

# FINAL PLAN OF REMEDIAL ACTION

**Krewatch Farm Site  
Seaford, Delaware**

**DNREC Project Nos. DE 0109 & DE 1077**



**June 2002**

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

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## **1.0 INTRODUCTION**

The Krewatch Farm (site) is located along Tharp Road approximately one half mile east of Rt. 13 in Seaford, Delaware. (Figure 1) The tax parcel number for this site is 331-6.00. The site is situated on a 168 acre parcel in Seaford, Delaware and is bounded mostly by wooded land to the west, north, and east and a cultivated field to the south. The site was identified by the Delaware Department of Natural Resources and Environmental Control (DNREC or Department) and the United States Environmental Protection Agency (EPA) after a trailer fire on the southern portion of the site on April 9, 1985.

This document is the Department's final plan of remedial action (final plan) for the site. It is based on the results of the previous investigations performed at the site. This final plan is issued under the provisions of the Delaware Hazardous Substances Cleanup Act (HSCA) and the Regulations Governing Hazardous Substance Cleanup (Regulations). It presents the Department's assessment of the potential health and environmental risk posed by the site.

As described in Section 12 of the Regulations, DNREC provided notice to the public and an opportunity for the public to comment on the proposed plan. At the comment period's conclusion, DNREC did not receive any comments. Accordingly DNREC will issue the final plan of remedial action (final plan). The final plan shall designate the selected remedy, if required, for the site. The proposed plan and the final plan will constitute the Remedial Decision Record.

Section 2 presents a summary of the site description, site history and previous investigations of the site. Section 3 provides a description of the remedial investigation results. Section 4 presents a discussion of the remedial objectives. Section 5 presents the final plan of remedial action. Section 6 discusses public participation requirements. Section 7 presents a declaration of the final remedial action and its effects on human health and the environment.

## **2.0 SITE DESCRIPTION AND HISTORY**

### **2.1 DESCRIPTION**

The Krewatch Farm site (DE-109/DE-1077) is located along Tharp Road in Seaford, Sussex County, Delaware and is owned by the Krewatch family. The site covers approximately 170 acres, a large portion of which is farmland.

The Krewatch Farm site includes but is not limited to the following three areas:

- Drum burial area located on the northwestern portion of the property (Figure 2);
- Drum storage area located on the southwestern portion of the property (Figure 3); and
- Oil spill area located on the southern portion of the property (Figure 4, the trailer area).

## 2.2 HISTORY

Between 1948 and 1985, Edward Krewatch purchased surplus oils and lubricants from the United States military for recycling and resale. Many of these oil products were stored at the site and appear to have been discharged to the ground. In addition, Mr. Krewatch leased the northwestern portion of the property to Antonio V. Nero who reportedly buried approximately 20 drums there.

The EPA contracted with Weston Inc. to conduct a Preliminary Assessment (PA) of the site in 1985. The conclusion of the PA was to classify the releases as an oil spill and require a cleanup. The cleanup effort was initiated by EPA in June 1985 and completed in July 1985. The cleanup effort resulted in the removal of 730 tons of bulk solids, the recycling of 800 gallons of oil products, the repackaging of 4,000 gallons of oil products, and the storage of 2,000 intact containers of oil products in a shed on the site.

In addition to the cleanup effort, the EPA conducted a magnetometer survey to locate any buried drums. The survey detected a drum burial area on the northwestern portion of the farm. (Figure 2) This location is approximately 300 yards north of the area of the trailer fire and is considered to be a separate source area.

In 1995, a sampling event was conducted by DNREC, which revealed elevated petroleum compounds in the soil of the drum burial area. The Department subsequently issued a notice letter to the potentially responsible parties (PRPs), Edward Krewatch, Antonio V. Nero, Gardner Asphalt, Emulsion Products Corporation, and Raymond T. Hyer, Jr., informing them of their potential liabilities, pursuant to HSCA.

In 1996, the PRPs requested entry in the State's Voluntary Cleanup Program (VCP) and entered into a VCP agreement with the DNREC to perform a cleanup of the property, and the drum burial area. Drum removal began shortly thereafter. As the removal continued, it was determined the drum burial area was larger and contained more drums than anticipated. Accordingly, the PRPs realized they could no longer afford the cleanup costs and withdrew from the VCP agreement.

On October 3, 1996, DNREC issued an Administrative Order to the PRPs requiring them to finish the cleanup, but they responded claiming bankruptcy. In order to keep the cleanup moving forward, DNREC requested assistance from EPA. EPA Removal Response Branch agreed to take the lead in the cleanup of the buried drums.

In August 1997, the EPA and DNREC worked together to complete the cleanup of the drum burial area. Soil and groundwater sampling was conducted in both the drum burial area and in the public wells around the site. The detected contaminant levels in both the groundwater and the soil were below the State of Delaware Uniform Risk-Based Remediation Standards (URS).

In 1997, the EPA determined that more information was needed to conclude the site ranking. At that time, DNREC conducted a Site Inspection (SI) encompassing both the drum burial area and the drum storage area. DNREC conducted the SI in the drum burial area and the drum storage area in 1997.

DNREC conducted a follow-up field visit on September 5, 2002. During this inspection, DNREC surveyed the site and took photographs of the site and the monitoring wells (Inspection Photos). The inspection showed that the monitoring wells were intact and that the site was used only for farming purposes.

### **3.0 INVESTIGATION RESULTS**

#### **3.1 SOIL**

As part of the site inspection, in the drum burial area, five (5) soil samples including a background and a duplicate soil sample were taken on November 4, 1987. Analysis of the subsurface soil samples revealed organic contaminants with concentrations of 2-butanone (14 parts per million or ppm), 4-methyl-2-pentanone (190 ppm), ethylbenzene (1.3 ppm), total xylenes (2.6 ppm), total petroleum hydrocarbons (TPH) of 100,000 ppm, and polynuclear aromatic hydrocarbons (PAH) of 200 ppm. TPH and PAH were found at the drum burial area that required further investigation and/or remedial action(s). In the drum storage area, the lab results did not show the presence of any contaminants above the unrestricted URS values as proposed in DNREC's Remedial Standards Guidance document dated December 1999. An Interim Action (IA) began in fall 1996 under the VCP program. Twenty-eight (28) drums filled with soil, approximately 15 cubic yards of crushed and empty drums, and 35.5 tons of contaminated soil were excavated from the drum burial site. These materials were removed on October 1996 and properly disposed of off-site.

During the cleanup of the drum burial area, it was determined that more drums were buried at this area than anticipated through a magnetometer survey. EPA completed drum removal activities in August 1997 from this area. Approximately 137 55-gallon drums and 543 5-gallon buckets of tar were removed. Additionally, 1,200 cubic yards of soil were removed from the drum burial area. The drum burial pit was sampled on July 27, 1997 to confirm or deny the presence of contaminants in this site. Figures 6 and 7 show the location and depth (respectively) of samples collected. Tables 2, 3, 4, and 5 show the results of the soil samples. Only aluminum and iron concentrations were higher than their respective unrestricted URS concentrations. Based on DNREC's site specific risk calculator evaluation, using the highest aluminum and iron concentrations found in the soil samples, no cancer or noncancerous risk was found. The calculated noncancerous risk for aluminum was 0.01 and 0.03 for iron. These risks are below the hazardous index of 1.0. The drum burial pit was backfilled and the waste soil and excavated drums were transported off-site for proper disposal.

#### **3.2 GROUNDWATER**

In 1998, DNREC performed a groundwater investigation of the area by installing three monitoring wells around the drum burial portion of the site. DNREC installed a cluster well consisting of one shallow well (screened at 25-35 feet) and one deep well (screened at 55-65 feet) between the drum burial area and the homes along Tharp Road, and one shallow background well (screened at 15-25 feet). Four (4) residential wells were also sampled as shown in (Figure 5). Samples collected from the monitoring wells were analyzed for volatile and semivolatile organic compounds, pesticides/polychlorinated biphenyls (PCBs), and metals while samples collected from the residential wells were analyzed for volatile and semi-volatile organic

compounds. The groundwater analytical data has been summarized in Table 1 and compared to DNREC's URS for groundwater. All of the detected contaminants' concentrations were below the unrestricted URS values.

### **3.3 SUMMARY**

The results of the soil investigations indicated that the Krewatch site contained contaminants at levels exceeding the URS values for unrestricted use. Specifically, TPH of 100,000 ppm exceeded the standards for surface and subsurface soil (0-6 feet deep) in the soil samples collected at the site. All contaminated soils were removed during the interim remedial actions conducted at this site. Confirmatory samples were taken as part of these activities and results of the confirmatory samples were below the unrestricted URS values except for aluminum and iron. Based on DNREC's site specific risk calculator, using the highest aluminum and iron concentrations found in the soil samples, no cancer and noncancer risk was found. The calculated noncancer risk for aluminum was 0.01 and 0.03 for iron. These risks are below the Hazardous Index of 1.0. Since aluminum and iron are naturally occurring elements, their presence in such a limited quantity does not pose a risk to human health, welfare or the environment. Groundwater data from confirmatory samples taken after the removal action showed that no unrestricted URS values were exceeded, except for aluminum and iron.

## **4.0 REMEDIAL ACTION OBJECTIVES**

According to Section 8.4 (1) of the Regulations, site-specific Remedial Action Objectives (RAOs) must be established for all plans of remedial action. The Regulations require that DNREC set objectives for land use, resource use, and cleanup levels that are protective of human health and the environment.

### **4.1 QUALITATIVE OBJECTIVES**

Qualitative objectives describe, in general terms, what the ultimate result of the remedial action, if necessary, should be. The following qualitative objectives are determined to be appropriate for the site:

- Prevent residential exposure to impacted soils and groundwater;
- Minimize potential exposure to site contaminants of concern for workers at the site;
- Prevent environmental degradation due to impacted soil and groundwater; and
- Continue the use of public water for all purposes to the surrounding community.

These objectives are consistent with the Sussex County zoning policies, state regulations governing water supply, worker health and safety, and HSCA.

### **4.2 QUANTITATIVE OBJECTIVES**

Quantitative objectives define specific levels of remedial action to achieve protection of human health and the environment. Based on the qualitative objectives, the quantitative objectives will be used to ensure that future site users such as site workers (farmers), visitors, and trespassers do

not come in contact with soils and groundwater that contain elevated levels of TPH and PAHs above the established unrestricted URS values.

Based on the qualitative objectives, the quantitative objective is:

- Prevent human exposure to soils and groundwater contaminated by VOCs, PAHs, and metals that would result in a carcinogenic risk exceeding  $1 \times 10^{-5}$  or a hazard index of 1.0.

## 5.0 FINAL PLAN OF REMEDIAL ACTION

Interim remedial actions were conducted at this site beginning in June 1985, and ended in August 1997. Because the remedial objectives at this site were met through the implementation of these interim remedial actions, DNREC recommend that no further action is required at this site.

## 6.0 PUBLIC PARTICIPATION

The Department actively solicited public comments or suggestions on the proposed plan of remedial action. The public comment period for this proposed plan began on April 21, 2003 and ended at the close of business (4:30 p.m.) May 12, 2003. No comments were received during the public comment period.

## 7.0 DECLARATION

This final plan of remedial action for the Krewatch 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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John Blevins, Director  
Division of Air and Waste Management

6.11.03  
\_\_\_\_\_  
Date

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Figure 1: Site Location Map

Krewatch Drum Site  
Seaford, Delaware  
Site Location Map

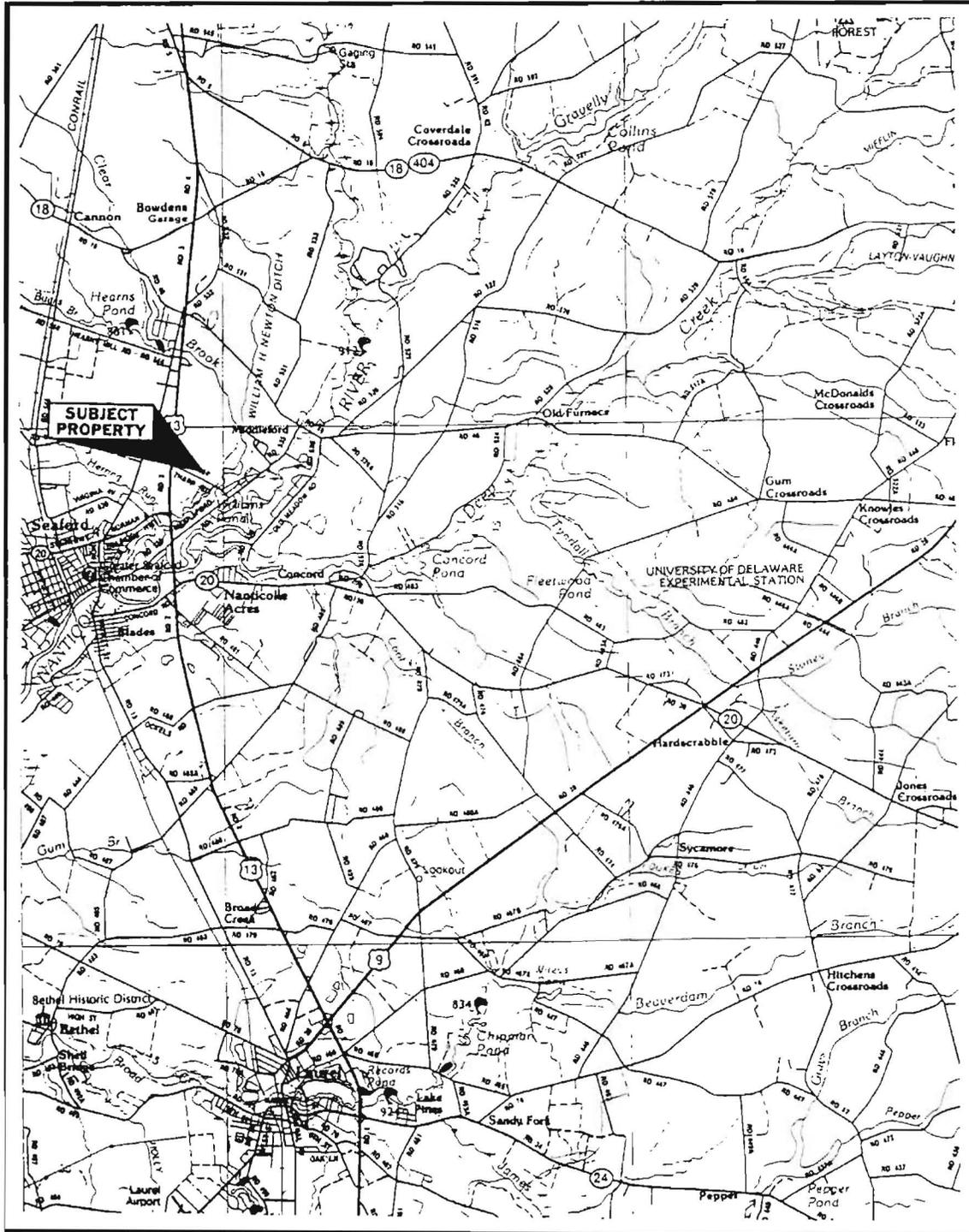


Figure 2: Location of Drum Burial Area at Krewatch

Krewatch Drum Site  
Seaford, Delaware

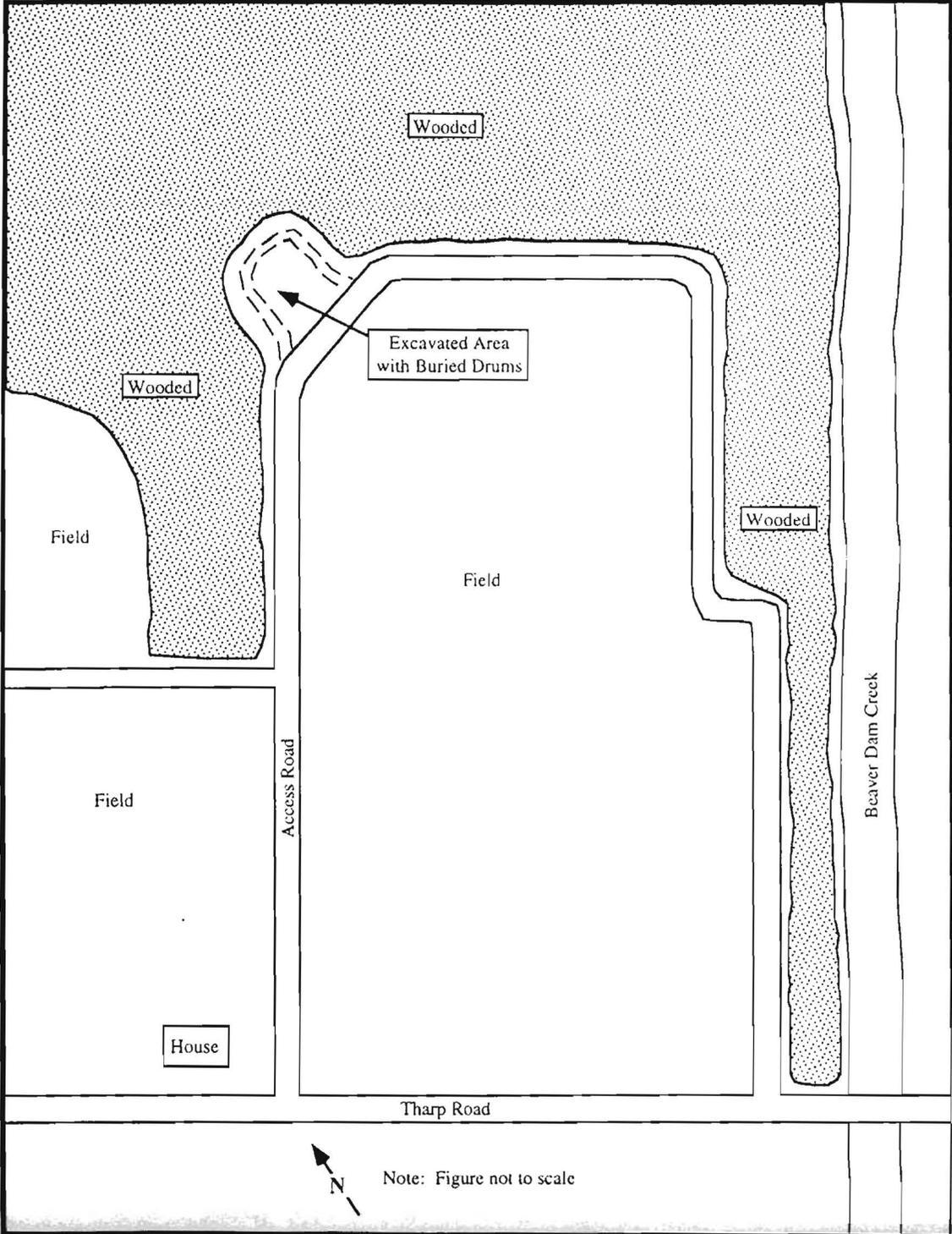
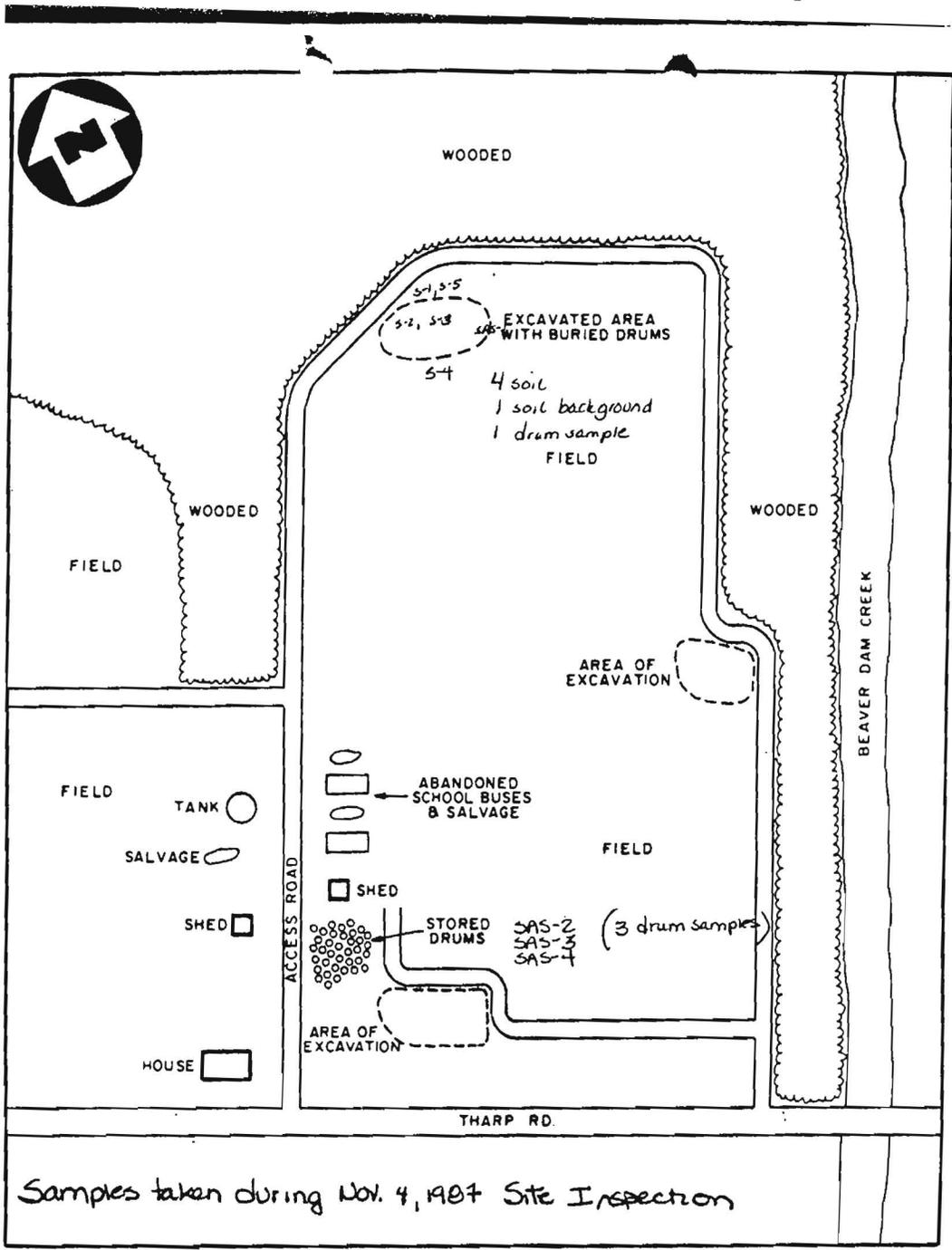


Figure 3: Location of Stored Drums and Oil Spill

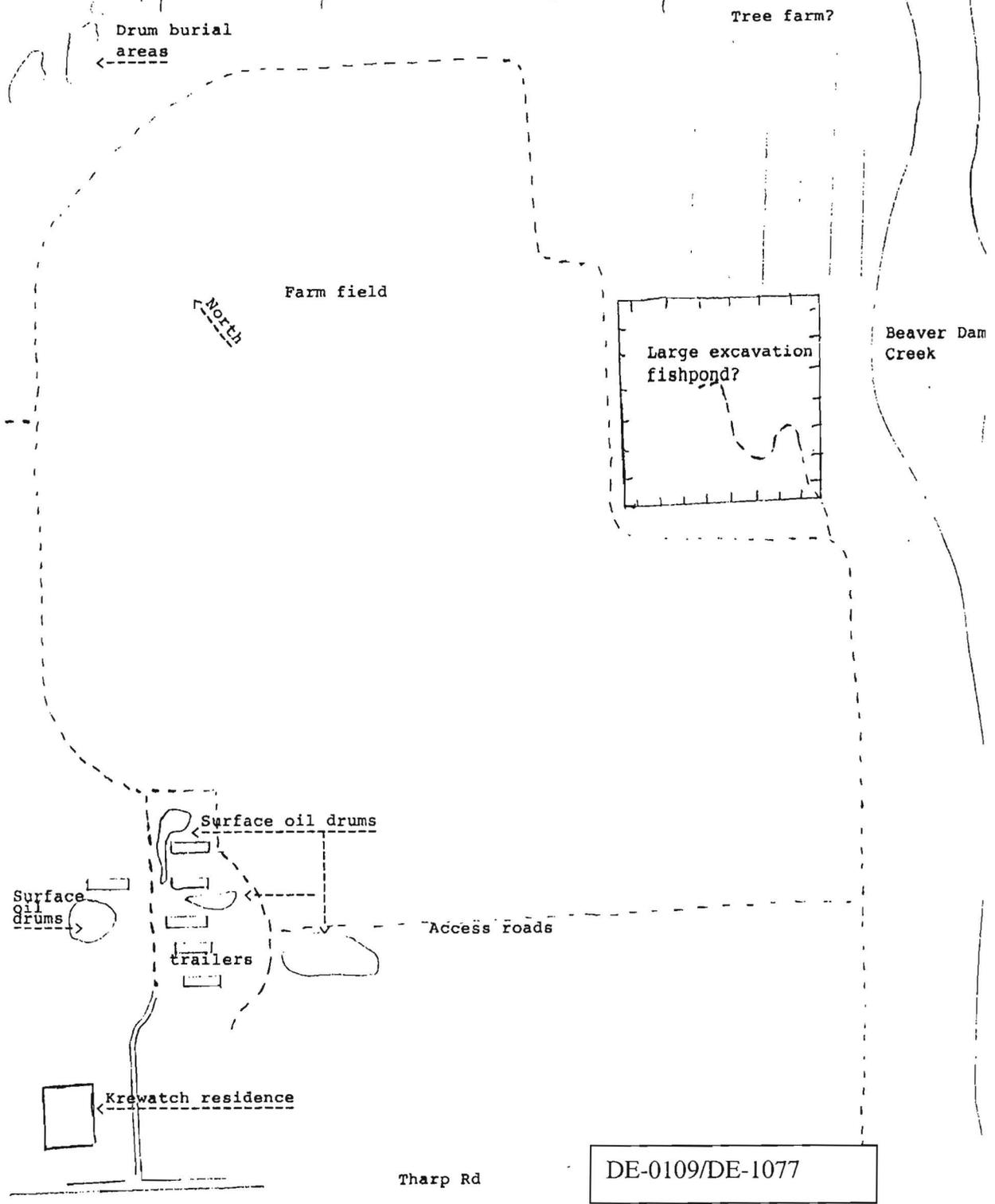


SITE SKETCH  
SEAFORD DRUM SITE, SEAFORD, DEL  
(NO SCALE)

FIGURE 2

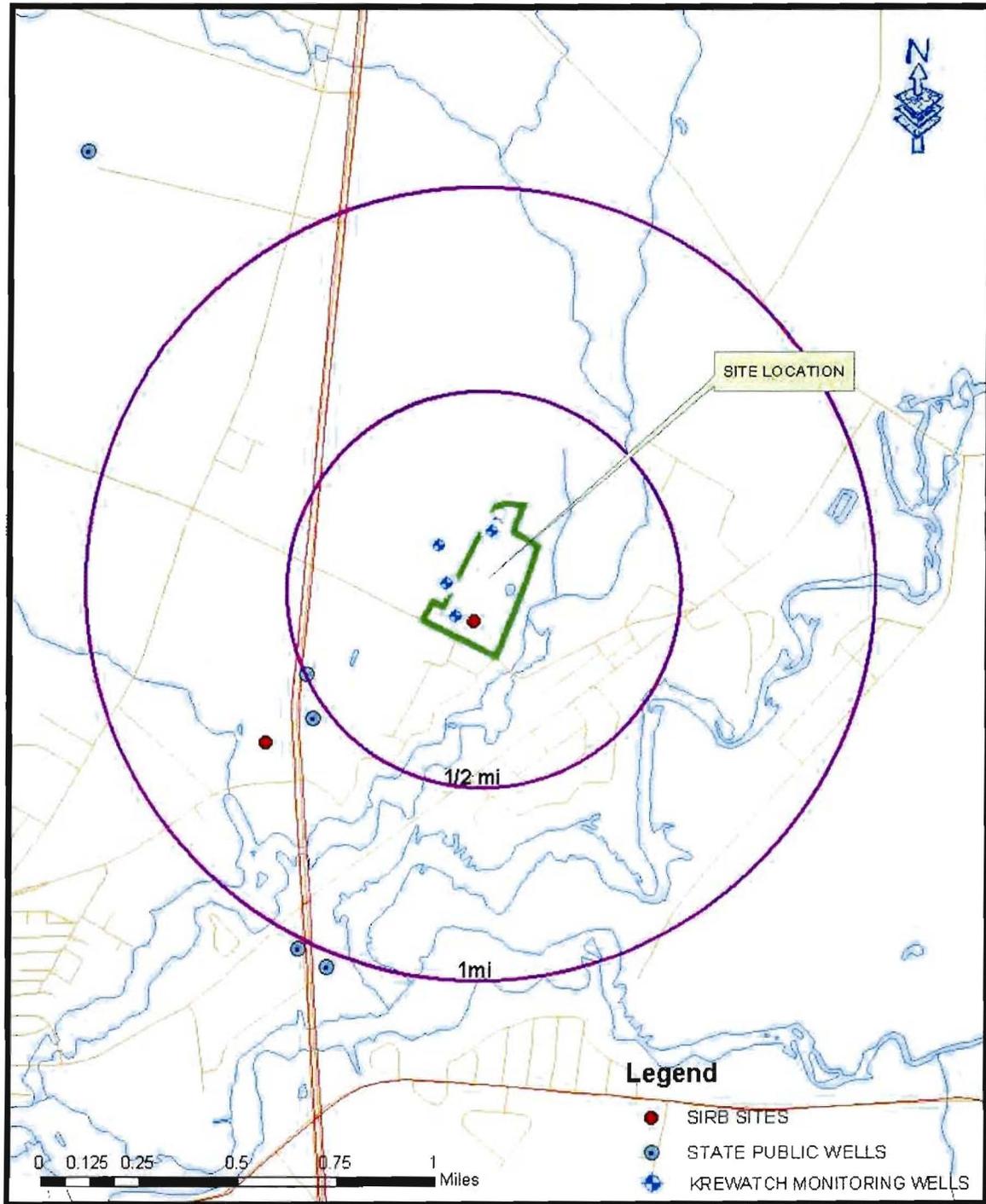


Figure 4: Location of Oil Spill at Krewatch



Site Sketch Map Seaford Drum Site De-  
NO SCALE

**Figure 5: Location of Monitoring and Domestic Wells**



**MONITORING WELLS AND DOMESTIC WELLS  
AROUND THE KREWATCH PROPERTY IN SUSSEX COUNTY DELAWARE**

Figure 6: Location of Confirmatory Soil Samples July 1997

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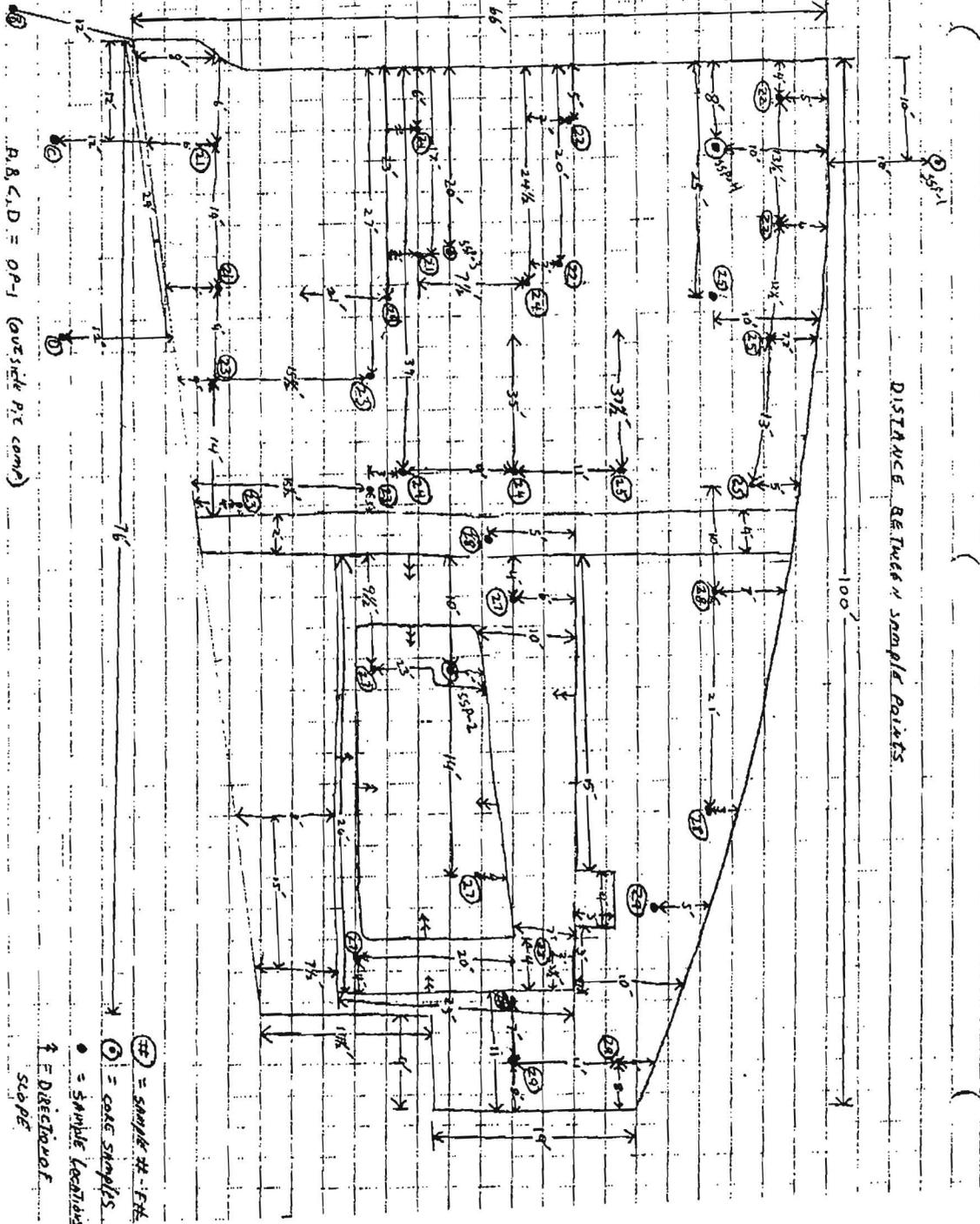


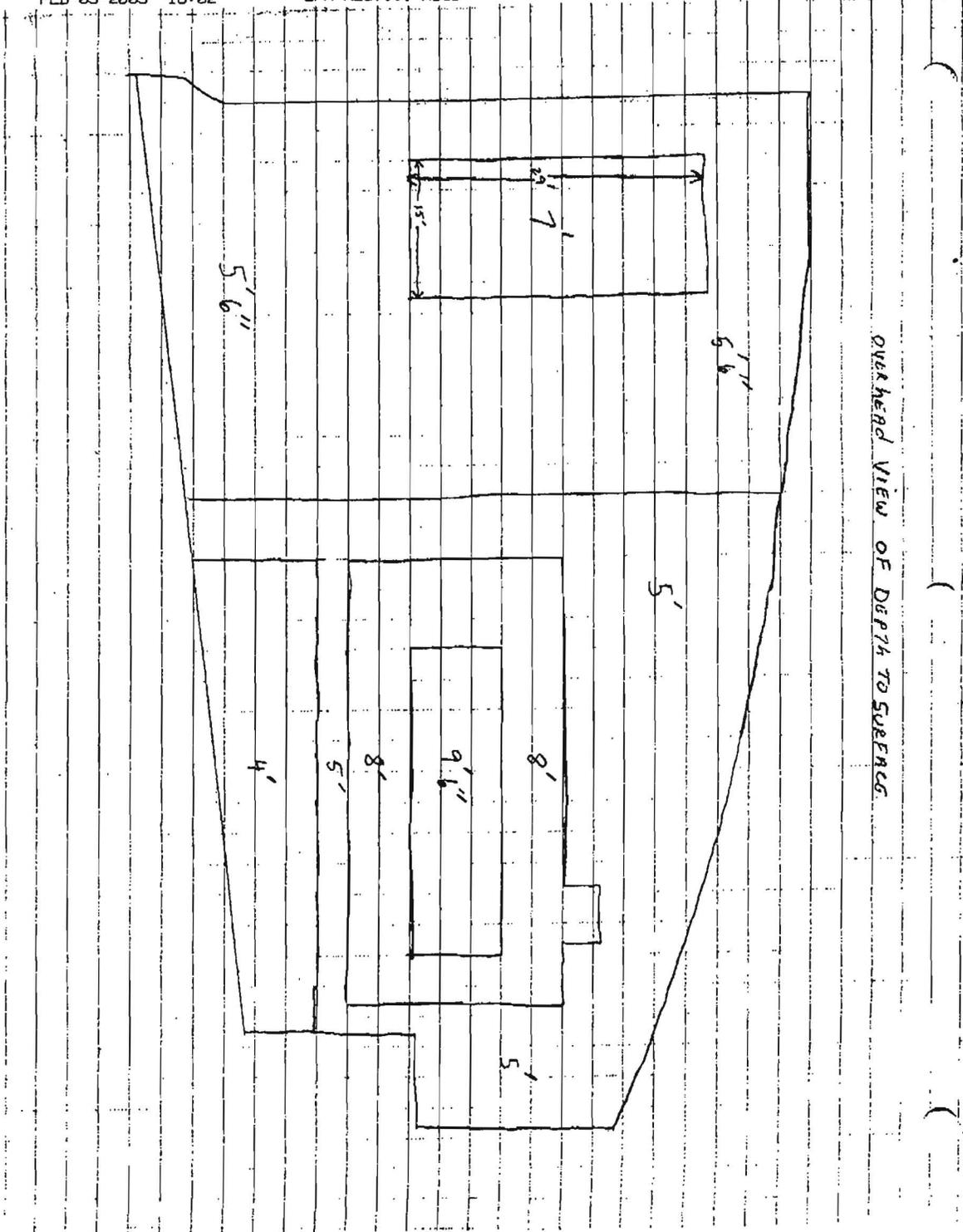
Figure 7: Depth of Confirmatory Soil Samples July 1997

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**Table 1: Groundwater Analysis 1998**  
Krewatch Site

CONTAMINANT	DelawareURS	DWC		DWK		DWL		MW1		MW2		MW3		MW4	
	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
1,2 Dichloroethane	5					1	J								
Chloroform	100							0.47	J						
Toluene	750							1	J						
Ethylbenzene	700							0.4	J						
Xylene (Total)	1200							2							
2 Methylphenol	180							18		30					
Di-n-butylphthalate	73	1	J	1	J	1	J								

URS Uniform Risk-Based Standard  
µg/L Micrograms per Liter  
DW Domestic Well  
MW Monitoring Well  
J Contaminant identification below the detection limit

**Table 2: Inorganic analysis data (Soil)**

CONTAMINANT	DE Unrestricted URS in mg/kg	Concentration Units mg/kg												
		Sample Location												
		F-21	F-22	F-23	F-24	F-25	F-27	F-28	F-29	SSP-1	SSP-2	SSP-3	SSP-4	OP-1
Aluminum*	12000	8390	5110	6430	5200	6070	17900	8080	4310	5920	29500	21100	9790	3770
Arsenic*	11	4.5		2.6	2.3		3.8				3.2		7.1	
Barium	550										61.3	55.5		
Chromium	220	9.7	5.9	7.6	6.5	6.9	21	8.1	4.4	5.6	25.6	20.7	7.9	3.8
Copper	310	11.4					7.5				7		11.4	
Iron*	22000	6550	4850	3950	4470	4500	13600	3400	2140	2840	16600	8610	3730	2790
Lead	400	10.4	7.5	6.5	7.1	7.9	10.4	5.3	4	4.7	6.8	6.8	7.8	4.9
Manganese	160	12.2	14	13.7	7.4	16	19.2	13.7	13.8	5.1	19.7	13.2	7.9	
Selenium	39		1.4						1.3					
Vanadium	55	16.3		13.7	12.5	11.9	34.8	13			34.2	24.9	18.2	
Zinc	2300	14.6	14.4	13.9	16.2	11.1	17.7	10	7.4	6.7	16.2	10.7	9.2	7.9
TPH	13000	49.9	75.7	117	579	603	61.6	60.1	117	110	142	181	150	566

\* Default background standard

**Table 3: Volatile organic analysis data (Soil)**

CONTAMINANT	DE Unrestricted URS in ug/kg	Concentration Units ug/kg												
		Sample Location												
		F-21	F-22	F-23	F-24	F-24RE	F-25	F-28	SSP-3	SSP-4	SSP-3RE	SSP-4RE	OP-1	OP-1RE
Acetone	780000	59	17	120	84	33	40	13		180	220	120	36	46
2-Butanone	400000		18	22						25		14		
Ethylbenzene	400000	20					19							
Toluene	650000				110	71								
Xylenes(total)	420000	92		37			100		6	17				

**Table 4: Semivolatile Organic (Soil)**

CONTAMINANTS	DE Unrestricted URS in ug/kg	Concentration Units ug/kg								
		Sample Location								
		F-21	F-22 F-23	F-24	F-24RE	F-25	SSP-2	SSP-4	OP-1	OP-1RE
2-Methylphenol	<b>390000</b>	490	1900 660	570	620	1200	730	1600		
Naphthalene	<b>160000</b>			1800	1700					
2-Methylnaphthlene	<b>160000</b>			390	500					
Phenanthrene	<b>1000000</b>								630	650
Fluoranthene	<b>310000</b>								430	400
Pyrene	<b>230000</b>								400	400
Acenaphthene	<b>470000</b>				1100					
Dibenzofuran	<b>3100</b>			880	880					
Flourene	<b>4700</b>			1200	1100					
Anthracene	<b>10000</b>			1600	1500					
Carbazole	<b>3200</b>			2500	2300					
Fluoranthene	<b>310000</b>			3000	3000					
Benzo[a]anthracene	<b>8000</b>			1700	1900					
Chrysene	<b>87000</b>			1900	1900					
Benzo[b]fluoranthene	<b>8000</b>			2400	1600					
Benzo[k]fluoranthene	<b>9000</b>			4100	1300				350	
Benzo[a]pyrene	<b>800</b>			140	140					
Indeno[1,2,3-cd]pyrene	<b>900</b>			440	380					
Benzo[g,h,i]perylene	<b>500000</b>			420	380					

**Table 5: Pesticides (Soil)**

DE Unrestricted URS ug/kg	Concentration Units ug/kg
beta-BHC	F-24 3.1

**Inspection Photos**

**Former Drum Burial Area**  
September 5, 2002



**Former Drum Storage and Oil Spill Areas**  
September 5, 2002

