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NSA MID SOUTH
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TECHNICAL MEMORANDUM FOR NORTH FUEL FARM TANKS 336 AND 337
INVESTIGATION MILLINGTON SUPPACT TN
11/18/1996
ENSAFE

50674

TECHNICAL MEMORANDUM

TO: Mark Taylor/David Porter, SOUTHDIV
Brian Donaldson, EPA Region IV
Jim Morrison, TDEC
Tonya Barker/Rob Williamson, NSA Memphis
Jack Carmichael, USGS
Brenda Duggar, MSCHD

FROM: Robert Smith, EnSafe/Allen & Hoshall

DATE: November 18, 1996

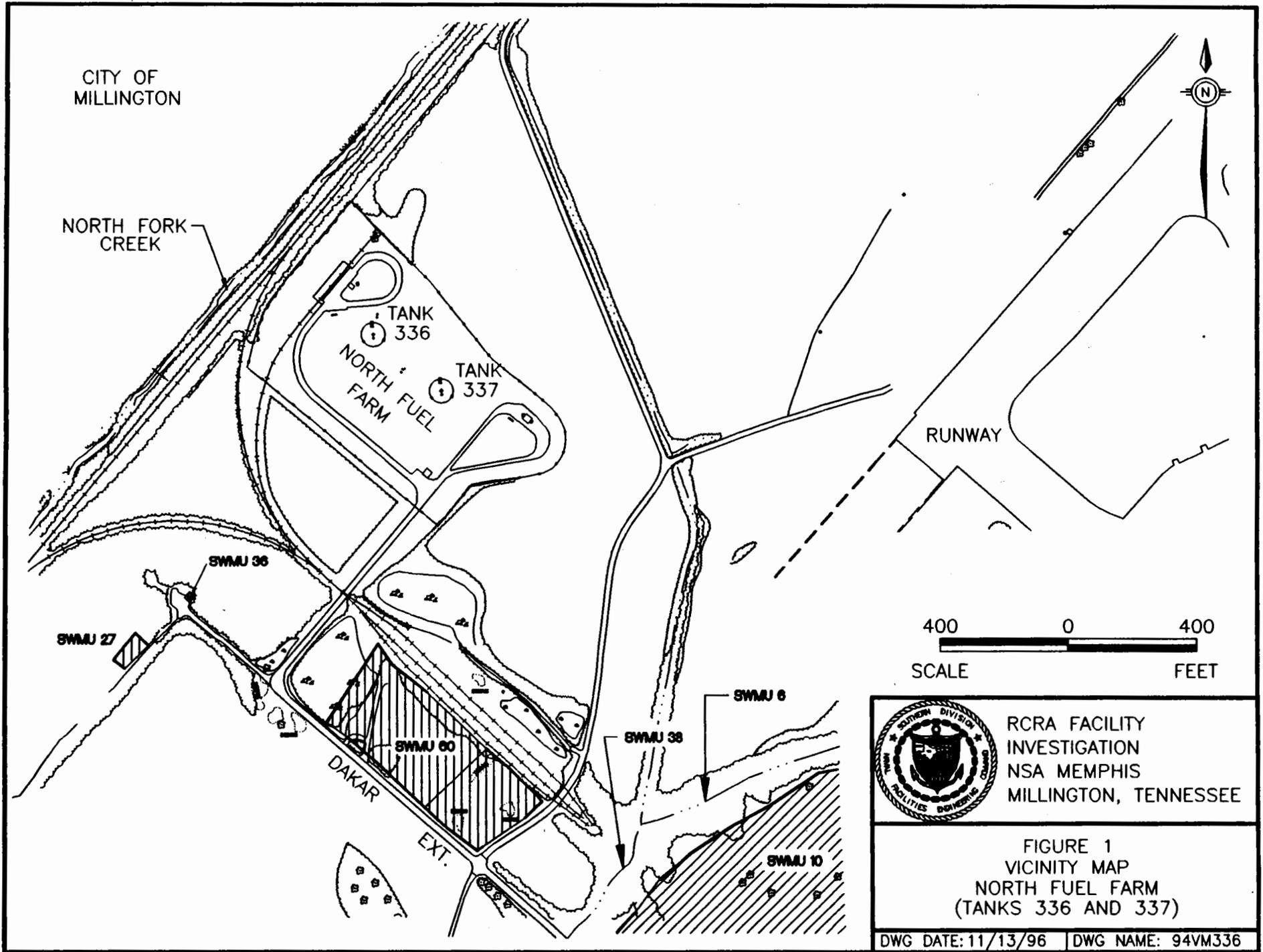
RE: North Fuel Farm (Tanks 336/337) Investigation, NSA Memphis,
Millington, TN

INTRODUCTION

The Navy, through EnSafe/Allen & Hoshall (E/A&H), conducted a soil and groundwater investigation in June 1996 at the North Fuel Farm in the northwest portion of the NSA Memphis Northside (Figure 1). The North Fuel Farm consists of two 420,000-gallon, field-constructed, concrete diesel fuel tanks (Tanks 336 and 337) and the associated piping and dispensing equipment. The North Fuel Farm area is in an area of the NSA Memphis Northside scheduled for closure under the Base Closure and Realignment Act of 1990 (BRAC). This area is scheduled to be transferred to the City of Millington; reportedly the city intends to use one of the tanks as non-potable water storage for fire protection.

PREVIOUS INVESTIGATIONS

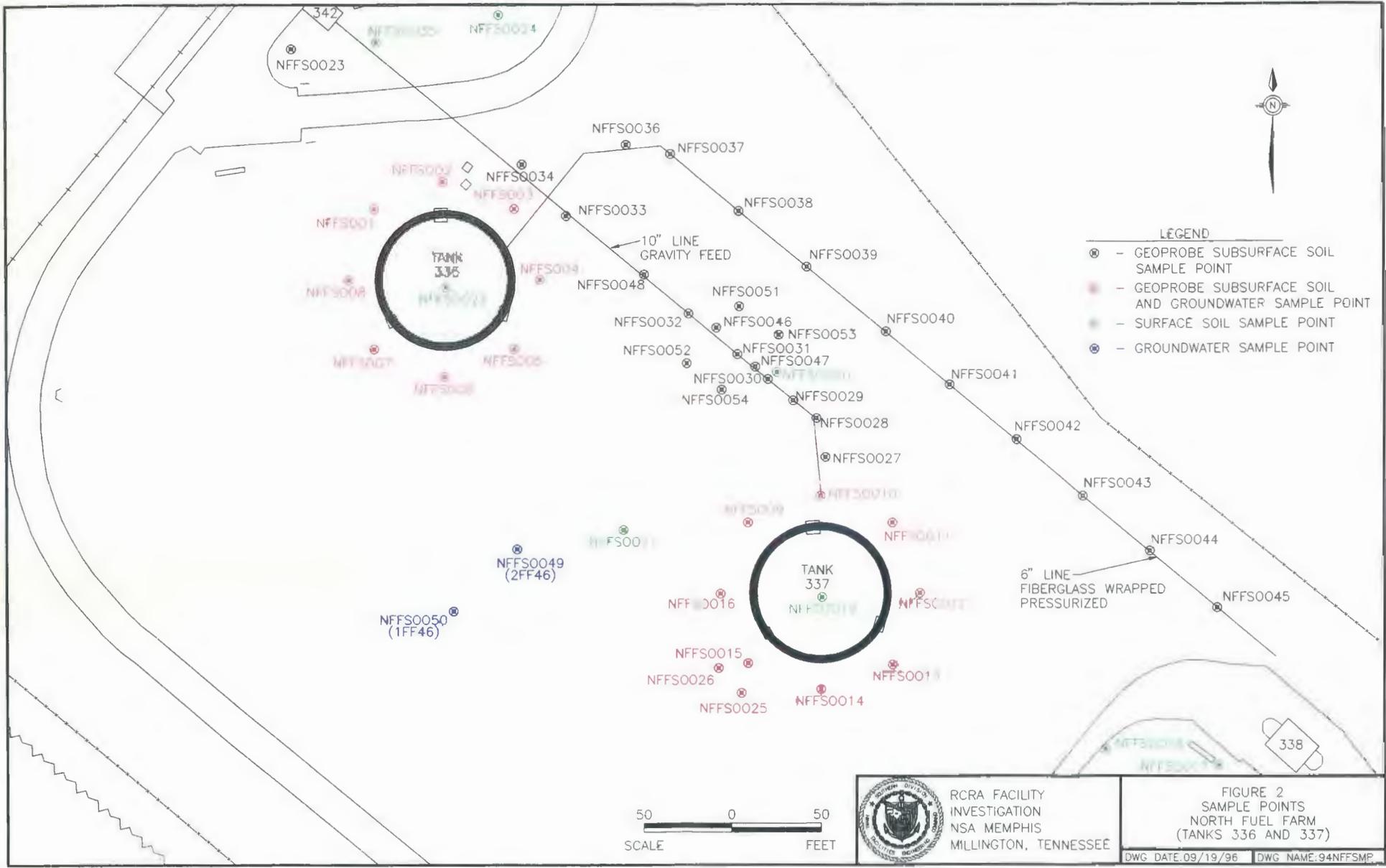
There have been no previous environmental investigations regarding Tanks 336 and 337. However, in November 1995, E/A&H collected groundwater samples from the North Fuel Farm area as part of the NSA Memphis Northside groundwater investigation. Fluvial deposits groundwater samples were collected from a depth of 46 feet below land surface (bls) at points 1FF46 and 2FF46 (Figure 2). Trichloroethylene (TCE) was detected in one sample (2FF46) at a concentration of 6.8 micrograms per liter ($\mu\text{g/L}$). No soil data existed for this site prior to the current (June 1996) investigation.



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SAMPLING RATIONALE

E/A&H used a Geoprobe® sampling system to collect subsurface soil and groundwater samples from around both tanks, and soil samples from beneath the two main pipelines to determine if contamination was present from any leaks and/or spillage during past operations. Soil samples were collected from intervals corresponding to the bottom of the tanks and the pipelines which were estimated to be 13 to 15 feet bls and 3 to 7 feet bls, respectively. The analytical results from the subsurface soil samples are presented in Table 1.

Surface-soil samples were also collected across the site to facilitate a preliminary risk evaluation (PRE). The data from these samples are presented in Tables 2 and 3, with the results discussed in the *Preliminary Risk Evaluation* section below.

Groundwater samples were collected at sample points adjacent to the tanks from a depth of 50 feet bls to determine if the fluvial deposits groundwater had been impacted. Groundwater samples were also collected from the previous locations of samples 1FF46 and 2FF46 to confirm the previous detection of TCE in the fluvial deposits groundwater. Groundwater sampling results are discussed in the *Sampling Results* section below.

The subsurface soil samples were split between an onsite laboratory (TEG from Lillburn, GA) and an offsite laboratory, Environmental Testing and Consulting (ETC from Memphis, TN). Onsite analyses consisted of volatile organics compounds (VOCs) analysis using USEPA Methods 8010 and 8020 for both soil and groundwater. Offsite analysis included Total Petroleum Hydrocarbons — Gasoline Range Organics (TPH-GRO), and Total Petroleum Hydrocarbons — Diesel Range Organics (TPH-DRO) using Tennessee-modified Method 8015 for gasoline range and diesel range organics. VOC analysis was selected because it can detect both chlorinated solvents such as TCE, as well as the petroleum constituents benzene, toluene, ethylbenzene, and xylenes (BTEX). The groundwater samples were submitted to the onsite laboratory for VOC analysis, only. Sample locations are presented in Figure 2.

Table 1
NSA Memphis
North Fuel Farm Geoprobe Soil Sample Results (in mg/kg)

		Parameters								
	Sample Point	Depth	TPH-DRO	TPH-GRO	Benzene	Toluene	Ethyl benzene	Xylenes (total)	BTEX (Total)	
Tank 336	NFFS0001	13-15'	ND	ND	ND	ND	ND	ND	ND	
	NFFS0002	13-15'	ND	ND	ND	ND	ND	ND	ND	
	NFFS0003	13-15'	ND	ND	ND	ND	ND	ND	ND	
	NFFS0004	13-15'	ND	ND	ND	ND	ND	ND	ND	
	NFFS0005	13-15'	ND	ND	ND	ND	ND	ND	ND	
	NFFS0006	13-15'	16.4	ND	ND	ND	ND	ND	ND	
	NFFS0007	13-15'	ND	ND	ND	ND	ND	ND	ND	
	NFFS0008	13-15'	ND	ND	ND	ND	ND	ND	ND	
Tank 337	NFFS0009	13-15'	ND	ND	ND	ND	ND	ND	ND	
	NFFS0010	13-15'	ND	ND	ND	ND	ND	ND	ND	
	NFFS0011	13-15'	ND	ND	ND	ND	ND	ND	ND	
	NFFS0012	13-15'	ND	ND	ND	ND	ND	ND	ND	
	NFFS0013	13-15'	ND	ND	ND	ND	ND	ND	ND	
	NFFS0014	13-15'	ND	ND	ND	ND	ND	ND	ND	
	NFFS0015		2-4'	ND	ND	ND	ND	ND	ND	ND
			6-8'	ND	ND	ND	ND	ND	12.1	12.1
			10-12'	ND	ND	33.1	ND	ND	77.3	110.4
			13-15'	ND	ND	ND	ND	ND	ND	ND
			16-18'	ND	ND	ND	ND	ND	ND	ND
	NFFC0015 (Duplicate)	13-15'	30.5	ND	ND	ND	ND	ND	ND	
	NFFS0016 ¹	13-15'	ND	ND	N/A	N/A	N/A	N/A	N/A	
	NFFS0025		2-4'	ND	ND	N/A	N/A	N/A	N/A	N/A
			6-8'	13.7	ND	N/A	N/A	N/A	N/A	N/A
10-12'			1560	230	N/A	N/A	N/A	N/A	N/A	
NFFS0026		2-4'	ND	ND	N/A	N/A	N/A	N/A	N/A	
		6-8'	ND	ND	N/A	N/A	N/A	N/A	N/A	
NFFS0027	3-7'	ND	ND	N/A	N/A	N/A	N/A	N/A		

Table 1
NSA Memphis
North Fuel Farm Geoprobe Soil Sample Results (in mg/kg)

	Sample Point	Depth	Parameters						
			TPH-DRO	TPH-GRO	Benzene	Toluene	Ethyl benzene	Xylenes (total)	BTEX (Total)
10" Line	NFFS0028	3-7'	ND	N/A	N/A	N/A	N/A	N/A	N/A
	NFFS0029	3-7'	ND	N/A	N/A	N/A	N/A	N/A	N/A
	NFFS0030	3-7'	109	181	ND	3.7	2.5	17	23.2
	NFFS0031	3-7'	13.6	ND	ND	0.01	0.04	0.12	0.17
	NFFS0032	3-7'	N/A	N/A	ND	2.7	1.8	12.3	16.8
		7-11'	ND	ND	ND	ND	ND	ND	ND
	NFFS0033	3-7'	318	81	ND	ND	ND	ND	ND
	NFFS0034	3-7'	ND	ND	ND	ND	ND	ND	ND
	NFFS0035	3-7'	N/A	N/A	ND	ND	ND	ND	ND
	6" Line	NFFS0036	3-7'	N/A	N/A	ND	ND	ND	ND
NFFS0037		3-7'	N/A	N/A	ND	ND	ND	ND	ND
NFFS0038		3-7'	N/A	N/A	ND	ND	ND	ND	ND
NFFS0039		3-7'	N/A	N/A	ND	ND	ND	ND	ND
NFFS0040		3-7'	N/A	N/A	ND	ND	ND	ND	ND
NFFS0041		3-7'	N/A	N/A	ND	ND	ND	ND	ND
NFFS0042		3-7'	N/A	N/A	ND	ND	ND	ND	ND
NFFS0043		3-7'	N/A	N/A	ND	ND	ND	ND	ND
NFFS0044		3-7'	N/A	N/A	ND	ND	ND	ND	ND
NFFS0045		3-7'	N/A	N/A	ND	ND	ND	ND	ND
NFFS0046		3-7'	N/A	N/A	ND	3.7	2	21.5	27.2
NFFS0047		3-7'	91.8	246	ND	ND	0.01	0.07	0.08
NFFS0048 ²		3-7'	52.3	ND	ND	ND	ND	ND	ND
NFFS0051		3-7'	ND	ND	ND	ND	ND	ND	ND
NFFC0051 (Duplicate)		3-7'	ND	ND	ND	ND	ND	ND	ND
NFFS0052		0-4'	ND	ND	ND	ND	ND	ND	ND
	6-8'	ND	ND	ND	ND	ND	ND	ND	
	10-12'	ND	ND	ND	ND	ND	ND	ND	

Table 1
NSA Memphis
North Fuel Farm Geoprobe Soil Sample Results (in mg/kg)

	Sample Point	Depth	Parameters						
			TPH-DRO	TPH-GRO	Benzene	Toluene	Ethyl benzene	Xylenes (total)	BTEX (Total)
6" Line (continued)	NFFC0052 (Duplicate)	0-4'	ND	ND	ND	ND	ND	ND	ND
	NFFS0053	0-4'	ND	ND	ND	ND	ND	ND	ND
		6-8'	ND	ND	ND	ND	ND	ND	ND
10-12'		ND	ND	ND	ND	ND	ND	ND	
NFFS0054	0-4'	ND	ND	ND	ND	ND	ND	ND	
	6-8'	42.7	149	ND	2.94	1.93	16.7	21.5	
	10-12'	ND	ND	ND	1.21	7.77	5.8	14.8	

Notes:

- ND = Sample was analyzed for the specified parameter; however, concentrations were below the method detection limit.
- N/A = Sample was not analyzed for the specified parameter.
- ¹ = Samples NFFS0017 through NFFS0024 were surface soil samples collected for risk analysis; they are not included in this table.
- ² = Samples NFFG0049 through NFFG0050 were groundwater samples collected from the upper fluvial deposits; they are not included in this table.

SAMPLING RESULTS

The analytical results for the subsurface soil samples collected during this investigation (Table 1) indicate that three areas ~~may~~ have been impacted by past Fuel Farm activities; the southwest edge of Tank 337, and two small areas around the 10-inch pipeline.

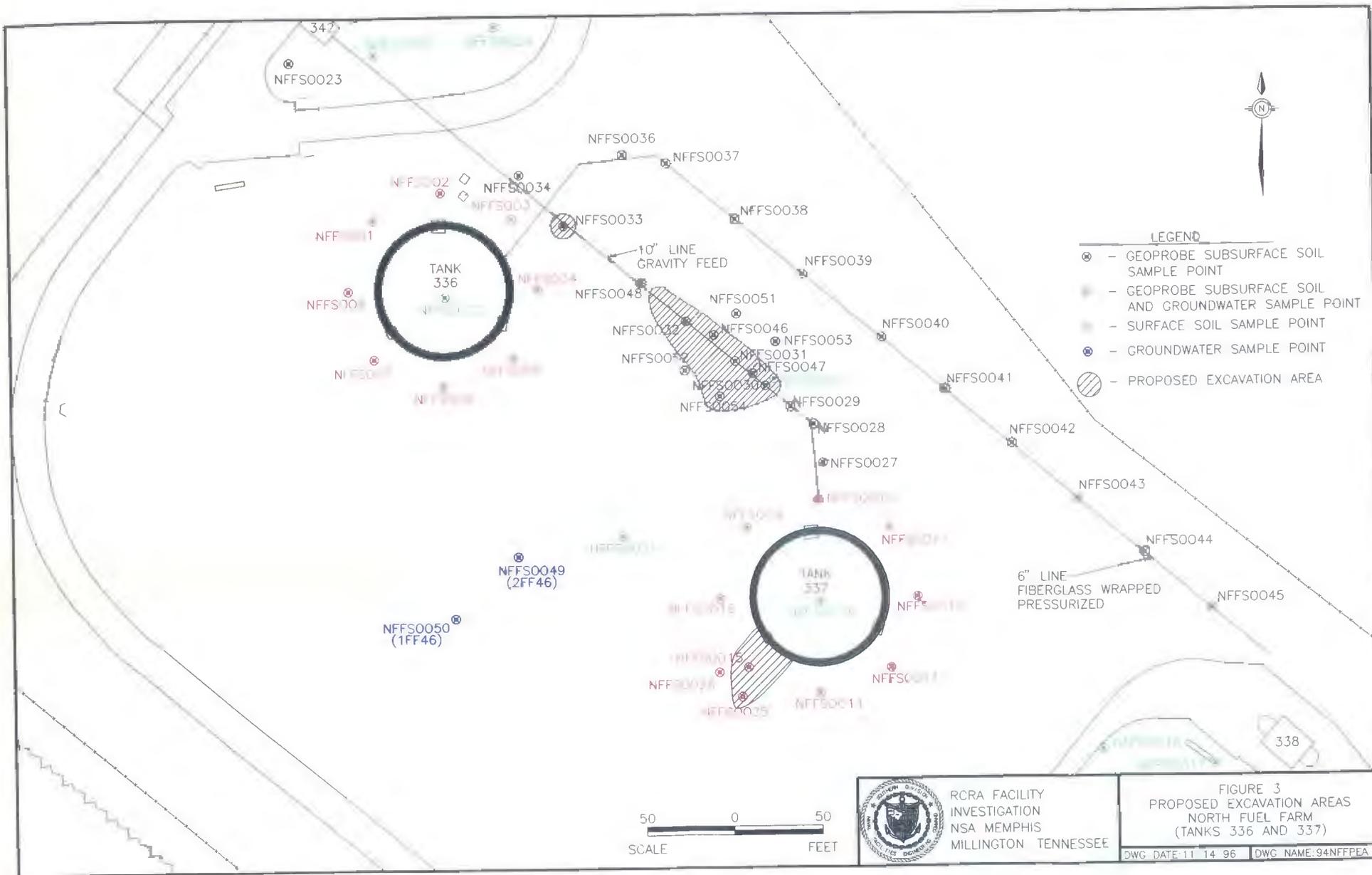
The first area is at the southwest edge of Tank 337 (the easternmost tank). The subsurface soil sample collected from location NFFS0015 indicated the presence of petroleum constituents (maximum concentration of 110 milligrams per kilogram [mg/kg] BTEX from a depth of 6 feet, to a depth of 12 feet), exceeding the Tennessee Department of Environment and Conservation (TDEC) site remediation level of 10 mg/kg BTEX. To delineate the extent of the contamination, two additional points were sampled, NFFS0025 and NFFS0026. As noted in Table 1, elevated concentrations of both TPH-DRO and TPH-GRO were detected to a depth of 12 feet bls at point NFFS0025 (1,560 mg/kg TPH-DRO); however, samples collected from point NFFS0026 were

below the method detection limits. Based on these results, the extent of the contamination adjacent to Tank 337 encompasses an area approximately 30 feet by 20 feet and to a depth of at least 15 feet. The impacted area is shown hatched in Figure 3.

The second impacted area was along a 10-inch gravity-fed steel pipeline that was used to transfer fuel from rail cars to the tanks. Petroleum products (TPH-DRO) were detected at concentrations exceeding the TDEC site remediation level of 100 mg/kg in subsurface soil samples collected from locations NFFS0030 (109 mg/kg) and NFFS0033 (318 mg/kg). Also, BTEX concentrations at locations NFFS0030 (23.2 mg/kg), NFFS0032 (16.8 mg/kg) and NFFS0046 (27.2 mg/kg) exceeded the TDEC limit of 10 mg/kg. Four additional locations were sampled three intervals (0 to 4 ft., 6 to 8 ft., and 10 to 12 ft. bls) to delineate the extent of the contamination along the pipeline: NFFS0051, NFFS0052, NFFS0053, and NFFS0054. Analytical results indicated the impacted area is approximately 85 feet long and 40 feet wide, with the depth of contamination apparently limited to approximately 12 feet bls. The impacted area is shown hatched in Figure 3.

A small area on the western end of the pipeline also had elevated concentrations of TPH- DRO (318 mg/kg at point NFFS0033). The estimated extent of the area of contamination, approximately 15 feet in diameter, is based solely on one sample point. The actual extent of contamination will be determined during the removal process. The impacted area is shown in Figure 3 as a hatched area.

Analysis of groundwater samples did not indicate fuel-related impacts on groundwater in the North Fuel Farm area. However, one groundwater sample, collected from 50 feet bls at location NFFS0003, indicated the presence of 1,1-dichloroethene at 2.2 $\mu\text{g/L}$, which is below the 7 $\mu\text{g/L}$ maximum contaminant level (MCL) set by the USEPA. Groundwater samples collected from the previous sampling points 1FF46 and 2FF46 did not contain concentrations of any contaminants above the method detection limit.



- LEGEND**
- ⊗ - GEOPROBE SUBSURFACE SOIL SAMPLE POINT
 - ⊙ - GEOPROBE SUBSURFACE SOIL AND GROUNDWATER SAMPLE POINT
 - ⊕ - SURFACE SOIL SAMPLE POINT
 - ⊚ - GROUNDWATER SAMPLE POINT
 - ▨ - PROPOSED EXCAVATION AREA

RCRA FACILITY INVESTIGATION
 NSA MEMPHIS
 MILLINGTON TENNESSEE

FIGURE 3
 PROPOSED EXCAVATION AREAS
 NORTH FUEL FARM
 (TANKS 336 AND 337)
 DWG DATE: 11/14/96 DWG NAME: 94NFFPEA

PRELIMINARY RISK EVALUATION

In accordance with *Guidance on Preliminary Risk Evaluations (PREs) for the Purpose of Reaching a Finding of Suitability to Lease* (USEPA Region IV Memorandum, 1994), a PRE was conducted for the North Fuel Farm area using data from the six surface (0 to 1 ft. bls) soil samples collected during the investigation. The PRE was conducted by constructing a table for carcinogenic and systemic (noncarcinogenic) compounds. The maximum concentration for each detected constituent and its corresponding RBC were entered into the table to calculate cumulative human health risk. However, if an inorganic's maximum concentration did not exceed its background reference concentration¹, it was not included in the PRE. This method was used to identify chemicals of potential concern (COPCs). Proportionate risk was calculated for each COPC by comparing its maximum reported concentration to the respective RBC value. Residential and commercial scenarios were calculated separately. RBC values have been calculated by the USEPA based on an Incremental Excess Lifetime Cancer Risk (ILCR) threshold of 10^{-6} for carcinogens or a hazard quotient (HQ) threshold of 1.0 for noncarcinogens. To determine the ILCR or Hazard Index (HI), a risk ratio was calculated for each contaminant by the following equations:

Carcinogenic Risk Ratio: $RR = (\text{media concentration}/\text{screening value}) \times TR$

Noncarcinogenic Risk Ratio: $RR = (\text{media concentration}/\text{screening value}) \times THQ$

where:

RR	=	the risk ratio
Media Concentration	=	the maximum concentration of a site constituent
Screening Value	=	the RBC value for that particular constituent
TR	=	target risk for RBCs
THQ	=	target HQ for RBCs

¹ Reference concentration calculations are documented in the *E/A&H Reference Concentrations Technical Memorandum (August 27, 1996)*.

The risk ratios for each chemical were summed separately for residential and commercial scenarios to determine the overall site risk. In accordance with the PRE guidance, the cumulative ILCR threshold is 10^{-4} , and the HI threshold is 1.0. If the ILCR was greater than 10^{-4} or the HI was greater than 1.0, the site may require additional investigation for the corresponding land-use scenario. If neither threshold was exceeded, the property may be considered suitable to lease for the specified land-use scenario.

Tables 2 and 3 summarize PRE results for the North Fuel Farm area.

Table 2
 North Fuel Farm — Preliminary Risk Evaluation — Carcinogens ($\mu\text{g}/\text{kg}$)

Parameter	Concentration ^a	Background Concentration ^b Reference	Screening Value ^c		Risk Ratio	
			Residential	Industrial	Residential	Industrial
Benzo(a)anthracene	290	N/A	8.80e+02	7.80e+03	3.30e-07	3.72e-08
Benzo(a)pyrene	260	N/A	8.80e+01	780	2.95e-06	3.33e-07
Benzo(b)fluoranthene	340	N/A	8.80e+01	7.80e+02	3.86e-06	4.36e-07
Benzo(g,h,i)perylene	120	N/A	8.80e+02	7.80e+03	1.36e-07	1.54e-08
Benzo(k)fluoranthene	410	N/A	8.80e+03	7.80e+04	4.66e-08	5.26e-09
Carbazole	100	N/A	3.20e+04	2.90e+05	3.13e-09	3.45e-10
Chrysene	330	N/A	8.80e+04	7.80e+05	3.75e-09	4.23e-10
4,4'-DDT	4.3	N/A	1.90e+03	1.70e+04	2.26e-09	2.53e-10
Dibenz(a,h)anthracene	54	N/A	8.80e+01	7.80e+02	6.14e-07	6.92e-08
Dieldrin	370	N/A	4.00e+01	3.60e+02	9.25e-06	1.03e-06
Indeno(1,2,3-cd)pyrene	120	N/A	8.80e+02	7.80e+03	1.36e-07	1.54e-08
PCB (Arochlor 1260)	210	N/A	8.30e+01	7.40e+02	2.53e-06	2.84e-07
ILCR					1.99e-05	2.22e-06

Notes:

- ^a = The highest detected concentration for each contaminant was used.
- ^b = Background reference concentration (RC) ($2 \times$ mean background). See the *Background Reference Concentration Technical Memorandum* (E/A&H, August 1996) for a discussion of RCs.
- ^c = Screening values are RBCs from the January to June 1996 RBC Table (June 3, 1996, USEPA Region III RBC memo).
- N/A = Not applicable.

Table 3
North Fuel Farm — Preliminary Risk Evaluation — Noncarcinogens (µg/kg)

Parameter	Concentration ^a	Background Reference Concentration ^b	Screening Value ^c		Risk Ratio	
			Residential	Industrial	Residential	Industrial
Acenaphthene	61	N/A	4.70e+06	1.20e+08	1.30e-05	5.08e-07
Anthracene	86	N/A	2.30e+07	6.10e+08	3.74e-06	1.41e-07
Cadmium	20,300	BDL	4.68e+05	1.00e+06	4.34e-02	2.03e-02
Fluoranthene	880	N/A	3.10e+06	8.20e+07	2.84e-04	1.07e-05
Fluorene	45	N/A	3.10e+06	8.20e+07	1.45e-05	5.49e-07
Lead	58,100	19.80	4.00e+05	4.00e+05	1.45e-01	1.45e-01
Nickel	17,200	BDL	1.60e+06	4.10e+07	1.08e-02	4.20e-04
Phenanthrene	830	N/A	3.10e+06	6.10e+07	2.68e-04	1.36e-05
Pyrene	570	N/A	2.30e+06	6.10e+07	2.48e-04	9.34e-06
Styrene	2	N/A	1.60e+07	4.10e+07	1.25e-07	4.88e-08
Toluene	8	N/A	1.60e+07	4.10e+08	5.00e-07	1.95e-08
HI					0.20	0.17

Notes:

- ^a = The highest detected concentration for each contaminant was used.
- ^b = Background reference concentration (2 × mean background). See the *Background Reference Concentration Technical Memorandum* (E/A&H, August 1996) for a discussion of RCs.
- ^c = Screening values are RBCs from the January to June 1996 RBC Table (June 3, 1996, EPA Region III RBC memo).
- N/A = Not applicable.
- BDL = Below detection limit

Both the ILCR and the HI were below the cumulative thresholds presented in the *Guidance on Preliminary Risk Evaluations (PREs) for the Purpose of Reaching a Finding of Suitability to Lease* and would therefore be suitable for both residential and commercial purposes. According to the Aviation-Related Development Alternative presented in the *Base Reuse and Economic Development Plan* (RKG, 1995), the area that includes the North Fuel Farm will be used for commercial purposes.

CONCLUSIONS AND RECOMMENDATIONS

Based on the information obtained during the field investigation at the North Fuel Farm, conclusions and recommendations are as follows.

Surficial Soil:

Based on the PRE results, surface soil contamination at this site does not exceed the residential nor the commercial thresholds defined in USEPA guidance. Therefore, the site should be considered suitable for leasing for the intended commercial land-use purposes.

Subsurface Soil:

Tank 337:

Based on the elevated BTEX concentrations, the area southwest of Tank 337, (see Figure 3) appears to have been impacted by a subsurface release of petroleum. The release was from approximately 6 feet bls to approximately 12 feet bls. Due to the absence of surface soil contamination, it is presumed that the release is related to tank leakage, rather than a surface spill.

To remediate this area and expedite the turnover of the property to meet the needs of the community, a soil removal of limited scope will be required. An estimated 6 feet of overlying soil should be removed and segregated for later use. The petroleum-contaminated soil could then be removed, using field screening techniques (e.g., a field infrared spectrophotometer) to define the extent of the excavation area. Samples should be collected from the excavation area to confirm contaminated soil exceeding the TDEC regulatory criteria was removed.

10-inch Pipeline

Two areas along the 10-inch pipeline (see Figure 3) have been impacted from leaks at mechanical joints or breakage points. The largest of the two areas is approximately 85 feet long and 40 feet wide and extends vertically from the depth of the pipeline (approximately 3 feet bls)

to extend 6 to 8 feet bls. The second and smaller area, is around sample point NFFS0033 and is estimated to extend from the depth of the pipeline to the same depth (6 to 8 feet bls). The horizontal extent is unknown at this time. However, based on the typically low permeability of the soil at NSA Memphis, and the observed TPH-DRO concentrations of 318 mg/kg, the horizontal extent of contamination in this area is not believed to be extensive.

As with Tank 337, a soil removal of limited scope should be performed to remediate these two areas. The surficial soil should be removed to gain access to the impacted soils, with the excavation area defined using field screening methodology.

Groundwater:

Potential contamination was detected in one of the 18 fluvial deposits groundwater samples collected. The only contaminant detected in this sample (NFFG0003) was 1,1-dichloroethene at a concentration of 2.2 $\mu\text{g/L}$, which is less than the USEPA MCL of 7 $\mu\text{g/L}$. Based on the results of the Geoprobe groundwater sampling, no further groundwater investigation is recommended.

Removal Action

Based on the conclusions and recommendations presented above, a soil removal will be performed in the pre-described areas. The removal will be performed by the Charleston Naval Shipyard Environmental Detachment (the Detachment) as specified in the attached Statement of Work (SOW — Attachment A) issued by the Southern Division Naval Facilities Engineering Command (SOUTHNAVFACENGCOM). All work will be performed in accordance with current TDEC guidelines using the procedures outlined in this document as well as the SOW.

Project Description

The Detachment will be performing several tank related projects under the attached SOW, including and inspecting Tanks 336 and 337. E/A&H personnel will be assisting the Detachment

in the removal of the petroleum contaminated soil associated with Tanks 336 and 337, and the associated piping.

The removal will be conducted using either a backhoe or trackhoe to excavate the areas identified in this Technical Memorandum. The excavation areas have been previously defined; however, field conditions and observations may warrant deviations from this plan. All such deviations will be documented either by the Detachment in the tank cleaning and inspection reports, or by E/A&H personnel in the soil removal report. The actual extent of the excavation will be determined by a field screening process using a field infrared spectrophotometer (IR). The field IR method is based on USEPA Method 418.1 (total petroleum hydrocarbons). A 10-foot by 10-foot grid will be established over each excavation area, with a 5-point composite screening sample collected from each 10-foot by 10-foot square. Samples will be collected from the floor and walls of the excavation. The excavation will continue until the IR readings indicate TPH concentrations of less than 100 mg/kg. The excavation may also be terminated if the total depth of the pits creates a safety hazard.

Once the IR readings indicate TPH concentrations of less than 100 mg/kg, confirmation samples will be collected and sent to an offsite laboratory for analysis by USEPA Method 418.1 and Tennessee-modified USEPA Method 8015 (gasoline range organics and diesel range organics).

Project Roles

The Detachment will be tasked to:

- clean petroleum storage tanks 336 and 337;
- remove and/or cap any associated piping;
- excavate the petroleum contaminated soil identified during the North Fuel Farm investigation;

- arrange for the disposal of all excavated materials
- maintain stockpile while awaiting disposal
- provide tank cleaning/inspection documentation to SOUTHNAVFACENCOM and the NSA Memphis Public Works Office ; and
- provide the necessary assistance to SOUTHNAVFACENCOM and the NSA Memphis Public Works Office, as specified in the SOW.

E/A&H will be tasked to:

- collect and analyze soil samples during the excavation process for screening purposes using the field IR;
- collect disposal samples from any stockpiled soil associated with the soil removal in the North Fuel Farm Area;
- collect samples from any sludges and/or rinse water associated with the soil removal in the North Fuel Farm Area;
- collect soil samples from the excavation area to confirm that established clean up goals have been achieved;
- provide documentation of the removal and the confirmation sampling results, in the form of a Technical Memorandum, to the BRAC Cleanup Team; and
- provide assistance to Detachment, SOUTHNAVFACENCOM, and the NSA Memphis Public Works Office, if necessary.

Analytical Requirements

Tanks 336 and 337 previously have contained both JP-5 and JP-8, respectively. During the soil removal process, screening samples will be collected and analyzed in the field using a field IR. As previously stated, this method is based on the USEPA Method 418.1, which detects and quantifies a wide range of hydrocarbon constituents. When the cleanup goal of 100 mg/kg is achieved, confirmation samples will be collected and submitted for offsite analysis using USEPA Method 418.1, as well as the Tennessee modified USEPA Methods for gasoline range organics (GRO.BTEX [TN-modified 8015.BTEX]). and diesel range organics (DRO [TN-modified 8015]).

As outlined in the SOW, E/A&H will also collect samples for offsite analysis of any sludge and/or rinse water generated during the clean up activities at the North Fuel Farm. Sludge samples will be analyzed for pH, flashpoint, Toxicity Characteristic Leachate Procedure (TCLP)-TPH, TCLP-Benzene, and TCLP-Metals, using the methods presented in Table 4. All offsite analysis will be conducted with a specified 5-working day turnaround time.

**Table 4
 North Fuel Farm Soil Removal
 Analytical Requirements**

Source	Matrix	Method
Excavation Screening Samples	Soil	TPH — Field IR
Excavation Confirmation Samples	Soil	TPH — USEPA Method 418.1 TPH-GRO — TN Modified 8015.BTEX TPH-DRO — TN Modified 8015
Tank Sludge, if necessary	Sludge	pH Flashpoint TCLP-TPH TCLP-Benzene TCLP-Metals
Rinse Water	Water	Oil & Grease Volatile Organic Compounds

All data received by E/A&H will be summarized with 2 copies forwarded to the NSA Memphis Public Works Office for distribution to the Detachment within 5 working days of receipt.

Soil Disposal

The Detachment will be responsible for obtaining all necessary disposal permits and or approvals. E/A&H will provide technical assistance in the disposal characterization and data presentation process.

Health and Safety

E/A&H personnel will follow the procedures outlined in the Comprehensive Health and Safety Plan. The Detachment will provide their own Health and Safety Plan which should outline all worker safety issues (i.e. air monitoring, exposure limits, action levels), as well as site security issues (i.e., barricades, etc.).

Attachment A
Statement of Work

FOR OFFICIAL USE ONLY

23 Oct. 96
Code 1846

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
2155 EAGLE DRIVE, P.O. BOX 190010
NORTH CHARLESTON, SOUTH CAROLINA
29419-9010

CONTRACT N62467-_____
STATEMENT OF WORK
SOW NO. _____

NAVAL SUPPORT ACTIVITY MEMPHIS, TN

CLEANING PETROLEUM TANKS
AND SOIL EXCAVATION

SECTION 1 - Project Description and Background

- 1.1 The objective of this scope of work is to accomplish the following at NSA Memphis:
 - 1.1.1 Clean petroleum storage tanks , USTs 336, 337 at the North Fuel Farm and ASTs 1717, 1718, 1719, 1720, oil water separator 1722 at the Carrier Deck. Tank 1754 to be triple rinsed only.
 - 1.1.2 Excavate all of the piping ancillary to USTs 336, 337 and the fuel stands. Cut or blank off at valve piping to the tanks at tank interface. Excavate petroleum contaminated soils to clean up the (3) sites. Site locations as shown in Fig.3, enclosure (1). Backfill, compact soil (95%), and seed the areas.
- 1.2 The sampling of soils (stockpiled and tank pits), tank contents (sludges and liquids), rinse water and closure documentation will be accomplished by EnSafe/Allen Hoshall under a separate contract.
- 1.3 The tank cleaning to be accomplished per SOUTHDIV Specification #13219, enclosure (2).
- 1.4 Soil excavation will be accomplished in accordance with Tennessee Department of Environment and Conservation (TDEC) guidelines. _____

- 1.5 Sections 2 and 3 of this statement of work describe the generic requirements of the work to be performed. Section 4 describes specific work to be performed by the AE.

SECTION 2 - Special Instructions

- 2.1 The Contractor (SPORTENVDETHASN) is responsible for recording all minutes of meetings and provide a copy of the minutes to the remedial project manager, and activity's environmental coordinator..
- 2.2 The Contractor is responsible for obtaining permission and clearance from the appropriate station security personnel to enter and perform the required work.
- 2.3 The Contractor shall forward all submissions to activity's environmental coordinator and to SOUTHNAVFACENGCOM, Code 1846. Submissions include storage tank cleaning reports, chain of custody, sludge and solid waste disposal manifests, associated photographs, drawings, registration forms, etc..
- 2.4 The Contractor shall schedule a meeting at NSA Memphis prior to contract award to discuss all phases of this work package and inspect the sites. This is necessary to facilitate the cost proposal.
- 2.5 Notify the activity environmental coordinator prior to making any visits to the site.

SECTION 3 - Applicable Documents

- 3.1 The following documents to be used in the cleaning of the tanks.
- 3.1.1 Cleaning Petroleum Storage Tanks, API Publication 2015, latest revision..
- 3.1.2 Interior Lining of Underground Storage Tanks, API Recommended Practice 1631, latest edition.
- 3.1.3 Safety and Health and Health Requirements Manual, US Army Corps of Engineers, EM 385-1-1, latest edition.
- 3.1.4 SOUTHDIV Guide Specification 13219,
- 3.1.5 TDEC CHAPTER 1200-1-15, Underground Storage Tank Program.
- 3.1.6 Technical Memorandum, EnSafe/Allen & Hoshall, Sep. 20, 1996.

SECTION 4 - Description of Work

- 4.1 Schedule a meeting at NSA Memphis to inspect all of the sites, plan the work and discuss the work plan prior to submittal of a cost proposal..

- 4.2 Tank cleaning to be in accordance with SOUTHDIV Specification 13219, enclosure (2) and applicable documents in Section 3..
 - 4.2.1 Clean the 420,000 gallon steel petroleum underground storage tank #336 at the N-94 Fuel Farm. Tank was used to store JP-5 fuel.
 - 4.2.2 Clean the 420,000 gallon steel petroleum underground storage tank #337 at the N-94 Fuel Farm. Tank was used to store JP-8 jet fuel..
 - 4.2.3 Clean tanks at the Carrier Deck:
 - 4.2.3.1 Aboveground storage tank (AST) # 1717, a 10,000 gallon steel JP-5 jet fuel storage tank.
 - 4.2.3.2 AST # 1718, a 10,000 gallon stainless steel AFFF fuel storage tank..
 - 4.2.3.2 AST # 1719, a 50,000 gallon stainless steel JP-5 jet fuel storage tank.
 - 4.2.3.3 AST # 1720, a 2,000 gallon steel JP-5 jet fuel storage tank.
 - 4.2.3.4 AST # 1722, a 20,000 gallon concrete oil water separator.
 - 4.2.3.5 Tank 1754 to be triple rinsed only.
- 4.3 After cleaning each tank, inspect the tanks for damage .
- 4.4 For each tank, prepare a tank cleaning/inspection report to document all phases of the work.
- 4.5 Furnish all labor, materials, and equipment necessary to accomplish the work, i.e., trackhoe, trucks, drums, frac tanks, plastic sheeting , bales of hay, etc..
- 4.6 Tanks 1718, 1719, 1720, 1722 at the Carrier deck to be cleaned first.
- 4.7 Sludges shall be drummed, drums shall be labeled as to content. Sludges to be disposed of through the activity's DRMO. Contractor to provide transportation.
- 4.8 Provide daily progress reports to the activity's environmental coordinator.
- 4.9 During pump out of tanks, separate the fuel, water, and sludges. DRMO may recycle the fuel and save on disposal cost. Water, after confirmatory testing, may be discharged into the activity's oil water separator.
- 4.10 Excavate all the piping ancillary to tanks 336 and 337 and the fuel stands. Backfill excavation with clean dirt, compact and seed the area.

- 4.11 Excavate all of the petroleum contaminated soils identified in technical memorandum, enclosure (1). Backfill excavations with clean soil, compact to 95% and seed the area.
- 4.12 A safety and health plan is required for the work in this scope of work.
- 4.13 SPORTENVDETHASN to provide a confined space entry harness with exception of respirator to station personnel to inspect the tanks.
- 4.14 All completed work to be approved by the stations environmental coordinator or SOUTHDIV .
- 4.15 All sampling of soils, sludges, rinse water, and excavation pits will be accomplished by EnSafe/Allen & Hoshall.

SECTION 5 - ENCLOSURES

- (1) TECHNICAL MEMORANDIUM, EnSafe/ Allen & Hoshall, Sep. 20, 1996
- (2) GUIDE SPECIFICATION, SECTION 13219, SOUTHDIV.

SECTION 6 -Submittals

- 6.1 Any deliverable generated during the storage tank cleaning project shall be forwarded to the RPM and the activity point of contact (two copies each).

SECTION 7 - Addresses

- 7.1 Commanding officer
Attn.: Code 1846
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive, P.O. Box 199910
North Charleston, SC 29419-9010

POC: John Karlyk
(803) 820-5624

- 7.2 Commanding Officer
Attn.PWD Environmental
Naval SupportActivity, Memphis
Millington, TN 38054-5000

POC: Mr. Randy Wilson
(901) 873-5462

7.3 EnSafe/Allen & Hoshall
Shelby Oaks Plaza
5909 Shelby Oaks Drive
Suite 201
Mcmmphis, TN, 38134

POC: Mr. John Stedman, Jr.
(901) 372-7962