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GROUNDWATER MONITORING AT FUEL FACILITY BUILDING 376 FACILITY ID # 0-791673
MILLINGTON SUPPACT TN
9/1/1997
RUST ENVIRONMENT AND INFRASTRUCTURE

GROUND-WATER MONITORING
at
FUEL FACILITY, BUILDING 376

NAVAL SUPPORT ACTIVITY MEMPHIS
Millington, TN
Facility # 0-791673

Southern Division
Naval Facilities Engineering Command
Contract N62467-93-D-0662

REI Project 33201
September 1997

Prepared by
Rust Environment & Infrastructure
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803/572-5600

EXECUTIVE SUMMARY

Southern Division Naval Facilities Engineering Command (SOUTHDIV) has contracted Rust Environment and Infrastructure (REI) to perform ground-water monitoring at the Fuel Facility, Building 376 at Naval Support Activity Memphis, Millington, Tennessee (NSA Memphis) in accordance with the Tennessee Department of Environment and Conservation (TDEC) Underground Storage Tank Division regulations.

Beginning with this sampling event (August 29, 1997), the Navy has initiated Closure Monitoring at the site.

On August 29, 1997, REI personnel measured ground-water elevations and sampled all four wells on-site. Samples were analyzed for concentrations of benzene, toluene, ethylbenzene, and total xylenes (BTEX), as well as total petroleum hydrocarbons-gasoline range organics (TPH-GRO). TDEC has established cleanup levels for only benzene (0.070 mg/l) and TPH (1.00 mg/l).

The findings of the Closure Monitoring phase performed by REI are:

- In the wells sampled, benzene was below detection limits; TPH concentrations were BDL in MW-1, MW-2 and MW-3 and below TDEC cleanup levels in monitoring well MW-4.
- The ground-water flow direction at the site is southwesterly, and the average calculated hydraulic gradient at the site is 0.04 ft/ft.
- The depth to static water table at the site ranges from 5.30 feet to 8.85 feet below grade.
- Free product was not detected in any of the facility wells.
- Natural biodegradation of the BTEX compounds appears to have occurred and historically, TPH compound concentrations have generally shown a downward trend. The TPH concentration decreased in MW-4 from 3.88 mg/l in March 1995 to 1.23 mg/l in March 1996. The TPH concentration increased from 1.23 mg/l in March 1996 to 1.67 mg/l in August 1996; the TPH concentration decreased from 1.67 mg/l in August 1996 to 0.372 mg/l in March 1997; the TPH concentration decreased from 0.372 mg/l in March 1997 to 0.196 mg/l in August 1997.

GROUND-WATER MONITORING
at
FLYING CLUB USTs 1205N and 1205S
NAVAL SUPPORT ACTIVITY MEMPHIS
Millington, TN
Facility # 0-790479

Southern Division
Naval Facilities Engineering Command
Contract N62467-93-D-0662

REI Project 33224
September 1997

Prepared by
Rust Environment & Infrastructure
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North Charleston, SC 29406
803/572-5600

EXECUTIVE SUMMARY

Southern Division Naval Facilities Engineering Command (SOUTHDIV) has contracted Rust Environment and Infrastructure (REI) to perform ground-water monitoring at the Flying Club Underground Storage Tank (UST) site at Naval Support Activity Memphis, Millington, Tennessee (NSA Memphis) in accordance with the Tennessee Department of Environment and Conservation (TDEC) Underground Storage Tank Division regulations.

On August 29, 1997, REI personnel measured ground-water levels in six (6) on-site monitoring wells. Samples were taken from three (3) wells; FCMW-3, FCMW-5 and FCMW-6. These samples were analyzed for benzene, toluene, ethylbenzene and total xylenes (BTEX), as well as for total petroleum hydrocarbons-gasoline range organics (TPH-GRO) and total petroleum hydrocarbons-diesel range organics (TPH-DRO). TDEC only has cleanup levels for benzene (0.070 mg/l) and TPH (1.00 mg/l).

The findings of the "monitoring only" phase performed by REI are:

- Of the three monitoring wells sampled, FCMW-5 reported benzene and TPH concentrations exceeding TDEC cleanup levels for a non-drinking water aquifer, while FCMW-3 and FCMW-6 reported benzene and TPH concentrations below TDEC cleanup levels.
- The ground-water flow direction at the site is southwesterly, and the calculated hydraulic gradient at the site ranged from 0.04 ft/ft to 0.05 ft/ft, which is consistent with previous reports.
- Depth to the static water table at the site ranged from 12.13 feet to 16.12 feet below grade.
- Free product was not detected in any of the monitoring wells.
- TPH concentrations have decreased slightly in FCMW-5 since March 1997. Based on these results as well as the decrease in contaminant concentrations in FCMW-3 it is apparent that natural biodegradation of the BTEX compounds will continue to occur at the site.

TABLE OF CONTENTS

	<u>Page</u>
EXECUTIVE SUMMARY	i
1.0 INTRODUCTION	1
1.1 Project Objective	1
1.2 Project Background	1
2.0 SITE SETTING	2
3.0 WORK PERFORMED	3
3.1 Previous Investigations	3
3.2 Water Level Measurements	4
3.3 Ground-Water Sampling	4
3.4 Collection Method	6
3.5 Chain of Custody	7
3.6 Disposal of Purge Water	7
3.7 Analytical Methods	7
3.8 Decontamination Procedures	7
3.9 Quality Assurance and Quality Control (QA/QC)	7
4.0 ANALYTICAL RESULTS	9
5.0 CONCLUSIONS AND RECOMMENDATIONS	13
6.0 CERTIFICATION	14

TABLES

Table 3-1	Water Table Elevations
Table 3-2	Sample Containers and Preservatives
Table 4-1	Ground-Water Analytical Results

FIGURES

Figure 1-1	Flying Club Site
Figure 2-1	Vicinity Map
Figure 2-2	Topographic Map
Figure 3-1	Piezometric Surface Map (March 17, 1997)
Figure 3-2	Piezometric Surface Map (August 29, 1997)

APPENDICES

Appendix A	TDEC Technical Guidance Document - 007
Appendix B	TDEC UST Site Ranking
Appendix C	Analytical Results

1.0 INTRODUCTION

1.1 Project Objective

The objective of this project is to provide ground-water monitoring at the old Flying Club Underground Storage Tank 1205N and 1205S site, Naval Support Activity Memphis, (NSA Memphis), Millington, Tennessee. The program shall be in accordance with the Tennessee Department of Environment and Conservation (TDEC) Technical Guidance Document (TGD) - 007 provided as Appendix A.

1.2 Project Background

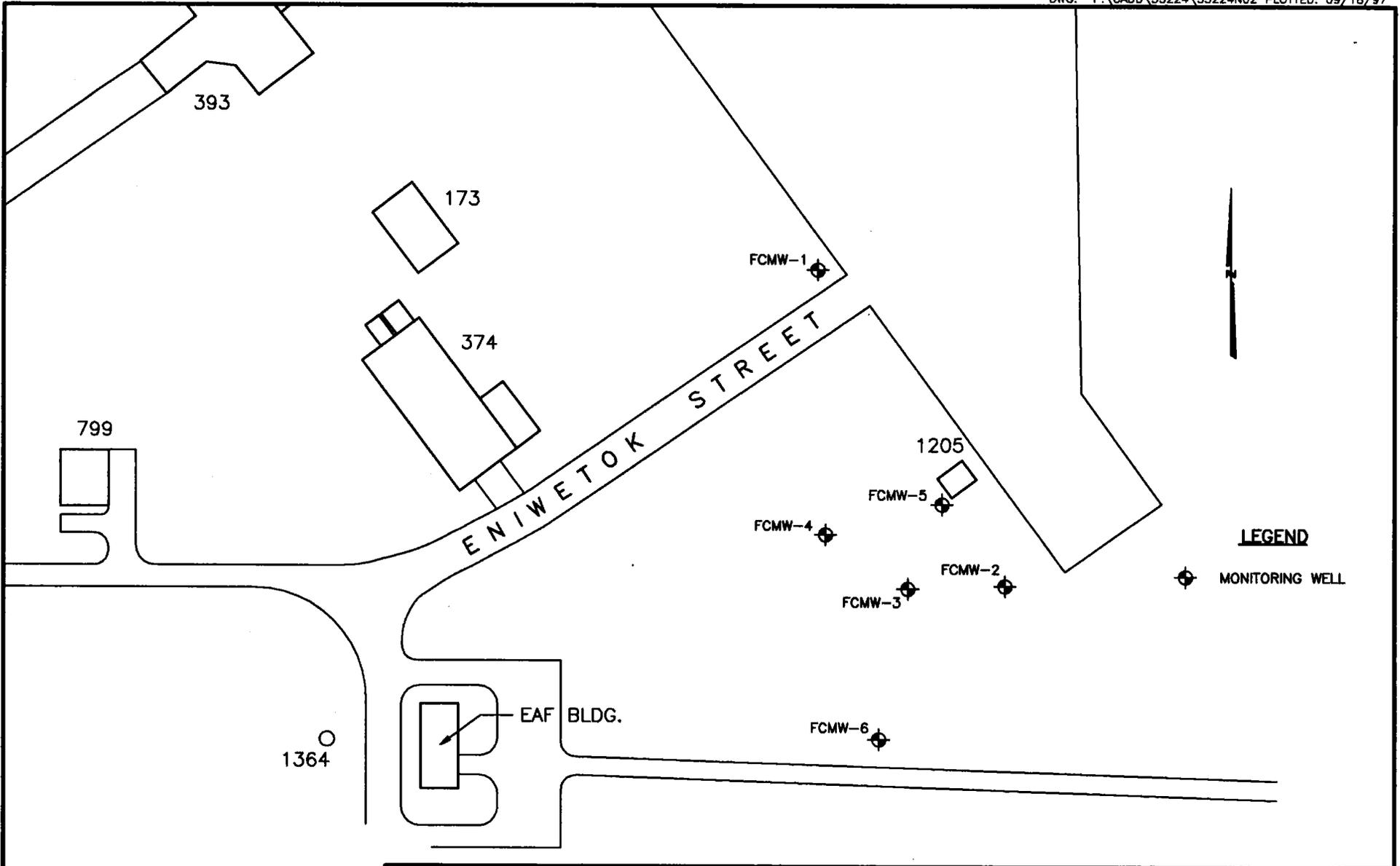
The old Flying Club UST site was formerly used as an aviation fuel storage and dispensing facility located east of the former Flying Club building #1205. Tank 1205N was a 1000-gallon steel UST and tank 1205S was a 2000-gallon steel UST.

As part of the site assessment, six (6) above-grade mounted ground-water monitoring wells were installed. Monitoring well locations are shown in Figure 1-1.

Four (4) leak detection wells around USTs 1205N and 1205S were installed in 1990. The tanks were removed in October 1991 and two wells, T1205N-1 and T1205N-2 were removed with the tanks. The remaining wells, T1205S-1 and T1205S-2 have been closed in accordance with TDEC guidelines.

The Environmental Assessment Report (EAR) prepared by Ensafe/Allen and Hoshell (E/A & H) in September, 1993 found that a petroleum release had occurred from tanks 1205N and 1205S prior to their removal. Benzene, Toluene, Ethyl benzene and Xylene (BTEX) and Total Petroleum Hydrocarbons (TPH) concentrations in the soil did not exceed the TDEC action level for a non-drinking water aquifer, but TPH and benzene concentrations in the ground-water did exceed TDEC action levels for a non-drinking water aquifer in three monitoring wells.

TDEC, Division of Underground Storage Tanks requested a Site Ranking for this site. The site ranking was completed and submitted to TDEC for review. Based on the submitted data, TDEC approved the Site Ranking Request and recommended the implementation of a "Monitoring Only" program. The TDEC UST Site Ranking for this site is presented as Appendix B.



RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 1-1

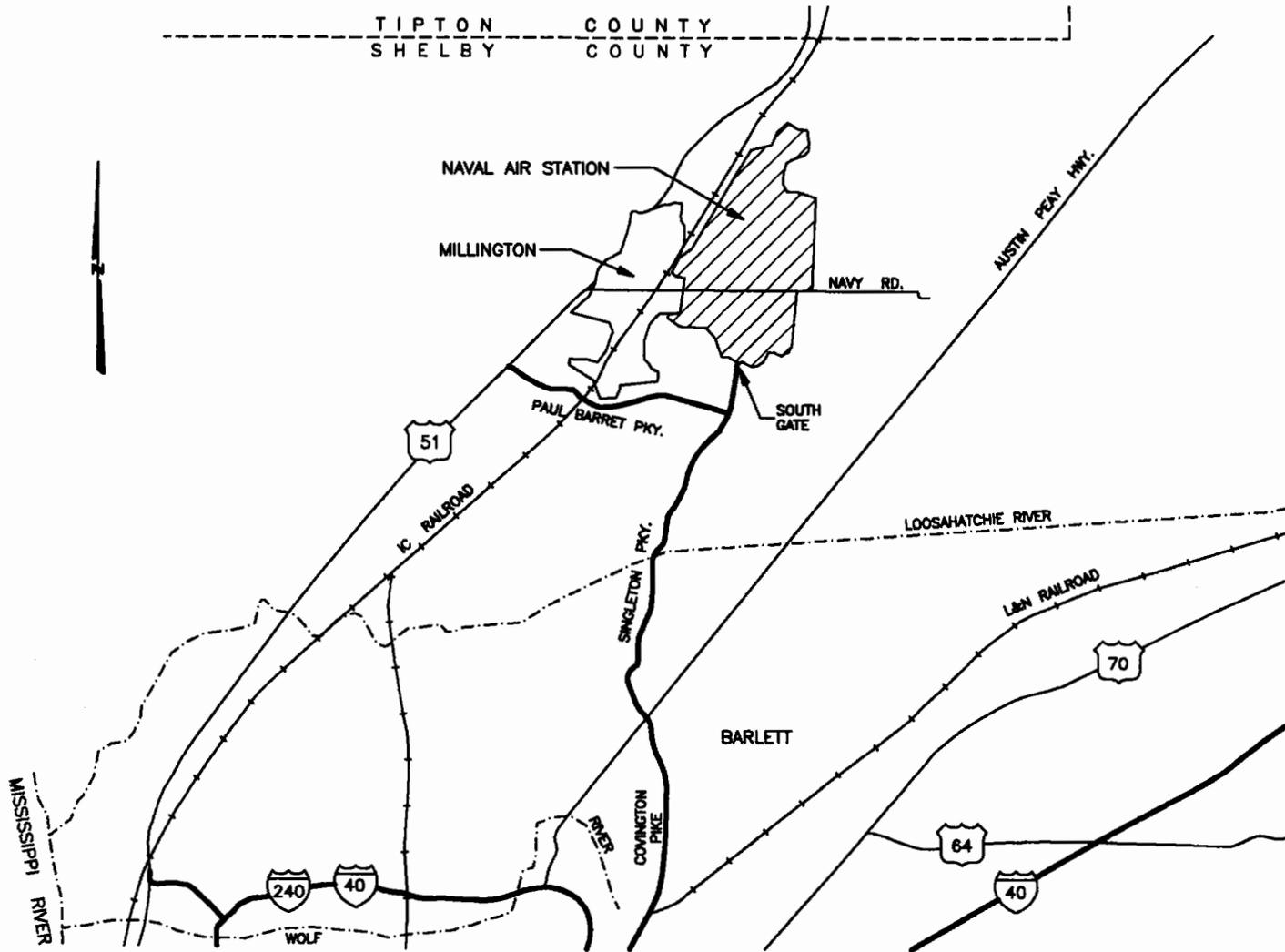
FLYING CLUB SITE
 NSA MEMPHIS
 UST's 1205N & 1205S
 RUST Project No. 33224

SEPTEMBER 1997

2.0 SITE SETTING

The old Flying Club site is located at the east end of Eniwetok Street on NSA Memphis in Millington, Shelby County, Tennessee. Figure 2-1 is a general vicinity map.

The site is shown in Figure 1-1 in the previous section, and it is located in a primarily flat, grassy area, southwest of a concrete/asphalt taxi-way used for out of service aircraft staging. Based on the topographic map shown as Figure 2-2, there exists about 4 feet of relief between the northern and southern portions of the site. Surficial vegetation consists primarily of grass and to the north and east, the site is bordered by either concrete or asphalt (E/A&H, 1993).



SCALE IN MILES

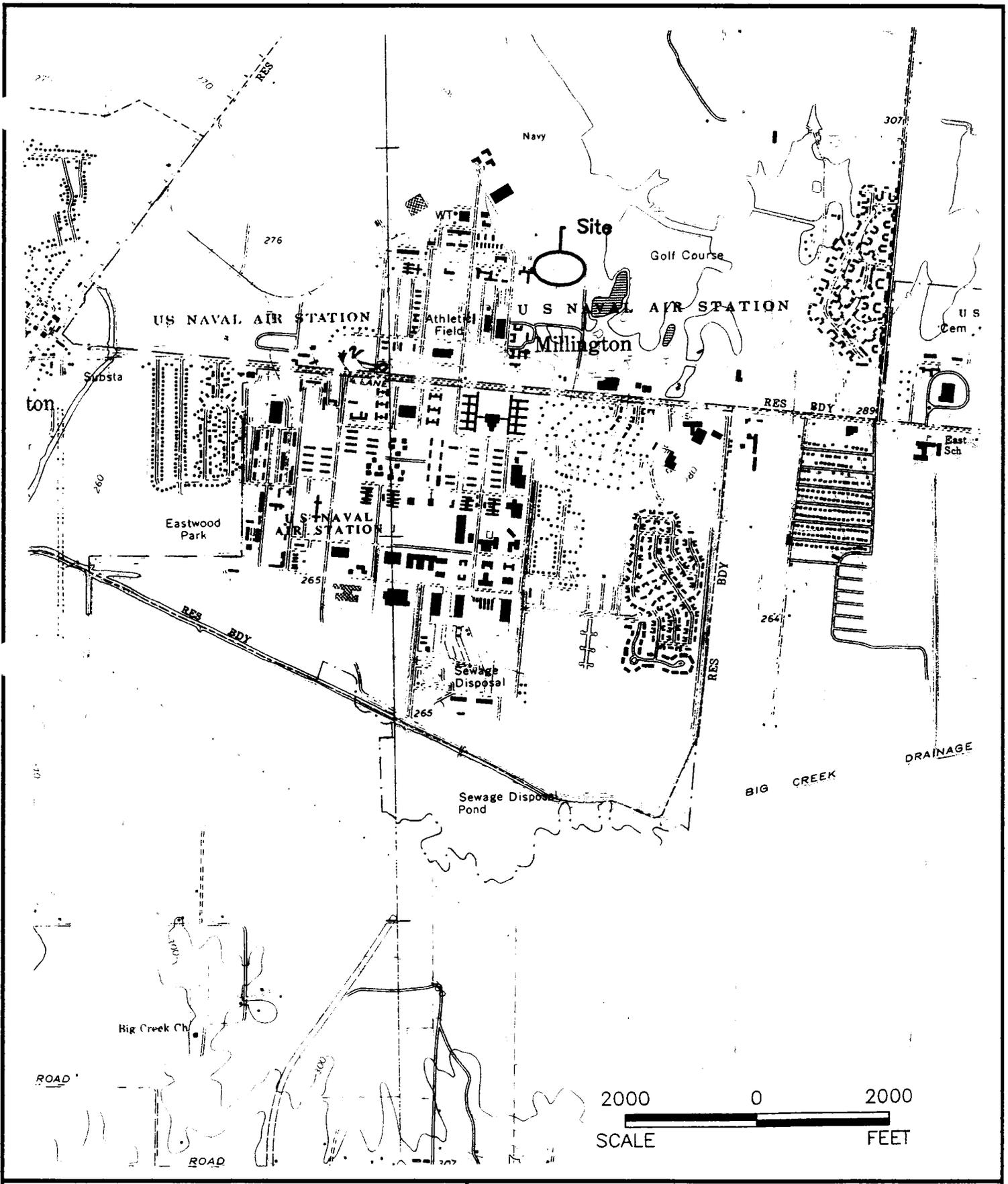


RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2-1

VICINITY MAP
NSA MEMPHIS
MEMPHIS, TENNESSEE
RUST Project No. 33224.000

SEPTEMBER 1997



RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 2-2
TOPOGRAPHIC MAP
NSA - MEMPHIS

SOURCE: USGS Millington and Brunswick , TN Quads
RUST Project No. 33224.000

3.0 WORK PERFORMED

The duration of this "monitoring only" phase was initially for one year. The Navy has the option to renew annually for three more years and one year of closure monitoring. The contract length could be a maximum of five years. Ground-water sampling events take place semi-annually (approximately six months apart). The first sampling event took place on March 28, 1995, and the results were presented in a report dated April, 1995. The second sampling event took place on September 12, 1995, and the results were presented in a report dated October, 1995. The third sampling event took place on March 26, 1996, and the results were presented in a report dated April 1996. The fourth sampling event took place on September 10, 1996, and the results were presented in a report dated October, 1996. The fifth sampling event took place on March 17, 1997, and the results were presented in a report dated April, 1997. The sixth sampling event took place on August 29, 1997, and the results are presented herein. The ground-water "monitoring only" program has been performed in accordance with TDEC TGD-007.

3.1 Previous Investigations

The findings of the "monitoring only" phase performed by REI and presented in the report dated April 1997 were as follows:

- Of the three monitoring wells sampled, FCMW-3, FCMW-5 and FCMW-6, only FCMW-5 reported benzene and TPH concentrations exceeding TDEC cleanup levels for a non-drinking water aquifer, while FCMW-3 reported TPH concentrations below TDEC cleanup levels.
- The ground-water flow direction at the site is southwesterly, and the calculated average hydraulic gradient at the site ranged from 0.03 ft/ft to 0.04 ft/ft.
- Depth to the static water table at the site ranged from 4.59 feet to 6.30 feet below grade.
- Free product was not detected in any of the monitoring wells.
- Although TPH concentrations have increased slightly in FCMW-5 since September 1996, contaminant concentrations are still lower than those reported in this well in September 1995. Based on these results as well as the decrease in contaminant concentrations in FCMW-3 and FCMW-6, it is apparent that natural biodegradation of the BTEX

compounds will continue to occur at the site.

3.2 Water Level Measurements

Static water levels were measured using an electronic water level indicator prior to sampling. All water level measurements, including total well depth measurements, were referenced from an established and documented point on the top of the well casing. Measurements were correlated with mean sea level datum and measured to the nearest 0.01 foot. Water level measurements were taken in monitoring wells FCMW-1, FCMW-2, FCMW-3, FCMW-4, FCMW-5 and FCMW-6.

Water table elevations taken on March 17, 1997 and August 29, 1997 are shown on Table 3-1, and piezometric surface maps for these same dates are shown on Figures 3-1 and 3-2, respectively. The ground-water flow direction at the site has remained southwesterly; the hydraulic gradient at the site ranged from 0.04 ft/ft to 0.05 ft/ft in August 1997 and ranged from 0.03 ft/ft to 0.04 ft/ft in March 1997.

3.3 Ground-Water Sampling

The ground-water samples were taken from monitoring wells FCMW-3, FCMW-5 and FCMW-6. Analytical results are discussed in Section 4.0, and the analytical data are shown in Appendix C.

3.3.1 Purging

After determining the static water level of the well, but prior to collecting a sample, the total volume of water standing in the well was calculated as follows:

- subtract depth to water (DTW) value from total depth to determine height of water column.
- determine cross-sectional surface area of well bore using the equation:

$$A = \pi r^2$$

where:

$$A = \text{cross-sectional area (ft}^2\text{)}$$

$$\pi = 3.14 \text{ (dimensionless)}$$

$$r = \text{radius of well bore (in feet)}$$

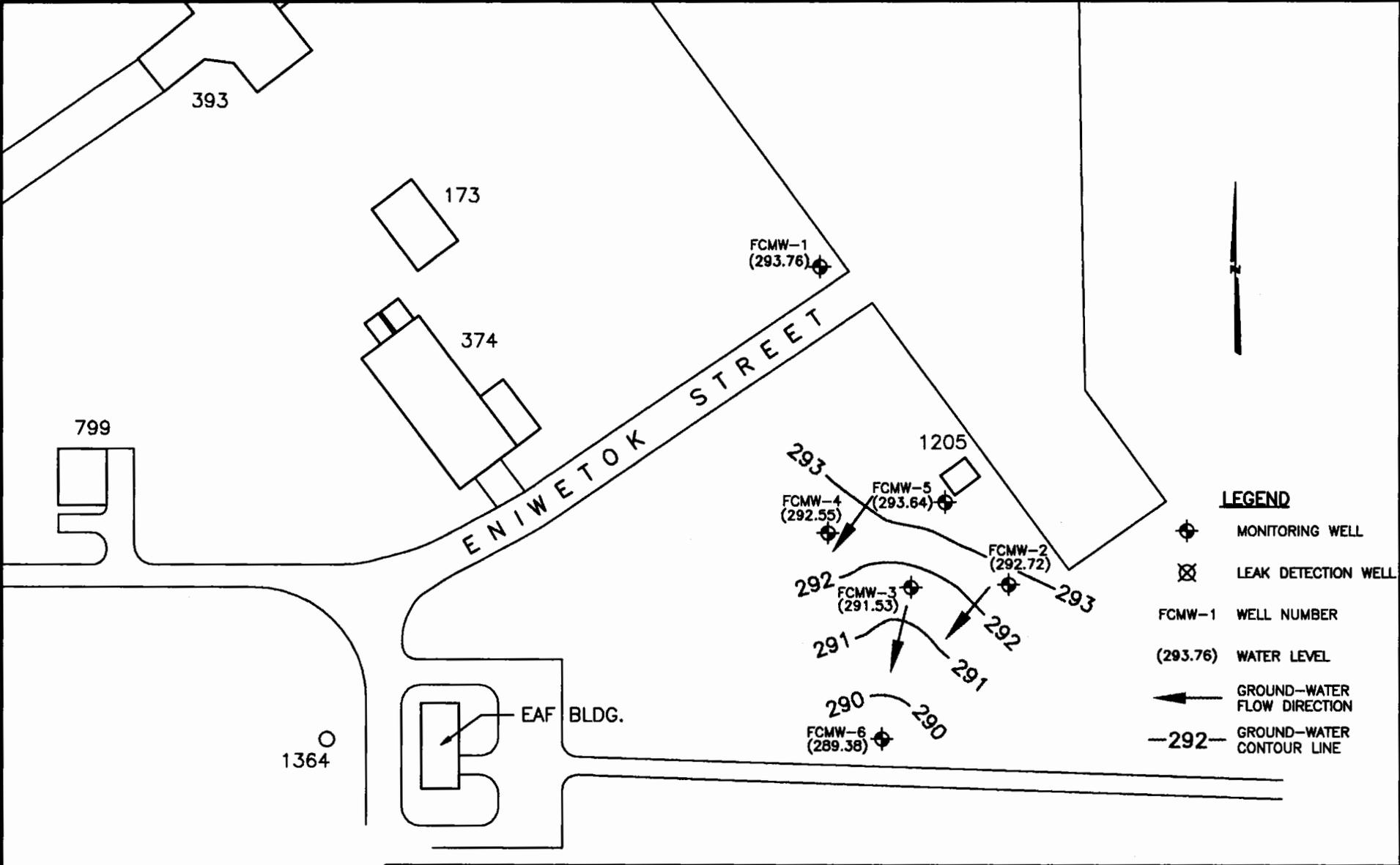
- multiply value of A by height of water column to determine well volume in cubic feet.

**TABLE 3-1
WATER TABLE ELEVATIONS
Flying Club UST Site
NSA Memphis
Facility # 0-790479
REI Project No. 33224**

Monitoring Well	Total Depth (ft/btoc)*	Top of Casing Elevation	DATE OF MEASUREMENTS			
			March 17, 1997		August 29, 1997	
			Depth to Water (ft/btoc)*	Water Level Elevation	Depth to Water (ft/btoc*)	Water Level Elevation
FC-MW-1	17.57	300.06	6.30	293.76	14.74	285.32
FC-MW-2	22.60	297.53	4.81	292.72	12.13	285.40
FC-MW-3	22.60	297.53	6.00	291.53	15.27	282.26
FC-MW-4	22.59	297.89	5.34	292.55	15.20	282.69
FC-MW-5	22.55	298.23	4.59	293.64	14.15	284.08
FC-MW-6	23.10	295.65	6.27	289.38	16.12	279.53

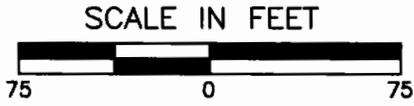
NOTE: Reference datum for elevations is Mean Sea Level.

* ft/btoc = feet below top of casing



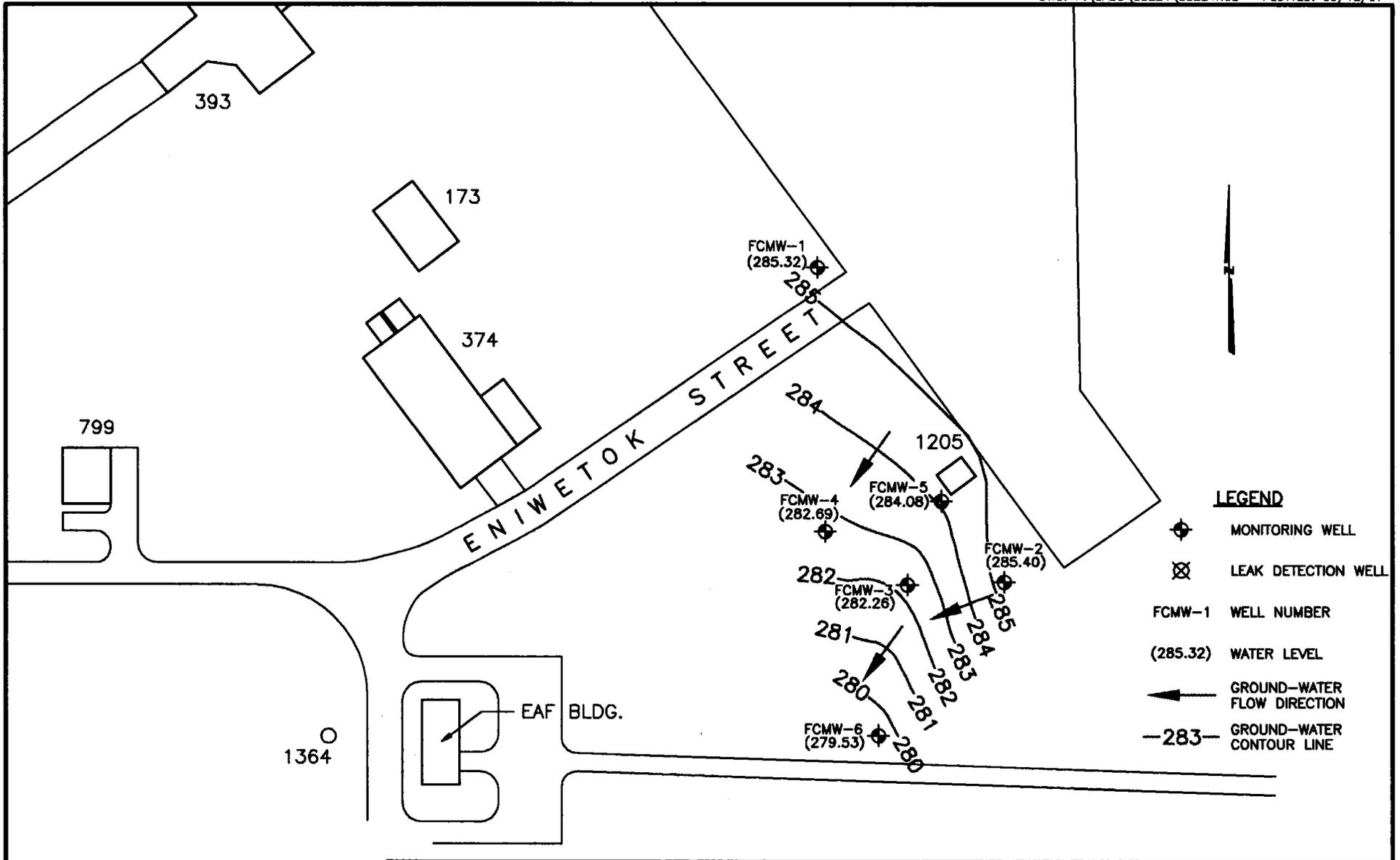
LEGEND

- ⊕ MONITORING WELL
- ⊗ LEAK DETECTION WELL
- FCMW-1 WELL NUMBER
- (293.76) WATER LEVEL
- ← GROUND-WATER FLOW DIRECTION
- 292- GROUND-WATER CONTOUR LINE

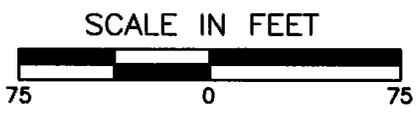


RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-1
 PIEZOMETRIC SURFACE MAP
 (MARCH 17, 1997)
 UST's 1205N & 1205S
 NSA MEMPHIS, TENNESSEE
 RUST Project No. 33224



- LEGEND**
- ⊕ MONITORING WELL
 - ⊗ LEAK DETECTION WELL
 - FCMW-1 WELL NUMBER
 - (285.32) WATER LEVEL
 - ← GROUND-WATER FLOW DIRECTION
 - 283- GROUND-WATER CONTOUR LINE



RUST ENVIRONMENT & INFRASTRUCTURE

FIGURE 3-2
 PIEZOMETRIC SURFACE MAP
 (AUGUST 29, 1997)
 UST's 1205N & 1205S
 NSA MEMPHIS, TENNESSEE
 RUST Project No. 33224

SEPTEMBER 1997

- multiply volume (cubic feet) by 7.48 gallons/ft³ to determine gallons of water per well volume.
- multiply well volume (gallons) by three to determine total water volume to be purged.

A minimum of three (3) well volumes were then purged from the well. Purging was accomplished using PVC, disposable, bottom entry bailers. A disposable bailer was dedicated to each monitoring well, thereby reducing the potential for cross-contamination. If the well was purged to dryness before three (3) well volumes were obtained, no further purging was required. During purging and prior to sample collection, standard field parameters, pH, specific conductance and temperature were measured.

3.3.2 Sample Containers and Preservation

Sample containers were as follows:

TABLE 3-2

Sample Containers and Preservatives		
Parameter	Container	Preservative
BTEX	40 ml amber glass vial with Teflon lined septa	four (4) drops of 1:1 hydrochloric acid
TPH, Gasoline Range Organics	40 ml amber glass vial with Teflon lined septa	200 uL of 50% hydrochloric acid
TPH, Diesel Range Organics	1 liter amber glass bottle with Teflon lined lid	five (5) ml of 1:1 hydrochloric acid

All sample containers were pre-cleaned and sealed by the distributor or laboratory. Each sample bottle was preserved with the proper preservative (e.g. HCL) prior to sample collection.

3.4 Collection Method

All samples from ground-water monitoring wells were collected with a new, disposable bailer. In order to keep agitation of the sample to a minimum, the bailer was slowly lowered into the water column. When collecting volatile organic samples, the sample container was completely filled so that no air bubbles were trapped inside. Care was also taken to have minimal overflow

so that the preservative was not lost.

Upon collection, samples were immediately labeled, placed in a cooler, and chilled to approximately 4°C. The samples were maintained at 4°C until they were delivered to a state approved laboratory.

3.5 Chain of Custody

A chain of custody form was completed for each ground-water sample taken. This form was signed by the person collecting the sample, the laboratory receiving the sample, and all intermediary persons with possession of the sample. Sample security was maintained during all phases of transport.

3.6 Disposal of Purge Water

All purge water was containerized in a container large enough to hold three (3) well volumes. The purge water was then transported to the Oil/Water Separator on base and disposed.

3.7 Analytical Methods

The ground-water samples were analyzed for BTEX by EPA Method 8020, TPH Gasoline Range Organics (TPH-GRO) by EPA Method 8015 and TPH - Diesel Range Organics (TPH-DRO) by EPA Method 8015.

3.8 Decontamination Procedures

All sampling and monitoring equipment which was not pre-cleaned or disposable was properly decontaminated before and after each use by the following procedure:

1. Cleaned with a non-phosphatic laboratory grade detergent wash;
2. Triple rinsed with distilled water; and
3. Allowed to air dry.

3.9 Quality Assurance and Quality Control (QA/QC)

The following procedures were conducted for QA/QC:

1. All equipment used for purging monitoring wells and collecting ground-water samples was properly decontaminated.

2. Sampling personnel wore new disposable sampling gloves while collecting all samples. Gloves were changed between sampling points.
3. Sampling containers were laboratory prepared glass bottles or vials.
4. Ground-water samples were immediately placed in the laboratory bottles or vials in a manner to minimize headspace.
5. All ground-water samples collected for laboratory analyses were immediately labeled and stored at 4°C or less.
6. Chain of custody forms were completed for each sampling event.
7. Sampling began at the location where contamination was least likely to exist (background) and ended at the location where the highest levels of contamination were most likely to exist (near the release).
8. When sampling monitoring wells, one (1) duplicate sample and one (1) field blank sample were collected. A duplicate sample was prepared by splitting the sample into two separate aliquots and submitting the samples to the laboratory for analyses. Field blanks were prepared by running deionized water through the sampling equipment (bailer) and transferring the water into sample containers identical to those used for ground-water sampling. In order to maintain unbiased analytical results, the identity of duplicate samples and field blanks were not revealed to the laboratory. A trip blank accompanied the sample cooler(s) from the laboratory to the field and back to the laboratory. The trip blanks were analyzed for BTEX by Method 8020 as a check on potential laboratory contaminants.

4.0 ANALYTICAL RESULTS

As mentioned in Section 3.7, ground-water samples were analyzed for BTEX by EPA Method 8020, TPH-GRO by EPA Method 8015 and TPH-DRO by EPA Method 8015. As stated in the scope of work, monitoring wells FCMW-3, FCMW-5 and FCMW-6 were sampled. No measurable free product was encountered in any of the monitoring wells. The analytical results are summarized in Table 4-1, and the analytical data are contained in Appendix C.

Monitoring wells FCMW-3 and FCMW-5 and FCMW-6 had reported benzene concentrations of 0.009 milligrams per liter (mg/l), 1.93 mg/l, and 0.002 mg/l, respectively. The duplicate sample at FCMW-5 had a reported benzene concentration of 2.03 mg/l. The benzene concentration in FCMW-5 exceeded the TDEC cleanup level for a non-drinking water aquifer of 0.070 mg/l. The benzene concentrations were below the TDEC cleanup level for a non-drinking water aquifer in FCMW-3 in MW-6.

As shown in Table 4-1, TPH-GRO was detected in each ground-water sample from the site. However, TPH-GRO was detected above TDEC's cleanup level for a non-drinking water aquifer (1.0 mg/l) in only one monitoring well in August 1997, FCMW-5 at 22.5 mg/l and FCMW-5 duplicate at 27.9 mg/l.

TPH-DRO was detected in each ground-water sample from the site. TPH-DRO was also detected above the TDEC cleanup level for a non-drinking water aquifer (1.0 mg/l) in only FCMW-5 (5.16 mg/l and 4.85B mg/l in FCMW-5 duplicate).

However, only in monitoring well FCMW-5 did the combined concentrations of TPH-GRO and TPH-DRO result in exceedances of the TDEC cleanup level for a non-drinking water aquifer.

The TPH-DRO analytical results were flagged as B-Detected in Blank. Contamination was identified in the Method Blank. In the field blank (REI CHAS 5018), the reported TPH-DRO concentration was due entirely to laboratory contamination. However, in the remaining TPH-DRO results, the reported concentrations were attributable to laboratory contamination and contamination consistent with light hydrocarbon/solvent contamination. Given, that the reported contaminant concentrations are relatively low, we feel that the Method Blank contamination did not affect the overall sample results, and the data is therefore reliable. As such, we feel a resampling event is not warranted at this time.

A few specific parameters showed slight changes in concentration. In particular, the benzene concentration in monitoring well FCMW-3 decreased from 0.040 mg/l in March 1997 to 0.009 mg/l in August 1997. Toluene concentration decreased slightly from 0.061 mg/l to 0.004 mg/l; as did the Ethyl benzene concentration from 0.007 mg/l to 0.003 mg/l. Total xylenes also decreased from 0.014 mg/l to 0.004 mg/l. TPH concentrations showed significant decreases, and the combined TPH-GRO and TPH-DRO concentration is now below the TDEC cleanup level for a non-drinking aquifer.

TABLE 4-1
GROUND-WATER ANALYTICAL RESULTS
Flying Club UST Site
NSA Memphis
Facility #0-790479
REI Project No. 33224

Monitoring Well ID/Sample ID	Benzene (mg/l)	Toluene (mg/l)	Ethyl benzene (mg/l)	Total Xylenes (mg/l)	TPH-GRO (mg/l)	TPH-DRO (mg/l)	TPH-GRO and TPH-DRO (mg/l)
FCMW-3	0.009	0.004	0.003	0.004	0.163	0.771B*	0.934
REI CHAS 5020	0.040	0.061	0.007	0.014	0.260	0.174	0.434
FCMW-5	1.93	13.20	0.153	0.505	22.5	5.16B*	27.66
REI CHAS 5021	2.41	19.10	0.133	0.462	26.80	3.60	30.40
FCMW-5 (Dup)	2.03	15.50	0.164	0.524	27.9	4.85B*	32.75
REI CHAS 5022	2.46	20.40	0.136	0.468	28.6	4.21	32.81
FCMW-6	0.002	0.002	0.002	BDL	0.206	0.363B*	0.569
REI CHAS 5019	BDL	BDL	0.001	0.001	0.132	0.161	0.293
Field Blank	BDL	BDL	BDL	BDL	BDL	0.238B*	0.238
REI CHAS 5018							

NOTE: The first entry in each block is from the August 1997 sampling event. The second entry is from the March 1997 event.

BDL Below Detection Limits

* Results flagged as B-Detected in Blank . The reported contamination was due to laboratory and sample contamination. The reported concentration in the field blank was solely due to laboratory contamination. Contamination was identified in the associated Method Blank as well as contamination in the sample consistent with light hydrocarbon/solvent contamination.

BOLD Indicates exceedances of TDEC cleanup levels for a non-drinking aquifer.

N/A Not Analyzed

Applicable TDEC clean-up levels: Benzene 0.070 ppm (mg/l)
TPH 1.00 ppm (mg/l)

In monitoring well FCMW-5, the benzene concentration decreased from 2.41 mg/l in March 1997 to 1.93 mg/l in August 1997 and toluene and total xylenes decreased on these same dates. Ethylbenzene concentrations slightly increased from 0.133 mg/l to 0.153 mg/l. TPH-GRO concentrations decreased from 26.8 mg/l to 22.5 mg/l on the respective dates. However, TPH-DRO concentrations increased from 3.6 mg/l to 5.16 mg/l. FCMW-5 duplicate sample had similar concentrations.

A comparison of the results of the March 1997 and August 1997 sampling events shows continued decrease in concentrations of the more volatile BTEX compounds, especially in FCMW-5. Overall TPH concentrations decreased in well FCMW-5 between March 1997 and August 1997.

Slight increases in contaminants of concern were evident in FCMW-6. Benzene concentration increased from BDL to 0.002 mg/l, and TPH-GRO concentration increased from 0.132 mg/l to 0.206 mg/l. TPH-DRO concentration increased from 0.161 mg/l to 0.363 mg/l. All concentrations reported at FCMW-6 are well below applicable TDEC clean-up levels.

Although BTEX and TPH concentrations have been detected at slightly elevated concentrations in FCMW-3 and FCMW-6 during previous sampling events, it is evident, based on the results of the March 1997 event, that natural attenuation of these compounds is occurring. It should also be noted that parameter concentrations in FCMW-5 are showing overall decreases since the March 1997 sampling event.

5.0 CONCLUSIONS AND RECOMMENDATIONS

- Of the three monitoring wells sampled, only FCMW-5 reported benzene and TPH concentrations exceeding TDEC cleanup levels for a non-drinking water aquifer, while FCMW-3 and FCMW-6 reported TPH concentrations below TDEC cleanup levels.
- The ground-water flow direction at the site is southwesterly, and the calculated hydraulic gradient at the site ranged from 0.04 ft/ft to 0.05 ft/ft, which is consistent with previous reports.
- Depth to the static water table at the site ranged from 12.13 feet to 16.12 feet below grade.
- Free product was not detected in any of the monitoring wells.
- TPH concentrations have decreased slightly in FCMW-5 since March 1997. Based on these results as well as the decrease in contaminant concentrations in FCMW-3 it is apparent that natural biodegradation of the BTEX compounds will continue to occur at the site.

REI recommends continuing the monitoring program and comparing the data between this sampling event and the next sampling event approximately six months from now.

6.0 CERTIFICATION

Signature Page

I certify that under penalty of law, including but not limited to penalties for perjury, that the information contained in this report and on any attachments, is true, accurate and complete to the best of my knowledge, information, and belief. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for intentional violations.

_____	_____	_____
Owner/Operator (Print)	Signature	Date
<u>Ronald P. Paulling</u>	<u>Ronald P. Paulling TN 3683</u>	<u>September 22, 1997</u>
P.E. or P.G. (Print)	Signature TN Lic./Reg. #	Date

If a P.E. signs the report, please indicate the area of expertise.

(Print or Type)

All signatures above must be notarized.

STATE OF SOUTH CAROLINA



Sworn to and subscribed before me by Ronald P. Paulling on this date September 22, 1997

My commission expires 11-25-97

CHARLES L. FANNING

Notary Public - Print Name

Charles L. Fanning

Signature

6.0 CERTIFICATION

Signature Page

I certify that under penalty of law, including but not limited to penalties for perjury, that the information contained in this report and on any attachments, is true, accurate and complete to the best of my knowledge, information, and belief. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for intentional violations.

DARRYL K. CREASY, LCDR, CEC, USN


Signature

8 OCT 97
Date

Owner/Operator (Print)

P.E. or P.G. (Print)

Signature TN Lic./Reg. #

Date

If a P.E. signs the report, please indicate the area of expertise.

(Print or Type)

Stamp/Seal

All signatures above must be notarized.

STATE OF TENNESSEE

Sworn to and subscribed before me by DARRYL CREASY on this date 8 OCT 97

My commission expires INDEFINITE

JASON H EATON, LT, JAGC, USMC

Notary Public - Print Name


Signature

**AUTHORITY:
TITLE 10, U.S. CODE SEC. 936
TENN CODE ANN. 58-1-605 ET SEQ**

APPENDIX A

TDEC - Technical Guidance Document - 007



STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION

DIVISION OF UNDERGROUND STORAGE TANKS

TECHNICAL GUIDANCE DOCUMENT - 007

EFFECTIVE DATE - JANUARY 1, 1994

REVISED DATE - AUGUST 1, 1996

RE: MONITORING AT UST SITES

The purpose of this Technical Guidance Document (TGD) is to assist the regulated community in determining the requirements for periodic monitoring and reporting at UST sites.

All work associated with this TGD shall be performed in accordance with the applicable sections of the Environmental Assessment Guidelines.

I. Monitoring Program Components

A. Comprehensive

Comprehensive Monitoring shall consist of the following activities in sequence:

1. Water Monitoring
 - a. Obtaining water and free product level measurements from all monitoring wells;
 - b. Obtaining free product level measurements from any release detection wells, if applicable;
 - c. Sampling all monitoring wells and recovery wells; and,
 - d. Sampling all springs and water supplies approved by the Division.

2. Vapor Monitoring

Vapor monitoring of all subsurface structures (i.e. basements, utility vaults, sewers, etc.) within 300 feet of known contamination. Known contamination shall be defined as all sampling locations where analytical results document contamination above the applicable cleanup levels or where free product has been observed. All structures which have been previously impacted by petroleum vapors shall also be monitored.

B. Site Status

Site Status Monitoring shall consist of the following activities:

1. Water Monitoring

- a. Obtaining water and free product level measurements from all monitoring wells;
- b. Obtaining free product level measurements from any release detection wells, if applicable;
- c. Sampling all monitoring wells approved by the Division;
- d. Sampling all springs and water supplies approved by the Division; and,
- e. Sampling the influent and effluent of the ground water treatment system, if applicable.

2. Vapor Monitoring

Vapor Monitoring of all subsurface structures (i.e. basements, utility vaults, sewers, etc.) within 300 feet of known contamination. Known contamination shall be defined as all sampling locations where analytical results document contamination above the applicable cleanup levels or where free product has been observed. All structures which have been previously impacted by petroleum vapors shall also be monitored.

3. Emissions Monitoring

Emissions monitoring from the soil vapor extraction system, if applicable. At a minimum, measurements of the total volatiles as measured by an organic vapor detector shall be taken.

C. Soil

Soil Monitoring shall consist of the installation of one boring in the location where the highest level of soil contamination was known to exist through previous site assessment activities.

II. Monitoring Programs

A. Corrective Action

Corrective Action Monitoring shall be performed upon approval of the Corrective Action Plan by the Division, and consist of the following:

1. Comprehensive Monitoring shall be performed within seventy-two hours prior to the start-up of the ground water corrective action system.

2. Site Status Monitoring shall be performed every six months thereafter until the ground water contaminant concentrations are below the applicable cleanup levels. Closure Monitoring shall commence 20 to 30 days after the Division approves the termination of the ground water corrective action system in accordance with Item C. below.
3. Soil Monitoring shall be conducted two years after the soil corrective action system becomes operational. It shall continue every two years thereafter until the soil contaminant concentrations decrease below the applicable cleanup levels.

B. Monitoring Only

A monitoring only program shall be implemented upon the Division's approval and consist of the following:

1. Comprehensive Monitoring shall be performed 20 to 30 days after the Division approves a monitoring only request.
2. Site Status Monitoring shall be conducted every six months thereafter until:
 - a. Contaminant concentrations are below the applicable cleanup levels; or,
 - b. The Division requires additional activities.

If the analytical results indicate contaminant concentrations are below the applicable cleanup levels, Closure Monitoring shall commence the next quarter in accordance with Item C. below and upon approval of the Division.

3. Soil Monitoring shall be performed every two years, until the soil contaminant concentrations are below the applicable cleanup levels or the Division requires additional activities.

C. Closure

Closure Monitoring shall be performed to determine that the ground water contaminant concentrations remain below the applicable cleanup levels for one year and shall consist of four (4) consecutive quarters of sampling using the following procedures:

1. Comprehensive Monitoring shall be conducted 20 to 30 days after the Division approves the start of a Closure Monitoring Program.
2. Site Status Monitoring shall be performed the second and third quarters.
3. Comprehensive Monitoring shall be conducted the fourth quarter.

If contaminant concentrations are detected above the applicable cleanup levels during closure monitoring, additional activities associated with corrective action may be required.

Refer to the UST Monitoring Summary at the end of this Guidance Document to determine when to perform each type of monitoring.

III. Report Preparation

Within thirty (30) days after sample collection, a report shall be prepared and submitted containing the following information:

A. Progress

For sites in corrective action, supply an "as built" equipment diagram. This diagram shall be submitted only in the first monitoring report after the system(s) has been installed or in any subsequent reports after a major modification as been made to the corrective action system(s).

If any corrective action has taken place since the last report, briefly describe the progress of the corrective action system(s) to date.

1. Based upon the readings taken during routine operation and maintenance (O & M) visits to the site, provide the average flow rate and the estimated total gallons of water treated for the reporting period. (Report this amount in Table 1)
2. Provide the gallons of free product removed during the reporting period and the total gallons removed to date. (Report this amount in Table 1) Describe the method for management and disposal of the free product.
3. Provide in Table 1 all monthly costs incurred at the site and the total costs incurred to date associated with monitoring and O and M. Costs shall include but not be limited to the following: all personnel time on and off site, report preparation, analytical costs, equipment rental, supplies, capital equipment, repairs, utilities, fees, per diem and mileage.
4. If modifications are made to a corrective action system, briefly explain the modifications and why they were necessary.
5. For each site visit, briefly describe the purpose of the visit including the length of time on the site and the names of the personnel and position/title on the site.

B. Problems

Briefly describe any problem(s) which have been encountered since the previous report and the actions taken to resolve the problem(s). If applicable, report in Table 1, the percent of time the treatment system was out of operation during the reporting period.

C. Water Monitoring

1. Potentiometric Data

- a. Provide a table, prepared in accordance with Section D.1.c. of the Initial Site Characterization Report Guidelines (ISCRG), from the data collected from all events.
- b. Provide two potentiometric maps, prepared in accordance with Section D.1.d of the ISCRG, from the data collected during the last two monitoring periods.

2. Analytical Data

- a. Provide a table, prepared in accordance with Section D.5 of the ISCRG, using analytical results from all events.

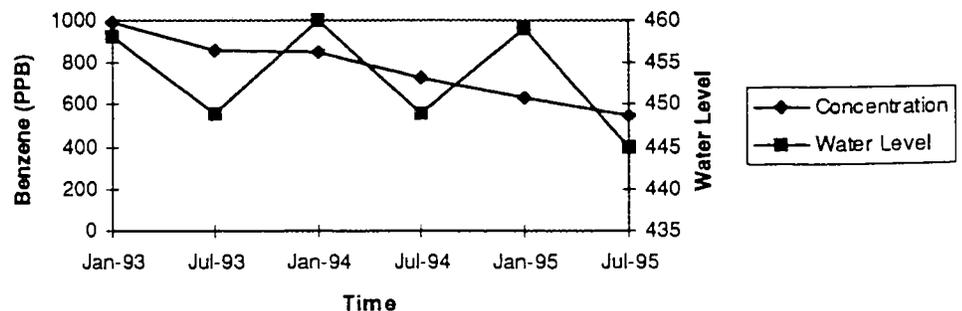
Provide all laboratory analysis sheets for this monitoring period in an appendix. Include the TN UST Facility ID Number on all laboratory analysis sheets. A copy of the chain of custody sheets shall be in the appendix.

Photostatic copies of the laboratory analysis sheets are not acceptable.

- b. Provide a graph for each monitoring well sampled showing the ground water contaminant concentrations for benzene and TPH and ground water levels versus time.

Provide a graph for each monitoring event showing the influent and effluent contaminant concentrations for benzene and TPH for sites in ground water corrective action.

Use all ground water data and indicate the point in time in which the system became operational. Use the example below as a guide.



- c. If Comprehensive Monitoring was conducted during the current monitoring period, provide a plume map(s) prepared in accordance with Section D.7. of the ISCRG.

D. Vapor Monitoring Results

Describe the results of the vapor monitoring. Provide a map showing the locations of the monitoring points and a table indicating the results of the monitoring.

E. Emissions Monitoring Results

Describe the results obtained from the monitoring of any soil vapor extraction systems and provide a table with the results of all sampling events.

F. Soil Monitoring Results

Describe the results of any soil sampling conducted during the reporting period. Provide a table with all soil analytical results obtained in accordance with this TGD.

If a soil vapor extraction system is being used, provide a zone of influence map showing the extent of vapor drawdown to a minimum 1 (one) inch of water.

G. Additional Information

Provide any additional information which was included in the approved CAP or required by the Division. If applicable, provide this additional information in tables or maps.

H. Signature Page

A signature page, as shown below shall be attached to the monitoring report. The page shall be signed by the owner/operator (or authorized representative within the organization) and a registered professional geologist under the Tennessee Geologist Act (*T.C.A. §62-36-101 et seq.*), or a registered professional engineer under the Tennessee Architects, Engineers, Landscape Architects, and Interior Designers Law and Rules (*T.C.A. §62-2-101 et seq.*).

We, the undersigned, certify under penalty of law, including but not limited to penalties for perjury, that the information contained in this report form and on any attachments, is true, accurate and complete to the best of our knowledge, information, and belief. We are aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for intentional violations.

Owner/Operator (Print name) Signature Date

Title (Print)

P.E. or P.G. (Print name) Signature Date

Tennessee Registration #

Note: Each of the above signatures shall be notarized separately with the following statement.

STATE OF _____ COUNTY OF _____

Sworn to and subscribed before me by _____ on this date

_____. My commission expires _____.

Notary Public (Print name) Signature Date

Stamp/Seal

MONITORING REPORT

Table 1

TN UST FACILITY ID NUMBER: _____

Reporting Period	From:	From:	From:	From:
	To:	To:	To:	To:
Avg. Flow Rate (GPM)				
Total Gallons Pumped Per Period				
Cumulative Total- Gallons Pumped				
% Time System Was Down				
Gallons of Free Product Removed				
Cumulative Gallons of Free Product Removed				

The Reporting Period described above shall be a six month interval.

Month						
# of Site Visits per Month						
Electrical Cost per Month						
Cumulative Electrical Costs To Date						
All Costs per Month						
Cumulative Costs To Date (Monitoring and O & M)						

The Reporting Period for O & M costs is monthly.

UST Monitoring Program Summary

Monitoring Program Components	When to Perform	Description
Comprehensive (Water and Vapor)	<ol style="list-style-type: none"> 1. Before CA system startup (Baseline). 2. Upon system shutdown(1st qtr. of Closure Monitoring). 3. The 4th quarter of Closure Monitoring. 4. Before beginning a Monitoring Only Program. 	<p>Sample all monitoring wells and recovery wells. Also all springs and water supplies proposed by the CAC and approved by the Division.</p> <p>Monitor for vapors in all subsurface structures (i.e. basement, sewers, utilities) within 300 feet of known contamination. Also any structure previously impacted by petroleum vapors.</p>
Site Status (Water, Vapor, and Emissions)	<ol style="list-style-type: none"> 1. Every six months during the operation of the corrective action system. 2. Every six months during Monitoring Only. 3. During the 2nd and 3rd quarter of Closure Monitoring. 	<p>Sample all monitoring wells proposed by the CAC and approved by the Division.</p> <p>The influent and effluent of the treatment system.</p> <p>Monitor for vapors in all subsurface structures (i.e. basement, sewers, utilities) 300 feet of known contamination. Also any structure previously impacted by petroleum vapor.</p> <p>Monitoring of the system's air effluent.</p>
Soil	<p>Every two years until achieving soil cleanup goals.</p>	<p>One boring in the area of highest soil contamination to monitor contaminant reduction.</p>

APPENDIX B

TDEC UST Site Ranking

UST SITE RANKING FORM

Facility ID Number: 0 - 7 9 0 4 7 9

Facility Name: Flying Club

Facility Address: Naval Air Station Memphis

Geologic and Hydrogeologic Factors

1 Minimum depth to the water table		
< 5.0 Feet		50
5.1 to 10.0 Feet		45
10.1 to 15.0 Feet		40
15.1 to 30.0 Feet		35
30.1 to 50.0 Feet		25
50.1 to 75.0 Feet		15
75.1 to 100.0 Feet		10
> 100.0 Feet		5
Score		40

2 Minimum distance between water table and contaminated soil		
< 5.0 Feet		50
5.1 to 10.0 Feet		45
10.1 to 15.0 Feet		40
15.1 to 30.0 Feet		35
30.1 to 50.0 Feet		25
50.1 to 75.0 Feet		15
75.1 to 100.0 Feet		10
> 100.0 Feet		5
Score		0

3 Soil Permeability		
> 10 ⁻⁴ cm/sec		30
10 ⁻⁴ to 10 ⁻⁶ cm/sec		20
< 10 ⁻⁶ cm/sec		10
Score		20

4 Calculated Ground Water Flow Rate		
< 10 feet/day		3
10 to 40 feet/day		6
40 to 90 feet/day		12
90 to 130 feet/day		18
130 to 260 feet/day		24
> 260 feet/day		30
Karst		30
Score		3

ENC: (1)

Receptor Factors

5	Basements		
	< 50.0 feet from known contamination	150	
	50.1 to 100.0 feet from known contamination	75	
	100.1 to 200.0 feet from known contamination	50	
	200.1 to 300.0 feet from known contamination	25	
	> 300.1 feet	0	
	Score		0

6	Sanitary sewers		
	< 50.0 feet from known contamination	75	
	50.1 to 100.0 feet from known contamination	40	
	100.1 to 200.0 feet from known contamination	20	
	200.1 to 300.0 feet from known contamination	10	
	> 300.1 feet	0	
	Score		0

7	Storm water sewers		
	< 50.0 feet from known contamination	50	
	50.1 to 100.0 feet from known contamination	30	
	100.1 to 200.0 feet from known contamination	10	
	200.1 to 300.0 feet from known contamination	5	
	> 300.1 feet	0	
	Score		0

8	Other subsurface utilities		
	< 50.0 feet from known contamination	30	
	50.1 to 100.0 feet from known contamination	20	
	100.1 to 200.0 feet from known contamination	10	
	200.1 to 300.0 feet from known contamination	5	
	> 300.1 feet	0	
	Score		20

9	Public water supply source		
	< .1 miles	300	
	.1 to .25 miles	200	
	.25 to .5 miles	100	
	> .51 miles	0	
	Score		200

10	Private water supply source		
	< .1 miles	200	
	.1 to .25 miles	150	
	.25 to .5 miles	100	
	> .51 miles	0	
	Score		0

11	Distance to surface water		
	< .1 miles		25
	.1 to .25 miles		15
	.25 to .5 miles		5
	> .51 miles		0
	Visibly impacted surface water from a petroleum product		200
		Score	5

Contaminant Factors

	A. Max. Contam. Levels	B. App. Cleanup Levels	C. Cont. Conc. Ratio A/B
12	Contaminant Concentration		
	Benzene in ground water	6.5	0.07
	TPH in ground water	70.2	1.0
	BTX in soil	57.7	250
	TPH in soil	300	500
			0.23
			0.6

13	Benzene in ground water		
	< 1.0	0	
	1.1 to 10.0	25	
	10.1 to 50.0	50	
	50.1 to 100.0	100	
	100.1 to 500.0	200	
	> 500.1	300	
		Score	100

	TPH in ground water		
	< 1.0	0	
	1.1 to 10.0	20	
	10.1 to 50.0	40	
	50.1 to 100.0	80	
	100.1 to 500.0	120	
	> 500.1	200	
		Score	80

15	BTX in soil		
	< 1.0	0	
	1.1 to 5.0	25	
	5.1 to 10.0	50	
	10.1 to 50.0	100	
	> 50.1	200	
		Score	0

16	TPH in soil		
	< 1.0	0	
	1.1 to 5.0	20	
	5.1 to 10.0	40	
	10.1 to 50.0	80	
	> 50.1	100	
		Score	0

17	Total site score		468
----	------------------	--	-----

UST Site Ranking
Flying Club
Facility I.D. 0-790479

I certify under penalty of law, including but not limited to penalties for perjury, that the information contained in this report and on any attachments, is true, accurate and complete to the best of my knowledge, information, and belief. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for intentional violations.

CDR D. J. CLARK
Owner/Operator (Print)

D. J. Clark
Signature

11-7-94
Date

Joe Matthews
P.E. or P.G. (Print)

Joe Matthews
Signature TN Lic./Reg. #
TN 1112

11-1-94
Date

If a P.E. signs the report, please indicate the area of expertise.

(Print or Type)

Stamp/Seal

All signatures above must be notarized.

Patricia L. King
Shelby County, TN Notary
My license expires 4-11-95

APPENDIX C

ANALYTICAL RESULTS



ENVIRONMENTAL TESTING & CONSULTING, INC.
 2924 Walnut Grove Road • Memphis, TN 38111 • (901) 327-2750 • FAX (901) 327-6334

Founded 1972

September 8, 1997

Mr. Ron Paulling
 Rust Environment &
 Infrastructure
 2694 Lake Park Drive
 North Charleston, SC 29406

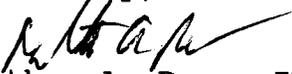
Ref: Analytical Testing
 ETC Order # 9708893
 Project Description Flying Club/NSA Memphis

The above referenced project has been analyzed per your instructions. The analyses were performed in our laboratory in accordance with Standard Methods 17th/18th Edition; The Solid Waste Manual SW-846; EPA Methods for the Analysis of Water and Wastes and/or 40 CFR part 136.

The results are shown on the attached analysis sheet(s).

Please do not hesitate to contact our office if you have any questions.

Sincerely,


 Nathan A. Pera, IV
 Chief Executive Officer

rt
 Attachment

RUSTCHARLES

Certifications

Tennessee	#02027	New Jersey	#81617
Arkansas		Mississippi	
Alabama	#40730	Oklahoma	#9311
Kentucky	#90047	Virginia	#00106
North Carolina	#415	Washington	#C248
South Carolina	#84002002	US Army Corps of Engineers	
	#84002001		

ENVIRONMENTAL TESTING & CONSULTING, INC.

2924 Walnut Grove Road - Memphis, TN 38111 - (901)327-2750

ORGANIC ANALYSIS DATA SHEET

Client Name **Rust Environment & Infrastructure**
Infrastructure
2694 Lake Park Drive
North Charleston, SC 29406

Site ID Flying Club/NSA Memphis

Project # 33224.10000
FID #

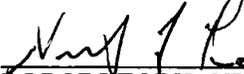
Date Arrived 08/29/97
ETC Order Number 9708893

ETC Lab ID 9708893-01
Sample ID: REICHAS5018

Matrix :AQUEOUS
Sample Date :08/29/97

TEST	RESULT	UNITS	DETECTION LIMIT	DATE EXTRACTED	DATE ANALYZED	BY	METHOD
BTEX/TPH GRO					09/03/97	QM	8020/GRO
Benzene	ND	mg/L	0.001				
Toluene	ND	mg/L	0.002				
Ethyl Benzene	ND	mg/L	0.001				
Xylenes (Total)	ND	mg/L	0.001				
Gasoline Range Organics	ND	mg/L	0.100				
MTBE	ND	mg/L	0.005				
<u>Surrogate Standard</u>		<u>% Recovery</u>					<u>QC Limits</u>
1 - BFB		88		50			150
2 - BFB		86		50			150

ND - Not Detected


LABORATORY MANAGER

ENVIRONMENTAL TESTING & CONSULTING, INC.
 2924 Walnut Grove Road - Memphis, TN 38111 - (901)327-2750
ORGANIC ANALYSIS DATA SHEET

Client Name **Rust Environment & Infrastructure**
Infrastructure
2694 Lake Park Drive
North Charleston, SC 29406

Site ID **Flying Club/NSA Memphis**

Project # **33224.10000**
 FID #

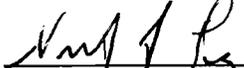
Date Arrived **08/29/97**
 ETC Order Number **9708893**

ETC Lab ID **9708893-02**
Sample ID: REICHAS5019

Matrix **:AQUEOUS**
 Sample Date **:08/29/97**

TEST	RESULT	UNITS	DETECTION LIMIT	DATE EXTRACTED	DATE ANALYZED	BY	METHOD
BTEX/TPH GRO					09/03/97	QM	8020/GRO
Benzene	0.002	mg/L	0.001				
Toluene	0.002	mg/L	0.002				
Ethyl Benzene	0.002	mg/L	0.001				
Xylenes (Total)	ND	mg/L	0.001				
Gasoline Range Organics	0.206	mg/L	0.100				
MTBE	0.006	mg/L	0.005				
<u>Surrogate Standard</u>		<u>% Recovery</u>					<u>QC Limits</u>
1 - BFB		88		50	150		
2 - BFB		81		50	150		

ND - Not Detected


 LABORATORY MANAGER

ENVIRONMENTAL TESTING & CONSULTING, INC.

2924 Walnut Grove Road - Memphis, TN 38111 - (901)327-2750

ORGANIC ANALYSIS DATA SHEET

Client Name Rust Environment &
Infrastructure
Infrastructure
2694 Lake Park Drive
North Charleston, SC 29406
Site ID Flying Club/NSA Memphis

Project # 33224.10000
FID #

Date Arrived 08/29/97
ETC Order Number 9708893

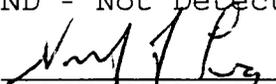
ETC Lab ID 9708893-03
Sample ID: REICHAS5020

Matrix :AQUEOUS
Sample Date :08/29/97

TEST	RESULT	UNITS	DETECTION LIMIT	DATE EXTRACTED	DATE ANALYZED	BY	METHOD
BTEX/TPH GRO					09/03/97	QM	8020/GRO
Benzene	0.009	mg/L	0.001				
Toluene	0.004	mg/L	0.002				
Ethyl Benzene	0.003	mg/L	0.001				
Xylenes (Total)	0.004	mg/L	0.001				
Gasoline Range Organics	0.163	mg/L	0.100				
MTBE	0.007	mg/L	0.005				

Surrogate Standard	% Recovery	QC Limits
- BFB	89	50 150
S2 - BFB	82	50 150

ND - Not Detected


LABORATORY MANAGER

ENVIRONMENTAL TESTING & CONSULTING, INC.
 2924 Walnut Grove Road - Memphis, TN 38111 - (901)327-2750
ORGANIC ANALYSIS DATA SHEET

Client Name **Rust Environment & Infrastructure**
Infrastructure
2694 Lake Park Drive
North Charleston, SC 29406

Site ID **Flying Club/NSA Memphis**

Project # **33224.10000**
 FID #

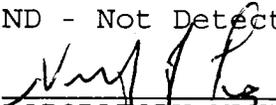
Date Arrived **08/29/97**
 ETC Order Number **9708893**

ETC Lab ID **9708893-04**
Sample ID: REICHAS5021

Matrix : **AQUEOUS**
 Sample Date : **08/29/97**

TEST	RESULT	UNITS	DETECTION LIMIT	DATE EXTRACTED	DATE ANALYZED	BY	METHOD
BTEX/TPH GRO					09/03/97	QM	8020/GRO
Benzene	1.93	mg/L	0.050				
Toluene	13.2	mg/L	0.050				
Ethyl Benzene	0.153	mg/L	0.001				
Xylenes (Total)	0.505	mg/L	0.050				
Gasoline Range Organics	22.5	mg/L	5.00				
MTBE	0.116	mg/L	0.005				
<u>Surrogate Standard</u>							
1 - BFB	106		50	150			
2 - BFB	94		50	150			

ND - Not Detected


 LABORATORY MANAGER

ENVIRONMENTAL TESTING & CONSULTING, INC.

2924 Walnut Grove Road - Memphis, TN 38111 - (901)327-2750

ORGANIC ANALYSIS DATA SHEET

Client Name **Rust Environment &
Infrastructure
Infrastructure
2694 Lake Park Drive
North Charleston, SC 29406**

Site ID **Flying Club/NSA Memphis**

Project # **33224.10000**
FID #

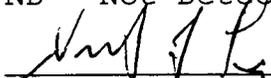
Date Arrived **08/29/97**
ETC Order Number **9708893**

ETC Lab ID **9708893-05**
Sample ID: REICHAS5022

Matrix : **AQUEOUS**
Sample Date : **08/29/97**

TEST	RESULT	UNITS	DETECTION LIMIT	DATE EXTRACTED	DATE ANALYZED	BY	METHOD
BTEX/TPH GRO					09/03/97	QM	8020/GRO
Benzene	2.03	mg/L	0.050				
Toluene	15.5	mg/L	0.100				
Ethyl Benzene	0.164	mg/L	0.001				
Xylenes (Total)	0.524	mg/L	0.050				
Gasoline Range Organics	27.9	mg/L	5.00				
MTBE	0.137	mg/L	0.005				
<u>Surrogate Standard</u>							
- BFB	87		50	150			
S2 - BFB	84		50	150			

ND - Not Detected


LABORATORY MANAGER

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ORGANIC ANALYSIS DATA SHEET

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North Charleston, SC 29406

Site ID **Flying Club/NSA Memphis**

Project # **33224.10000**
FID #

Date Arrived **08/29/97**
ETC Order Number **9708893**

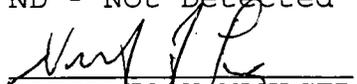
ETC Lab ID **9708893-06**
Sample ID: Trip Blank

Matrix : **AQUEOUS**
Sample Date : **08/29/97**

TEST	RESULT	UNITS	DETECTION LIMIT	DATE EXTRACTED	DATE ANALYZED	BY	METHOD
BTEX/TPH GRO					09/03/97	QM	8020/GRO
Benzene	ND	mg/L	0.001				
Toluene	ND	mg/L	0.002				
Ethyl Benzene	ND	mg/L	0.001				
Xylenes (Total)	ND	mg/L	0.001				
Gasoline Range Organics	ND	mg/L	0.100				
MTBE	ND	mg/L	0.005				

Surrogate Standard	% Recovery	QC Limits
- BFB	90	50 150
S2 - BFB	86	50 150

ND - Not Detected


LABORATORY MANAGER

ENVIRONMENTAL TESTING & CONSULTING, INC.

2924 Walnut Grove Road - Memphis, TN 38111 - (901)327-2750

ORGANIC ANALYSIS DATA SHEET

Client Name **Rust Environment &
Infrastructure
Infrastructure
2694 Lake Park Drive
North Charleston, SC 29406**
Site ID **Flying Club/NSA Memphis**

Project # **33224.10000**
FID #

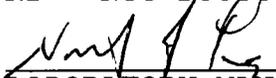
Date Arrived **08/29/97**
ETC Order Number **9708893**

ETC Lab ID **9708893-01**
Sample ID: REICHAS5018

Matrix **:AQUEOUS**
Sample Date **:08/29/97**

TEST	RESULT	UNITS	DETECTION LIMIT	DATE EXTRACTED	DATE ANALYZED	BY	METHOD
Petroleum Hydrocarbons							TN DRO
Diesel Range Organics	0.238B	mg/L	0.100	09/02/97	09/04/97	JP	
<u>Surrogate Standard</u>	<u>% Recovery</u>		<u>QC Limits</u>				
S1 - OTP	95		50	150			

ND - Not Detected


LABORATORY MANAGER

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2924 Walnut Grove Road - Memphis, TN 38111 - (901)327-2750

ORGANIC ANALYSIS DATA SHEET

Client Name **Rust Environment &
Infrastructure
Infrastructure
2694 Lake Park Drive
North Charleston, SC 29406**
Site ID **Flying Club/NSA Memphis**

Project # 33224.10000
FID #

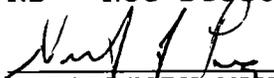
Date Arrived 08/29/97
ETC Order Number 9708893

ETC Lab ID 9708893-02
Sample ID: REICHAS5019

Matrix :AQUEOUS
Sample Date :08/29/97

TEST	RESULT	UNITS	DETECTION LIMIT	DATE EXTRACTED	DATE ANALYZED	BY	METHOD
Petroleum Hydrocarbons							TN DRO
Diesel Range Organics	0.363B	mg/L	0.100	09/02/97	09/04/97	JP	
<u>Surrogate Standard</u>	<u>% Recovery</u>		<u>QC Limits</u>				
S1 - OTP	83		50	150			

ND - Not Detected


LABORATORY MANAGER

ENVIRONMENTAL TESTING & CONSULTING, INC.
 2924 Walnut Grove Road - Memphis, TN 38111 - (901)327-2750
ORGANIC ANALYSIS DATA SHEET

Client Name **Rust Environment & Infrastructure**
Infrastructure
2694 Lake Park Drive
North Charleston, SC 29406

Site ID **Flying Club/NSA Memphis**

Project # **33224.10000**
 FID #

Date Arrived **08/29/97**
 ETC Order Number **9708893**

ETC Lab ID **9708893-03**
Sample ID: REICHAS5020

Matrix : **AQUEOUS**
 Sample Date : **08/29/97**

TEST	RESULT	UNITS	DETECTION LIMIT	DATE EXTRACTED	DATE ANALYZED	BY	METHOD
Petroleum Hydrocarbons							TN DRO
Diesel Range Organics	0.771B	mg/L	0.100	09/02/97	09/04/97	JP	
Surrogate Standard	% Recovery		QC Limits				
S1 - OTP	87		50	150			

ND - Not Detected


 LABORATORY MANAGER

ENVIRONMENTAL TESTING & CONSULTING, INC.

2924 Walnut Grove Road - Memphis, TN 38111 - (901)327-2750

ORGANIC ANALYSIS DATA SHEET

Client Name **Rust Environment &
Infrastructure
Infrastructure
2694 Lake Park Drive
North Charleston, SC 29406**

Site ID **Flying Club/NSA Memphis**

Project # **33224.10000**
FID #

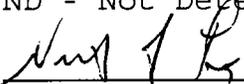
Date Arrived **08/29/97**
ETC Order Number **9708893**

ETC Lab ID **9708893-04**
Sample ID: REICHAS5021

Matrix **:AQUEOUS**
Sample Date **:08/29/97**

TEST	RESULT	UNITS	DETECTION LIMIT	DATE EXTRACTED	DATE ANALYZED	BY	METHOD
Petroleum Hydrocarbons							TN DRO
Diesel Range Organics	5.16B	mg/L	1.00	09/02/97	09/05/97	JP	
<u>Surrogate Standard</u>	<u>% Recovery</u>		<u>QC Limits</u>				
S1 - OTP	81		50	150			

ND - Not Detected


LABORATORY MANAGER

ENVIRONMENTAL TESTING & CONSULTING, INC.
 2924 Walnut Grove Road - Memphis, TN 38111 - (901)327-2750
ORGANIC ANALYSIS DATA SHEET

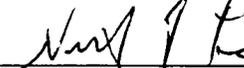
Client Name **Rust Environment & Infrastructure Infrastructure** Project # **33224.10000**
 FID #
2694 Lake Park Drive
North Charleston, SC 29406
 Site ID **Flying Club/NSA Memphis**

Date Arrived **08/29/97**
 ETC Order Number **9708893**

ETC Lab ID **9708893-05** Matrix : **AQUEOUS**
Sample ID: REICHAS5022 Sample Date : **08/29/97**

TEST	RESULT	UNITS	DETECTION LIMIT	DATE EXTRACTED	DATE ANALYZED	BY	METHOD
Petroleum Hydrocarbons							TN DRO
Diesel Range Organics	4.85B	mg/L	1.00	09/02/97	09/05/97	JP	
<u>Surrogate Standard</u>	<u>% Recovery</u>		<u>QC Limits</u>				
S1 - OTP	76		50	150			

ND - Not Detected


 LABORATORY MANAGER

ENVIRONMENTAL TESTING AND CONSULTING, INC.
MEMPHIS, TN
CASE NARRATIVE

Client Name : Rust E & I
Project Name : Flying Club / NSA Memphis
ETC Order # : 9708-893

Remarks

TPH Method TN - DRO

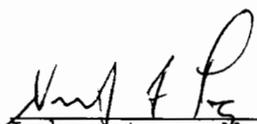
Contamination was identified in Method Blank 0902-3BLK at 0.344 mg/L. The contamination appears as individual, discrete peaks as opposed to a pattern fingerprint indicating hydrocarbon (eg Diesel Fuel) contamination. All results were flagged as "B - Detected in Blank."

Sample 9708-893-01 showed low level contamination consistent with contamination identified in the associated Method Blank. All results were flagged as appropriate to indicate that the reported contamination was due to laboratory contamination.

Sample 9708-893-02 showed low level contamination consistent with contamination identified in the associated Method Blank as well as contamination consistent with a light hydrocarbon/solvent contamination. Results were flagged to indicate that the Method Blank contamination did contribute to the reported value.

Sample 9708-893-03 showed low level contamination consistent with contamination identified in the associated Method Blank as well as contamination consistent with a light hydrocarbon/solvent contamination. Results were flagged to indicate that the Method Blank contamination did contribute to the reported value.

Samples 9708-893-04 and 9708-893-05 showed high level of contamination consistent with a light hydrocarbon/solvent contamination. While this result was flagged, the Method Blank contamination did not affect the overall sample results.


Laboratory Manager