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DRAFT GROUNDWATER QUALITY INVESTIGATION AT TRUMBO POINT BULK FUEL STORAGE FACILITY NAS KEY WEST FL

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TRUMBO POINT BULK FUEL STORAGE FACILITY

KEY WEST, FLORIDA

MONROE COUNTY

October, 1989

Florida Department of Environmental Regulation

Site Investigation Section

Ground-Water Investigation Report Number 89-05

by

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Executive Summary

A ground-water quality investigation was conducted in July, 1989 by the Site Investigation Section (SIS) in Key West, Florida on the United States Navy Trumbo Point Fuel Storage Facility. This investigation was conducted at the request of the DER Southeast District Branch Office Manager (Marathon). The purpose was to determine the type and source(s) of petroleum hydrocarbon contamination present in the ground-water and identify any additional areas requiring further study. Ground water quality data from a series of monitor wells (located within the facility) sampled by SIS personnel identified three primary areas of highly contaminated ground water and data from 1985 and 1986/87 studies conducted by Geraghty and Miller, Inc. aided in identifying two additional areas that need further study.

Primary Area 1, in the vicinity of Key West Pipeline CON tanks Numbers 2 and 3, is highly contaminated by the jet fuel and aviation fuel components benzene, xylene, toluene, ethylbenzene, naphthalene and lead. Primary Area 2, in the vicinity of U. S. Navy storage tanks D-4 and D-6 is highly contaminated with the diesel fuel components naphthalene, xylene and phenanthrene. Primary Area 3, in the vicinity of U. S. Navy storage tanks D-21 and D-3 is moderately contaminated with the jet fuel and diesel fuel components naphthalene, xylene and dimethyl naphthalene.

The 1985 and 1986/87 studies indicate two additional areas within the storage facility require additional study. The first area is located in the vicinity of U.S. Navy storage tanks D-5 and D-7. Ground-water samples (from a monitor well no longer in existence) and soil boring samples collected from this area during a 1985 study, were reported to emit a petroleum odor. However, ground-water and soil samples have never been collected for laboratory analyses. The second area is located in the vicinity of U. S. Navy

storage tanks D-1 and D-2. Geraghty and Miller, Inc. reported petroleum odors being emitted from a ground-water sample collected from monitor well MW-6 and several soil boring samples collected around these tanks. Again, soil and ground-water samples were never collected for laboratory analyses and MW-6 was destroyed prior to our study.

It is apparent that ground water contamination is present and that numerous violations of water quality standards exist. However, it will be necessary to have a complete understanding of the extent of contamination, potential sources and, avenues for contaminant migration before site remediation per Chapter 17-70, F.A.C. can be initiated.

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Trumbo Point Bulk Fuel Storage Facility

Key West, Florida

Monroe County

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1.0 Introduction

On July 11, representatives of the Florida Department of Environmental Regulation, Site Investigation Section visited the U.S. Navy bulk fuel storage facility located at Trumbo Point Annex in Key West, Florida (Figure 1.1). The purpose of the visit was to ascertain the extent of previously documented fuel spills at this facility by resampling existing monitor wells in and adjacent to the property. The results of this investigation are presented below.

2.0 Background

The bulk fuel storage facility was established at Trumbo Point Annex by the U.S. Navy in 1917. It was of relative insignificance until 1942, when 19 large capacity fuel storage tanks and a network of underground pipelines (designed to transmit fuel into and out of the facility) were constructed on the site to accommodate Naval vessels during World War II. Through the ensuing years, these tanks, along with three others added in 1963, have contained several types of fuel as well as hazardous waste (waste oil and hydraulic fluids) and Bunker C crude oil (Naval Assessment Study, 1985). Some of these tanks have since been disassembled, others are now inactive. Presently, ten tanks contain fuel. Figure 2.1 and Table 2.1 show the locations of these tanks and the historical data associated with each.

In April of 1985, the Navy secured the services of Geraghty and Miller,

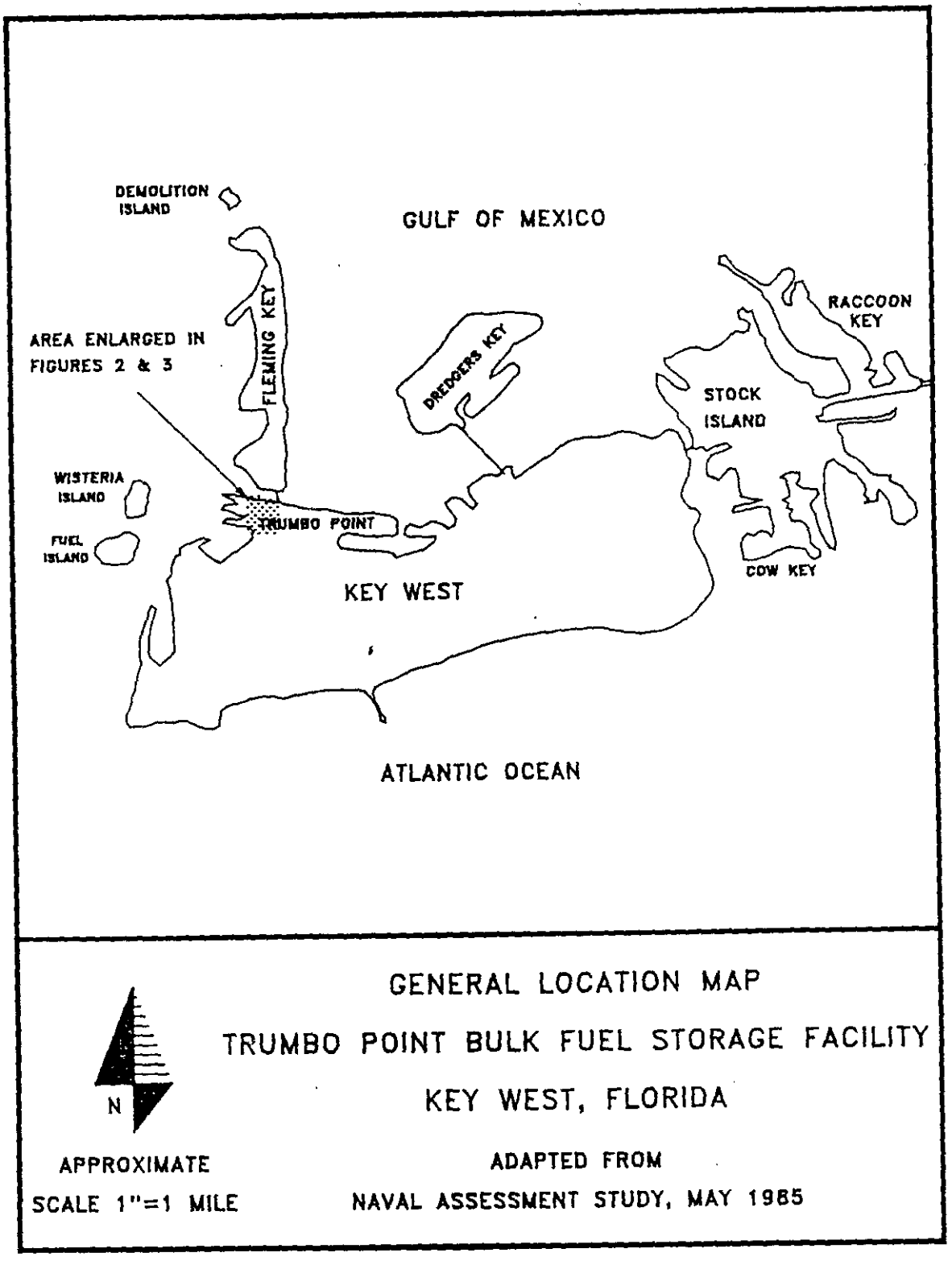
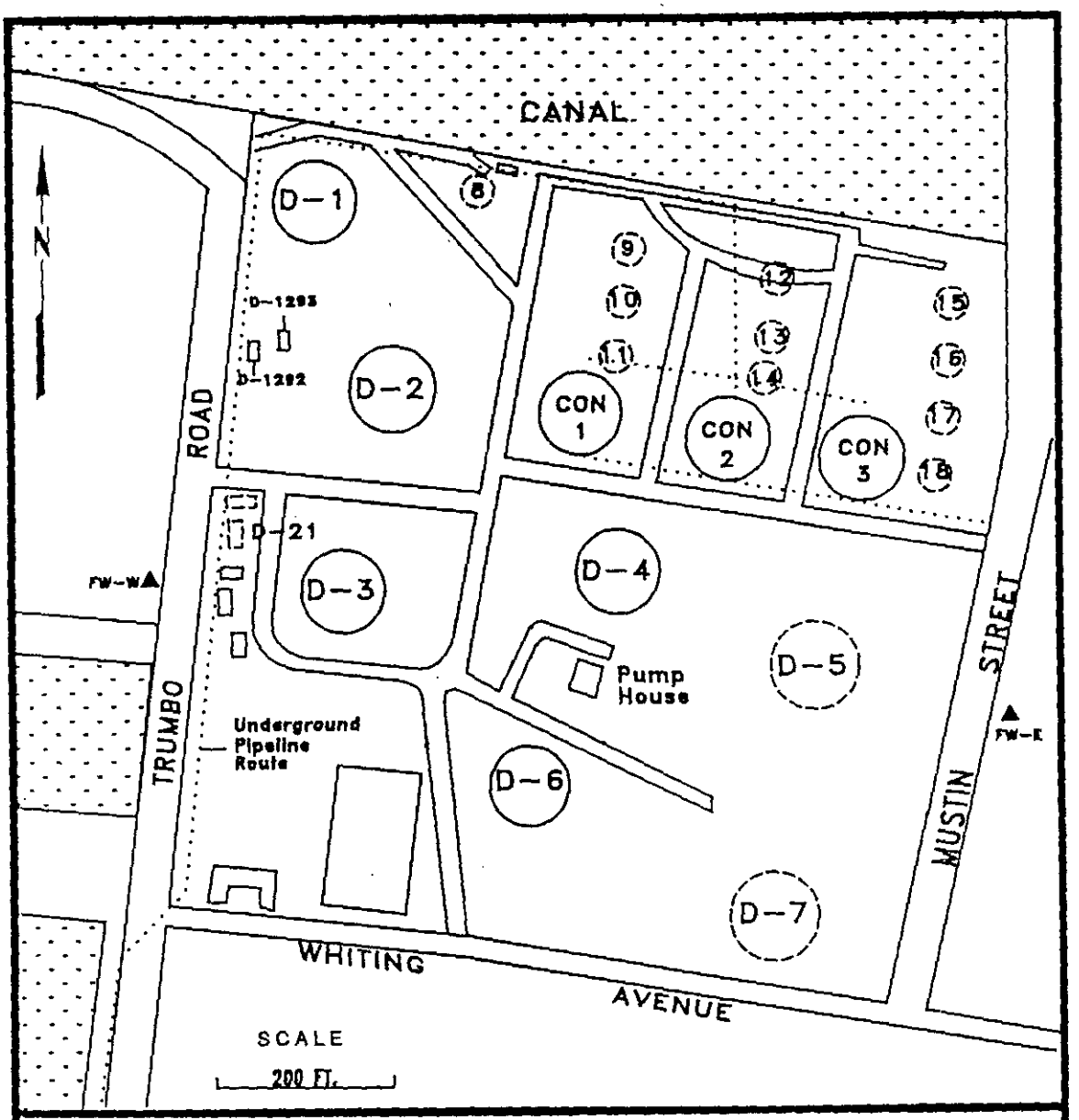

DEMOLITION ISLAND
GULF OF MEXICO
FLEMING KEY
AREA ENLARGED IN FIGURES 2 & 3
DREDGERS KEY
RACCOON KEY
STOCK ISLAND
WISTERIA ISLAND
TRUMBO POINT
FUEL ISLAND
COW KEY
KEY WEST
ATLANTIC OCEAN
N
APPROXIMATE SCALE 1"=1 MILE
GENERAL LOCATION MAP
TRUMBO POINT BULK FUEL STORAGE FACILITY
KEY WEST, FLORIDA
ADAPTED FROM
NAVAL ASSESSMENT STUDY, MAY 1985

FIGURE 1.1



TRUMBO POINT BULK FUEL STORAGE FACILITY

Location of active tanks

Location of demolished or inactive tanks

Location of fire protection supply wells

ADAPTED FROM GERAGHTY & MILLER, 1985

FIGURE 2.1

Table 2.1
Historical Information, Trumbo Point Bulk Storage Facility

Tank No.	Product Type	Tank Status	Size (KGAL)	Date Constructed	Last Used	Date Demolished
D-1	Diesel	Active	567	1942	--	--
D-2	Diesel	Active	586	1942	--	--
D-3	Diesel	Active	586	1942	--	--
D-4	Diesel	Out of Service	1155	1942	1988	--
D-6	Waste Oil	Active	1155	1942	--	--
D-15	Bunker C	Inactive	?	1942	1973	--
D-16	Water	Inactive	?	1942	1971	--
D-17	Water	Inactive	?	1942	1971	--
D-18	Water	Inactive	?	1942	1971	--
D-21	Hazardous Waste[1]	Inactive	1	1942	1982	--
D-1292	Mogas[2]	Active	15	1900	--	--
D-1293	Mogas	Out of Service	15	1900	--	--
Con-1	JP-5	Active	2100	1966	--	--
Con-2	JP-5	Active	2100	1966	--	--
Con-3	JP-5	Active	1050	1966	--	--
D-5	Waste Oil	Demolished	1155	1942	1985	1985
D-7	Empty	Demolished	1155	1942	1985	1985
D-8	Avgas[3]	Demolished	?	1942	1971	1985
D-9	Avgas	Demolished	?	1942	1971	1985
D-10	Avgas	Demolished	?	1942	1971	1985
D-11	Avgas	Demolished	?	1942	1971	1985
D-12	Avgas	Demolished	?	1942	1971	1985
D-13	Avgas	Demolished	?	1942	1971	1985
D-14	Avgas	Demolished	?	1942	1971	1985

Table Information Adapted From Geraghty & Miller, 1988
[1]Hazardous Waste - waste oil and hydraulic fluids.
[2]Mogas - motor gasoline.
[3]Avgas - aviation gasoline.

Inc. to conduct a preliminary ground-water investigation at Trumbo Point. The purpose of the investigation was to determine whether past fuel handling practices at the facility had visually contaminated the ground water and, if so, to identify the extent of contamination. Of primary concern to the Navy was a diesel fuel loss near storage tank D-4 and an alleged jet fuel loss in the area of CON tank 2, from a pipeline owned and maintained by Key West Pipeline Company. Ten 2 inch PVC monitor wells (MW-1 through MW-10, Figure 2.2) were installed to depths of 15 feet below land surface (BLS) within the storage facility. Ground-water samples were collected for visual inspection and total dissolved solids (TDS) analyses. If undissolved product was observed in the samples, its presence was reported, however, no ground-water samples were collected for water quality analyses. Two of the wells, MW-4 and MW-7, were reported to contain undissolved product in thicknesses of 1.39 feet and 0.31 feet, respectively. Total dissolved solids levels ranged from 970 to 2,160 milligrams per liter (mg/l) indicating this aquifer is classified as G-II (having less than 10,000 mg/l TDS pursuant to Chapter 17-3.403, F.A.C.).

At the request of the Navy, Geraghty and Miller, Inc. conducted a follow-up investigation at Trumbo Point in July of 1986. Six additional monitor wells (KWM-20 through KWM-25) were drilled. Ground-water samples were then collected from six of the sixteen monitor wells (KWM-20, KWM-25, MW-2, MW-5, MW-9 and MW-10) and analyzed for purgeable aromatic and base-neutral extractable organic compounds. One well (MW-9) contained benzene and ethylbenzene at levels of 8,000 parts per billion (ppb) and 2,500 ppb, respectively. This well was also found to contain 180 ppb of naphthalene. Analytical data for the remaining monitor wells sampled during this event reported no measureable concentrations of contaminants.

In addition, ground-water samples from the monitor wells not samples for

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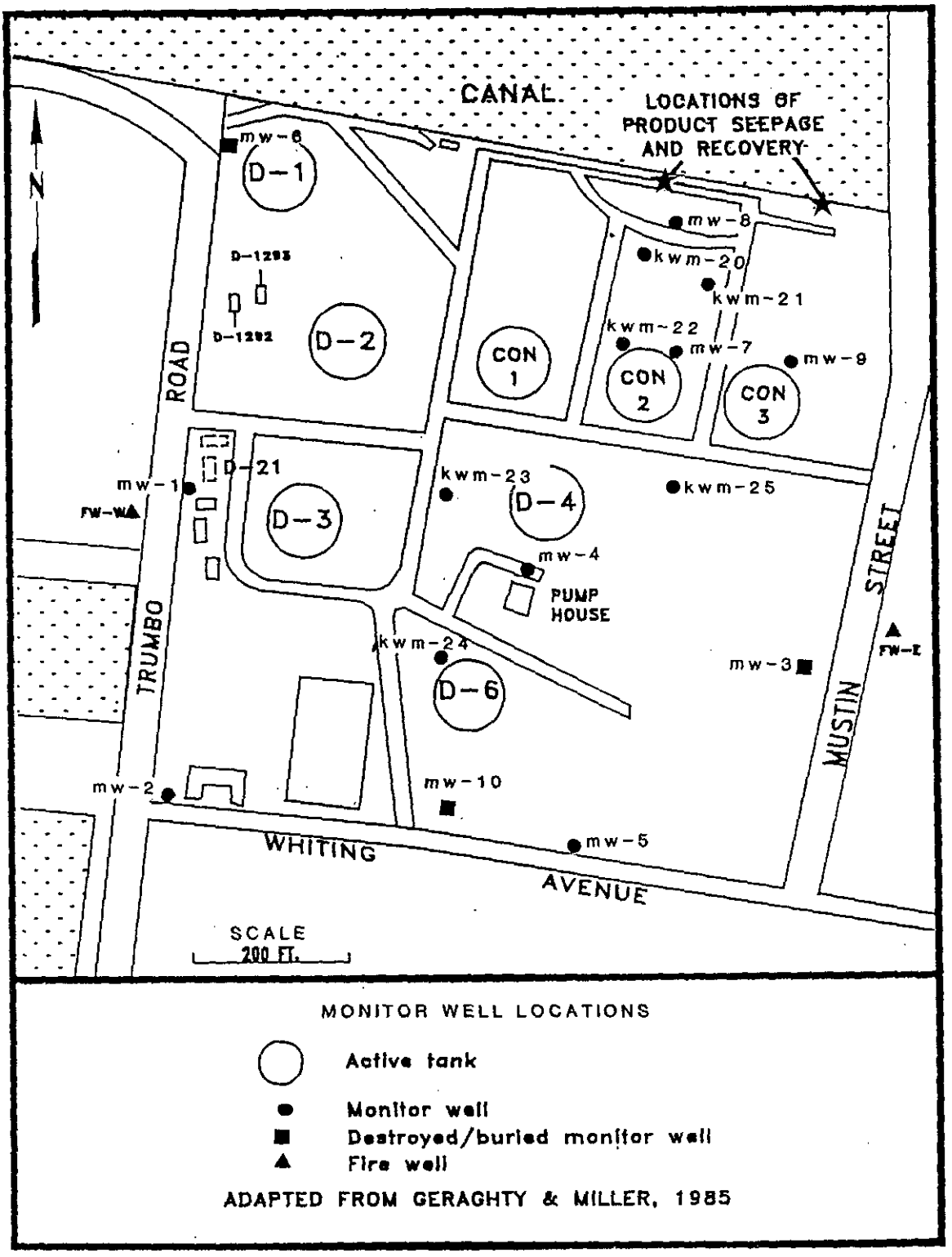

FIGURE 2.2

water quality analyses (excluding MW-3 and MW-6 which were destroyed prior to the 1986/87 study) were visually inspected. Five wells (MW-1, MW-4, MW-7, KWM-22 and KWM-23) were found to contain undissolved product, ranging in apparent thickness from 0.16 feet in MW-4 to 4.80 feet in KWM-22. Undissolved product thickness measurements have been recorded at the Trumbo Point storage facility since 1985 and are presented in Table 2.2.

In October of 1987, undissolved product was observed seeping from the seawall into an adjacent canal located on the northern boundary of the storage facility (Figure 2.2). Naval personnel patched the seawall and, subsequently, removed 1,600 gallons of fuel (tentatively identified as JP5 jet fuel) from a recovery pit constructed along the seawall. In January of 1988, fuel collection activities were discontinued and product seepage into the recovery pit or thru the seawall has not reoccurred.

3.0 Site Conditions

3.1 Topography and Drainage

According to Geraghty and Miller, Inc. (June 1985) elevations at the storage tank facility range from 3 to 6 feet above National Geodetic Vertical Datum (NGVD). A series of connected berms and elevated roads traverse the site and serve as flow restrictors in the event of a major spill. As a result, natural drainage of the site has been altered and surface water either percolates into the underlying sediments or is routed to underground storm drains that discharge into the sea (Naval Assessment Study, 1985).

3.2 Geology

Geraghty and Miller (June, 1985) report surficial sediments at the Trumbo

Table 2.2
Undissolved Product Thickness Measurement Summary

	Measurement Date					
Well Name	4/85'	7/9/86'	7/10/86'	8/4/86'	4/15/88'	7/11/89"
MW-1	0	0.47	0.39	0.61	0.31	*
MW-2	0	0	0	--	0	0
MW-3	0	--	--	--	--	--
MW-4	1.39	--	0.16	0.48	0	0.08
MW-5	0	0	0	0	0	0
MW-6	0	--	--	--	--	--
MW-7	0.31	0	1.59	1.20	0	2.46
MW-8	0	--	--	--	--	*
MW-9	0	0	0	0	0	*
MW-10	0	0	'0	0	0	--
KWM-20	--	0	0	0	3.26	*
KWM-21	--	--	0	0	0.70	*
KWM-22	--	*	4.80	0	4.65	1.77
KWM-23	--	2.66	2.96	5.80	7.71	*
KWM-24	--	--	0	0	6.27	*
KWM-25	--	0	0	0	0	0

Apparent thicknesses of hydrocarbons are measured in feet.
* - Presence of hydrocarbon detected but not measureable.
' - Sampled by Geraghty & Miller using electronic probe.
" - Sampled by FDER using Interface probe.
-- - Not measured.

Point storage facility consist of fill materials ranging in thickness from nine to thirteen feet. These unconsolidated sediments (silt, sand, shell and limestone fragments) exhibit relatively low permeability as evidenced by slow surface infiltration of storm water. The surficial sediments are underlain by the Miami Oolite. This Pleistocene formation is a highly porous, oolitic limestone into which all monitor wells were completed. In Key West, this formation is approximately 20 feet thick. Beneath the Miami Oolite lies the Key Largo Limestone. This Pleistocene carbonate is a hard, highly permeable formation approximately 180 feet thick.

A natural gamma log of the storage facilities fire protection supply well located on Trumbo Road is presented in Figure 3.1. It indicates the Miami Oolite to be approximately 18 feet thick, with the top of the formation occurring at six feet BLS (DER, July 1989). At 24 feet BLS a marked lithology change appears to occur and is presumed to represent the formation top of the Key West Limestone.

3.3 Ground-Water Occurrence and Use

In Key West the surficial aquifer is contained within the Miami Oolite and the Key Largo Limestone. Water quality in this aquifer ranges from potable (fresh) to hypersaline. Although fresh water lenses exist on the island they are not widely utilized as a source of potable ground-water due to the risk of salt water intrusion and the shallow nature of their occurrence. Most residents of Key West obtain their fresh water via a 130 mile pipeline extending through the Keys southwest from the mainland. Some potable water is still obtained from shallow wells, however, there are no fresh water supply wells at the Key West Naval Air Station (Naval Assessment Study, 1985).

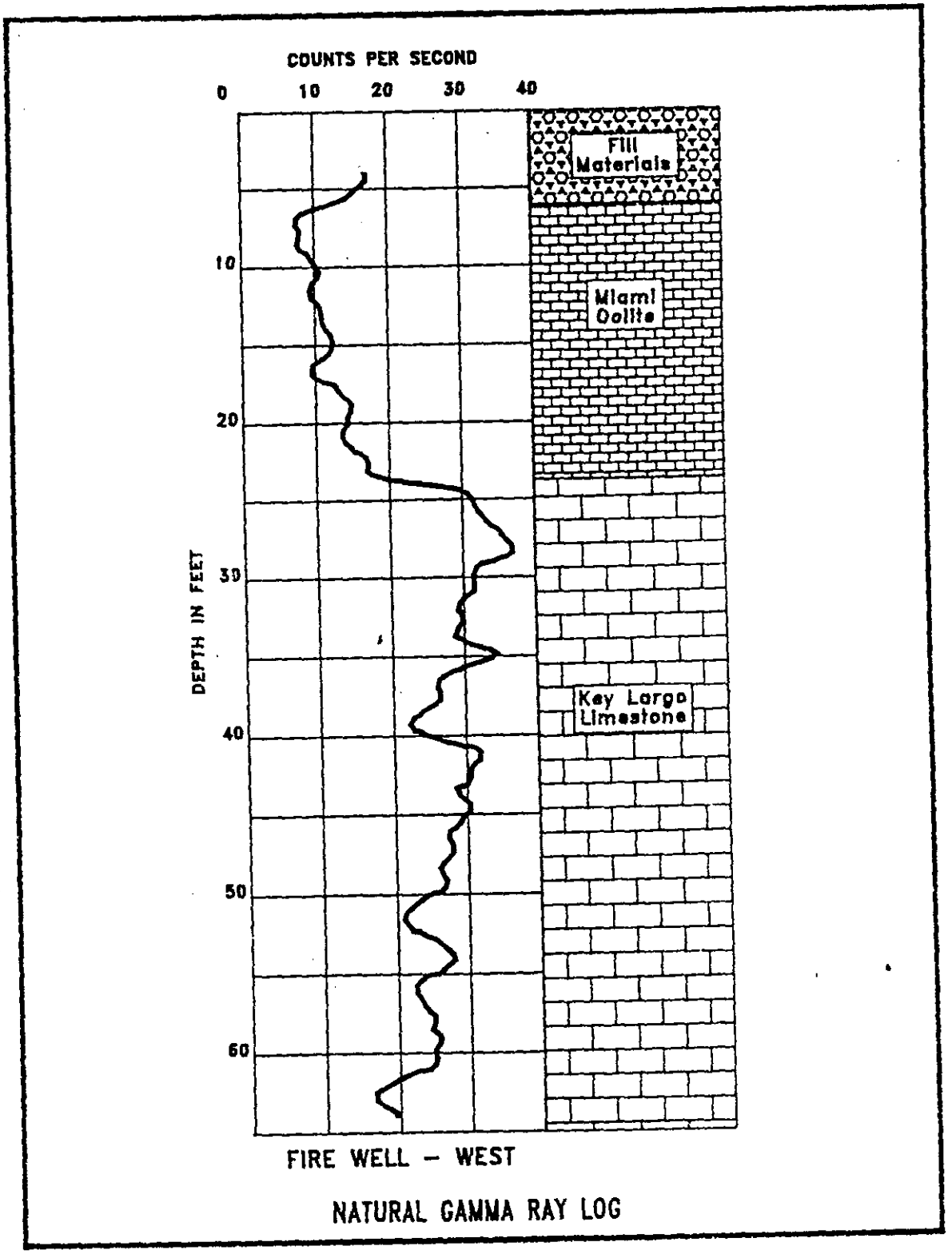
COUNTS PER SECOND
0
10
20
30
40
DEPTH IN FEET
10
20
30
40
50
60
Fill Materials
Miami Oolite
Key Largo Limestone
FIRE WELL - WEST
NATURAL GAMMA RAY LOG

FIGURE 3.1

3.4 Ground-Water Flow

Water levels at Trumbo Point are influenced by tidal activity. The high permeabilities of the Key Largo Limestone and the Miami Oolite allow seawater to move freely into and out of these formations. The Naval Assessment Study of 1985 reports ground-water flowing toward the Gulf at high tide and toward the Atlantic at ebb. However, net ground-water flow at the storage facility was found to be radial from the center of the facility toward the nearest body of water (Geraghty and Miller in 1985).

On July 11, the Site Investigation Section took one set of ground-water level measurements from the accessible monitor wells at the storage facility. Ordinarily, several sets of measurements would have been taken to account for tidal influence. However, this was considered to be outside the scope of this investigation due to the limited amount of time available. With the exception of monitor wells MW-7 and KWM-22, where ground-water levels were influenced by the presence of undissolved product, ground-water levels indicate flow in the general direction of the adjacent canal to the north, which substantiates earlier findings by Geraghty and Miller.

4.0 Field Activities

Prior to the collection of ground-water samples, undissolved product thickness, water level and total depth measurements were taken for each accessible monitor well. These measurements were taken relative to the top-of-casing elevations provided by Geraghty and Miller (Table 4.1). Water and fuel levels were measured with an Oil Recovery Systems Interface Probe (TM) which was decontaminated prior to insertion into each well. Three of the

Table 4.1
Ground-Water Elevation and Apparent Undissolved Product
Thickness Measurements - 7/11/89

Well ID	Top of Casing (feet NGVD)	Total Depth (feet BLS)	Apparent Hydrocarbon Thickness (feet)	Ground Water Level (feet BTOC)	Ground Water Elevation (feet NGVD)
MW-1	5.82	12.30	NP	5.05	0.77
MW-2	6.11	12.64	NP	5.02	1.09
MW-3	Buried by fill material - unable to locate				
MW-4	7.59	10.33	0.08	7.15	0.51
MW-5	6.79	12.72	NP	4.89	1.90
MW-6	Destroyed prior to DER investigation				
MW-7	7.33	9.90	2.46	8.56	.86
MW-8	NA	12.31	NP	6.05	
MW-9	6.99	12.82	NP	6.20	0.79
MW-10	Buried by fill material - unable to locate				
KWM-20	6.99	14.80	NP	6.28	0.71
KWM-21	7.64	14.80	NP	6.75	0.89
KWM-22	7.72	14.40	1.77	8.44	.83
KWM-23	6.85	15.00	NP	5.83	1.02
KWM-24	6.63	14.85	NP	5.71	0.92
KWM-25	7.09	14.73	NP	6.35	0.74
FW-E	NA	56.00	NP	6.80	
FW-W	NA	64.80	NP	6.15	

NGVD - National Geodetic Vertical Datum
BLS - Below Land Surface
NP - Not Present

wells (MW-4, MW-7 and KWM-22) showed measureable quantities of undissolved product (Table 4.1) and the majority of wells (excluding MW-2, MW-5 and KWM-25) exhibited a hydrocarbon odor. Adjacent to the bulk storage facility, on its east and west boundaries, are two fire wells from which ground-water samples, water level and total depth measurements were also taken. No undissolved product or hydrocarbon odor was detected in these wells.

Ground-water samples for water quality analyses were collected on July 11 and 12, 1989. Prior to sampling, each well was purged of a minimum of three casing volumes. Cross-contamination of the wells from purging was avoided by using new sections of clean, disposable polyethylene tubing. Each of the wells was then sampled with laboratory-cleaned Teflon or disposable PVC bailers.

All samples collected during the investigation were analyzed for purgeable organics per EPA Methods 601 and 602, base-neutral acid extractables per EPA Method 625, PCBs per EPA Method 608 and for the metals arsenic, cadmium, chromium, copper, iron and lead.

Purgeable samples were collected in 40 milliliter glass vials containing HCl as a preservative. Individual samples were bagged in plastic and sealed in steel cans containing vermiculite to preclude cross contamination. Base-neutral acid extractables and PCBs were collected in one liter glass bottles and metals were collected in 150 milliliter plastic bottles containing HNO_3 as a preservative. All samples were then packed in ice and delivered to Savannah Laboratories in Tallahassee for analyses. At all times, during collection, storage and delivery, strict chain-of-custody policies were adhered to.

Following sample collection, in-situ field parameters (temperature, pH, and conductivity) were measured in monitor wells MW-2, MW-5 and KWM-25 using a Hydrolab Digital Model 4041 (Table 4.2). Between wells the Hydrolab probe was

Table 4.2
Field Parameter Measurememts 7/12/89

Well Name	Temperature Centigrade	pH (Std. Units)	Conductivity (umhos/cm)
MW-2	30.2	6.8	2280
MW-5	29.4	6.8	1776
KWM-25	27.9	6.8	1402

washed with Alconox soap followed by an isopropanol rinse to avoid the possibility of cross-contamination. In-situ parameters for the remaining monitor wells were not measured. Their suspected contamination levels were judged too high to risk damaging the Hydrolab probe.

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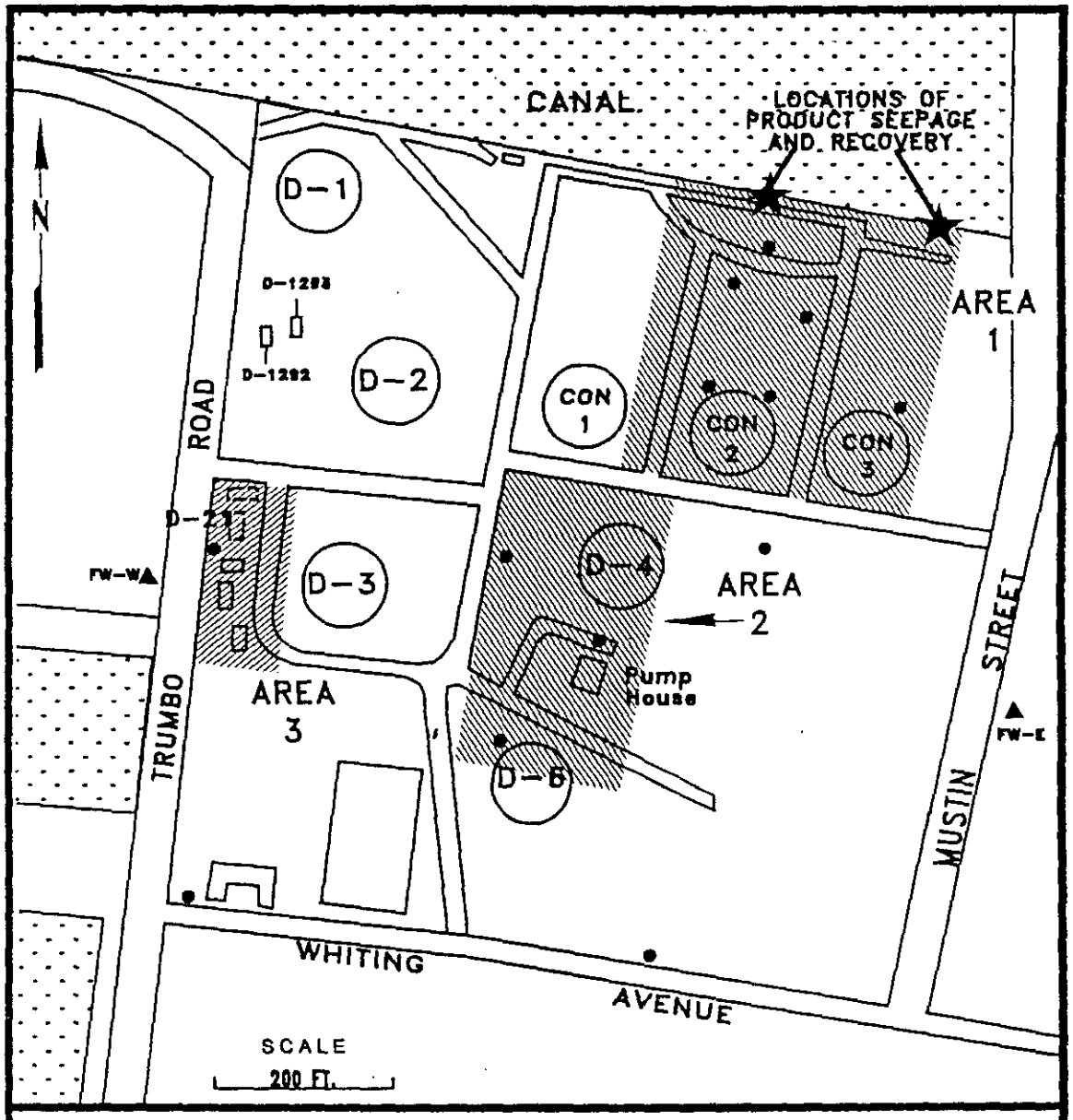
5.0 Water Quality

Shallow ground water beneath the Trumbo Point storage facility is classified by the Environmental Regulation Commission as G-II. This category includes ground water containing 10,000 parts per million or less of total dissolved solids (per Chapter 17-3.403, F.A.C.). The Environmental Regulation Commission considers G-II ground water to be potable or of potential use as a source of drinking water. Water quality standards for this ground water are set forth and regulated by Chapter 17-22.210, F.A.C. Laboratory analytical data for ground-water samples collected by FDER at the Trumbo Point facility document three areas of ground-water degradation and numerous violations of ground-water quality standards (Figure 5.1). A complete summary of analytical results for all ground-water samples collected by FDER at the Trumbo Point facility is presented in Tables 5.1 thru 5.5 and laboratory data sheets are provided in the Appendix.

Area 1

This area is in proximity to Key West Pipeline CON tanks Numbers 2 and 3, and includes monitor wells MW-7, MW-8, MW-9, KWM-20 and KWM-22 (Figure 5.1). Undissolved product thickness measurements collected from monitor wells on 7/11/89 recorded the presence of undissolved petroleum in two wells. These



TRUMBO POINT BULK FUEL STORAGE FACILITY

PRIMARY AREAS OF CONTAMINATION

ADAPTED FROM GERAGHTY & MILLER, 1985

FIGURE 5.1

Table 5.1 Ground-Water Quality Analytical Results
Volatile Organic Compounds

Well ID	Contaminant	Concentration (ug/l)
Equipment Blank 1	ND	
Equipment Blank 2	ND	
Fire Well-West	ND	
Fire Well-East	ND	
MW-1	Toluene	74
	Xylenes	470
MW-2	ND	
MW-4	Ethylbenzene	1.3
MW-5	ND	
MW-5(Dup.)	ND	
MW-7	Benzene	17000
	Ethylbenzene	4300
	Toluene	6500
	Xylenes	170000
MW-8	Toluene	160
	Xylenes	1900
MW-9	Benzene	150
	Toluene	1500
	Xylenes	3100
KWM-20	Xylenes	630
KWM-22	Benzene	270
	Ethylbenzene	200
	Toluene	310
	Xylenes	530
KWM-23	Toluene	55
	Xylenes	2200
KWM-23(Dup.)	Toluene	38
	Xylenes	550
KWM-24	Benzene	24
	Ethylbenzene	31
	Toluene	93
	Xylenes	920
KWM-25	ND	

Table 5.2
Ground Water Quality Results
Extractable Organic Compounds

Well ID	Contaminant	Concentration*
Fire Well-West	ND	
Fire Well-East	ND	
MW-1	ND	
MW-2	ND	
MW-4	Naphthalene	34 ug/1
MW-5	ND	
MW-5(Dup.)	ND	
MW-7	Naphthalene	2,200,000 ug/Kg
MW-8	Naphthalene	1,200,000 ug/Kg
MW-9	Bis(2-Ethylhexyl)phthalate	22 ug/1
	Naphthalene	210 ug/1
	2,4-Dimethylphenol	26 ug/1
	Phenol	16 ug/1
KWM-20	Naphthalene	2,100,000 ug/Kg
KWM-22	Naphthalene	2,700,000 ug/Kg
KWM-23	Naphthalene	1,300,000 ug/Kg
	Phenanthrene	580,000 ug/Kg
KWM-23(Dup.)	Naphthalene	1,300,000 ug/Kg
	Phenanthrene	590,000 ug/Kg
KWM-24	Phenanthrene	690,000 ug/Kg
KWM-25	ND	

*Concentrations expressed in ug/1 represent single water phase samples. Concentrations expressed in ug/kg represent two phase (water and organic) samples. In this case a sample of the organic phase was drawn and weighed prior to analysis.

Table 5.3
Ground Water Quality Analytical Results - PCB

Well ID	Contaminant
Fire Well-West	ND
Fire Well-East	ND
MW-1	ND
MW-2	ND
MW-4	ND
MW-5	ND
MW-5(Dup.)	ND
MW-7	ND
MW-8	ND
MW-9	ND
KWM-20	ND
KWM-22	ND
KWM-23	ND
KWM-23(Dup.)	ND
KWM-24	ND
KWM-25	ND

ND = Nothing Detected
Detection Limit = 0.05 micrograms per liter (ug/l)

Table 5.4
Ground Water Quality Analytical Results - Metals (mg/l)

Well ID	Arsenic *(0.05)	Cadmium *(0.01)	Chromium *(0.05)	Copper *(1.0)	Iron *(0.300)	Lead *(0.05)
Fire Well-West	ND	ND	ND	ND	.83	ND
Fire Well-East	ND	ND	ND	ND	.014	ND
MW-1	.062	ND	ND	.036	10	.075
MW-2	ND	ND	ND	ND	2.8	ND
MW-4	.076	ND	ND	ND	3.3	ND
MW-5	.045	ND	ND	ND	1.8	ND
MW-5(Dup.)	.11	ND	.015	.011	8.0	ND
MW-7	.38	.0094	.076	.093	240	1.4
MW-8	.10	.0091	.031	.12	17	.070
MW-9	.10	ND	.014	ND	53	.0074
KWM-20	.020	ND	ND	.056	1.9	.026
KWM-22	ND	.0069	ND	.034	8.2	4.1
KWM-23	.021	.023	ND	ND	6.6	.0061
KWM-23(Dup.)	.034	.017	ND	ND	5.8	.0083
KWM-24	.035	ND	ND	ND	1.7	.0066
KWM-25	.028	ND	ND	.064	11	.0088

*Water Quality Standard (mg/l) Chapter 17-22.210, F.A.C.
ND = Nothing detected

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Table 5.5
Ground Water Quality Results
Tentatively Identified Compounds (TICs)

Well ID	Volatile Organics	Extractable Organics	Concentration*
Fire Well-West	ND	ND	
Fire Well-East	ND	ND	
MW-1	ND	Unknown hydrocarbon C_{11} - C_{20}	7,100,000 ug/kg
		Unknown hydrocarbon C_{13} - C_{43}	5,300,000 ug/kg
		Unknown dimethyl naphthalene	3,700,000 ug/kg
		Unknown hydrocarbon C_{12} - C_{28}	3,500,000 ug/kg
		Unknown trimethyl octane	3,300,000 ug/kg
		Unknown hydrocarbon C_{11} - C_{18}	3,100,000 ug/kg
		Unknown hydrocarbon	3,100,000 ug/kg
		Unknown hydrocarbon C_{13} - C_{44}	3,100,000 ug/kg
		Unknown	2,400,000 ug/kg
		Unknown	2,300,000 ug/kg
MW-2	ND	ND	
MW-4	ND	2-Methyl naphthalene	79 ug/l
		Unknown	77 ug/l
		Unknown hydrocarbon C_{13} - C_{20}	66 ug/l
		Unknown alkyl benzene	61 ug/l
		1-Methyl naphthalene	61 ug/l
		Unknown	59 ug/l
		Unknown	50 ug/l
		Unknown	47 ug/l
		Unknown	47 ug/l
		Unknown hydrocarbon C_{11} - C_{44}	46 ug/l
MW-5	ND	Unknown	31 ug/l
		Unknown	7.4 ug/l
MW-5(Dup.)	ND	Unknown	20 ug/l
MW-7	ND	Unknown hydrocarbon C_6 - C_{12}	22,000,000 ug/kg
		Unknown hydrocarbon C_{13}	18,000,000 ug/kg
		Unknown	16,000,000 ug/kg
		Unknown hydrocarbon C_{11} - C_{15}	16,000,000 ug/kg
		Unknown hydrocarbon C_{13} - C_{43}	15,000,000 ug/kg
		Unknown hydrocarbon	14,000,000 ug/kg
		Unknown	14,000,000 ug/kg
		Unknown	13,000,000 ug/kg
		Unknown hydrocarbon	12,000,000 ug/kg
		Unknown hydrocarbon	11,000,000 ug/kg

Table 5.5 (continued)
Ground Water Quality Results
Tentatively Identified Compounds (TICs)

Well ID	Volatile Organics	Extractable Organics	Concentration*
MW-8	ND	Unknown hydrocarbon C_{10} - C_{13}	34,000,000 ug/kg
		Unknown alkyl octane	19,000,000 ug/kg
		Unknown trimethyl dodecane	17,000,000 ug/kg
		Unknown dimethyl undecane	17,000,000 ug/kg
		Unknown hydrocarbon	15,000,000 ug/kg
		Unknown tetra hydro-methyl naphthalene	13,000,000 ug/kg
		Unknown	13,000,000 ug/kg
		Unknown alkyl octane	13,000,000 ug/kg
		Unknown hydrocarbon	11,000,000 ug/kg
		Unknown	11,000,000 ug/kg
MW-9	ND	Unknown hydrocarbon C_{10} - C_{14}	230 ug/1
		2-Methyl-naphthalene	190 ug/1
		Unknown hydrocarbon C_{13}	120 ug/1
		Unknown alkyl benzene	108 ug/1
		Unknown hydrocarbon C_{11} - C_{15}	100 ug/1
		Unknown	82 ug/1
		Unknown hydrocarbon	81 ug/1
		Unknown hydrocarbon C_{13}	81 ug/1
		Unknown PAH - C_{11}	78 ug/1
		Unknown	77 ug/1
KWM-20	ND	Unknown hydrocarbon	36,000,000 ug/kg
		Unknown hydrocarbon C_{10} - C_{15}	20,000,000 ug/kg
		Unknown hydrocarbon C_{11} - C_{15}	17,000,000 ug/kg
		Unknown hydrocarbon C_{13}	17,000,000 ug/kg
		Unknown hydrocarbon C_{10} - C_{13}	16,000,000 ug/kg
		Unknown hydrocarbon	16,000,000 ug/kg
		Unknown	14,000,000 ug/kg
		Unknown hydrocarbon	14,000,000 ug/kg
		Unknown hydrocarbon C_{11} - C_{15}	13,000,000 ug/kg
		Unknown hydrocarbon C_{11} - C_{19}	13,000,000 ug/kg
KWM-22	ND	Unknown hydrocarbon C_{11} - C_{13}	32,000,000 ug/kg
		Unknown hydrocarbon C_{11} - C_{15}	21,000,000 ug/kg
		Unknown hydrocarbon C_6 - C_{12}	20,000,000 ug/kg
		Unknown hydrocarbon C_{13}	18,000,000 ug/kg
		Unknown	16,000,000 ug/kg
		Unknown hydrocarbon C_{11} - C_{19}	16,000,000 ug/kg
		Unknown aromatic hydrocarbon	15,000,000 ug/kg
		Unknown hydrocarbon	14,000,000 ug/kg
		Unknown	13,000,000 ug/kg
		Unknown	13,000,000 ug/kg

Table 5.5 (continued)
Ground Water Quality Results
Tentatively Identified Compounds (TICs)

Well ID	Volatile Organics	Extractable Organics	Concentration*
KWM-23	ND	Unknown hydrocarbon C_4 - C_{20}	27,000,000 ug/kg
		Unknown hydrocarbon C_{10} - C_{43}	20,000,000 ug/kg
		Unknown hydrocarbon C_{13} - C_{15}	16,000,000 ug/kg
		Unknown hydrocarbon C_{13} - C_{44}	14,000,000 ug/kg
		Unknown hydrocarbon C_{11} - C_{17}	13,000,000 ug/kg
		Unknown	13,000,000 ug/kg
		Unknown alkyl octane	11,000,000 ug/kg
		Unknown	9,900,000 ug/kg
		Unknown trimethyl naphthalene	9,600,000 ug/kg
		Unknown	9,300,000 ug/kg
KWM-24	ND	Unknown hydrocarbon C_{13} - C_{19}	21,000,000 ug/kg
		Unknown hydrocarbon C_{10} - C_{21}	17,000,000 ug/kg
		Unknown hydrocarbon C_{13} - C_{18}	16,000,000 ug/kg
		Unknown hydrocarbon C_{13} - C_{44}	11,000,000 ug/kg
		Unknown hydrocarbon C_{11} - C_{19}	9,000,000 ug/kg
		Unknown	9,000,000 ug/kg
		Unknown	9,000,000 ug/kg
		Unknown alkyl octane	8,700,000 ug/kg
		Unknown trimethyl naphthalene	8,200,000 ug/kg
		Unknown trimethyl naphthalene	8,200,000 ug/kg
KWM-25	ND	Unknown	6.3 ug/l

*Concentrations expressed in ug/l represent single water phase samples. Concentrations expressed in ug/kg represent two phase (water and organic) samples. In this case, a sample of the organic phase was drawn and weighed prior to analysis.

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wells, MW-7 and KWM-22, contained apparent product thicknesses of 2.46 feet and 1.77 feet, respectively (Table 4.1). Water in monitor wells MW-8, MW-9 and KWM-20 exhibited strong hydrocarbon odor but no product was evident in measurable quantities. Analytical data for samples collected from these wells indicate the ground water is highly contaminated with volatile organics, extractable organic compounds and several metals.

Samples collected from monitor wells MW-7, MW-9 and KWM-22 contain the volatile organic compound (VOC) benzene at concentrations that greatly exceed the water quality standard of one microgram per liter (ug/l). The VOCs xylene and toluene are also present in moderate to high concentration in wells MW-7, MW-8, MW-9, KWM-20 and KWM-22 (Table 5.1). The base-neutral compound naphthalene is present in moderate to high concentration in samples collected from monitor wells MW-7, MW-8, MW-9, KWM-20 and KWM-22. In addition, the ground-water sample collected from monitor well MW-9 contained (2-ethylhexyl)-phthalate, 2,4-Dimethylpenol and phenol (Table 5.2).

Several metals were also identified in samples collected from these monitor wells (Table 5.4). Of greatest significance are the lead values reported for samples collected from monitor wells MW-7 (1.4 mg/l) and KWM-22 (4.1 mg/l). Lead concentrations in both wells are obviously elevated and exceed the water quality standard for lead of .05 milligrams per liter (mg/l). Other metals and numerous tentatively identified extractable organic compounds (TICs) are reported in moderate to high concentrations in all ground-water samples collected from monitor wells in this area (Tables 5.4 and 5.5).

Area 2

This area is adjacent to U.S. Navy storage tanks D-4 and D-6 and includes

monitor wells MW-4, KWM-23 and KWM-24 (Figure 5.1). Measurements obtained from these monitor wells document only one well with measurable quantities of undissolved product, MW-4 (Table 4.1). The two remaining monitor wells in this area contained emulsified hydrocarbons (observed during sample collection) and all three emitted strong hydrocarbon odors. Organic and inorganic compounds identified in the ground-water samples collected from these monitor wells are very similar to those reported in area one.

Ground water collected from monitor well KWM-24 contains benzene at a concentration of 24 ug/l, again exceeding the water quality standard of 1 ug/l. Also, ethylbenzene, toluene and xylene are present in moderate to high concentrations in monitor wells KWM-23 and KWM-24 (Table 5.1). In addition, the base-neutral compounds naphthalene and phenanthrene are present in very high concentrations in samples collected from monitor wells KWM-23 and KWM-24, and low concentration in monitor well MW-4.

Metals analyses for ground-water samples collected from these monitor wells indicate elevated concentrations of iron in all three monitor wells in excess of secondary water quality standards. Also, monitor well MW-4 contained arsenic in a concentration that exceeded water quality standards and all three monitor wells in this area contain numerous TICs (Tables 5.4 and 5.5).

Area 3

Area 3 is adjacent to U.S. Navy storage tanks D-21 and D-3 and includes monitor well MW-1 (Figure 5.1). The presence of undissolved product is indicated in MW-1 but not in measurable thickness. While purging this well for sample collection, some emulsified hydrocarbon was observed and discharge water produced a gray froth and slight petroleum odor. Analytical data for

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ground-water samples collected from MW-1 indicate contamination by volatile organics, extractable organics and several metals.

Volatile organics analyses indicate the presence of toluene (74 ug/l) and xylene (470 ug/l). Base-neutral and acid extractable compounds were not detected but the metals arsenic, lead and iron were present in concentrations of .062 mg/l, .075 mg/l and 10 mg/l, respectively. Water quality standards for xylene and toluene do not exist, but concentrations of the metals reported do exceed water quality standards outlined in Chapter 17-22.210, F.A.C. In addition, numerous extractable organic TICs (Table 5.5) similar to those identified in areas one and two were identified in samples collected from MW-1. Figure 5.2 provides a graphical summary of contaminants identified during this investigation.

6.0 Conclusions and Recommendations

Conclusions

It is apparent that past operating practices have contributed to the degradation of the shallow ground water and soil at the Trumbo Point facility. Ground-water contamination associated with petroleum products (e.g., aviation gasoline, jet fuel and diesel fuel) were identified in nine of the twelve monitor wells sampled. Historical information and ground-water analytical data indicate the contaminants present in the ground water are not attributable to one specific source or event. Apparent thickness measurements for undissolved product show seven of the fourteen accessible monitor wells have contained undissolved product at some time since their installation and, monitor well MW-1 began containing product approximately fifteen months after

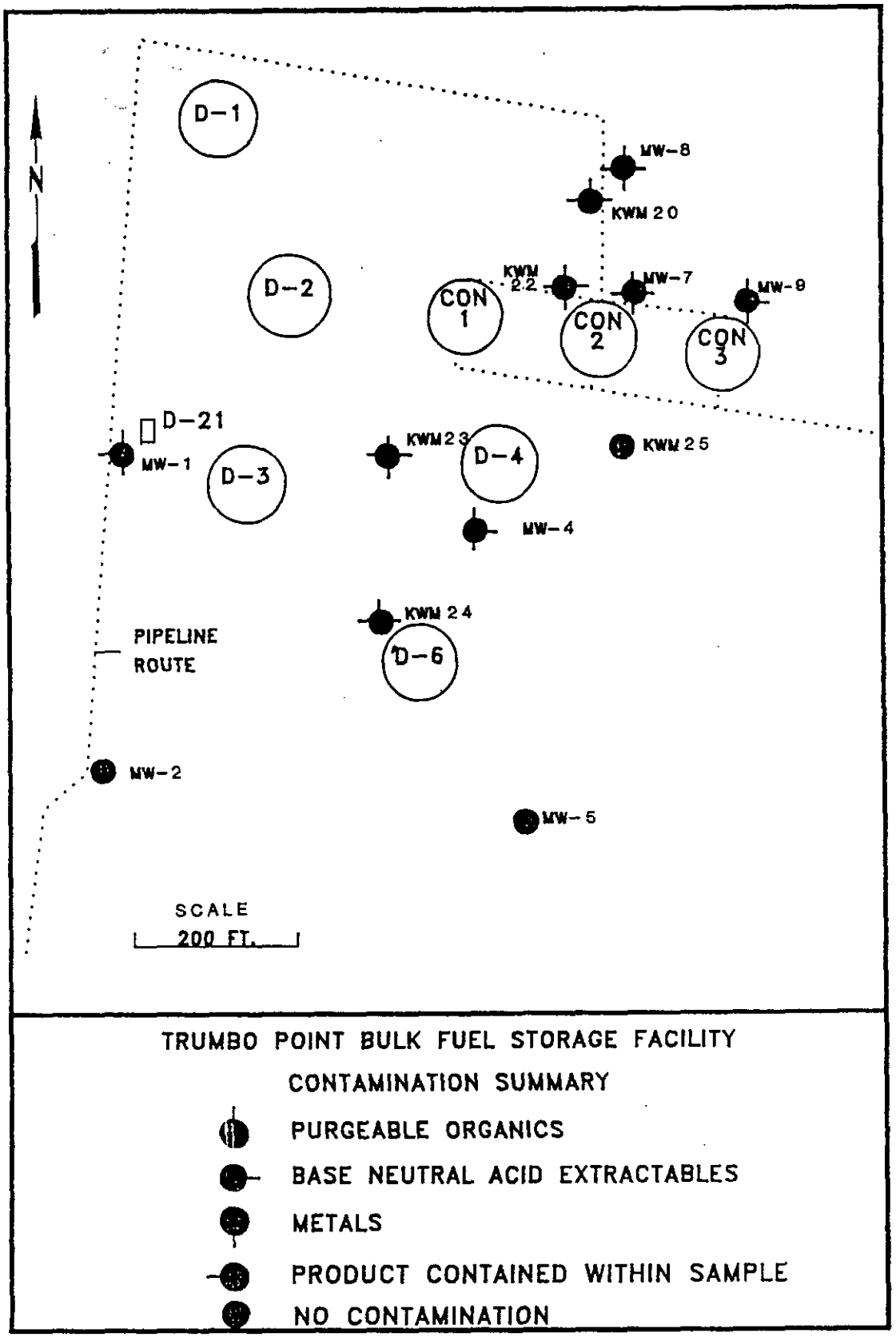
N
D-1
MW-8
KWM 20
D-2
KWM 22
MW-7
MW-9
CON 1
CON 2
CON 3
D-21
MW-1
D-3
KWM 23
D-4
KWM 25
MW-4
KWM 24
PIPELINE ROUTE
D-6
MW-2
MW-5
SCALE
200 FT.
TRUMBO POINT BULK FUEL STORAGE FACILITY
CONTAMINATION SUMMARY
PURGEABLE ORGANICS
BASE NEUTRAL ACID EXTRACTABLES
METALS
PRODUCT CONTAINED WITHIN SAMPLE
NO CONTAMINATION

FIGURE 5.2

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its installation (Table 2.2). Also, water quality data report elevated concentrations of iron in all three areas containing contamination. Iron is not present in jet fuel perse but becomes a good indicator parameter for jet fuel and any other hydrocarbon spill as a result of a biodegredation redox mechanism (Watts, 1989).

The hydrocarbon product and associated ground-water contamination identified in Area 1 appears to be predominantly from a jet fuel loss. This is suggested by the high concentrations of the jet fuel indicator parameters lead, naphthalene, and xylene (Watts, 1989). However, samples collected from monitor well MW-7 (and MW-9 in the 1986/87 study) contained very high concentrations of benzene, xylene, ethylbenzene, and toluene. The relative abundance of these compounds suggests another source other than jet fuel. Historical data indicate that monitor well MW-7 and MW-9 are in close proximity (Figure 2.2) to the previous locations of aviation gasoline storage tanks 14 and 17 and aviation gasoline consists predominantly of these volatile compounds (Watts, 1989).

Water quality data for samples collected in Area 2 indicate ground water is highly contaminated with diesel fuel constituents. Again, this conclusion is based on the occurrence and high concentrations of the diesel fuel indicator parameters naphthalene, phenanthrene and 1-Methylnaphthalene (Watts, 1989). In 1981, the U. S. Navy documented a loss of diesel fuel as a result of a corroded underground pipeline in the area of diesel storage tank D-4 (U. S. Navy Contamination Investigation, Site 9). Although, approximately 20,000 gallons of diesel fuel were recovered, it is apparent the contamination identified in Area 2 is attributable to this event.

Monitor well MW-1, located in Area 3, is in proximity to a number of storage tanks of various capacities. As stated earlier, this monitor well did

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not contain undissolved product until several months after its installation. This suggests the undissolved product has migrated into this area from a nearby source. The sample collected from this well contained high concentrations of the jet fuel indicator parameters lead and xylene as well as some diesel fuel constituents (Table 5.5). In January 1983, NDE Technology, Inc. identified a leak in an above-ground valve located on one of the two Navy-owned pipelines serving the facility (U.S. Navy Contamination Investigation, Site #9). This leak was located near building D-24 in what appears to be in an area that is upgradient from monitor well MW-1. A soil boring (SB-2) advanced near building D-24 during the 1985 study was reported to emit a petroleum odor. This suggests the contamination identified in MW-1 may have migrated from this leak or from another nearby storage tank.

In summary, a total of thirteen monitor wells were sampled for water quality analyses. Three of these wells (MW-4, MW-7 and MW-22) contained undissolved product in measurable quantities; seven wells (MW-1, MW-8, MW-9, KWM-20, KWM-21, KWM-23, and KWM-24) contained undissolved or emulsified product that was clearly visible but not present in measurable quantities and; three wells were reported to be free from contamination. Ground water collected from the four monitor wells, MW-7, MW-9, KWM-22 and KWM-24, contained benzene, lead, and iron in concentrations that exceeded water quality standards set forth in Chapter 17-22.210, F.A.C. Other contaminants in violation of water quality standards were identified in monitor wells MW-1 and MW-4 (arsenic) and MW-7 (chromium).

Recommendations

Numerous options exist for the remediation of the hydrocarbon contamination at the Trumbo Point fuel storage facility. However, this can

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only be accomplished when a complete understanding of the avenues for contaminant migration (e.g., buried pipelines, conduit), soil properties, hydrogeologic variables and extent of the contamination is achieved. This and previous reports serve only to document the existence and type of contamination present in the shallow ground water. Soil sampling data documented in the 1985 study was inconclusive at best. Laboratory analyses were not performed on any of the soil samples collected and the depth from which each sample was taken and the sampling methodolody was never reported. While existing reports document contamination in three areas, several other areas are of key importance and need to be addressed before site remediation per Chapter 17-70, F.A.C. can be initiated.

Monitor well MW-3 was located in the area previously occupied by storage tanks D-5 and D-7. Very little data was obtained from this well while it existed and ground-water samples for water quality analyses were never collected before its destruction prior to the 1986/87 study. At a minimum, two additional monitor wells should be installed in this area for the purpose of ground-water sample collection and water level elevation measurements. Also, soil samples should be collected for laboratory analyses from areas where storage tanks D-5 and D-7 were previously located. This recommendation is based upon information reported in the 1985 study that documents the presence of "slight to moderate" petroleum odor detected in ground water collected from MW-3 and the soil borings (SB-4 and SB-5) advanced in its proximity.

Monitor well MW-6, located adjacent to storage tank D-1 was also destroyed prior to the 1986/87 study. Again, ground-water samples for water quality analyses were never collected. This well should be replaced as close to its original location as possible and ground-water samples should be

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collected and water level elevations measured. If the ground-water flow direction documented in the 1985 and 1986/87 studies is correct, contaminants could also be migrating in this direction. An additional monitor well should be installed at a location between storage tanks D-1 and D-2 (Figure 2.2). The area containing these tanks is approximately 120,000 square feet and lacks monitor well coverage despite documentation in the 1985 study that reported strong, moderate and slight petroleum odors being emitted from soil borings SB-9, SB-1 and SB-12 respectively. In addition, this area should have soil samples collected for laboratory analyses from locations along the above-ground berm to the east and adjacent to storage tanks D-1 and D-2 (Figure 2.2). It is also recommended all underground equipment throughout the facility (e.g., tanks, pipelines) be tested for structural integrity and possible leakage.

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Naval Energy and Environmental Support Activity, 1985. Initial Assessment Study of Naval Air Station, Key West, Florida.

Naval Facilities Engineering Command, 1989. Site 9 Contamination Investigation Naval Air Station - Key West.

Watts, G. B., 1989. Ground Water Monitoring Parameters and Pollution Sources, Third Edition.

Appendix

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PROJECT NO: Task Assignment #T010

Ms. Barbara McCaskill
Dept. of Environmental Regulation
2600 Blairstone Road
Tallahassee, Florida 32399-2400

INVOICE NO: 35047

INVOICE DATE: 16 AUG 1989

TERMS: Net 30 Days

LOG NO: 89-5514

INVOICE

ITEM	SAMPLE IDENTIFICATION	QTY	ANALYSIS	PRICE	AMOUNT
1	1-Fire Well East 2-KMW-25 3-MW-5 4-MW-5 Duplicate 5-MW-2 6-Fire Well West 7-KMW-23 8-KMW-23 Duplicate 9-KMW-24 10-MW-4 11-MW-9 12-MW-20 13-MW-8 14-MW-22 15-MW-7 16-MW-1	16	601 and 602, BN-A Extractables (625), PCB in liquid, Arsenic, Cadmium, Chromium, Copper, Iron, Lead	$605.00	9,680.00
2	17-Equipment Blank #1 18-Equipment Blank #2	2	601 and 602	$120.00	240.00

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SITE INVESTIGATION SECTION

TOTAL $9,920.00

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P.O. Box 13548
Savannah, GA 31404

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Project: Task Assignment #T010

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-1	Fire Well East	Client
5514-2	KMW-25	
5514-3	MW-5	
5514-4	MW-5 Duplicate	
5514-5	MW-2	

PARAMETER	5514-1	5514-2	5514-3	5514-4	5514-5
601 and 602					
Bromodichloromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon Tetrachloride, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
2-Chloroethylvinyl Ether, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Dibromochloromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0

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5514-1	Fire Well East	Client
5514-2	KMW-25	
5514-3	MW-5	
5514-4	MW-5 Duplicate	
5514-5	MW-2	

PARAMETER	5514-1	5514-2	5514-3	5514-4	5514-5
1,1-Dichloroethene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
cis/trans-1,2-Dichloroethylene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Cis-1,3-Dichloropropene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Trans-1,3-Dichloropropene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene Chloride, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethylene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Trichlorofluoromethane, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl Chloride, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0	<1.0	<1.0	<1.0

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5514-2	KMW-25	
5514-3	MW-5	
5514-4	MW-5 Duplicate	
5514-5	MW-2	

PARAMETER	5514-1	5514-2	5514-3	5514-4	5514-5
BN-A Extractables (625)					
Acenaphthene, ug/l	<10	<10	<10	<10	<10
Acenaphthylene, ug/l	<10	<10	<10	<10	<10
Anthracene, ug/l	<10	<10	<10	<10	<10
Aldrin, ug/l	<10	<10	<10	<10	<10
Benzo(a)Anthracene, ug/l	<10	<10	<10	<10	<10
Benzo(b)fluoranthene, ug/l	<10	<10	<10	<10	<10
Benzo (k) Fluoranthene, ug/l	<10	<10	<10	<10	<10
Benzo(a)pyrene, ug/l	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene, ug/l	<10	<10	<10	<10	<10
Benzyl butyl phthalate, ug/l	<10	<10	<10	<10	<10
beta-BHC, ug/l	<10	<10	<10	<10	<10
delta-BHC, ug/l	<10	<10	<10	<10	<10
bis(2-Chloroethyl) ether, ug/l	<10	<10	<10	<10	<10
bis(2-Chloroethoxy) methane, ug/l	<10	<10	<10	<10	<10
bis(2-Ethylhexyl) phthalate, ug/l	<10	<10	<10	<10	<10
bis(2-Chloroisopropyl) ether, ug/l	<10	<10	<10	<10	<10
4-Bromophenyl-phenyl-ether, ug/l	<10	<10	<10	<10	<10
Chlordane, ug/l	<20	<20	<20	<20	<20

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-1	Fire Well East	Client
5514-2	KMW-25	
5514-3	MW-5	
5514-4	MW-5 Duplicate	
5514-5	MW-2	

PARAMETER	5514-1	5514-2	5514-3	5514-4	5514-5
2-Chloronaphthalene, ug/l	<10	<10	<10	<10	<10
4-Chlorophenyl-phenyl ether, ug/l	<10	<10	<10	<10	<10
Chrysene, ug/l	<10	<10	<10	<10	<10
4,4'-DDD, ug/l	<10	<10	<10	<10	<10
4,4'-DDE, ug/l	<30	<30	<30	<30	<30
4,4'-DDT, ug/l	<10	<10	<10	<10	<10
Dibenzo (a,h)anthracene, ug/l	<10	<10	<10	<10	<10
Di-n-butylphthalate, ug/l	<10	<10	<10	<10	<10
1,3-Dichlorobenzene, ug/l	<10	<10	<10	<10	<10
1,2-Dichlorobenzene, ug/l	<10	<10	<10	<10	<10
1,4-Dichlorobenzene, ug/l	<10	<10	<10	<10	<10
3,3'-Dichlorobenzidine, ug/l	<20	<20	<20	<20	<20
Dieldrin, ug/l	<10	<10	<10	<10	<10
Diethyl Phthalate, ug/l	<10	<10	<10	<10	<10
Dimethyl phthalate, ug/l	<10	<10	<10	<10	<10
2,4-Dinitrotoluene, ug/l	<10	<10	<10	<10	<10
2,6-Dinitrotoluene, ug/l	<10	<10	<10	<10	<10
Di-n-octylphthalate, ug/l	<10	<10	<10	<10	<10
Endosulfan sulfate, ug/l	<10	<10	<10	<10	<10

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LOG NO: 89-5514

Received: 17 JUL 89

Dr. Robert Patton
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Project: Task Assignment #T010

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-1	Fire Well East	Client
5514-2	KMW-25	
5514-3	MW-5	
5514-4	MW-5 Duplicate	
5514-5	MW-2	

PARAMETER	5514-1	5514-2	5514-3	5514-4	5514-5
Endrin Aldehyde, ug/l	<10	<10	<10	<10	<10
Fluoranthene, ug/l	<10	<10	<10	<10	<10
Fluorene, ug/l	<10	<10	<10	<10	<10
Heptachlor, ug/l	<10	<10	<10	<10	<10
Heptachlor epoxide, ug/l	<10	<10	<10	<10	<10
Hexachlorobenzene, ug/l	<10	<10	<10	<10	<10
Hexachlorobutadiene, ug/l	<10	<10	<10	<10	<10
Hexachloroethane, ug/l	<10	<10	<10	<10	<10
Indeno (1,2,3-cd)pyrene, ug/l	<10	<10	<10	<10	<10
Isophorone, ug/l	<10	<10	<10	<10	<10
Naphthalene, ug/l	<10	<10	<10	<10	<10
Nitrobenzene, ug/l	<10	<10	<10	<10	<10
N-Nitrosodi-N-Propylamine, ug/l	<10	<10	<10	<10	<10
Aroclor-1016, ug/l	<100	<100	<100	<100	<100
Aroclor-1221, ug/l	<100	<100	<100	<100	<100
Aroclor-1232, ug/l	<100	<100	<100	<100	<100
Aroclor-1242, ug/l	<100	<100	<100	<100	<100
Aroclor-1248, ug/l	<100	<100	<100	<100	<100
Aroclor-1254, ug/l	<100	<100	<100	<100	<100

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5514-2	KMW-25	
5514-3	MW-5	
5514-4	MW-5 Duplicate	
5514-5	MW-2	

PARAMETER	5514-1	5514-2	5514-3	5514-4	5514-5
Aroclor-1260, ug/l	<100	<100	<100	<100	<100
Phenanthrene, ug/l	<10	<10	<10	<10	<10
Pyrene, ug/l	<10	<10	<10	<10	<10
Toxaphene, ug/l	<200	<200	<200	<200	<200
1,2,4-Trichlorobenzene, ug/l	<10	<10	<10	<10	<10
4-Chloro-3-methylphenol, ug/l	<10	<10	<10	<10	<10
2-Chlorophenol, ug/l	<10	<10	<10	<10	<10
2,4-Dichlorophenol, ug/l	<10	<10	<10	<10	<10
2,4-Dimethylphenol, ug/l	<10	<10	<10	<10	<10
2,4-Dinitrophenol, ug/l	<50	<50	<50	<50	<50
2-Methyl-4,6-dinitrophenol, ug/l	<50	<50	<50	<50	<50
2-Nitrophenol, ug/l	<10	<10	<10	<10	<10
4-Nitrophenol, ug/l	<50	<50	<50	<50	<50
Pentachlorophenol, ug/l	<50	<50	<50	<50	<50
Phenol, ug/l	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol, ug/l	<10	<10	<10	<10	<10

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5514-2	KMW-25	
5514-3	MW-5	
5514-4	MW-5 Duplicate	
5514-5	MW-2	

PARAMETER	5514-1	5514-2	5514-3	5514-4	5514-5
PCB in liquid					
Aroclor-1016, ug/l	<0.50	<0.50	<0.50	<0.50	<0.50
Aroclor-1221, ug/l	<0.50	<0.50	<0.50	<0.50	<0.50
Aroclor-1232, ug/l	<0.50	<0.50	<0.50	<0.50	<0.50
Aroclor-1242, ug/l	<0.50	<0.50	<0.50	<0.50	<0.50
Aroclor-1248, ug/l	<0.50	<0.50	<0.50	<0.50	<0.50
Aroclor-1254, ug/l	<0.50	<0.50	<0.50	<0.50	<0.50
Aroclor-1260, ug/l	<0.50	<0.50	<0.50	<0.50	<0.50
Arsenic, mg/l	<0.010	0.028	0.045	0.11	<0.010
Cadmium , mg/l	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Chromium, mg/l	<0.010	<0.010	<0.010	0.015	<0.010
Copper, mg/l	<0.010	0.064	<0.010	0.011	<0.010
Iron, mg/l	0.014	11	1.8	8.0	2.8 ←
Lead, mg/l	<0.0050	0.0088	<0.0050	<0.0050	<0.0050

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-6	Fire Well West	Client
5514-7	KMW-23	
5514-8	KMW-23 Duplicate	
5514-9	KMW-24	
5514-10	MW-4	

PARAMETER	5514-6	5514-7	5514-8	5514-9	5514-10
601 and 602					
Bromodichloromethane, ug/l	<1.0	<25	<25	<20	<1.0
Bromoform, ug/l	<1.0	<25	<25	<20	<1.0
Bromomethane, ug/l	<1.0	<25	<25	<20	<1.0
Benzene, ug/l	<1.0	<25	<25	24	<1.0
Carbon Tetrachloride, ug/l	<1.0	<25	<25	<20	<1.0
Chlorobenzene, ug/l	<1.0	<25	<25	<20	<1.0
Chloroethane, ug/l	<1.0	<25	<25	<20	<1.0
2-Chloroethylvinyl Ether, ug/l	<1.0	<25	<25	<20	<1.0
Chloroform, ug/l	<1.0	<25	<25	<20	<1.0
Ethylbenzene, ug/l	<1.0	<25	<25	31	1.3
Chloromethane, ug/l	<1.0	<25	<25	<20	<1.0
Dibromochloromethane, ug/l	<1.0	<25	<25	<20	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<25	<25	<20	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<25	<25	<20	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<25	<25	<20	<1.0
Dichlorodifluoromethane, ug/l	<1.0	<25	<25	<20	<1.0
1,1-Dichloroethane, ug/l	<1.0	<25	<25	<20	<1.0
1,2-Dichloroethane, ug/l	<1.0	<25	<25	<20	<1.0

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5514-7	KMW-23	
5514-8	KMW-23 Duplicate	
5514-9	KMW-24	
5514-10	MW-4	

PARAMETER	5514-6	5514-7	5514-8	5514-9	5514-10
1,1-Dichloroethene, ug/l	<1.0	<25	<25	<20	<1.0
cis/trans-1,2-Dichloroethylene, ug/l	<1.0	<25	<25	<20	<1.0
1,2-Dichloropropane, ug/l	<1.0	<25	<25	<20	<1.0
Cis-1,3-Dichloropropene, ug/l	<1.0	<25	<25	<20	<1.0
Trans-1,3-Dichloropropene, ug/l	<1.0	<25	<25	<20	<1.0
Methylene Chloride, ug/l	<1.0	<25	<25	<20	<1.0
1,1,2,2-Tetrachloroethane, ug/l	<1.0	<25	<25	<20	<1.0
Tetrachloroethylene, ug/l	<1.0	<25	<25	<20	<1.0
Toluene, ug/l	<1.0	55	38	93	<1.0
1,1,1-Trichloroethane, ug/l	<1.0	<25	<25	<20	<1.0
1,1,2-Trichloroethane, ug/l	<1.0	<25	<25	<20	<1.0
Trichloroethene, ug/l	<1.0	<25	<25	<20	<1.0
Trichlorofluoromethane, ug/l	<1.0	<25	<25	<20	<1.0
Vinyl Chloride, ug/l	<1.0	<25	<25	<20	<1.0
Xylenes, ug/l	<1.0	2200	550	920	<1.0

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
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5514-7	KMW-23	
5514-8	KMW-23 Duplicate	
5514-9	KMW-24	
5514-10	MW-4	

PARAMETER	5514-6	5514-7	5514-8	5514-9	5514-10
BN-A Extractables (625)		*	*	*	
Acenaphthene, ug/l	<10	<410000	<530000	<520000	<10
Acenaphthylene, ug/l	<10	<410000	<530000	<520000	<10
Anthracene, ug/l	<10	<410000	<530000	<520000	<10
Aldrin, ug/l	<10	<410000	<530000	<520000	<10
Benzo(a)Anthracene, ug/l	<10	<410000	<530000	<520000	<10
Benzo(b)fluoranthene, ug/l	<10	<410000	<530000	<520000	<10
Benzo (k) Fluoranthene, ug/l	<10	<410000	<530000	<520000	<10
Benzo(a)pyrene, ug/l	<10	<410000	<530000	<520000	<10
Benzo(g,h,i)perylene, ug/l	<10	<410000	<530000	<520000	<10
Benzyl butyl phthalate, ug/l	<10	<410000	<530000	<520000	<10
beta-BHC, ug/l	<10	<410000	<530000	<520000	<10
delta-BHC, ug/l	<10	<410000	<530000	<520000	<10
bis(2-Chloroethyl) ether, ug/l	<10	<410000	<530000	<520000	<10
bis(2-Chloroethoxy) methane, ug/l	<10	<410000	<530000	<520000	<10
bis(2-Ethylhexyl) phthalate, ug/l	<10	<410000	<530000	<520000	<10
bis(2-Chloroisopropyl) ether, ug/l	<10	<410000	<530000	<520000	<10
4-Bromophenyl-phenyl-ether, ug/l	<10	<410000	<530000	<520000	<10
Chlordane, ug/l	<20	<820000	<1100000	<1000000	<20

* = Values are in ug/kg - Product weighed and analyzed.

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5514-7	KMW-23	
5514-8	KMW-23 Duplicate	
5514-9	KMW-24	
5514-10	MW-4	

PARAMETER	5514-6	5514-7*	5514-8*	5514-9*	5514-10
2-Chloronaphthalene, ug/l	<10	<410000	<530000	<520000	<10
4-Chlorophenyl-phenyl ether, ug/l	<10	<410000	<530000	<520000	<10
Chrysene, ug/l	<10	<410000	<530000	<520000	<10
4,4'-DDD, ug/l	<10	<410000	<530000	<520000	<10
4,4'-DDE, ug/l	<30	<1200000	<1600000	<1600000	<30
4,4'-DDT, ug/l	<10	<410000	<530000	<520000	<10
Dibenzo (a,h)anthracene, ug/l	<10	<410000	<530000	<520000	<10
Di-n-butylphthalate, ug/l	<10	<410000	<530000	<520000	<10
1,3-Dichlorobenzene, ug/l	<10	<410000	<530000	<520000	<10
1,2-Dichlorobenzene, ug/l	<10	<410000	<530000	<520000	<10
1,4-Dichlorobenzene, ug/l	<10	<410000	<530000	<520000	<10
3,3'-Dichlorobenzidine, ug/l	<20	<820000	<1100000	<1000000	<20
Dieldrin, ug/l	<10	<410000	<520000	<520000	<10
Diethyl Phthalate, ug/l	<10	<410000	<520000	<520000	<10
Dimethyl phthalate, ug/l	<10	<410000	<520000	<520000	<10
2,4-Dinitrotoluene, ug/l	<10	<410000	<520000	<520000	<10
2,6-Dinitrotoluene, ug/l	<10	<410000	<520000	<520000	<10
Di-n-octylphthalate, ug/l	<10	<410000	<520000	<520000	<10
Endosulfan sulfate, ug/l	<10	<410000	<520000	<520000	<10

* = Values are in ug/kg - Product weighed and analyzed.

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5514-7	KMW-23	
5514-8	KMW-23 Duplicate	
5514-9	KMW-24	
5514-10	MW-4	

PARAMETER	5514-6	5514-7*	5514-8*	5514-9*	5514-10
Endrin Aldehyde, ug/l	<10	<410000	<520000	<520000	<10
Fluoranthene, ug/l	<10	<410000	<520000	<520000	<10
Fluorene, ug/l	<10	<410000	<520000	<520000	<10
Heptachlor, ug/l	<10	<410000	<520000	<520000	<10
Heptachlor epoxide, ug/l	<10	<410000	<520000	<520000	<10
Hexachlorobenzene, ug/l	<10	<410000	<520000	<520000	<10
Hexachlorobutadiene, ug/l	<10	<410000	<520000	<520000	<10
Hexachloroethane, ug/l	<10	<410000	<520000	<520000	<10
Indeno (1,2,3-cd)pyrene, ug/l	<10	<410000	<520000	<520000	<10
Isophorone, ug/l	<10	<410000	<520000	<520000	<10
Naphthalene, ug/l	<10	1300000	1300000	<520000	34
Nitrobenzene, ug/l	<10	<410000	<530000	<520000	<10
N-Nitrosodi-N-Propylamine, ug/l	<10	<410000	<530000	<520000	<10
Aroclor-1016, ug/l	<100	<4100000	<5300000	<520000	<100
Aroclor-1221, ug/l	<100	<4100000	<5300000	<520000	<100
Aroclor-1232, ug/l	<100	<4100000	<5300000	<520000	<100
Aroclor-1242, ug/l	<100	<4100000	<5300000	<520000	<100
Aroclor-1248, ug/l	<100	<4100000	<5300000	<520000	<100
Aroclor-1254, ug/l	<100	<4100000	<5300000	<520000	<100

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5514-7	KMW-23	
5514-8	KMW-23 Duplicate	
5514-9	KMW-24	
5514-10	MW-4	

PARAMETER	5514-6	5514-7*	5514-8*	5514-9*	5514-10
Aroclor-1260, ug/l	<100	<4100000	<5300000	<520000	<100
Phenanthrene, ug/l	<10	580000	590000	690000	<10
Pyrene, ug/l	<10	<410000	<530000	<520000	<10
Toxaphene, ug/l	<200	<8200000	<11000000	<10000000	<200
1,2,4-Trichlorobenzene, ug/l	<10	<410000	<530000	<520000	<10
4-Chloro-3-methylphenol, ug/l	<10	<410000	<530000	<520000	<10
2-Chlorophenol, ug/l	<10	<410000	<530000	<520000	<10
2,4-Dichlorophenol, ug/l	<10	<410000	<530000	<520000	<10
2,4-Dimethylphenol, ug/l	<10	<410000	<530000	<520000	<10
2,4-Dinitrophenol, ug/l	<50	<2100000	<2700000	<2600000	<50
2-Methyl-4,6-dinitrophenol, ug/l	<50	<2100000	<2700000	<2600000	<50
2-Nitrophenol, ug/l	<10	<410000	<530000	<520000	<10
4-Nitrophenol, ug/l	<50	<2100000	<2700000	<2600000	<50
Pentachlorophenol, ug/l	<50	<2100000	<2700000	<2600000	<50
Phenol, ug/l	<10	<410000	<530000	<520000	<10
2,4,6-Trichlorophenol, ug/l	<10	<410000	<530000	<520000	<10

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SAVANNAH LABORATORIES AND ENVIRONMENTAL SERVICES, INC.

TALLAHASSEE DIVISION
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LOG NO: 89-5514

Received: 17 JUL 89

Dr. Robert Patton
DER-Chemistry Section
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Project: Task Assignment #T010

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-6	Fire Well West	Client
5514-7	KMW-23	
5514-8	KMW-23 Duplicate	
5514-9	KMW-24	
5514-10	MW-4	

PARAMETER	5514-6	5514-7	5514-8	5514-9	5514-10
PCB in liquid					
Aroclor-1016, ug/l	<0.50	<2.0	<2.0	<2.0	<0.50
Aroclor-1221, ug/l	<0.50	<2.0	<2.0	<2.0	<0.50
Aroclor-1232, ug/l	<0.50	<2.0	<2.0	<2.0	<0.50
Aroclor-1242, ug/l	<0.50	<2.0	<2.0	<2.0	<0.50
Aroclor-1248, ug/l	<0.50	<2.0	<2.0	<2.0	<0.50
Aroclor-1254, ug/l	<0.50	<2.0	<2.0	<2.0	<0.50
Aroclor-1260, ug/l	<0.50	<2.0	<2.0	<2.0	<0.50
Arsenic, mg/l	<0.010	0.021	0.034	0.035	0.076
Cadmium , mg/l	<0.0050	0.023	0.017	<0.0050	<0.0050
Chromium, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Copper, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
Iron, mg/l	0.83	6.6	5.8	1.7	3.3
Lead, mg/l	<0.0050	0.0061	0.0083	0.0066	<0.0050

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REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-11	MW-9	Client
5514-12	MW-20	
5514-13	MW-8	
5514-14	MW-22	
5514-15	MW-7	

PARAMETER	5514-11	5514-12	5514-13	5514-14	5514-15
601 and 602					
Bromodichloromethane, ug/l	<25	<50	<50	<100	<50
Bromoform, ug/l	<25	<50	<50	<100	<50
Bromomethane, ug/l	<25	<50	<50	<100	<50
Benzene, ug/l	150	<50	<50	270	17000
Carbon Tetrachloride, ug/l	<25	<50	<50	<100	<50
Chlorobenzene, ug/l	<25	<50	<50	<100	<50
Chloroethane, ug/l	<25	<50	<50	<100	<50
2-Chloroethylvinyl Ether, ug/l	<25	<50	<50	<100	<50
Chloroform, ug/l	<25	<50	<50	<100	<50
Ethylbenzene, ug/l	<25	<50	<50	200	4300
Chloromethane, ug/l	<25	<50	<50	<100	<50
Dibromochloromethane, ug/l	<25	<50	<50	<100	<50
1,2-Dichlorobenzene, ug/l	<25	<50	<50	<100	<50
1,3-Dichlorobenzene, ug/l	<25	<50	<50	<100	<50
1,4-Dichlorobenzene, ug/l	<25	<50	<50	<100	<50
Dichlorodifluoromethane, ug/l	<25	<50	<50	<100	<50
1,1-Dichloroethane, ug/l	<25	<50	<50	<100	<50
1,2-Dichloroethane, ug/l	<25	<50	<50	<100	<50

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-11	MW-9	Client
5514-12	MW-20	
5514-13	MW-8	
5514-14	MW-22	
5514-15	MW-7	

PARAMETER	5514-11	5514-12	5514-13	5514-14	5514-15
1,1-Dichloroethene, ug/l	<25	<50	<50	<100	<50
cis/trans-1,2-Dichloroethyl ene, ug/l	<25	<50	<50	<100	<50
1,2-Dichloropropane, ug/l	<25	<50	<50	<100	<50
Cis-1,3-Dichloropropene, ug/l	<25	<50	<50	<100	<50
Trans-1,3-Dichloropropene, ug/l	<25	<50	<50	<100	<50
Methylene Chloride, ug/l	<25	<50	<50	<100	<50
1,1,2,2-Tetrachloroethane, ug/l	<25	<50	<50	<100	<50
Tetrachloroethylene, ug/l	<25	<50	<50	<100	<50
Toluene, ug/l	1500	<50	160	310	6500
1,1,1-Trichloroethane, ug/l	<25	<50	<50	<100	<50
1,1,2-Trichloroethane, ug/l	<25	<50	<50	<100	<50
Trichloroethene, ug/l	<25	<50	<50	<100	<50
Trichlorofluoromethane, ug/l	<25	<50	<50	<100	<50
Vinyl Chloride, ug/l	<25	<50	<50	<100	<50
Xylenes, ug/l	3100	630	1900	530	170000

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-11	MW-9	Client
5514-12	MW-20	
5514-13	MW-8	
5514-14	MW-22	
5514-15	MW-7	

PARAMETER	5514-11	5514-12*	5514-13*	5514-14*	5514-15*
BN-A Extractables (625)					
Acenaphthene, ug/l	<10	<360000	<570000	<540000	<560000
Acenaphthylene, ug/l	<10	<360000	<570000	<540000	<560000
Anthracene, ug/l	<10	<360000	<570000	<540000	<560000
Aldrin, ug/l	<10	<360000	<570000	<540000	<560000
Benzo(a)Anthracene, ug/l	<10	<360000	<570000	<540000	<560000
Benzo(b)fluoranthene, ug/l	<10	<360000	<570000	<540000	<560000
Benzo (k) Fluoranthene, ug/l	<10	<360000	<570000	<540000	<560000
Benzo(a)pyrene, ug/l	<10	<360000	<570000	<540000	<560000
Benzo(g,h,i)perylene, ug/l	<10	<360000	<570000	<540000	<560000
Benzyl butyl phthalate, ug/l	<10	<360000	<570000	<540000	<560000
beta-BHC, ug/l	<10	<360000	<570000	<540000	<560000
delta-BHC, ug/l	<10	<360000	<570000	<540000	<560000
bis(2-Chloroethyl) ether, ug/l	<10	<360000	<570000	<540000	<560000
bis(2-Chloroethoxy) methane, ug/l	<10	<360000	<570000	<540000	<560000
bis(2-Ethylhexyl) phthalate, ug/l	22	<360000	<570000	<540000	<560000
bis(2-Chloroisopropyl) ether, ug/l	<10	<360000	<570000	<540000	<560000
4-Bromophenyl-phenyl-ether, ug/l	<10	<360000	<570000	<540000	<560000
Chlordane, ug/l	<20	<720000	<1100000	<1100000	<1100000

* = Values are in ug/kg - Product weighed and analyzed.

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-11	MW-9	Client
5514-12	MW-20	
5514-13	MW-8	
5514-14	MW-22	
5514-15	MW-7	

PARAMETER	5514-11	5514-12*	5514-13*	5514-14*	5514-15*
2-Chloronaphthalene, ug/l	<10	<360000	<570000	<540000	<560000
4-Chlorophenyl-phenyl ether, ug/l	<10	<360000	<570000	<540000	<560000
Chrysene, ug/l	<10	<360000	<570000	<540000	<560000
4,4'-DDD, ug/l	<10	<360000	<570000	<540000	<560000
4,4'-DDE, ug/l	<30	<1100000	<1700000	<1600000	<1700000
4,4'-DDT, ug/l	<10	<360000	<570000	<540000	<560000
Dibenzo (a,h)anthracene, ug/l	<10	<360000	<570000	<540000	<560000
Di-n-butylphthalate, ug/l	<10	<360000	<570000	<540000	<560000
1,3-Dichlorobenzene, ug/l	<10	<360000	<570000	<540000	<560000
1,2-Dichlorobenzene, ug/l	<10	<360000	<570000	<540000	<560000
1,4-Dichlorobenzene, ug/l	<10	<360000	<570000	<540000	<560000
3,3'-Dichlorobenzidine, ug/l	<20	<720000	<1100000	<1100000	<560000
Dieldrin, ug/l	<10	<360000	<570000	<540000	<560000
Diethyl Phthalate, ug/l	<10	<360000	<570000	<540000	<560000
Dimethyl phthalate, ug/l	<10	<360000	<570000	<540000	<560000
2,4-Dinitrotoluene, ug/l	<10	<360000	<570000	<540000	<560000
2,6-Dinitrotoluene, ug/l	<10	<360000	<570000	<540000	<560000
Di-n-octylphthalate, ug/l	<10	<360000	<570000	<540000	<560000
Endosulfan sulfate, ug/l	<10	<360000	<570000	<540000	<560000

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REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-11	MW-9	Client
5514-12	MW-20	
5514-13	MW-8	
5514-14	MW-22	
5514-15	MW-7	

PARAMETER	5514-11	5514-12*	5514-13*	5514-14*	5514-15*
Endrin Aldehyde, ug/l	<10	<360000	<570000	<540000	<560000
Fluoranthene, ug/l	<10	<360000	<570000	<540000	<560000
Fluorene, ug/l	<10	<360000	<570000	<540000	<560000
Heptachlor, ug/l	<10	<360000	<570000	<540000	<560000
Heptachlor epoxide, ug/l	<10	<360000	<570000	<540000	<560000
Hexachlorobenzene, ug/l	<10	<360000	<570000	<540000	<560000
Hexachlorobutadiene, ug/l	<10	<360000	<570000	<540000	<560000
Hexachloroethane, ug/l	<10	<360000	<570000	<540000	<560000
Indeno (1,2,3-cd)pyrene, ug/l	<10	<360000	<570000	<540000	<560000
Isophorone, ug/l	<10	<360000	<570000	<540000	<560000
Naphthalene, ug/l	210	2100000	1200000	2700000	2200000
Nitrobenzene, ug/l	<10	<360000	<570000	<540000	<560000
N-Nitrosodi-N-Propylamine, ug/l	<10	<360000	<570000	<540000	<560000
Aroclor-1016, ug/l	<100	<3600000	<570000	<5400000	<5600000
Aroclor-1221, ug/l	<100	<3600000	<570000	<5400000	<5600000
Aroclor-1232, ug/l	<100	<3600000	<570000	<5400000	<5600000
Aroclor-1242, ug/l	<100	<3600000	<570000	<5400000	<5600000
Aroclor-1248, ug/l	<100	<3600000	<570000	<5400000	<5600000
Aroclor-1254, ug/l	<100	<3600000	<570000	<5400000	<5600000

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-11	MW-9	Client
5514-12	MW-20	
5514-13	MW-8	
5514-14	MW-22	
5514-15	MW-7	

PARAMETER	5514-11	5514-12*	5514-13*	5514-14*	5514-15*
Aroclor-1260, ug/l	<100	<3600000	<570000	<5400000	<5600000
Phenanthrene, ug/l	<10	<360000	<570000	<540000	<560000
Pyrene, ug/l	<10	<360000	<570000	<540000	<560000
Toxaphene, ug/l	<200	<7200000	<11000000	<11000000	<11000000
1,2,4-Trichlorobenzene, ug/l	<10	<360000	<570000	<540000	<560000
4-Chloro-3-methylphenol, ug/l	<10	<360000	<570000	<540000	<560000
2-Chlorophenol, ug/l	<10	<360000	<570000	<540000	<560000
2,4-Dichlorophenol, ug/l	<10	<360000	<570000	<540000	<560000
2,4-Dimethylphenol, ug/l	26	<360000	<570000	<540000	<560000
2,4-Dinitrophenol, ug/l	<50	<1800000	<2900000	<2700000	<2800000
2-Methyl-4,6-dinitrophenol, ug/l	<50	<1800000	<2900000	<2700000	<2800000
2-Nitrophenol, ug/l	<10	<360000	<570000	<540000	<560000
4-Nitrophenol, ug/l	<50	<1800000	<2900000	<2700000	<2800000
Pentachlorophenol, ug/l	<50	<1800000	<2900000	<2700000	<2800000
Phenol, ug/l	16	<360000	<570000	<540000	<560000
2,4,6-Trichlorophenol, ug/l	<10	<360000	<570000	<540000	<560000

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-11	MW-9	Client
5514-12	MW-20	
5514-13	MW-8	
5514-14	MW-22	
5514-15	MW-7	

PARAMETER	5514-11	5514-12	5514-13	5514-14	5514-15
PCB in liquid					
Aroclor-1016, ug/l	<0.50	<2.0	<1.0	<2.0	<2.0
Aroclor-1221, ug/l	<0.50	<2.0	<1.0	<2.0	<2.0
Aroclor-1232, ug/l	<0.50	<2.0	<1.0	<2.0	<2.0
Aroclor-1242, ug/l	<0.50	<2.0	<1.0	<2.0	<2.0
Aroclor-1248, ug/l	<0.50	<2.0	<1.0	<2.0	<2.0
Aroclor-1254, ug/l	<0.50	<2.0	<1.0	<2.0	<2.0
Aroclor-1260, ug/l	<0.50	<2.0	<1.0	<2.0	<2.0
Arsenic, mg/l	0.10	0.020	0.10	<0.010	0.38
Cadmium , mg/l	<0.0050	<0.0050	0.0091	0.0069	0.0094
Chromium, mg/l	0.014	<0.010	0.031	<0.010	0.076
Copper, mg/l	<0.010	0.056	0.12	0.034	0.093
Iron, mg/l	53	1.9	17	8.2	240
Lead, mg/l	0.0074	0.026	0.070	4.1	1.4

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-16	MW-1	Client

PARAMETER	5514-16
601 and 602	
Bromodichloromethane, ug/l	<25
Bromoform, ug/l	<25
Bromomethane, ug/l	<25
Benzene, ug/l	<25
Carbon Tetrachloride, ug/l	<25
Chlorobenzene, ug/l	<25
Chloroethane, ug/l	<25
2-Chloroethylvinyl Ether, ug/l	<25
Chloroform, ug/l	<25
Ethylbenzene, ug/l	<25
Chloromethane, ug/l	<25
Dibromochloromethane, ug/l	<25
1,2-Dichlorobenzene, ug/l	<25
1,3-Dichlorobenzene, ug/l	<25
1,4-Dichlorobenzene, ug/l	<25
Dichlorodifluoromethane, ug/l	<25
1,1-Dichloroethane, ug/l	<25
1,2-Dichloroethane, ug/l	<25
1,1-Dichloroethene, ug/l	<25
cis/trans-1,2-Dichloroethylene, ug/l	<25
1,2-Dichloropropane, ug/l	<25
Cis-1,3-Dichloropropene, ug/l	<25

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-16	MW-1	Client

PARAMETER	5514-16
Trans-1,3-Dichloropropene, ug/l	<25
Methylene Chloride, ug/l	<25
1,1,2,2-Tetrachloroethane, ug/l	<25
Tetrachloroethylene, ug/l	<25
Toluene, ug/l	74
1,1,1-Trichloroethane, ug/l	<25
1,1,2-Trichloroethane, ug/l	<25
Trichloroethene, ug/l	<25
Trichlorofluoromethane, ug/l	<25
Vinyl Chloride, ug/l	<25
Xylenes, ug/l	470

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LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-16	MW-1	Client

PARAMETER	5514-16
BN-A Extractables (625)	
Acenaphthene, ug/kg	<170000
Acenaphthylene, ug/kg	<170000
Anthracene, ug/kg	<170000
Aldrin, ug/kg	<170000
Benzo(a)Anthracene, ug/kg	<170000
Benzo(b)fluoranthene, ug/kg	<170000
Benzo (k) Fluoranthene, ug/kg	<170000
Benzo(a)pyrene, ug/kg	<170000
Benzo(g,h,i)perylene, ug/kg	<170000
Benzyl butyl phthalate, ug/kg	<170000
beta-BHC, ug/kg	<170000
delta-BHC, ug/kg	<170000
bis(2-Chloroethyl) ether, ug/kg	<170000
bis(2-Chloroethoxy) methane, ug/kg	<170000
bis(2-Ethylhexyl) phthalate, ug/kg	<170000
bis(2-Chloroisopropyl) ether, ug/kg	<170000
4-Bromophenyl-phenyl-ether, ug/kg	<170000
Chlordane, ug/kg	<340000
2-Chloronaphthalene, ug/kg	<170000
4-Chlorophenyl-phenyl ether, ug/kg	<170000
Chrysene, ug/kg	<170000
4,4'-DDD, ug/kg	<170000

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Janette Davis Long
Vice-President

SAVANNAH LABORATORIES AND ENVIRONMENTAL SERVICES, INC.

TALLAHASSEE DIVISION
2820 Industrial Plaza Blvd. (32301)
P. O. Box 13056 • Tallahassee, FL 32317-3056
(904) 878-3994

LOG NO: 89-5514

Received: 17 JUL 89

Dr. Robert Patton
DER-Chemistry Section
2600 Blairstone Road
Tallahassee, Florida 32399-2400

Project: Task Assignment #T010

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-16	MW-1	Client

PARAMETER	5514-16
4,4'-DDE, ug/kg	<510000
4,4'-DDT, ug/kg	<170000
Dibenzo (a,h)anthracene, ug/kg	<170000
Di-n-butylphthalate, ug/kg	<170000
1,3-Dichlorobenzene, ug/kg	<170000
1,2-Dichlorobenzene, ug/kg	<170000
1,4-Dichlorobenzene, ug/kg	<170000
3,3'-Dichlorobenzidine, ug/kg	<340000
Dieldrin, ug/kg	<170000
Diethyl Phthalate, ug/kg	<170000
Dimethyl phthalate, ug/kg	<170000
2,4-Dinitrotoluene, ug/kg	<170000
2,6-Dinitrotoluene, ug/kg	<170000
Di-n-octylphthalate, ug/kg	<170000
Endosulfan sulfate, ug/kg	<170000
Endrin Aldehyde, ug/kg	<170000
Fluoranthene, ug/kg	<170000
Fluorene, ug/kg	<170000
Heptachlor, ug/kg	<170000
Heptachlor epoxide, ug/kg	<170000
Hexachlorobenzene, ug/kg	<170000
Hexachlorobutadiene, ug/kg	<170000
Hexachloroethane, ug/kg	<170000

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REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-16	MW-1	Client

PARAMETER	5514-16
Indeno (1,2,3-cd)pyrene, ug/kg	<170000
Isophorone, ug/kg	<170000
Naphthalene, ug/kg	<170000
Nitrobenzene, ug/kg	<170000
N-Nitrosodi-N-Propylamine, ug/kg	<170000
Aroclor-1016, ug/kg	<1700000
Aroclor-1221, ug/kg	<1700000
Aroclor-1232, ug/kg	<1700000
Aroclor-1242, ug/kg	<1700000
Aroclor-1248, ug/kg	<1700000
Aroclor-1254, ug/kg	<1700000
Aroclor-1260, ug/kg	<1700000
Phenanthrene, ug/kg	<170000
Pyrene, ug/kg	<170000
Toxaphene, ug/kg	<3400000
1,2,4-Trichlorobenzene, ug/kg	<170000
4-Chloro-3-methylphenol, ug/kg	<170000
2-Chlorophenol, ug/kg	<170000
2,4-Dichlorophenol, ug/kg	<170000
2,4-Dimethylphenol, ug/kg	<170000
2,4-Dinitrophenol, ug/kg	<850000
2-Methyl-4,6-dinitrophenol, ug/kg	<850000
2-Nitrophenol, ug/kg	<170000
4-Nitrophenol, ug/kg	<850000
Pentachlorophenol, ug/kg	<850000
Phenol, ug/kg	<170000
2,4,6-Trichlorophenol, ug/kg	<170000

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REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-16	MW-1	Client

PARAMETER	5514-16
PCB in liquid	
Aroclor-1016, ug/l	<2.0
Aroclor-1221, ug/l	<2.0
Aroclor-1232, ug/l	<2.0
Aroclor-1242, ug/l	<2.0
Aroclor-1248, ug/l	<2.0
Aroclor-1254, ug/l	<2.0
Aroclor-1260, ug/l	<2.0
Arsenic, mg/l	0.062
Cadmium , mg/l	<0.0050
Chromium, mg/l	<0.010
Copper, mg/l	0.036
Iron, mg/l	10
Lead, mg/l	0.075

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Project: Task Assignment #T010

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-17	Equipment Blank #1	Client
5514-18	Equipment Blank #2	

PARAMETER	5514-17	5514-18
601 and 602		
Bromodichloromethane, ug/l	<1.0	<1.0
Bromoform, ug/l	<1.0	<1.0
Bromomethane, ug/l	<1.0	<1.0
Benzene, ug/l	<1.0	<1.0
Carbon Tetrachloride, ug/l	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0
Chloroethane, ug/l	<1.0	<1.0
2-Chloroethylvinyl Ether, ug/l	<1.0	<1.0
Chloroform, ug/l	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0
Chloromethane, ug/l	<1.0	<1.0
Dibromochloromethane, ug/l	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0
Dichlorodifluoromethane, ug/l	<1.0	<1.0
1,1-Dichloroethane, ug/l	<1.0	<1.0
1,2-Dichloroethane, ug/l	<1.0	<1.0
1,1-Dichloroethene, ug/l	<1.0	<1.0
cis/trans-1,2-Dichloroethylene, ug/l	<1.0	<1.0
1,2-Dichloropropane, ug/l	<1.0	<1.0

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LOG NO: 89-5514

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Project: Task Assignment #T010

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
5514-17	Equipment Blank #1	Client
5514-18	Equipment Blank #2	

PARAMETER	5514-17	5514-18
Cis-1,3-Dichloropropene, ug/l	<1.0	<1.0
Trans-1,3-Dichloropropene, ug/l	<1.0	<1.0
Methylene Chloride, ug/l	<1.0	<1.0
1,1,2,2-Tetrachloroethane, ug/l	<1.0	<1.0
Tetrachloroethylene, ug/l	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0
1,1,1-Trichloroethane, ug/l	<1.0	<1.0
1,1,2-Trichloroethane, ug/l	<1.0	<1.0
Trichloroethene, ug/l	<1.0	<1.0
Trichlorofluoromethane, ug/l	<1.0	<1.0
Vinyl Chloride, ug/l	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0

Method: EPA 40 CFR Part 136
Method: EPA SW-846
HRS Certification #'s:81291,87279,E81005,E87052

Thomas L. Stephens

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SAVANNAH LABORATORIES & ENVIRONMENTAL SERVICES, INC.

CHAIN OF CUSTODY RECORD

COMPANY NAME: FDER - TALLAHASSEE — SITE INVESTIGATION SECTION TEAM ONE

PROJECT NAME/PROJECT NUMBER: U.S. NAVY TRUMBO POINT TANK FARM

SAMPLERS (Signature): W. MARTIN, H. DAVIS, D. PHILLIPS

COLOR CODE — WATER/WASTEWATER | SOIL/SLUDGE

SLSES LOG NO.	DATE 1989	TIME	COMP	GRAB	SAMPLE IDENTIFICATION	NO OF CONTAINERS	1 liter plastic lug (T)	1 liter glass w/TFE (J)	500 ml plastic-nerA (A)	500 ml plastic-mer(K)	250 ml plastic (D)	250 ml oval glass(C)	110 ml amber glass(E)	100 ml plastic (G)	40ml vial w/ins. (F)	20 ml plastic vial(I)	1 liter wm glass (L)	1 liter wm plastic (U)	500 ml wm glass (N)	500 ml wm plastic (P)	40ml vial w/ins. (G)	*Container sealed	ADDITIONAL SAMPLE INFORMATION
	7-11	1405		✓	FIRE WELL EAST	6		2						1	3								
	7-11	1547		✓	KMW-25	6		2						1	3								
	7-11	1549		✓	MW-5	6		2						1	3								
	7-11	1550		✓	MW-5 DUPLICATE	6		2						1	3								
	7-11	1535		✓	EQUIPMENT BLANK #1	3									3								
	7-11	1648		✓	MW-2	6		2						1	3								
	7-11	1756		✓	FIRE WELL WEST	6		2						1	3								
	7-12	0945		✓	KMW 23 & DUPLICATE	12		4						2	6								PRODUCT OBSERVED
	7-12	1017		✓	KMW 24	6		2						1	3								TRACE PRODUCT
	7-12	1050		✓	MW-4	6		2						1	3								PRODUCT
	7-12	1127		✓	MW-9	6		2						1	3								PRODUCT
	7-12	1150		✓	MW-20	6		2						1	3								PRODUCT
	7-12	1225		✓	MW-8	6		2						1	3								PRODUCT (REACTS w/ HCL)
	7-12	1330		✓	MW-22	6		2						1	3								PRODUCT (YELLOW BRN)
	7-12	1350		✓	EQUIPMENT BLANK #2	3																	

Relinquished by:	Date/Time	Received by:	Date/Time	Relinquished by:	Date/Time
David Phillips	7/6/89 2:00	[illegible]		Hal Davis	7/17/89 11:00
Relinquished by:	Date/Time	Received by:	Date/Time	Relinquished by:	Date/Time
		Tommy Jones	7/17 1100		

Color Code/Preservative
- Green - sulfuric acid
- Purple - no preservative
- Red - nitric acid
- Tan - zinc acetate
- Yellow - sodium thiosulfate
- Blue - sodium hydroxide

Container seal intact
Field _____
Lab _____

It is very important that we have your Project Name or Project #.

7-12	1400		✓	MW-7	6		2						1	3									PRODUCT
7-12	1450		✓	MW-1	6		2						1	3									PRODUCT & ODOR

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

CLIENT: DER - Patton PROJECT:

LOG NUMBER: 895514-1 SAMPLE DESCRIPTION: Firewell East

MATRIX: Water

CAS NUMBER	COMPOUND NAME	ESTIMATED CONCENTRATION
	VOLATILE ORGANICS	
1.	N/A	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	SEMIVOLATILE ORGANICS	
1.	No TICs were found above detection limit.	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

RECEIVED FDER
AUG 28 1989
SITE INVESTIGATION SECTION

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

CLIENT: DER - Patton PROJECT:

LOG NUMBER: 895514-2 SAMPLE DESCRIPTION: KMW-25

MATRIX: Water

CAS NUMBER	COMPOUND NAME	ESTIMATED CONCENTRATION ug/l
	VOLATILE ORGANICS	
1.	N/A	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	SEMIVOLATILE ORGANICS	
1.	Unknown	6.3
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

CLIENT: DER - Patton PROJECT:

LOG NUMBER: 895514-3 SAMPLE DESCRIPTION: MW-5

MATRIX: Water

CAS NUMBER	COMPOUND NAME	ESTIMATED CONCENTRATION ug/l
	VOLATILE ORGANICS	
1.	N/A	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	SEMIVOLATILE ORGANICS	
1.	Unknown	31
2.	Unknown	7.4
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

CLIENT: DER - Patton PROJECT:

LOG NUMBER: 895514-4 SAMPLE DESCRIPTION: MW-5 Duplicate

MATRIX: Water

CAS NUMBER	COMPOUND NAME	ESTIMATED CONCENTRATION ug/l
	VOLATILE ORGANICS	
1.	N/A	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	SEMIVOLATILE ORGANICS	
1.	Unknown	20
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

CLIENT: DER - Patton PROJECT:

LOG NUMBER: 895514-5 SAMPLE DESCRIPTION: MW-2

MATRIX: Water

CAS NUMBER	COMPOUND NAME	ESTIMATED CONCENTRATION
	VOLATILE ORGANICS	
1.	N/A	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	SEMIVOLATILE ORGANICS	
1.	No TICs were found above detection limit.	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

CLIENT: DER - Patton PROJECT:

LOG NUMBER: 895514-6 SAMPLE DESCRIPTION: Firewell West

MATRIX: Water

CAS NUMBER	COMPOUND NAME	ESTIMATED CONCENTRATION
	VOLATILE ORGANICS	
1.	N/A	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	SEMIVOLATILE ORGANICS	
1.	No other TICs were found above detection limit.	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

CLIENT: DER - Patton PROJECT:

LOG NUMBER: 895514-16 SAMPLE DESCRIPTION: MW-1

MATRIX: Water

CAS NUMBER	COMPOUND NAME	ESTIMATED CONCENTRATION ug/kg
	VOLATILE ORGANICS	
1.	N/A	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	SEMIVOLATILE ORGANICS	
1.	Unknown hydrocarbon C_{11} - C_{20}	7,100,000
2.	Unknown hydrocarbon C_{13} - C_{43}	5,300,000
3.	Unknown dimethyl naphthalene	3,700,000
4.	Unknown hydrocarbon C_{12} - C_{28}	3,500,000
5.	Unknown trimethyl octane	3,300,000
6.	Unknown hydrocarbon C_{11} - C_{18}	3,100,000
7.	Unknown hydrocarbon	3,100,000
8.	Unknown hydrocarbon C_{13} - C_{44}	3,100,000
9.	Unknown	2,400,000
10.	Unknown	2,300,000

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

CLIENT: DER - Patton PROJECT:

LOG NUMBER: 895514-15 SAMPLE DESCRIPTION: MW-7

MATRIX: Water

CAS NUMBER	COMPOUND NAME	ESTIMATED CONCENTRATION ug/kg
	VOLATILE ORGANICS	
1.	N/A	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	SEMIVOLATILE ORGANICS	
1.	Unknown hydrocarbon C_6 - C_{12}	22,000,000
2.	Unknown hydrocarbon C_{13}	18,000,000
3.	Unknown	16,000,000
4.	Unknown hydrocarbon C_{11} - C_{15}	16,000,000
5.	Unknown hydrocarbon C_{13} - C_{43}	15,000,000
6.	Unknown hydrocarbon	14,000,000
7.	Unknown	14,000,000
8.	Unknown	13,000,000
9.	Unknown hydrocarbon	12,000,000
10.	Unknown hydrocarbon	11,000,000

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

CLIENT: DER - Patton PROJECT:

LOG NUMBER: 895514-14 SAMPLE DESCRIPTION: MW-22

MATRIX: Water

CAS NUMBER	COMPOUND NAME	ESTIMATED CONCENTRATION ug/kg
	VOLATILE ORGANICS	
1.	N/A	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	SEMIVOLATILE ORGANICS	
1.	Unknown hydrocarbon C_{11} - C_{13}	32,000,000
2.	Unknown hydrocarbon C_{11} - C_{15}	21,000,000
3.	Unknown hydrocarbon C_6 - C_{12}	20,000,000
4.	Unknown hydrocarbon C_{13}	18,000,000
5.	Unknown	16,000,000
6.	Unknown hydrocarbon C_{11} - C_{19}	16,000,000
7.	Unknown aromatic hydrocarbon	15,000,000
8.	Unknown hydrocarbon	14,000,000
9.	Unknown	13,000,000
10.	Unknown	13,000,000

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

CLIENT: DER - Patton PROJECT:

LOG NUMBER: 895514-13 SAMPLE DESCRIPTION: MW-8

MATRIX: Water

CAS NUMBER	COMPOUND NAME	ESTIMATED CONCENTRATION ug/kg
	VOLATILE ORGANICS	
1.	N/A	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	SEMIVOLATILE ORGANICS	
1.	Unknown hydrocarbon C_{10} - C_{13}	34,000,000
2.	Unknown alkyl octane	19,000,000
3.	Unknown trimethyl dodecane	17,000,000
4.	Unknown dimethyl undecane	17,000,000
5.	Unknown hydrocarbon	15,000,000
6.	Unknown tetra hydro-methyl naphthalene	13,000,000
7.	Unknown	13,000,000
8.	Unknown alkyl octane	13,000,000
9.	Unknown hydrocarbon	11,000,000
10.	Unknown	11,000,000

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

CLIENT: DER - Patton PROJECT:

LOG NUMBER: 895514-12 SAMPLE DESCRIPTION: MW-20

MATRIX: Water

CAS NUMBER	COMPOUND NAME	ESTIMATED CONCENTRATION ug/kg
	VOLATILE ORGANICS	
1.	N/A	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	SEMIVOLATILE ORGANICS	
1.	Unknown hydrocarbon	36,000,000
2.	Unknown hydrocarbon C_{10} - C_{15}	20,000,000
3.	Unknown hydrocarbon C_{11} - C_{15}	17,00,000
4.	Unknown hydrocarbon C_{13}	17,000,000
5.	Unknown hydrocarbon C_{10} - C_{13}	16,000,000
6.	Unknown hydrocarbon	16,000,00
7.	Unknown	14,000,000
8.	Unknown hydrocarbon	14,000,000
9.	Unknown hydrocarbon C_{11} - C_{15}	13,000,000
10.	Unknown hydrocarbon C_{11} - C_{19}	13,000,000

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

CLIENT: DER - Patton PROJECT:

LOG NUMBER: 895514-11 SAMPLE DESCRIPTION: MW-9

MATRIX: Water

CAS NUMBER	COMPOUND NAME	ESTIMATED CONCENTRATION ug/l
	VOLATILE ORGANICS	
1.	N/A	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	SEMIVOLATILE ORGANICS	
1.	Unknown hydrocarbon C_{10} - C_{14}	230
2. 00091-57-6	2 methyl-naphthalene	190
3.	Unknown hydrocarbon C_{13}	120
4.	Unknown alkyl benzene	108
5.	Unknown hydrocarbon C_{11} - C_{15}	100
6.	Unknown	82
7.	Unknown hydrocarbon	81
8.	Unknown hydrocarbon C_{13}	81
9.	Unknown PAH - C_{11}	78
10.	Unknown	77

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

CLIENT: DER - Patton PROJECT:

LOG NUMBER: 895514-10 SAMPLE DESCRIPTION: MW-4

MATRIX: Water

CAS NUMBER	COMPOUND NAME	ESTIMATED CONCENTRATION ug/l
	VOLATILE ORGANICS	
1.	N/A	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	SEMIVOLATILE ORGANICS	
1. 00091-57-6	2-methyl naphthalene	79
2.	Unknown	77
3.	Unknown hydrocarbon C_{13} - C_{20}	66
4.	Unknown alkyl benzene	61
5. 00090-12-0	1-methyl naphthalene	61
6.	Unknown	59
7.	Unknown	50
8.	Unknown	47
9.	Unknown	47
10.	Unknown hydrocarbon C_{11} - C_{44}	46

TENTATIVELY IDENTIFIED COMPOUNDS (TICs)

CLIENT: DER - Patton PROJECT:

LOG NUMBER: 895514-9 SAMPLE DESCRIPTION: MW-24

MATRIX: Water

CAS NUMBER	COMPOUND NAME	ESTIMATED CONCENTRATION ug/kg
	VOLATILE ORGANICS	
1.	N/A	
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
	SEMIVOLATILE ORGANICS	
1.	Unknown hydrocarbon C_{13} - C_{19}	21,000,000
2.	Unknown hydrocarbon C_{10} - C_{21}	17,000,000
3.	Unknown hydrocarbon C_{13} - C_{18}	16,000,000
4.	Unknown hydrocarbon C_{13} - C_{44}	11,000,000
5.	Unknown hydrocarbon C_{11} - C_{19}	9,000,000
6.	Unknown	9,000,000
7.	Unknown	9,000,000
8.	Unknown alkyl octane	8,700,000
9.	Unknown trimethyl naphthalene	8,200,000
10.	Unknown trimethyl naphthalene	8,200,000