N65928.AR.000944
NTC ORLANDO
5090.3a

GROUNDWATER SAMPLING AT STUDY AREA 18 WITH TRANSMITTAL LETTER NTC ORLANDO FL
9/22/1999
TETRA TECH

TETRA TECH NUS, INC.
800 Oak Ridge Turn
(423) 483-9900

[redacted]
00258

99-A164

September 22, 1999

Commanding Officer
SOUTHNAVFACENGCOM
ATTN: Ms. Barbara Nwokike, Code 1873
P.O. Box 190010
2155 Eagle Drive
North Charleston, SC 29419-9010

Subject: Groundwater Monitoring Report for Study Area 18
Main Base, NTC, Orlando

Dear Ms. Nwokike:

Enclosed is a report describing the sampling activities performed at Study Area 18 in May 1999. Groundwater elevation contour maps and the results of the sample analyses are presented in the report. As mentioned in the presentation of the preliminary data at the July OPT meeting in Orlando, no VOCs were detected above Florida GCTLs. Iron and aluminum, however, were detected above screening criteria (GCTL and background concentrations).

If you have any questions regarding the report, please contact me at (423) 220-4730.

Sincerely,

Steven B. McCoy

Steven B. McCoy, P.E.
Task Order Manager

SBM:ckf

Enclosure

c: Mr. Wayne Hansel, SOUTHNAVFACENGCOM
Mr. David Grabka, FDEP
Ms. Nancy Rodriguez, USEPA Region IV
Mr. Allan Aikens, CH2M Hill
Mr. Rick Allen, Harding Lawson Associates
File/Edb

GROUNDWATER MONITORING REPORT FOR STUDY AREA 18

CTO Number: 0024

Trip Dates: May 25-26, 1999

Site Name: Study Area 18
McCoy Annex, Naval Training Center Orlando, Florida

TO Manager: Steve McCoy

Field Team: Gary Braganza, Field Team Leader

Prepared by: Renna D. Ayers

1. PURPOSE

Groundwater sampling at Study Area 18 (SA 18) was conducted to:

- Confirm the presence of metals at concentrations above the screening criteria [Florida Groundwater Cleanup Target Levels (GCTLs) and background concentrations] in groundwater
- Confirm the presence of chlorinated solvents above GCTLs in monitoring wells associated with the Building 7182 UST
- Determine the extent of chlorinated solvent contamination in groundwater if detected above GCTLs

The fieldwork was performed in accordance with the *Project Operations Plan for Site Investigations and Remedial Investigations* (POP) prepared by ABB-ES (1997).

2. ACTIVITIES

Tetra Tech NUS, Inc. (Tetra Tech) mobilized to the field on May 25, 1999. The day of May 25 was spent receiving and setting up the equipment and materials required to perform the fieldwork. A total of 7 wells were scheduled for sampling. Groundwater levels were measured in all seven wells at SA 18 on May 25, 1999. Groundwater elevations for this field event and previous events are summarized in Table 1.

Groundwater sampling was conducted on May 26, 1999. All wells were purged using the low-flow method described in the POP. The purpose of the low-flow purging was to reduce turbidity, which could artificially raise the concentrations of the inorganic constituents; and to reduce the volume of purge water required to obtain a representative sample. Purging of the monitoring wells consisted of removing groundwater at a low flow rate using a peristaltic pump. Water levels were monitored every 3 to 5 minutes to ensure that drawdown remained less than 0.3 ft, and field parameters were measured to determine when stabilization was achieved. The groundwater sample log sheets are included in Attachment A.

Groundwater samples from SA 18 were analyzed for volatile organic compounds (VOCs) using SW 846 Method 8260 and Target Analyte List (TAL) inorganics using SW 846 Method 6010. Four wells, OLD-18-01 through OLD-18-04, were analyzed for inorganics and the remaining three wells, MW-1 through MW-3, were analyzed for VOCs based on historical data. All samples were placed in ice-filled coolers and submitted to Accutest Laboratories in Orlando for analysis. The positive analytical detections are presented in Table 2.

3. PROBLEMS ENCOUNTERED

None.

4. RESULTS

Water Level Survey - The groundwater elevation data for SA 18 are summarized in Table 1. The water table configuration at the site is presented in Figure 1. Based on groundwater elevation data for May 25, 1999, groundwater at SA 18 flows to the southeast. In contrast, the groundwater elevation data from September 14, 1995, indicate that groundwater flows to the north.

Data Validation - All sample analyses were subjected to data validation in accordance with the guidance document *Navy Installation Restoration Chemical Data Quality Assurance Manual* (June 1998). Qualification of the data was performed using the *USEPA Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Data Review* (February 1994). The data validation evaluated data completeness, holding time compliance, calibration compliance, laboratory blank contamination, surrogate spike recovery, matrix spike recovery, blank spike recovery, internal standard response, sample quantitation, and detection limits. Qualifiers resulting from the validation process are shown with the analyte concentrations in Tables 2, 3, and 4.

Analytical Results - Table 2 presents a summary of the groundwater analytical detections for SA 18. Cells with bold print indicate concentrations above the GCTLs. Shaded cells with bold print indicate concentrations above the GCTLs and established background concentrations (inorganic analytes only). There were no VOC concentrations above GCTLs. The distribution of inorganic analytes detected above GCTLs and background is shown on Figure 2.

Inorganic analytes aluminum and iron were detected above their respective GCTLs and background concentrations. Aluminum was detected at concentrations above its screening criteria (GCTL = 200 ug/L, background = 4067 ug/L) in two of the four wells (OLD-18-01 and OLD-18-04). Iron was detected above its screening criteria (GCTL = 300 ug/L, background = 1227 ug/L) in all four wells sampled (OLD-18-01 through OLD-18-04).

Historical analytical data are presented for comparison in Table 3 and all validated results are provided in Table 4.

TABLES

No.

1 Water Level Elevations - Study Area 18

2 Summary of Detections in Groundwater - Study Area 18

3 Historical Groundwater Analytical Results – Study Area 18

4 Validated Groundwater Analytical Results – Study Area 18

TABLE 1
WATER LEVEL ELEVATIONS
STUDY AREA 18

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Well	Top of Casing Elevation	5/30/95		9/14/95		6/17/96		7/13/98		8/5/98		05/25/99	
		Depth to Water (BTOC)	Groundwater Elevation (AMSL)	Depth to Water (BTOC)	Groundwater Elevation (AMSL)	Depth to Water (BTOC)	Groundwater Elevation (AMSL)	Depth to Water (BTOC)	Groundwater Elevation (AMSL)	Depth to Water (BTOC)	Groundwater Elevation (AMSL)	Depth to Water (BTOC)	Groundwater Elevation (AMSL)
OLD-18-01	90.79	6.01	84.78	4.81	85.98	4.64	86.15	NM	-	NM	-	5.24	85.55
OLD-18-02	90.59	NM	-	3.03	87.56	NM	-	NM	-	NM	-	5.15	85.44
OLD-18-03	91.24	NM	-	3.60	87.64	NM	-	NM	-	NM	-	6.22	85.02
OLD-18-04	90.11	4.11	86.00	2.61	87.50	NM	-	NM	-	NM	-	4.50	85.61
MW-1	95.02*	not installed		not installed		not installed		4.43	90.59*	4.36	90.66*	5.65	89.37*
MW-2	94.81*	not installed		not installed		not installed		4.26	90.55*	4.20	90.61*	5.30	89.51*
MW-3	95.38*	not installed		not installed		not installed		4.77	90.61*	4.70	90.68*	5.09	90.29*

BTOC - Below top of casing
AMSL - Above mean sea level
NM - not measured
* = Top of Casing relative to an arbitrary datum. Not comparable to the elevations for the other monitoring wells.

TABLE 2
SUMMARY OF DETECTIONS IN GROUNDWATER
STUDY AREA 18

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Sample ID	GCTL (a)	NTC	NTC18G00110	NTC18G00210	NTC18G00310	NTC18G00410	NTC18G00410-dup
Lab ID	CRITERIA	BACKGROUND	F4206-4	F4206-5	F4206-6	F4206-7	F4206-8
Sample Date	ug/L	SCREENING	5/26/99	5/26/99	5/26/99	5/26/99	5/26/99
Volatile Organics (ug/L)			NA	NA	NA	NA	NA
CIS-1,2-DICHLOROETHENE	70						2.3
TETRACHLOROETHYLENE	3						0.74 J
TRICHLOROETHYLENE	3						
Inorganics (ug/L)							
ALUMINUM	200	4067	**5160**	**1050**	**683**	**4840**	**5270**
ALUMINUM (dissolved)	200	4067	**4990**	**572**	**272**	**3850**	**5450**
ARSENIC	50	5	3.4	24.6		6.6	4.2
ARSENIC (dissolved)	50	5	4	18		6.9	
BARIUM	2000	31.4	82.8	70.8	27.1	164	87
BARIUM (dissolved)	2000	31.4	84.3	67	25.4	158	86.3
CALCIUM	--	36830	9800	6480	18500	7660	10400
CALCIUM (dissolved)	--	36830	10300	6310	18000	7850	10600
CHROMIUM	100	7.8	20.8			25.6	21.9
CHROMIUM (dissolved)	100	7.8	21.5			21.9	23.6
COPPER	1000	5.4				7.1	
IRON	300	1227	**6010**	**3990**	**4990**	**10500**	**6320**
IRON (dissolved)	300	1227	**6120**	**3650**	**4590**	**10200**	**6380**
MAGNESIUM	--	4560	3110	2170	3580	3990	3280
MAGNESIUM (dissolved)	--	4560	3230	2100	3470	3970	3300
MANGANESE	50	17	37.8	10.4	14.3	22.9	39.8
MANGANESE (dissolved)	50	17	40.9	14.5	14.6	27	41.1
MERCURY	2	0.12		0.28			
POTASSIUM	--	5400	5780	797	1020	4310	5940
POTASSIUM (dissolved)	--	5400	5770	759	940	4630	5740
SODIUM	160000	18222	14400	6300	8120	25500	15200
SODIUM (dissolved)	160000	18222	15000	6020	7730	25600	15100
VANADIUM	49	20.6	20.4		24.2	20.9	22
VANADIUM (dissolved)	49	20.6	22.2		19.8	19.4	23.6
ZINC	5000	4					37.4
ZINC (dissolved)	5000	4	38.4				

GCTL - Groundwater Cleanup Target Level
J - Estimated concentration
NA - Not analyzed
(a) GCTL from Development of Soil Cleanup Target Levels (SCTLs) for Chapter 62-785, F.A.C. (1998)
Bold only - Exceeds GCTL but below background concentrations
Bold and shaded - Exceeds GCTL and the background concentration
Blank cell - Indicates analyte not detected.

TABLE 2
SUMMARY OF DETECTIONS IN GROUNDWATER
STUDY AREA 18

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Sample ID	GCTL (a)	NTC	NTC18GMW110	NTC18GMW210	NTC18GMW310
Lab ID	CRITERIA	BACKGROUND	F4206-1	F4206-2	F4206-3
Sample Date	ug/L	SCREENING	5/26/99	5/26/99	5/26/99
Volatile Organics (ug/L)					
CIS-1,2-DICHLOROETHENE	70			2.7	
TETRACHLOROETHYLENE	3			0.81 J	
TRICHLOROETHYLENE	3			0.44 J	0.71 J
Inorganics (ug/L)			NA	NA	NA
ALUMINUM	200	4067			
ALUMINUM (dissolved)	200	4067			
ARSENIC	50	5			
ARSENIC (dissolved)	50	5			
BARIUM	2000	31.4			
BARIUM (dissolved)	2000	31.4			
CALCIUM	--	36830			
CALCIUM (dissolved)	--	36830			
CHROMIUM	100	7.8			
CHROMIUM (dissolved)	100	7.8			
COPPER	1000	5.4			
IRON	300	1227			
IRON (dissolved)	300	1227			
MAGNESIUM	--	4560			
MAGNESIUM (dissolved)	--	4560			
MANGANESE	50	17			
MANGANESE (dissolved)	50	17			
MERCURY	2	0.12			
POTASSIUM	--	5400			
POTASSIUM (dissolved)	--	5400			
SODIUM	160000	18222			
SODIUM (dissolved)	160000	18222			
VANADIUM	49	20.6			
VANADIUM (dissolved)	49	20.6			
ZINC	5000	4			
ZINC (dissolved)	5000	4			

GCTL - Groundwater Cleanup Target Level
J - Estimated concentration
NA - Not analyzed
(a) GCTL from Development of Soil Cleanup Target Levels (SCTLs) for Chapter 62-785, F.A.C. (1998)
Bold only - Exceeds GCTL but below background concentrations
Bold and shaded - Exceeds GCTL and the background concentration
Blank cell - Indicates analyte not detected.

TABLE 3
HISTORICAL GROUNDWATER DETECTIONS
STUDY AREA 18

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Sample ID	GCTL (a)	NTC	18G00101	18G00102	NTC18G00110	18G00201	NTC18G00210	18G00301	NTC18G00310	18G00401	NTC18G00410	NTC18G00410-	081GM101	NTC18GMW110
Lab ID	CRITERIA	BACKGROUND	G7705002	MB169003	F4206-4	G7607007	F4206-5	G7607008	F4206-6	G7607009	F4206-7	F4206-7	S884722-3	F4206-1
Sample Date	(µg/L)	SCREENING	5/30/95	6/17/96	5/26/99	5/18/95	5/26/99	5/18/95	5/26/99	5/18/95	5/26/99	5/26/99	8/5/98	5/25/99
Volatile Organics (µg/L)			NA	NA	NA		NA		NA		NA			
CIS-1,2-DICHLOROETHENE	70											2.3		
CIS/TRANS-1,2-DICHLOROETHENE	63												24	
METHYLENE CHLORIDE	5											0.74 J		
TETRACHLOROETHENE	3													
TRICHLOROETHENE	3													
XYLENE (TOTAL)	20					0.3J				1				
Semivolatile Organics (µg/L)				NA	NA		NA		NA		NA			NA
ACENAPHTHENE	210					2J							1.1 X	
BIS(2-ETHYLHEXYL)PHTHALATE	6					1				2				
1-METHYLNAPHTHALENE	20												4.5	
2-METHYLNAPHTHALENE	20												4.6	
NAPHTHALENE	20					12							5.4	
PHENANTHRENE	210												0.35	
Inorganics (µg/L)													NA	NA
ALUMINUM	200	4067	65600	5620	5160	21900	1050	14100	683	7360	4840	5270		
ALUMINUM (dissolved)	200	4067		5530 J	4890		572		272		3850	5450		
ARSENIC	50	5	14.6 J	3 BJ	3.4	33.4	24.6			6.2 J	6.6	4.2		
ARSENIC (dissolved)	50	5		3.3 BJ	4		18				6.9			
BARIUM	2000	31.4	590 J	71.1 B	82.8	159 B	70.8	74.4 B	27.1	208	164	87		
BARIUM (dissolved)	2000	31.4		66.7 B	84.3		67		25.4		158	86.3		
BERYLLIUM	4		3.6 B	0.57 B		0.36 B		0.32 B		1.5 B				
BERYLLIUM (dissolved)	4			0.48 B										
CADMIUM	5			3.8 B										
CALCIUM	--	36830	14300	7760	9800	6490	6480	1660 B	18500	5130	7660	10400		
CALCIUM (dissolved)	--	36830		7790	10300		6310		18000		7850	10600		
CHROMIUM	100	7.8	95.6	21.8	20.8	27.5				27.8	25.6	21.9		
CHROMIUM (dissolved)	100	7.8		20.1	21.5						21.9	23.6		
COBALT	420		8.3 J	3 B		3.4 B		3.3 B		3.6 B				
COBALT (dissolved)	420													
COPPER	1000	5.4	27.6	11.8 B		4.8 B					7.1			
COPPER (dissolved)	1000	5.4												
IRON	300	1227	23400	5410	6010	4500	3990	4630	4950	13400	10500	6320		
IRON (dissolved)	300	1227		5250	6120		3650		4590		10200	6380		
LEAD	15	4	54.6			12		3.9		5.1				
LEAD (dissolved)	15	4												
MAGNESIUM	--	4560	9950	3020 B	3110	2370 B	2170	2760 B	3580	5610	3990	3260		
MAGNESIUM (dissolved)	--	4560		3000 B	3230		2100		3470		3970	3300		
MANGANESE	50	17	53.5	27.6	37.8	20.3	10.4	14.8 B	14.3	19.6	22.9	39.8		
MANGANESE (dissolved)	50	17		27.5	40.9		14.5		14.6		27	41.1		
MERCURY	2	0.12	0.68	0.12 B			0.28							
MERCURY (dissolved)	2	0.12		0.09 B										
NICKEL	100		76	13.8 B										
NICKEL (dissolved)	100			10.6 B										
POTASSIUM	--	5400	7190	9470	5780	1200 B	797	1060 B	1020	3040 B	4310	5940		
POTASSIUM (dissolved)	--	5400		9680	5770		759		940		4630	5740		
SELENIUM	50	9.7	8.5											
SELENIUM (dissolved)	50	9.7												
SODIUM	160000		30000	31700 J	14400	10000	6300	9620	8120	28900	25500	15200		
SODIUM (dissolved)	160000			32000 J	15000		6020		7730		25600	15100		
THALLIUM	2	3.8	79.4 J											
VANADIUM	49	20.6	211	19.8 B	20.4	22.4 B		18.1 B	24.2	38.4 B	20.9	22		
VANADIUM (dissolved)	49	20.6		17.7 B	22.2				19.8		19.4	23.6		
ZINC	5000	4	20.1									37.4		
ZINC (dissolved)	5000	4			38.4									

(Footn[illegible] the last page of table)

TABLE 3
HISTORICAL GROUNDWATER DETECTIONS
STUDY AREA 18

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

Sample ID Lab ID Sample Date	GCTL (a) CRITERIA (µg/L)	NTC BACKGROUND SCREENING	081GM201 S884722-4 8/5/98	NTC18GMW210 F4206-2 5/25/99	081GM301 S884722-5 8/5/98	NTC18GMW310 F4206-3 5/25/99
Volatile Organics (µg/L)						
CIS-1,2-DICHLOROETHENE	70			2.7		
CIS/TRANS-1,2-DICHLOROETHENE	63		49			
METHYLENE CHLORIDE	5		24		28	
TETRACHLOROETHENE	3			0.81 J	4.9	
TRICHLOROETHENE	3			0.44 J		0.71 J
XYLENE (TOTAL)	20					
Semivolatile Organics (µg/L)				NA		NA
ACENAPHTHENE	210					
BIS(2-ETHYLHEXYL)PHTHALATE	6					
1-METHYLNAPHTHALENE	20					
2-METHYLNAPHTHALENE	20					
NAPHTHALENE	20		1.6			
PHENANTHRENE	210					
Inorganics (µg/L)			NA	NA	NA	NA
ALUMINUM	200	4067				
ALUMINUM (dissolved)	200	4067				
ARSENIC	50	5				
ARSENIC (dissolved)	50	5				
BARIUM	2000	31.4				
BARIUM (dissolved)	2000	31.4				
BERYLLIUM	4					
BERYLLIUM (dissolved)	4					
CADMIUM	5					
CALCIUM	--	36830				
CALCIUM (dissolved)	--	36830				
CHROMIUM	100	7.8				
CHROMIUM (dissolved)	100	7.8				
COBALT	420					
COBALT (dissolved)	420					
COPPER	1000	5.4				
COPPER (dissolved)	1000	5.4				
IRON	300	1227				
IRON (dissolved)	300	1227				
LEAD	15	4				
LEAD (dissolved)	15	4				
MAGNESIUM	--	4560				
MAGNESIUM (dissolved)	--	4560				
MANGANESE	50	17				
MANGANESE (dissolved)	50	17				
MERCURY	2	0.12				
MERCURY (dissolved)	2	0.12				
NICKEL	100					
NICKEL (dissolved)	100					
POTASSIUM	--	5400				
POTASSIUM (dissolved)	--	5400				
SELENIUM	50	9.7				
SELENIUM (dissolved)	50	9.7				
SODIUM	160000					
SODIUM (dissolved)	160000					
THALLIUM	2	3.8				
VANADIUM	49	20.6				
VANADIUM (dissolved)	49	20.6				
ZINC	5000	4				
ZINC (dissolved)	5000	4				

(Footnotes on the last page of table)

TABLE 3
HISTORICAL GROUNDWATER DETECTIONS
STUDY AREA 18

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

(a) GCTL from Development of Soil Cleanup Target Levels (SCTLs) for Chapter 62-785, F.A.C. (1998)
B - Concentration between instrument detection limit and reporting limit
GCTL - Groundwater Cleanup Target Level
J - Estimated concentration
NA - Not analyzed
X - Less than 40% relative percent difference, lower value reported
Blank cell - Indicates analyte not detected
Bold and shaded cell - Detected concentration exceeds GCTL & the background concentration (inorganics only)
Shaded cell - Detected concentration exceeds GCTL

TABLE 4
VALIDATED GROUNDWATER RESULTS
STUDY AREA 18

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

SAMPLE ID	NTC18G00110	NTC18G00210	NTC18G00310	NTC18G00410	NTC18G00410-D	NTC18GMW110	NTC18GMW210	NTC18GMW310
LAB ID	F4206-4	F4206-5	F4206-6	F4206-7	F4206-8	F4206-1	F4206-2	F4206-3
SAMPLE DATE	5/26/99	5/26/99	5/26/99	5/26/99	5/26/99	5/25/99	5/25/99	5/25/99
VOLATILE ORGANICS (µg/L)								
1,1,1-TRICHLOROETHANE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
1,1,2,2-TETRACHLOROETHANE	N/A	N/A	N/A	N/A	1 U	1 U	1 U	1 U
1,1,2-TRICHLOROETHANE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
1,1-DICHLOROETHANE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
1,1-DICHLOROETHENE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
1,2-DICHLOROETHANE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
1,2-DICHLOROPROPANE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
2-BUTANONE	N/A	N/A	N/A	N/A	10 UR	10 UR	10 UR	10 UR
2-HEXANONE	N/A	N/A	N/A	N/A	10 U	10 U	10 U	10 U
4-METHYL-2-PENTANONE	N/A	N/A	N/A	N/A	10 U	10 U	10 U	10 U
ACETONE	N/A	N/A	N/A	N/A	50 UR	50 UR	50 UR	50 UR
BENZENE	N/A	N/A	N/A	N/A	1 U	1 U	1 U	1 U
BROMODICHLOROMETHANE	N/A	N/A	N/A	N/A	1 U	1 U	1 U	1 U
BROMOFORM	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
BROMOMETHANE	N/A	N/A	N/A	N/A	5 U	5 U	5 U	5 U
CARBON DISULFIDE	N/A	N/A	N/A	N/A	10 U	10 U	10 U	10 U
CARBON TETRACHLORIDE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
CHLOROBENZENE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
CHLOROETHANE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
CHLOROFORM	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
CHLOROMETHANE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
CIS-1,2-DICHLOROETHENE	N/A	N/A	N/A	N/A	2.3	2 U	2.7	2 U
CIS-1,3-DICHLOROPROPENE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
DIBROMOCHLOROMETHANE	N/A	N/A	N/A	N/A	1 U	1 U	1 U	1 U
ETHYLBENZENE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
METHYLENE CHLORIDE	N/A	N/A	N/A	N/A	5 U	5 U	5 U	5 U
STYRENE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
TETRACHLOROETHENE	N/A	N/A	N/A	N/A	0.74 J	2 U	0.81 J	2 U
TOLUENE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U

U - Non-detect (associated value is the detection limit)
J - Estimated concentration
R - Rejected
NA - Not analyzed

TABLE 4
VALIDATED GROUNDWATER RESULTS
STUDY AREA 18

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

SAMPLE ID	NTC18G00110	NTC18G00210	NTC18G00310	NTC18G00410	NTC18G00410-D	NTC18GMW110	NTC18GMW210	NTC18GMW310
LAB ID	F4206-4	F4206-5	F4206-6	F4206-7	F4206-8	F4206-1	F4206-2	F4206-3
SAMPLE DATE	5/26/99	5/26/99	5/26/99	5/26/99	5/26/99	5/25/99	5/25/99	5/25/99
VOLATILE ORGANICS (µg/L) (Continued)								
TRANS-1,2-DICHLOROETHENE	N/A	N/A	N/A	N/A	2 U	2 U	2 U	2 U
TRANS-1,3-DICHLOROPROPENE	N/A	N/A	N/A	N/A	1 U	1 U	1 U	1 U
TRICHLOROETHENE	N/A	N/A	N/A	N/A	2 U	2 U	0.44 J	0.71 J
VINYL CHLORIDE	N/A	N/A	N/A	N/A	1 U	1 U	1 U	1 U
XYLENES, TOTAL	N/A	N/A	N/A	N/A	6 U	6 U	6 U	6 U
METALS (µg/L)								
ALUMINUM	5160	1050	683	4840	5270	N/A	N/A	N/A
ALUMINUM (DISSOLVED)	4990	572	272	3850	5450	N/A	N/A	N/A
ANTIMONY	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	N/A	N/A	N/A
ANTIMONY (DISSOLVED)	2.4 U	2.4 U	2.4 U	2.4 U	2.4 U	N/A	N/A	N/A
ARSENIC	3.4	24.6	3.4 U	6.6	4.2	N/A	N/A	N/A
ARSENIC (DISSOLVED)	4	18	3.4 U	6.9	3.4 U	N/A	N/A	N/A
BARIUM	82.8	70.8	27.1	164	87	N/A	N/A	N/A
BARIUM (DISSOLVED)	84.3	67	25.4	158	86.3	N/A	N/A	N/A
BERYLLIUM	2.6 U	1.6 U	1.4 U	4 U	3 U	N/A	N/A	N/A
BERYLLIUM (DISSOLVED)	3 U	2 U	1.8 U	3.9 U	3.6 U	N/A	N/A	N/A
CADMIUM	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	N/A	N/A	N/A
CADMIUM (DISSOLVED)	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	N/A	N/A	N/A
CALCIUM	9800	6480	18500	7660	10400	N/A	N/A	N/A
CALCIUM (DISSOLVED)	10300	6310	18000	7850	10600	N/A	N/A	N/A
CHROMIUM	20.8	3.6 U	3 U	25.6	21.9	N/A	N/A	N/A
CHROMIUM (DISSOLVED)	21.5	3 U	2.6 U	21.9	23.6	N/A	N/A	N/A
COBALT	1.5 U	1.5 U	0.89 U	2.8 U	1.8 U	N/A	N/A	N/A
COBALT (DISSOLVED)	2 U	2.3 U	2.2 U	4.9 U	1.7 U	N/A	N/A	N/A
COPPER	0.75 U	0.75 U	0.75 U	7.1	0.75 U	N/A	N/A	N/A
COPPER (DISSOLVED)	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	N/A	N/A	N/A
IRON	6010	3990	4990	10500	6320	N/A	N/A	N/A
IRON (DISSOLVED)	6120	3650	4590	10200	6380	N/A	N/A	N/A
LEAD	4.6 U	1.6 U	2.4 U	7.7 U	3.2 U	N/A	N/A	N/A
LEAD (DISSOLVED)	4.6 U	1.6 U	1.6 U	4.5 U	4.9 U	N/A	N/A	N/A

U - Non-detect (associated value is the detection limit)
J - Estimated concentration
R - Rejected
NA - Not analyzed

TABLE 4
VALIDATED GROUNDWATER RESULTS
STUDY AREA 18

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

SAMPLE ID	NTC18G00110	NTC18G00210	NTC18G00310	NTC18G00410	NTC18G00410-D	NTC18GMW110	NTC18GMW210	NTC18GMW310
LAB ID	F4206-4	F4206-5	F4206-6	F4206-7	F4206-8	F4206-1	F4206-2	F4206-3
SAMPLE DATE	5/26/99	5/26/99	5/26/99	5/26/99	5/26/99	5/25/99	5/25/99	5/25/99
METALS (µg/L) (Continued)								
LEAD	4.6 U	1.6 U	2.4 U	7.7 U	3.2 U	N/A	N/A	N/A
LEAD (DISSOLVED)	4.6 U	1.6 U	1.6 U	4.5 U	4.9 U	N/A	N/A	N/A
MAGNESIUM	3110	2170	3580	3990	3280	N/A	N/A	N/A
MAGNESIUM (DISSOLVED)	3230	2100	3470	3970	3300	N/A	N/A	N/A
MANGANESE	37.8	10.4	14.3	22.9	39.8	N/A	N/A	N/A
MANGANESE (DISSOLVED)	40.9	14.5	14.6	27	41.1	N/A	N/A	N/A
MERCURY	0.25 U	0.28	0.25 U	0.25 U	0.25 U	N/A	N/A	N/A
MERCURY (DISSOLVED)	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	N/A	N/A	N/A
NICKEL	7.6 U	1.8 U	1.4 U	12.9 U	8.6 U	N/A	N/A	N/A
NICKEL (DISSOLVED)	8.2 U	1.9 U	1.5 U	10.7 U	8.2 U	N/A	N/A	N/A
POTASSIUM	5780	797	1020	4310	5940	N/A	N/A	N/A
POTASSIUM (DISSOLVED)	5770	759	940	4630	5740	N/A	N/A	N/A
SELENIUM	4 U	2 U	2 U	4.4 U	2.3 U	N/A	N/A	N/A
SELENIUM (DISSOLVED)	3 U	2 U	2 U	2.9 U	3.4 U	N/A	N/A	N/A
SILVER	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	N/A	N/A	N/A
SILVER (DISSOLVED)	0.96 U	0.96 U	0.96 U	0.96 U	0.96 U	N/A	N/A	N/A
SODIUM	14400	6300	8120	25500	15200	N/A	N/A	N/A
SODIUM (DISSOLVED)	15000	6020	7730	25600	15100	N/A	N/A	N/A
THALLIUM	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	N/A	N/A	N/A
THALLIUM (DISSOLVED)	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	N/A	N/A	N/A
VANADIUM	20.4	3.4 U	24.2	20.9	22	N/A	N/A	N/A
VANADIUM (DISSOLVED)	22.2	2.9 U	19.8	19.4	23.6	N/A	N/A	N/A
ZINC	29.6 U	23.4 U	28 U	28.9 U	37.4	N/A	N/A	N/A
ZINC (DISSOLVED)	38.4	31 U	33.6 U	26.5 U	35.3 U	N/A	N/A	N/A

U - Non-detect (associated value is the detection limit)
J - Estimated concentration
R - Rejected
NA - Not analyzed

FIGURES

No.

1 Groundwater Elevation Map on May 25, 1999 - Study Area 18

2 Inorganic Concentrations Above Groundwater Screening Criteria for May 25, 1999 - Study Area 18

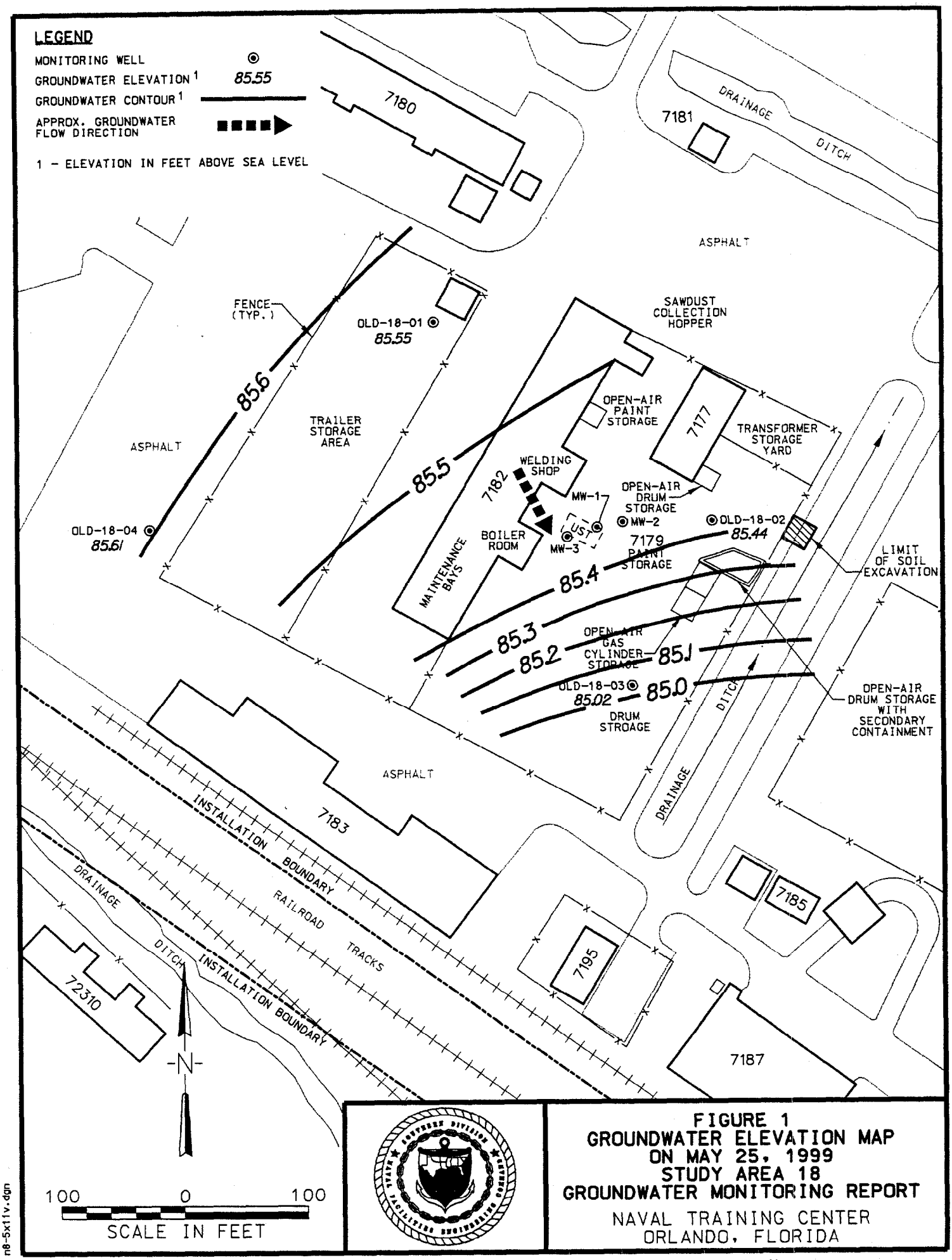

FIGURE 1
GROUNDWATER ELEVATION MAP
ON MAY 25, 1999
STUDY AREA 18
GROUNDWATER MONITORING REPORT

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

n8-5x11v.dgn

CAD FILE NO./DATE: 7457M014.dgn/9-1-99

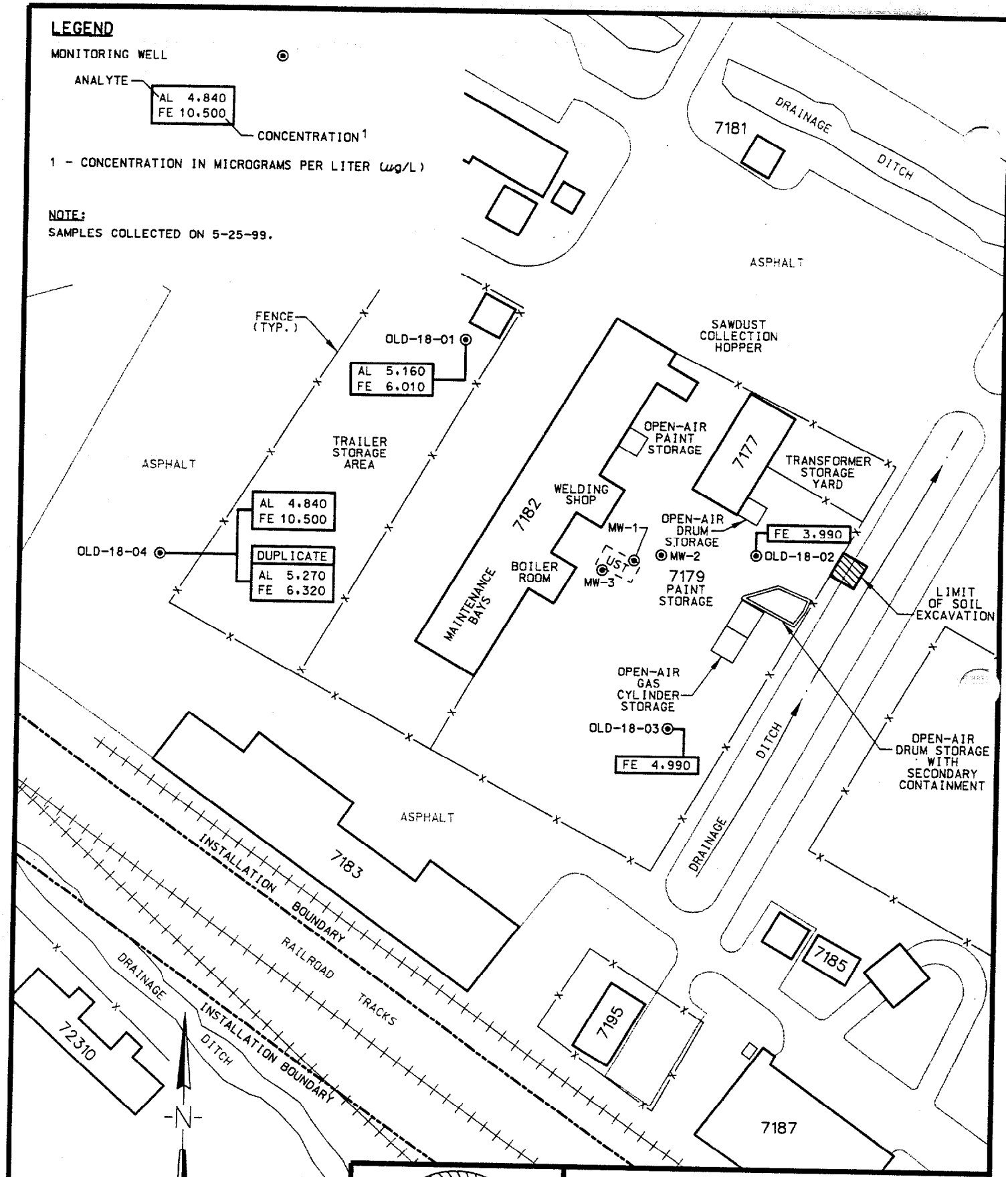

FIGURE 2
INORGANIC CONCENTRATIONS ABOVE GROUNDWATER SCREENING CRITERIA
STUDY AREA 18
GROUNDWATER MONITORING REPORT

NAVAL TRAINING CENTER
ORLANDO, FLORIDA

n8-5x11v.dgn

CAD FILE NO./DATE: 7457M015.dgn/9-17-99

ATTACHMENT A

GROUNDWATER SAMPLE LOG SHEETS

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Orlando NTC
Project No.: 7457

[ ] Domestic Well Data
[✓] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: NTCG18MW11C
Sample Location: MW1
Sampled By: ~~Gary Burg~~
C.O.C. No.:
Type of Sample:
[ ] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 5/25/99	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time: 17:00										
Method:										

PURGE DATA

Date: 5/25/99	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity			
Method:	Initial	6.5	0.343	27.4	191	0.58				
Monitor Reading (ppm): 0 ppm	1	6.8	0.343	27.4	85	0.61				
Well Casing Diameter: 2"	2	6.8	0.362	27.4	42	0.72				
Well Casing Material: PVC	3	6.5	0.385	27.3	19	0.90				
Total Well Depth (TD): 11.60		6.5	0.385	27.3	9	0.90				
Static Water Level (WL): 5.65		6.5	0.385	27.3	9	0.90				
One Casing Volume(gal/L): 0.95		6.5	0.385	27.3	9	0.90				
Start Purge (hrs):										
End Purge (hrs):										
Total Purge Time (min):										
Total Vol. Purged (gal/L): 5.00										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Orlando NTC
Project No.: 7457

[ ] Domestic Well Data
[✓] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: NTC18GMW210
Sample Location: MW2
Sampled By: [illegible]
C.O.C. No.:
Type of Sample:
[ ] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 5/25	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time: 18:15										
Method:										

PURGE DATA

Date: 5/25/99	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity			
Method:	Initial	7.1	0.343	28.1	452	1.40				
Monitor Reading (ppm): 0 ppm	1	7.3	0.335	28.1	131	1.60				
Well Casing Diameter: 2"	2	7.3	0.342	28.3	181	0.91				
Well Casing Material: PVC	3	7.2	0.341	28.2	26	1.39				
Total Well Depth (TD): 11.45		7.2	0.348	28.1	9	1.39				
Static Water Level (WL): 5.30		7.2	0.348	28.3	6	1.37				
One Casing Volume(gal/L): 0.98		7.2	0.348	28.1	6	1.38				
Start Purge (hrs):										
End Purge (hrs):										
Total Purge Time (min):										
Total Vol. Purged (gal/L): 5.00										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Orlando NTC
Project No.: 7457

[ ] Domestic Well Data
[✓] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: NTC18GMW31
Sample Location: MW-3
Sampled By: Gary Bergman
C.O.C. No.:
Type of Sample:
[ ] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 5/25/99	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time: 19:20										
Method:										

PURGE DATA

Date: 5/25/99	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity			
Method: Peristaltic pump	Initial	6.8	0.324	28.4	>1000	1.77				
Monitor Reading (ppm): 0ppm	1	6.5	0.324	28.8	154	1.86				
Well Casing Diameter: 2"	2	6.7	0.324	28.8	67	0.75				
Well Casing Material: PVC	3	6.9	0.328	28.5	17	1.83				
Total Well Depth (TD): 11.40		6.9	0.328	28.5	8	1.72				
Static Water Level (WL): 5.09		6.9	0.328	28.5	8	1.72				
One Casing Volume(gal/L): 1.00		6.9	0.328	28.6	7	1.72				
Start Purge (hrs):										
End Purge (hrs):										
Total Purge Time (min):										
Total Vol. Purged (gal/L): 6.5gal										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Gary Bergman

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Orlando NTC
Project No.: 7457

[ ] Domestic Well Data
[✓] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: NTC18G-00110
Sample Location: ~~OLD-18-02~~ OLD-18-01
Sampled By: GB
C.O.C. No.:
Type of Sample:
[ ] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 5/26/99	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time: 9:45										
Method: Peristaltic										

PURGE DATA

Date: 5/26/99	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity			
Method:	Initial	7.10	0.50	27.3	921	1.01				
Monitor Reading (ppm): 0 ppm	1	7.12	0.99	27.9	189	1.31				
Well Casing Diameter: PVC	2	7.12	0.96	27.5	135	1.90				
Well Casing Material: 2"	3	7.12	0.99	27.4	77	2.29				
Total Well Depth (TD):		7.11	0.99	27.4	58	2.78				
Static Water Level (WL):		7.11	0.10	27.4	33	2.74				
One Casing Volume(gal/L):		7.10	0.10	27.4	25	2.74				
Start Purge (hrs):		7.10	0.10	27.5	25	2.74				
End Purge (hrs):		7.09	0.11	27.5	26	2.73				
Total Purge Time (min):		7.09	0.10	27.5	25	2.73				
Total Vol. Purged (gal/L):										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle If Applicable:
MS/MSD
Duplicate ID No.:

Signature(s):

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Orlando NTC
Project No.: 7457

[ ] Domestic Well Data
[ ] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: NTCG180021
Sample Location: ~~MW-2~~ OLD-
Sampled By: Gary Bugnyar
C.O.C. No.:
Type of Sample:
[ ] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 5/26/99	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time: 15:30										
Method:										

PURGE DATA

Date: 5/26	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity			
Method:	Initial	6.98	0.243	31.6	488	1.45				
Monitor Reading (ppm): 0 ppm	1	7.14	0.243	31.3	115	2.75				
Well Casing Diameter: 2"	2	7.16	0.242	32.3	184	2.31				
Well Casing Material: PVC	3	7.15	0.258	32.5	19	2.33				
Total Well Depth (TD): 12.40		7.15	0.255	32.5	8	2.33				
Static Water Level (WL): 5.15		7.15	0.255	32.6	7	2.33				
One Casing Volume(gal/L): 1.16		7.15	0.255	32.6	8	2.33				
Start Purge (hrs):										
End Purge (hrs):										
Total Purge Time (min):										
Total Vol. Purged (gal/L): ~5 gal										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Orlando NTC
Project No.: 7457

[ ] Domestic Well Data
[✓] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: NTC18G00310
Sample Location: OLD-18-03
Sampled By: BB
C.O.C. No.:
Type of Sample:
[ ] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 5/26/99	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time:										
Method:										

PURGE DATA

Date: 5/26/99	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity			
Method: Peristaltic pump	Initial	7.07	0.153	28.6	156	1.30				
Monitor Reading (ppm): 0 ppm	1	7.15	0.152	28.4	40	1.97				
Well Casing Diameter: 2"	2	7.10	0.152	28.4	32	2.37				
Well Casing Material: PVC	3	7.11	0.152	28.5	30	2.40				
Total Well Depth (TD): 11.72		7.10	0.152	28.5	30	2.42				
Static Water Level (WL): 6.22		7.12	0.152	28.5	26	2.42				
One Casing Volume(gal/L): 0.08		7.10	0.152	28.5	25	2.43				
Start Purge (hrs):		7.10	0.152	28.5	26	2.42				
End Purge (hrs):										
Total Purge Time (min):										
Total Vol. Purged (gal/L): ≈5 gal										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle if Applicable:

MS/MSD	Duplicate ID No.:	Signature(s):

GROUNDWATER SAMPLE LOG SHEET

Project Site Name: Orlando NTC
Project No.: 7457

[ ] Domestic Well Data
[ ] Monitoring Well Data
[ ] Other Well Type:
[ ] QA Sample Type:

Sample ID No.: NTCG1800410
Sample Location: ~~[illegible]~~ OLD-1
Sampled By: Gary [illegible]
C.O.C. No.:
Type of Sample:
[ ] Low Concentration
[ ] High Concentration

SAMPLING DATA

Date: 5/26	Color	pH	S.C. mS/cm	Temp. °C	Turbidity NTU	DO (mg/L) Meter	DO (mg/L) Titration	CO_2	H_2S	Fe +2
Time: 17:40										
Method:	orange rust color									

PURGE DATA

Date: 5/26	Volume	pH	S.C.	Temp (°C)	Turbidity	DO	Salinity			
Method: Peristaltic	Initial	7.08	0.270	29.3	35	1.69				
Monitor Reading (ppm): 0ppm	1	7.09	0.266	29.1	24	1.67				
Well Casing Diameter: 2"	2	7.11	0.263	28.6	18	1.72				
Well Casing Material: PVC	3	7.12	0.263	28.5	11	1.71				
Total Well Depth (TD): 12.80		7.12	0.262	28.2	8	1.70				
Static Water Level (WL): 4.50		7.12	0.262	28.2	8	1.70				
One Casing Volume(gal/L): 1.32		7.12	0.262	28.2	8	1.70				
Start Purge (hrs):										
End Purge (hrs):										
Total Purge Time (min):										
Total Vol. Purged (gal/L): ≈ 5.5										

SAMPLE COLLECTION INFORMATION

Analysis	Preservative	Container Requirements	Collected

OBSERVATIONS / NOTES

Circle if Applicable:		Signature(s):
MS/MSD	Duplicate ID No.:	