

**NATURAL ATTENUATION MONITORING REPORT  
3rd QUARTERLY, YEAR 2004  
UNDERGROUND STORAGE TANK 19  
BUILDING 3241  
NAVAL AIR STATION PENSACOLA, FLORIDA**

**CONTRACT No. N62467-03-G-0110  
CONTRACT TASK ORDER No. 005**

**PREPARED FOR:**

United States Naval Facilities  
Engineering Command  
Southern Division  
2155 Eagle Drive  
North Charleston, South Carolina 29406

**PREPARED BY:**

Aerostar Environmental Services, Inc.  
803 Government Street, Suite A  
Mobile, Alabama 36602  
(251) 432-2664

April 2005

---

Emilie Wien, Project Manager

Date

---

Leon J. Carrero, P.G.; Manager, Environmental Services

Date

**CERTIFICATION**

**PROFESSIONAL GEOLOGIST LICENSED IN THE STATE OF FLORIDA**

This is to certify that the geological and hydrogeological features of the ***3rd Quarterly, Year 2004 Natural Attenuation Monitoring Report, Underground Storage Tank 19, Building 3241, Naval Air Station Pensacola, Florida*** has been prepared and examined by the undersigned.

Signed: \_\_\_\_\_

Leon J. Carrero, P.G.

Florida Registration Number: 1727

Date Signed: \_\_\_\_\_

## TABLE OF CONTENTS

---

<b>1.0</b>	<b>INTRODUCTION</b> .....	<b>1</b>
<b>2.0</b>	<b>BACKGROUND</b> .....	<b>2</b>
<b>3.0</b>	<b>SITE ASSESSMENT ACTIVITIES</b> .....	<b>3</b>
3.1	Groundwater Elevation Measurements.....	3
3.2	Groundwater Sample Collection .....	3
<b>4.0</b>	<b>RESULTS OF THE SITE ASSESSMENT</b> .....	<b>4</b>
4.1	Groundwater Flow Direction .....	4
4.2	Groundwater Laboratory Analysis .....	4
<b>5.0</b>	<b>SUMMARY AND RECOMMENDATIONS</b> .....	<b>5</b>

---

## **TABLES**

<b>TABLE 1:</b>	Groundwater Elevation Table
<b>TABLE 2:</b>	Groundwater Laboratory Analytical Summary

---

## **FIGURES**

<b>FIGURE 1:</b>	Site Location Map
<b>FIGURE 2:</b>	Site Map
<b>FIGURE 3:</b>	Groundwater Elevation Map (August 2004)
<b>FIGURE 4:</b>	Groundwater VOA Concentration Map (August 2004)

---

## **APPENDICES**

<b>APPENDIX A:</b>	Groundwater Sampling Logs
<b>APPENDIX B:</b>	Laboratory Analytical Results and Chain of Custody

## **1.0 INTRODUCTION**

Aerostar Environmental Services, Inc. (AEROSTAR) has prepared the 3rd Quarterly, Year 2004 Natural Attenuation Monitoring Report for Underground Storage Tank (UST) 19, Building 3241, Naval Air Station (NAS) Pensacola, Florida, hereafter referred to as the site. This report summarizes the quarterly groundwater sampling results from August 2004. This work is being performed under BOA Contract No. N62467-03-G-0110/005. A site location map is presented as **Figure 1**.

The site is located at the eastern end of Forrest Sherman Field, north of the Naval Aviation Museum and adjacent to the south side of Building 3221, the Aircraft Maintenance and Restoration Facility. The site is the former location of a UST containing fuel oil. The majority of the area in the vicinity of Building 3241 is paved asphalt or concrete. An area of bare soil, approximately 20 feet by 50 feet, is located adjacent to the south side of Building 3221 where the UST was located. A site map is presented as **Figure 2**.

## **2.0 BACKGROUND**

Building 3241 contains four boilers which are used for heating Building 3221. A fuel oil UST of unknown capacity was located along the south side of Building 3241 and was used to provide fuel for the boilers. The UST was removed in 1994. The boilers have been refitted and are currently fueled by natural gas.

During the removal and closure of the UST, five soil samples were collected from the tank excavation. The samples were analyzed for Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) Method SW-846 8260 and Semi-Volatile Organic Compounds (SVOCs) by EPA Method SW-846 8270A. Total xylenes and 1,1,2,2-tetrachloroethane were detected at concentrations exceeding the Florida Department of Environmental Protection (FDEP) soil cleanup target levels (SCTLs).

Following the tank removal, a shallow monitor well was installed and a groundwater sample was collected for laboratory analysis. The monitor well was designated as MW-1S for the site investigation. The groundwater sample was analyzed for VOCs by EPA Method SW-846 8260 and for SVOCs by EPA Method SW-846 8270A. Benzene was detected in the groundwater sample at a concentration of 220 micrograms per liter ( $\mu\text{g/L}$ ), exceeding the FDEP groundwater cleanup target level (GCTL) of 1  $\mu\text{g/L}$ . The well was resampled and a benzene concentration of 150  $\mu\text{g/L}$  was reported (Tetra Tech NUS, Inc., 2002).

A Site Assessment was performed by Tetra Tech NUS, Inc. in 2002. Mobile laboratory and offsite laboratory analysis for VOCs and naphthalene showed concentrations in the soil are below SCTLs. Four shallow groundwater monitor wells (MW-2S, MW-3S, MW-4S and MW-5S) and one deep groundwater monitor well (MW-4D) were installed during the site assessment. Benzene was detected above the GCTL at a concentration of 19  $\mu\text{g/L}$  in the groundwater sample collected from MW-4S.

Tetra Tech NUS, Inc. recommended the implementation of a natural attenuation monitoring plan for Building 3241. The recommendation included quarterly sampling of source wells MW-1S and MW-4S, and two downgradient wells MW-3S and MW-5S. The FDEP approved the natural attenuation monitoring plan in March 2003.

AEROSTAR was awarded the natural attenuation monitoring contract at UST 19, Building 3241, in April 2004.

### **3.0 SITE ASSESSMENT ACTIVITIES**

This section describes the field tasks completed during the quarterly groundwater sampling event conducted in August 2004. Field tasks included measuring the depth to groundwater in six monitor wells and collecting samples from four groundwater monitor wells. The following sections detail the scope of work for the assessment activities conducted at the site.

#### **3.1 Groundwater Elevation Measurements**

On August 26, 2004, AEROSTAR mobilized to the site to collect depth-to-water measurements from groundwater monitor wells MW-1S, MW-2S, MW-3S, MW-4S, MW-4D, and MW-5S. Prior to gauging the depths-to-water, the well caps were removed and the water levels were allowed to stabilize for at least 15 minutes. The depths-to-water were measured to the nearest 0.01 foot using an electronic water level indicator and recorded on a field sample collection log. The estimated direction of groundwater flow is discussed in Section 4.1.

#### **3.2 Groundwater Sample Collection**

On August 26, 2004, AEROSTAR collected groundwater samples from monitor wells MW-1S, MW-3S, MW-4S and MW-5S to evaluate groundwater quality. Groundwater sampling procedures were conducted in accordance with the guidelines established in the Work Plan and the FDEP Standard Operating Procedures (SOP)-001/01 document, revision date February 1, 2004. The groundwater samples were collected utilizing a variable speed peristaltic pump and transferred into the appropriate laboratory supplied sample containers, placed on ice, and delivered, under chain-of-custody, to a Navy approved laboratory for analyses via EPA Method 8021B for Volatile Organic Aromatics (VOAs).

The FDEP groundwater sampling logs are included in **Appendix A**. The results of the groundwater laboratory analyses are detailed in Section 4.2, and included in **Appendix B**.

## **4.0 RESULTS OF THE SITE ASSESSMENT**

### **4.1 Groundwater Flow Direction**

Depth-to-water measurements were collected from six monitor wells (MW-1S through MW-5S and MW-4D) on August 26, 2004. The depth-to-water and total depth of each monitor well was recorded and is presented in **Table 1**. The general groundwater flow direction based on these measurements was estimated to be towards the southeast. **Figure 3** illustrates the groundwater contours and general groundwater flow direction for the August 2004 monitoring event.

### **4.2 Groundwater Laboratory Analysis**

The groundwater samples collected from MW-1S, MW-3S, MW-4S and MW-5S showed dissolved hydrocarbon concentrations to be below the laboratory detection limits. The results of the groundwater laboratory analysis are summarized in **Table 2**. Groundwater VOA concentrations from the August 2004 sampling event are illustrated in **Figure 4**. The laboratory analytical results with appropriate chain-of-custody records are included in **Appendix B**.

## **5.0 SUMMARY AND RECOMMENDATIONS**

AEROSTAR conducted quarterly groundwater natural attenuation sampling activities during August 2004 at UST 19, Building 3241, NAS Pensacola, Florida. Laboratory results for the August 2004 groundwater sampling event reported VOA concentrations in the groundwater samples collected from MW-1S, MW-3S, MW-4S and MW-5S to be below the laboratory detection limits. AEROSTAR recommends continuing with quarterly groundwater sampling to monitor the natural attenuation of hydrocarbons at the site.

# **TABLES**

**TABLE 1  
GROUNDWATER ELEVATION TABLE**

UST 19, Building 3241

NAS Pensacola

Well Designation	MW-1S			MW-2S			MW-3S			MW-4S		
Diameter	2	in.		2	in.		2	in.		2	in.	
Well Depth	17.06	feet		17.74	feet		18.01	feet		18.02	feet	
Screen Interval	Unknown <sup>1</sup>		feet	7.74 - 17.74		feet	8.01 - 18.01		feet	8.02 - 18.02		feet
TOC Elevation <sup>2</sup>	30.00	feet		29.32	feet		30.90	feet		30.72	feet	
DATE	ELEV	DTW	FP	ELEV	DTW	FP	ELEV	DTW	FP	ELEV	DTW	FP
8/26/2004	20.38	9.62		20.53	8.79		20.06	10.84		20.36	10.36	

Well Designation	MW-4D			MW-5S		
Diameter	2	in.		2	in.	
Well Depth	29.80	feet		17.85	feet	
Screen Interval	19.80 - 29.80		feet	7.85 - 17.85		feet
TOC Elevation <sup>2</sup>	30.80	feet		30.60	feet	
DATE	ELEV	DTW	FP	ELEV	DTW	FP
8/26/2004	18.28	12.52		20.17	10.43	

Notes:

<sup>1</sup> Monitor well construction details are unknown.

<sup>2</sup> TOC Elevations were obtained from the Tetra Tech NUS, Inc. Site Assessment Report, September 2002.

**TABLE 2**  
**GROUNDWATER LABORATORY ANALYTICAL SUMMARY**

UST 19, Building 3241  
NAS Pensacola

Sample Location	Date	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	Naphthalene
FDEP Groundwater Cleanup Target Level*		1	40	30	20	50	20
FDEP Natural Attenuation Default Concentration*		100	400	300	200	500	200
MW-1S	8/26/2004	<1.0	<5.0	<1.0	<2.0	<5.0	<5.0
MM-3S	8/26/2004	<1.0	<5.0	<1.0	<2.0	<5.0	<5.0
MW-4S	8/26/2004	<1.0	<5.0	<1.0	<2.0	<5.0	<5.0
MW-5S	8/26/2004	<1.0	<5.0	<1.0	<2.0	<5.0	<5.0

Notes:

All results are in micrograms per liter (ug/L).

\* FDEP Groundwater Cleanup Target Levels and Natural Attenuation Default Concentrations are from Chapter 62-777, Florida Administrative Code.

## **FIGURES**

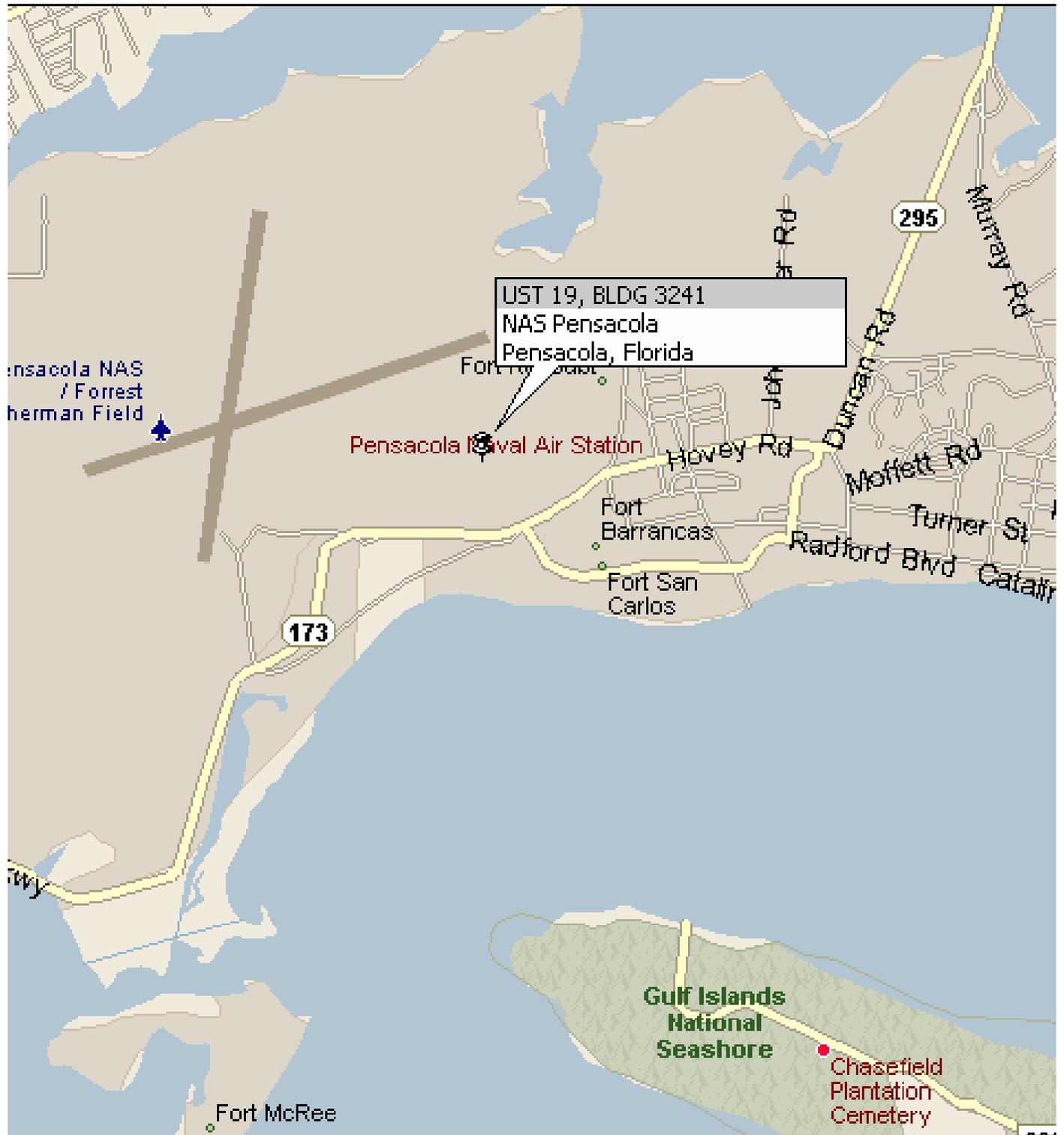


FIGURE 1 - SITE LOCATION MAP



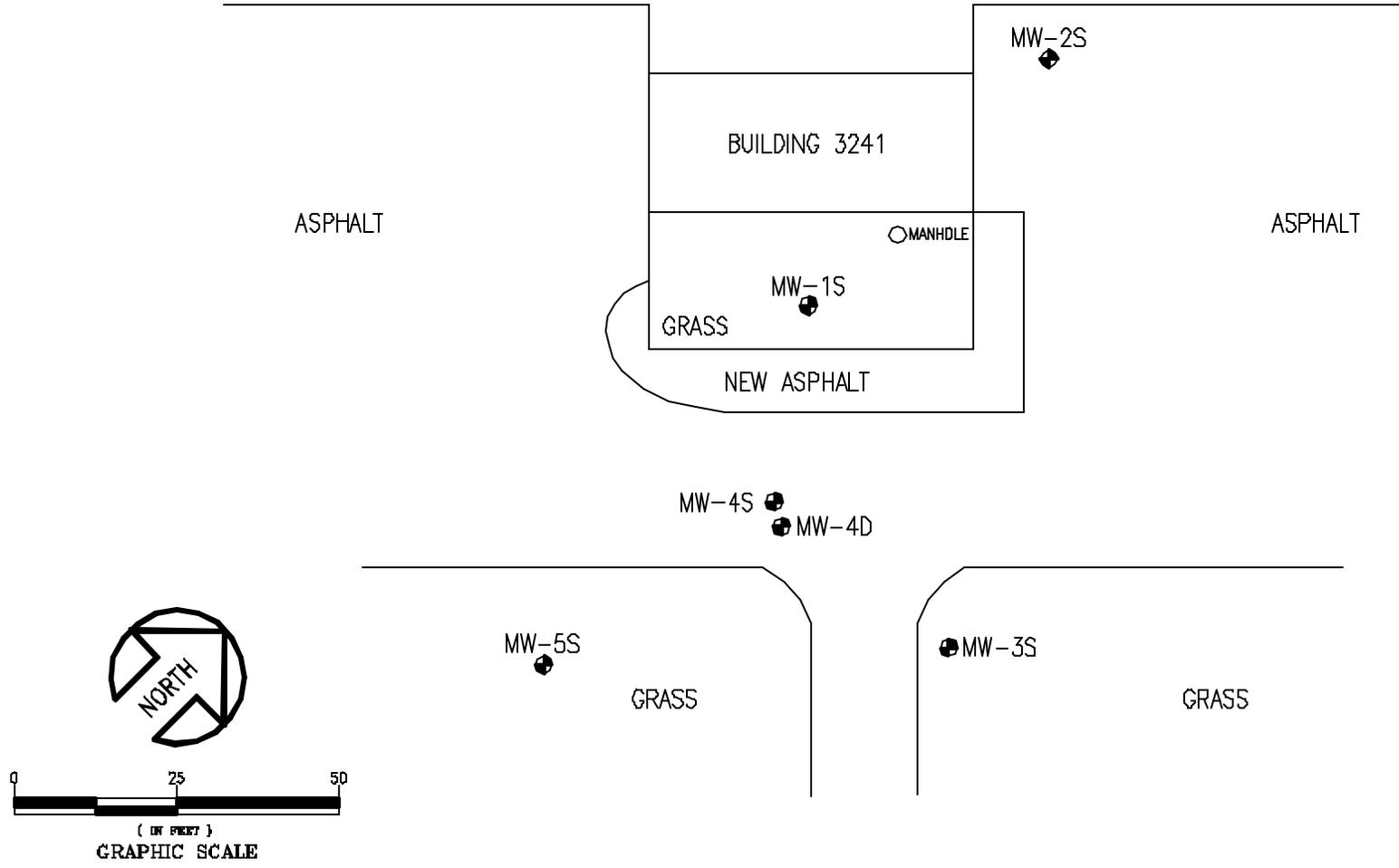
UNDERGROUND STORAGE TANK 19,  
BUILDING 3241  
NAS PENSACOLA, FLORIDA

DRAWN BY: THW

REFERENCE: MAP OF  
PENSACOLA, FLORIDA  
PREPARED BY: THE  
MICROSOFT CORP.

**LEGEND**

● Monitor Well Location



PROJECT # 0404-197-24

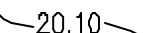
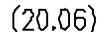
**FIGURE 2 – SITE MAP**

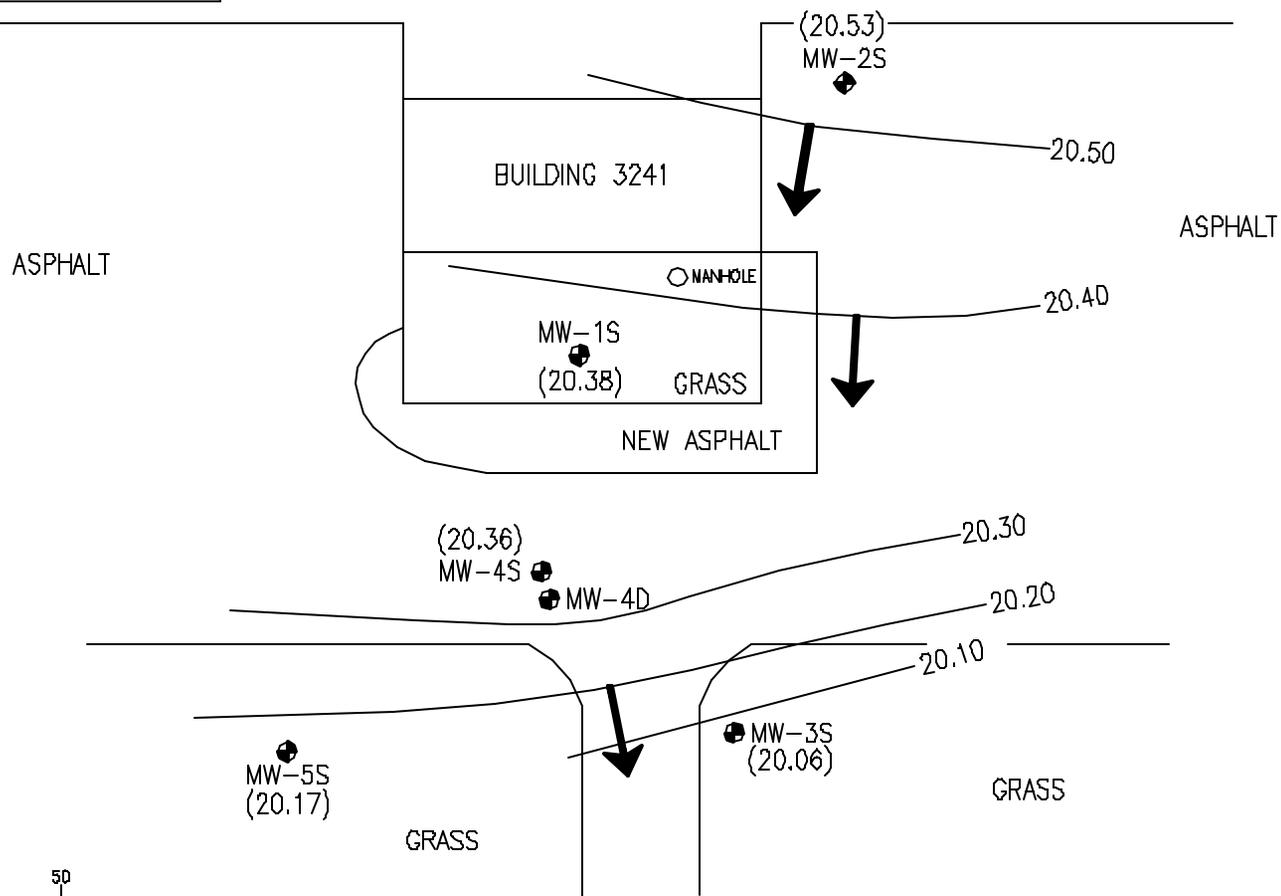
**UNDERGROUND STORAGE TANK 19  
BUILDING 3241  
NAS PENSACOLA, FLORIDA**

**DRAWN BY: PRF**

**DATE: 12/20/04**



LEGEND	
	Monitor Well Location
	Groundwater Contour Line (feet)
	Groundwater Elevation (feet)
	Groundwater Flow Direction



PROJECT # 0404-197-24

FIGURE 3 – GROUNDWATER ELEVATION MAP (August 2004)



UNDERGROUND STORAGE TANK 19  
 BUILDING 3241  
 NAS PENSACOLA, FLORIDA

DRAWN BY: PRF

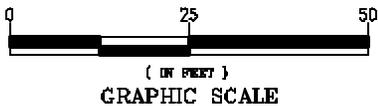
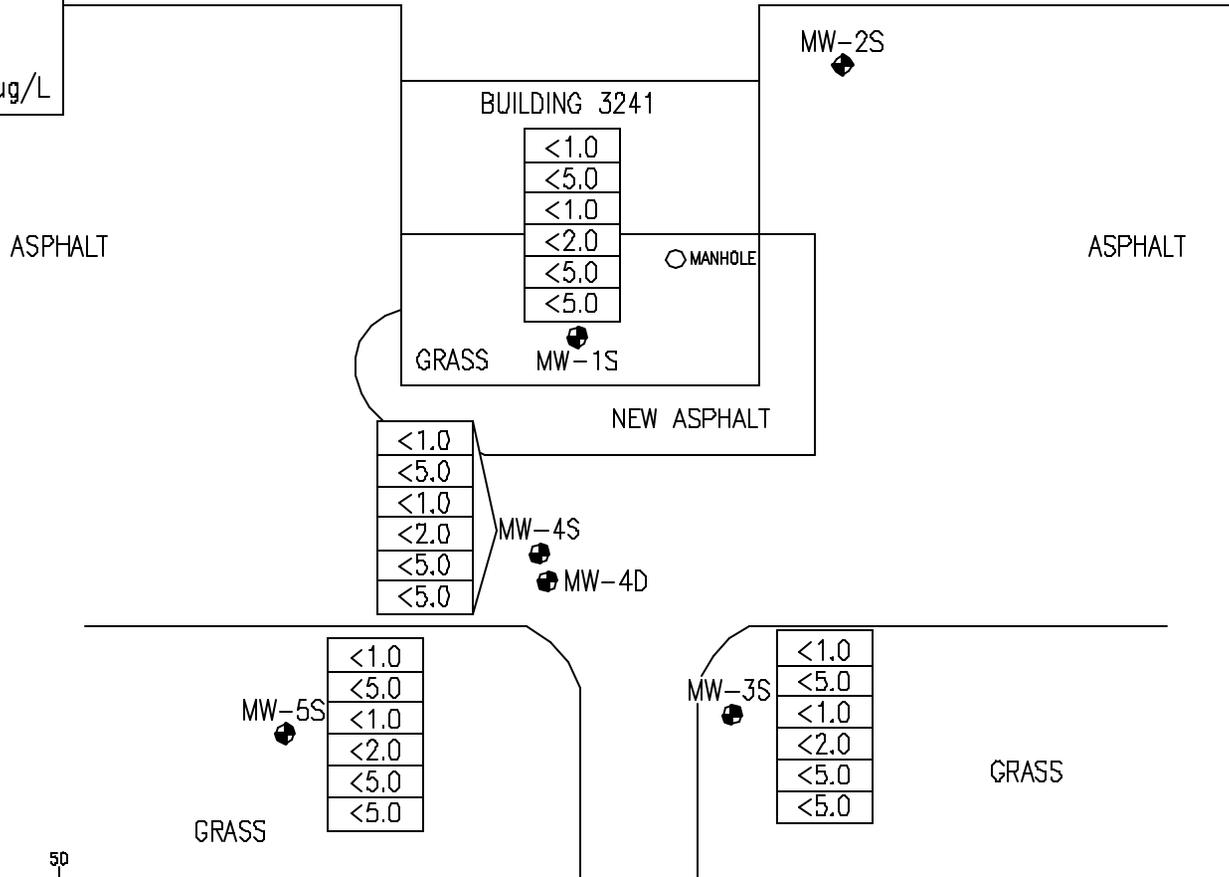
DATE: 12/20/04

**LEGEND**

● Monitor Well Location

<1.0	- Benzene
<5.0	- Toluene
<1.0	- Ethylbenzene
<2.0	- Total Xylenes
<5.0	- MTBE
<5.0	- Naphthalene

\* All concentrations are in ug/L



PROJECT # 0404-197-24

FIGURE 4 - GROUNDWATER VOA CONCENTRATION MAP (August 2004)

UNDERGROUND STORAGE TANK 19  
BUILDING 3241  
NAS PENSACOLA, FLORIDA

DRAWN BY: PRF  
DATE: 12/20/04



## **APPENDIX A**

## State of Florida, Department of Environmental Protection GROUNDWATER SAMPLING LOG

SITE NAME: NAS Pensacola		SITE LOCATION: Site 3241, UST 000019	
WELL NO: MW-15	SAMPLE ID: MW-15	DATE: 08/26/04	

### PURGING DATA

WELL DIAMETER (in): 2	TOTAL WELL DEPTH (ft): 17.06	STATIC DEPTH TO WATER (ft): 9.62	WELL CAPACITY (gal/ft): 0.16								
1 WELL VOLUME (gal) = (TOTAL WELL DEPTH - DEPTH TO WATER) X WELL CAPACITY = $= (17.06 - 9.62) \times 0.16 = 1.2$											
PURGE METHOD: Peristaltic Pump		PURGE INITIATED AT: 1320	PURGE ENDED AT: 1342	TOTAL VOL PURGED (gal): 3.7							
TIME	VOLUME PURGED (gal)	CUMUL. VOLUME PURGED (gal)	PURGE RATE (gpm)	DEPTH TO WATER (ft)	pH	TEMP. (°C)	COND. (µmhos)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR
1329	1.2	1.2	0.13	9.67	4.86	28.9	505	2.0	30.4	clear	None
1336	1.2	2.4	0.17	9.68	4.85	29.0	470	2.0	18.1	clear	None
1341	1.2	3.6	0.24	9.69	4.86	28.8	475	2.0	12.9	clear	None
WELL CAPACITY (Gallons per Foot): 0.75' = 0.02; 1' = 0.04; 1.25' = 0.06; 2' = 0.16; 3' = 0.37; 4' = 0.65; 5' = 1.02; 6' = 1.47; 12' = 5.88											

### SAMPLING DATA

SAMPLED BY (PRINT): Philip R. Foster				SAMPLER(S) SIGNATURE(S): 			
AFFILIATION: AEROSTAR							
SAMPLING METHOD(S): Peristaltic Pump				SAMPLING INITIATED AT: 1345		SAMPLING ENDED AT: 1347	
FIELD DECONTAMINATION: Y <input type="checkbox"/> N <input checked="" type="checkbox"/>		FIELD-FILTERED: Y <input type="checkbox"/> N <input checked="" type="checkbox"/>		DUPLICATE: Y <input type="checkbox"/> N <input checked="" type="checkbox"/>			
SAMPLE CONTAINER SPECIFICATION			SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	
NO.	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOLUME ADDED IN FIELD (mL)	FINAL pH		
2	CG	40mL	HCL	-	-	BTEX + Naphthalene	
REMARKS:							
MATERIAL CODES: AG = AMBER GLASS; CG = CLEAR GLASS; PE = POLYETHYLENE; O = OTHER (SPECIFY)							







## **APPENDIX B**

## Analytical Report

For: Mr. Philip Foster  
Aerostar  
7856 Westside Park Drive  
Mobile, AL 36695  
CC:

Order Number: C408673  
SDG Number:  
Client Project ID:  
Project: NAS PENSACOLA-PENSACOLA, FL (BLDG 3241)  
Report Date: 09/03/2004  
Sampled By: Client  
Sample Received Date: 08/27/2004  
Requisition Number:  
Purchase Order:

Melissa L Pope

Melissa L. Pope, Project Manager  
mpope@stl-inc.com  
09/03/2004

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

## Sample Summary

Order: C408673  
Date Received: 08/27/2004

Client: Aerostar  
Project: NAS PENSACOLA-PENSACOLA, FL (BLDG 3241)

Client Sample ID	Lab Sample ID	Matrix	Date Sampled
MW-1S	C408673*1	Li qui d	08/26/2004 13: 45
MW-3S	C408673*2	Li qui d	08/26/2004 12: 08
MW-4S	C408673*3	Li qui d	08/26/2004 13: 10
MW-5S	C408673*4	Li qui d	08/26/2004 12: 38

Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
08673-1	MW-1S	Li qui d	08/27/04	08/26/04 13: 45	
08673-2	MW-3S	Li qui d	08/27/04	08/26/04 12: 08	
08673-3	MW-4S	Li qui d	08/27/04	08/26/04 13: 10	
08673-4	MW-5S	Li qui d	08/27/04	08/26/04 12: 38	

Parameter	Units	Lab Sample IDs			
		08673-1	08673-2	08673-3	08673-4

Aromatic Volatile Organics (8021B)

Methyl t-butyl ether (MTBE)	ug/l	<5.0	<5.0	<5.0	<5.0
Benzene	ug/l	<1.0	<1.0	<1.0	<1.0
Toluene	ug/l	<5.0	<5.0	<5.0	<5.0
Ethyl benzene	ug/l	<1.0	<1.0	<1.0	<1.0
Xylenes, Total	ug/l	<2.0	<2.0	<2.0	<2.0
Naphthalene	ug/l	<5.0	<5.0	<5.0	<5.0
Surrogate-a, a, a-Tri fluorotoluene (PID) *	%	101 %	101 %	100 %	99 %
Dilution Factor		1	1	1	1
Prep Date		09/02/04	09/02/04	09/02/04	09/02/04
Analysis Date		09/02/04	09/02/04	09/02/04	09/02/04
Batch ID		TRW126A	TRW126A	TRW126A	TRW126A
Prep Method		5030B	5030B	5030B	5030B
Analyst		CP	CP	CP	CP
Quantitation Factor		1	1	1	1

Analytical Data Report

Lab Sample ID	Description	Matrix	Date Received	Date Sampled	SDG#
08673-5	Method Blank	Liquid	08/27/04		
08673-8	Lab Control Standard % Recovery	Liquid	08/27/04		

Parameter	Units	Lab Sample IDs	
		08673-5	08673-8

Aromatic Volatile Organics (8021B)

Methyl t-butyl ether (MTBE)	ug/l	<5.0	90 %
Benzene	ug/l	<1.0	97 %
Toluene	ug/l	<5.0	94 %
Ethyl benzene	ug/l	<1.0	97 %
Xylenes, Total	ug/l	<2.0	96 %
Naphthalene	ug/l	<5.0	87 %
Surrogate-a, a, a-Tri fluorotoluene (PID) *	%	102 %	100 %
Dilution Factor		1	
Prep Date		09/01/04	
Analysis Date		09/01/04	
Batch ID		TRW126A	TRW126A
Prep Method		5030B	
Analyst		CP	
Quantitation Factor		1	

