SUMMARY

A preliminary risk assessment to evaluate the possible effects on human health from the use of the site consistent with the objectives discussed above was performed using appropriate risk assessment methods. This preliminary assessment was based on a worst-case scenario using the highest concentration of contaminants of concern found in shallow soils and a worker regularly exposed to the soils, such as a gardener/landscaper.

The carcinogenic cumulative risk posed by shallow site soils to a commercial worker would be approximately 3.0×10^{-5} (3.0 in 100,000), which exceed DNREC acceptable risk guidelines of 1.0×10^{-5} (1.0 in 100,000). The individual compounds that most significantly contribute to the carcinogenic risk are chlordane and heptachlor epoxide. All non-carcinogenic cumulative risk would result in a Hazard Quotient of less than 1.0 that is within DNREC's acceptable risk guidelines.

PROPOSED PLAN OF INTERIM REMEDIAL ACTION

Based on the preliminary results of the remedial investigation, and the RAOs at the site, DNREC proposes the following interim remedial actions for the site:

1. Conduct a soil removal action consisting of excavation of soils impacted by chlorinated pesticides in excess of the unrestricted URS values and disposal of these soils at an approved

facility. Following soil excavation, confirmatory samples will be collected and analysis will be performed, to include a combination of field analytical methods in the DNREC mobile laboratory and a fixed analytical laboratory, either the DNREC Environmental Services lab in Dover or STL Edison.

2. Areas included in the soil removal action are the battery storage / disposal area , stained soil/drum storage area, diesel fuel storage tank, loading dock sump and sump discharge, former aboveground fuel oil storage tank, the former tank storage area and former transformer area.
3. Any petroleum contaminated materials or underground storage tanks (USTs) that are encountered during construction at the site will be addressed by DNREC's Tank Management Branch (TMB) according to the applicable TMB regulations.

John Blevins, Director
Division of Air and Waste Management

Date of Review of Proposed Plan of
Interim Remedial Action

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PUBLIC PARTICIPATION

The Department actively solicits written public comments and suggestions on the proposed plan of interim remedial action. The comment period begins on December 22, 2004 and ends on January 11, 2005. If you have any questions or concerns regarding the site, or if you would like to view reports or other information regarding the site, please contact the project manager, Larry Jones, at 391 Lukens Drive, New Castle, Delaware 19720, or at 302-395-2600.

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