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DRAFT RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION
REPORT VOLUME 4 OF 12 SECTIONS 10.6 TO 10.7 ZONE L CNC CHARLESTON SC
12/18/1998
ENSAFE INC.

**DRAFT ZONE L
RCRA FACILITY INVESTIGATION REPORT
CHARLESTON NAVAL COMPLEX**

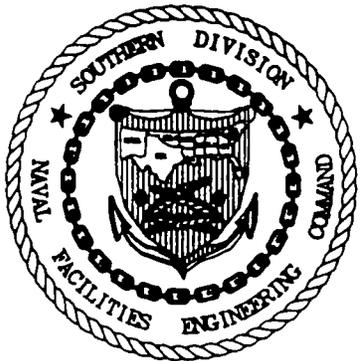


**VOLUME 4 OF 12
SECTIONS 10.6 TO 10.7**

**CTO-029
CONTRACT NO: N62467-89-D-0318**

Prepared for:

**Department of the Navy
Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina**



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December 18, 1998

10.6 Subzone F

The boundaries of Subzone F for the Zone L RFI are the existing areas investigated in the Zone F RFI. Data from the environmental samples collected during the Zone E investigation have been compared to data collected for the Zone L investigation. The sampling locations from Zone F are presented in Figures 10.6.1 and 10.6.2.

10.6.1 Subzone F, SWMU 37

Zone L sampling in Subzone F, SWMU 37, consisted of 63 groundwater and 48 soil samples collected using DPT methods and analyzed for VOCs, metals, and cyanide. The sampling locations are presented in Figures 10.6.3 through 10.6.8.

10.6.1.1 Nature of Contamination in Subzone F, SWMU 37, DPT Soil

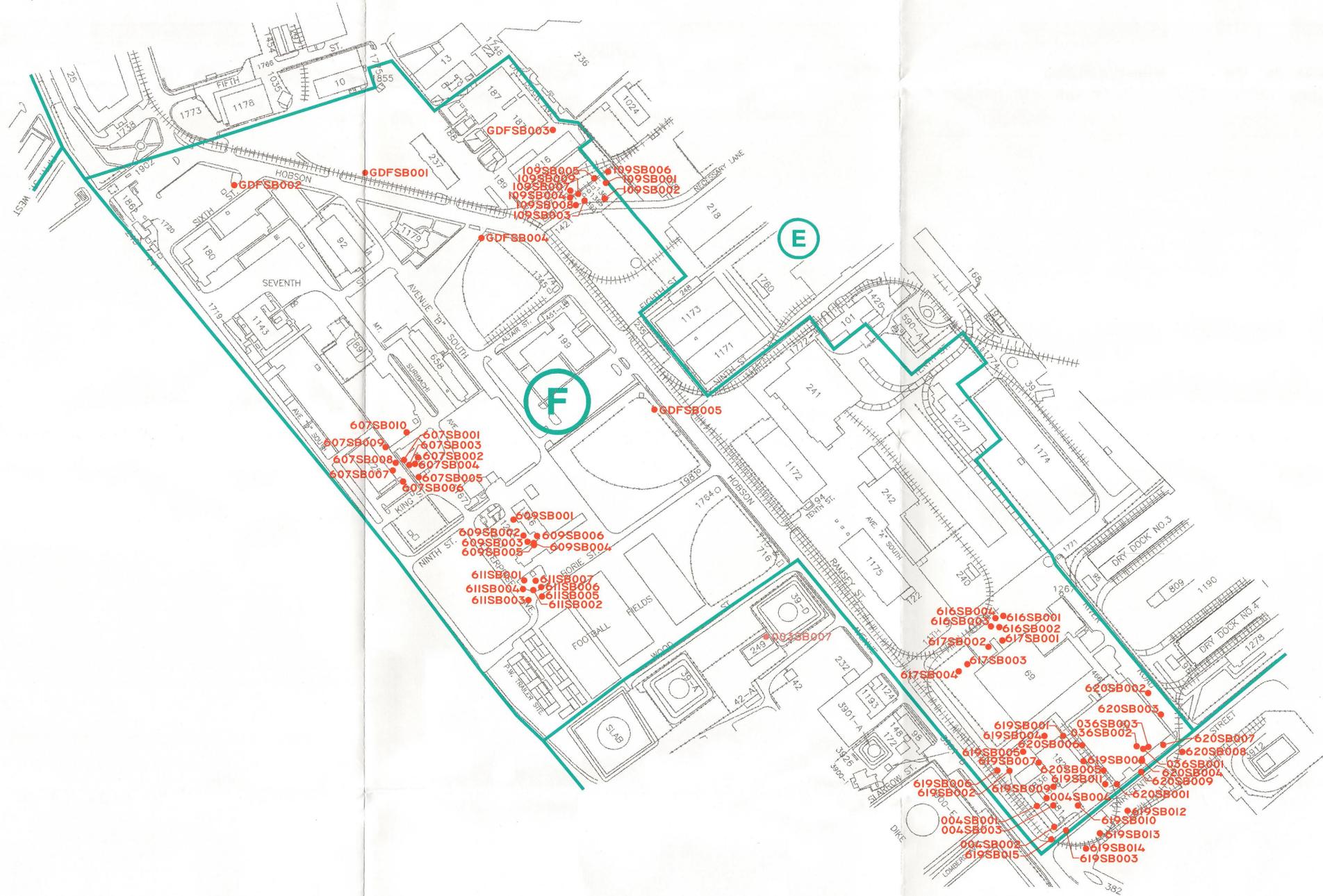
VOCs analytical results from DPT collection are summarized in Table 10.6.1. Inorganic analytical results are summarized in Table 10.6.2. Appendix C contains the complete data report for all samples collected in Subzone F, Zone L.

Volatile Organic Compounds Detected in DPT Soil

Four VOCs were detected in DPT soil samples. None exceeded the RBC or SSL values.

Metals/Cyanide Detected in DPT Soil

As summarized in Table 10.6.2, aluminum (22/48), arsenic (43/48), barium (1/48), chromium (1/48), iron (45/48), manganese (11/48), thallium (2/48), and vanadium (1/48) exceeded the RBC values. Chromium (2/48) also exceeded the SSL value. The locations that exceed the RBC or SSL values are presented in Figure 10.6.3.



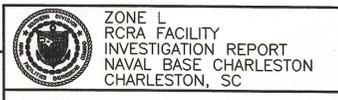
LEGEND:

- 609SB002. SOIL BORING W/ ID NUMBER
- F STUDY ZONE BOUNDARY WITH LETTER DESIGNATION

NOTE:
 SAMPLES FROM ADJACENT ZONES SHOWN FOR REFERENCE IN LIGHTER COLOR



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FIGURE 10.6.1
 ZONE F SOIL BORING LOCATIONS

Dr by: W. FAULK	Tr by: —	Sheet 1
Ck by: C. VERNOY	Appr by: T. HAVERKOST	Of 1
Date: 11/24/98	DWG Name: 2912C070	



LEGEND:

- 037GP023 DPT GROUNDWATER SAMPLE W/ ID NUMBER
- 037SP033 DPT SOIL SAMPLE W/ ID NUMBER
- SANITARY SEWER MANHOLE
- SANITARY SEWER LINE
- STUDY ZONE BOUNDARY WITH LETTER DESIGNATION

NOTE:
SAMPLES FROM ADJACENT ZONES SHOWN FOR REFERENCE
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FIGURE 10.6.3
SWMU 37 (SANITARY SEWER SYSTEM)
SAMPLING LOCATIONS
SUBZONE F

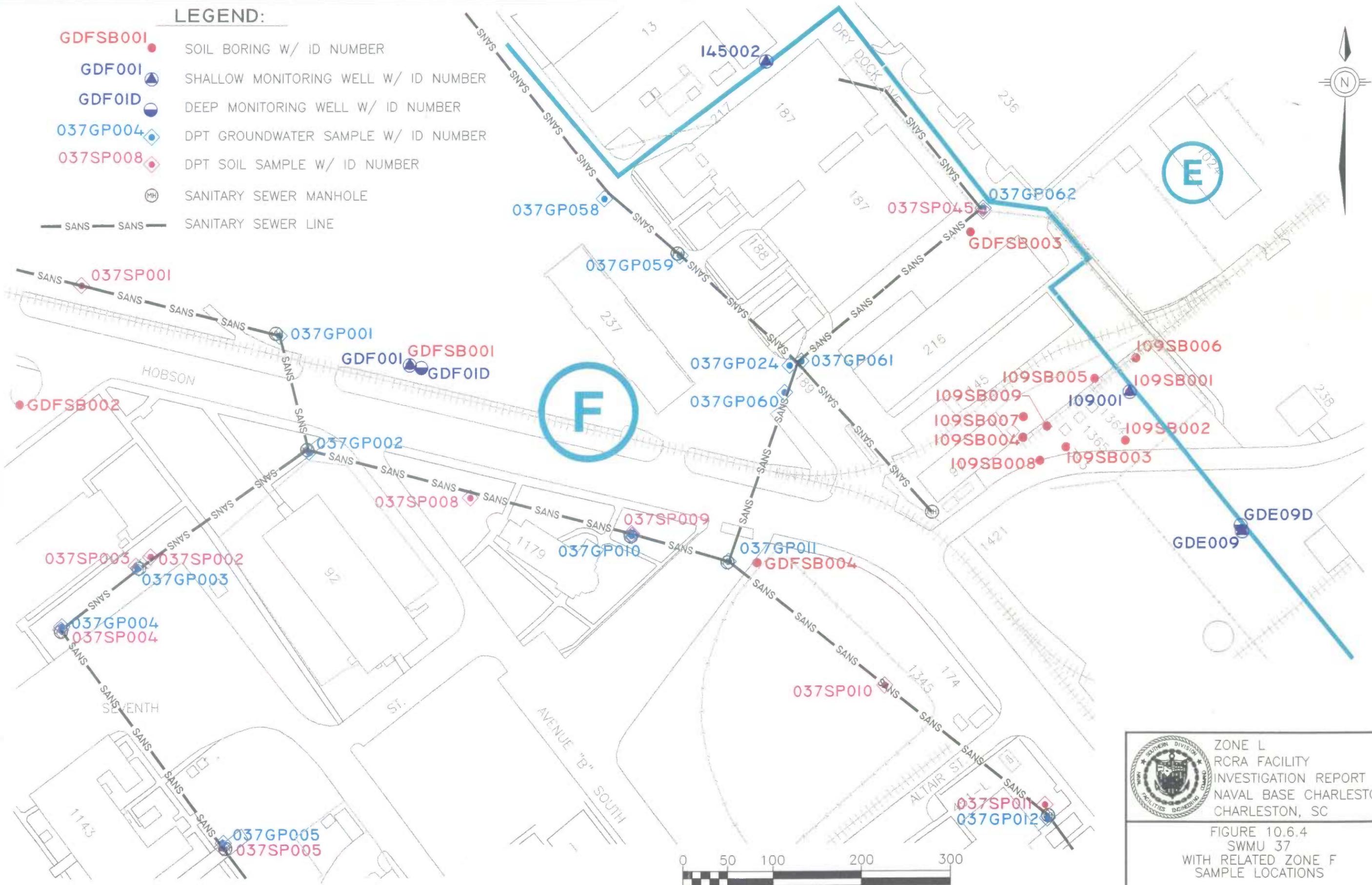
Dr by: W. FAULK	Tr by: -	Sheet 1
Ck by: C. VERNY	Appr by: T. HAVERKOST	Of 1
Date: 11/24/98	DWG Name: 2912C072	

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LEGEND:

- **GDFSB001** SOIL BORING W/ ID NUMBER
- ▲ **GDF001** SHALLOW MONITORING WELL W/ ID NUMBER
- **GDF01D** DEEP MONITORING WELL W/ ID NUMBER
- ◆ **037GP004** DPT GROUNDWATER SAMPLE W/ ID NUMBER
- ◆ **037SP008** DPT SOIL SAMPLE W/ ID NUMBER
- MH SANITARY SEWER MANHOLE
- SANS SANITARY SEWER LINE

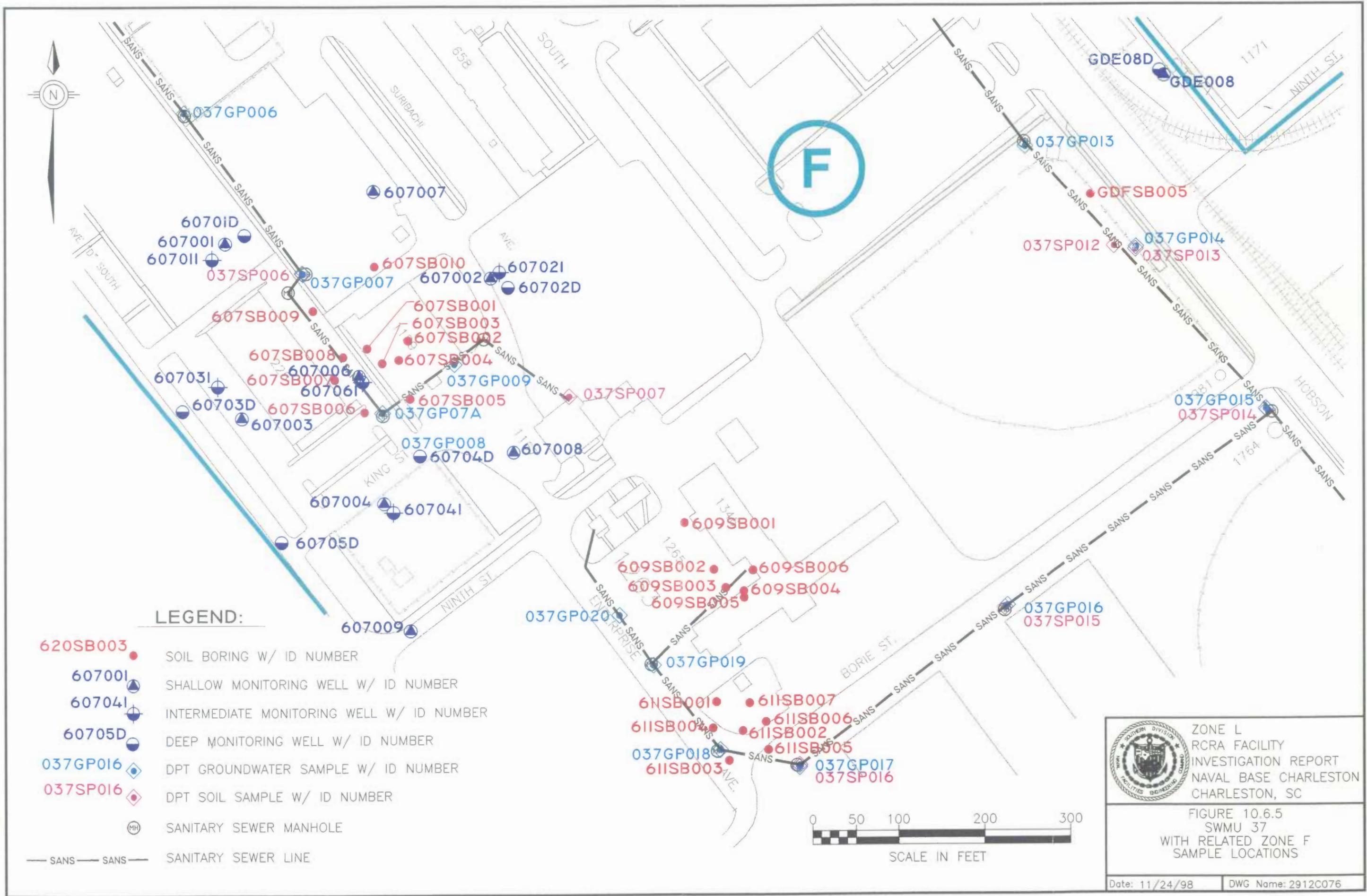




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FIGURE 10.6.4
SWMU 37
WITH RELATED ZONE F
SAMPLE LOCATIONS

Date: 11/24/98 DWG Name: 2912C075



LEGEND:

- 620SB003 ● SOIL BORING W/ ID NUMBER
- 607001 ▲ SHALLOW MONITORING WELL W/ ID NUMBER
- 607041 ⊕ INTERMEDIATE MONITORING WELL W/ ID NUMBER
- 60705D ● DEEP MONITORING WELL W/ ID NUMBER
- 037GP016 ◆ DPT GROUNDWATER SAMPLE W/ ID NUMBER
- 037SP016 ◆ DPT SOIL SAMPLE W/ ID NUMBER
- Ⓜ SANITARY SEWER MANHOLE
- SANS — SANITARY SEWER LINE





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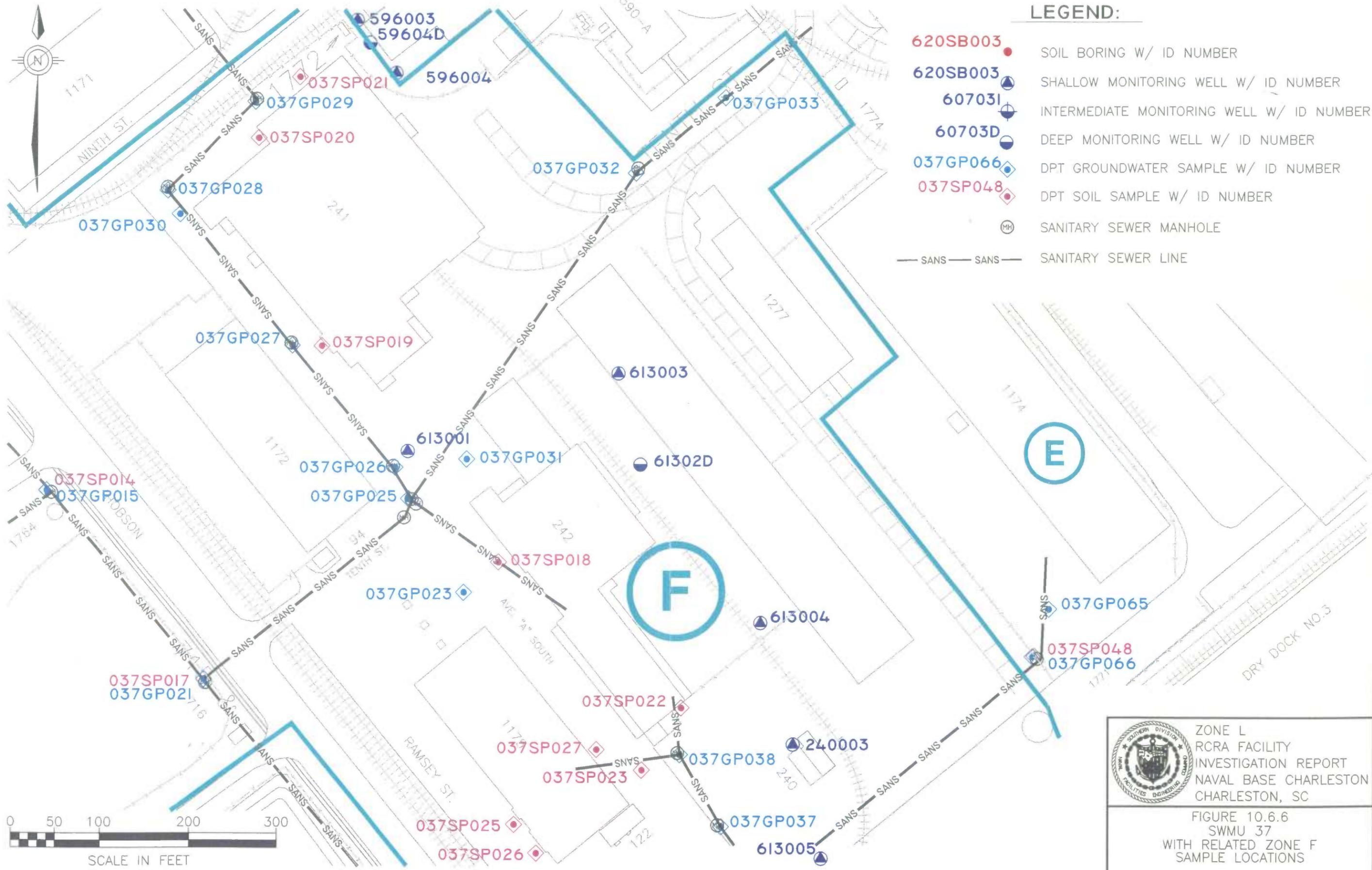
FIGURE 10.6.5
 SWMU 37
 WITH RELATED ZONE F
 SAMPLE LOCATIONS

Date: 11/24/98 DWG Name: 2912C076

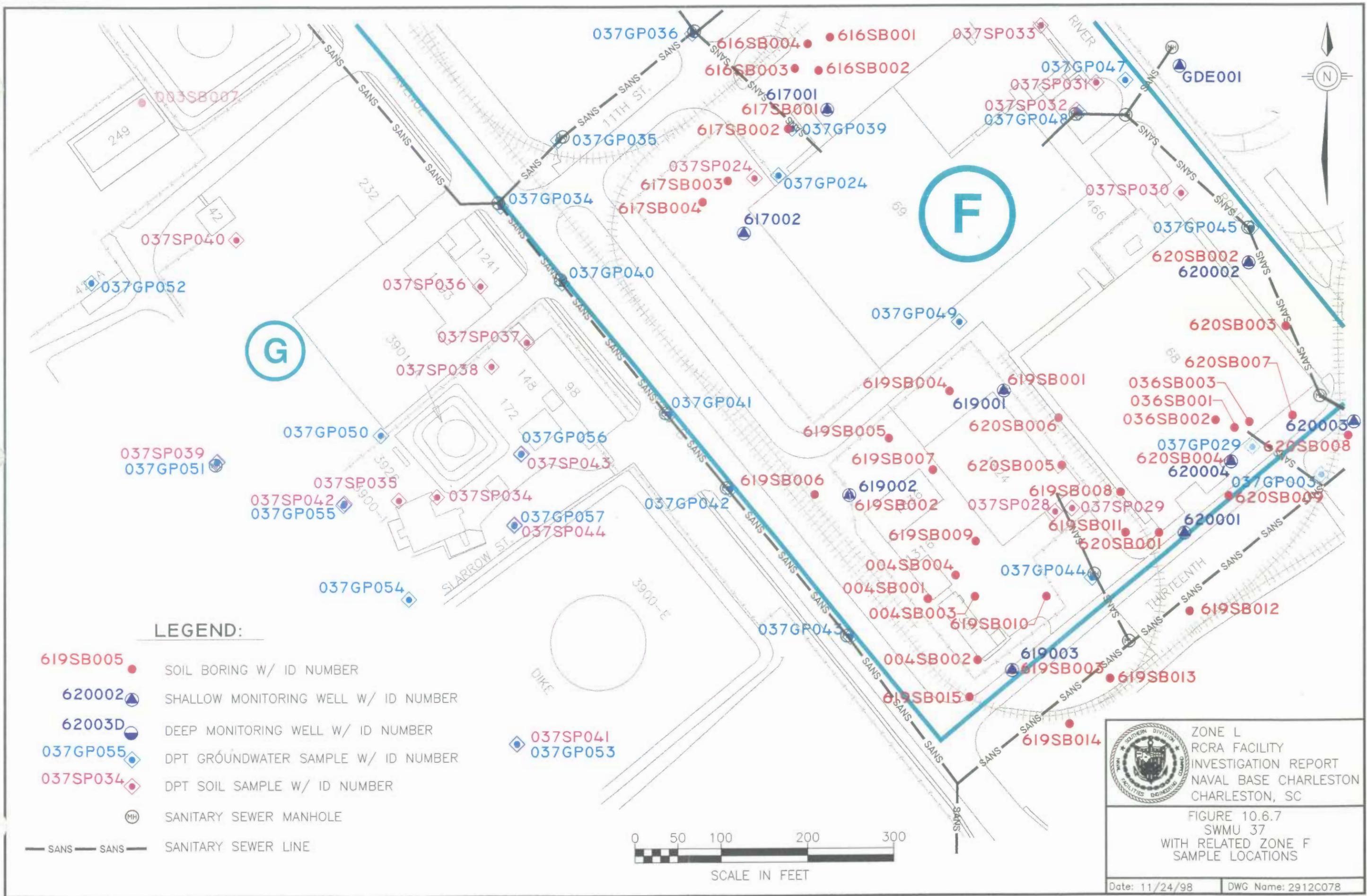


LEGEND:

- 620SB003 ● SOIL BORING W/ ID NUMBER
- 620SB003 ▲ SHALLOW MONITORING WELL W/ ID NUMBER
- 60703I ⊕ INTERMEDIATE MONITORING WELL W/ ID NUMBER
- 60703D ⊕ DEEP MONITORING WELL W/ ID NUMBER
- 037GP066 ◆ DPT GROUNDWATER SAMPLE W/ ID NUMBER
- 037SP048 ◆ DPT SOIL SAMPLE W/ ID NUMBER
- Ⓜ SANITARY SEWER MANHOLE
- SANS — SANITARY SEWER LINE




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 FIGURE 10.6.6
 SWMU 37
 WITH RELATED ZONE F
 SAMPLE LOCATIONS
 Date: 11/24/98 DWG Name: 2912C077



LEGEND:

- 619SB005 ● SOIL BORING W/ ID NUMBER
- 620002 ▲ SHALLOW MONITORING WELL W/ ID NUMBER
- 62003D ● DEEP MONITORING WELL W/ ID NUMBER
- 037GP055 ◆ DPT GROUNDWATER SAMPLE W/ ID NUMBER
- 037SP034 ◆ DPT SOIL SAMPLE W/ ID NUMBER
- Ⓜ SANITARY SEWER MANHOLE
- SANS — SANITARY SEWER LINE




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FIGURE 10.6.7
 SWMU 37
 WITH RELATED ZONE F
 SAMPLE LOCATIONS

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Table 10.6.1
SWMU 37, Zone L, Subzone F
Organic Compounds Detected in DPT Soil

Compound	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Volatile Organic Compounds (µg/kg)							
2-Butanone (MEK)	7/48	6.78-78.7	35.7	4700000	0	7800 c	NO
Acetone	22/48	5.15-3545	272.2	780000	0	16000	NO
Carbon disulfide	4/48	6.10-19.7	11.3	780000	0	32000	NO
Tetrachloroethene	8/48	4.31-31.6	11.2	12000	0	60	NO

Notes:

- µg/kg = Micrograms per kilogram
- RBC = Risk-based concentration
- GW = Groundwater
- SSL = Soil screening level
- c = Calculated SSL
- Soil to GW = Generic SSLs based on DAF = 20, adapted from *USEPA Soil Screening Guidance: Technical Background Document*, May 1996 (first preference), or calculated using values from Table 6.2 in Zone F RFI Report

Table 10.6.2
SWMU 37, Zone L, Subzone F
Inorganic Detections for DPT Soil

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Reference Conc.	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Inorganic Elements (mg/kg)								
Cyanide (CN)	4/48	0.310-0.770	0.478	160	0.29	0	40	NO
Aluminum (Al)	48/48	1740-23800	8565	7800	18500	22	1000000 c	NO
Arsenic (As)	43/48	1.51-35.9	8.98	0.430	19.9	43	29	YES
Barium (Ba)	48/48	4.02-618	39.3	550	61.5	1	1600	NO
Beryllium (Be)	41/48	0.210-1.41	0.524	16	1.05	0	63	NO
Cadmium (Cd)	4/48	0.360-0.850	0.583	7.80	0.26	0	8	NO
Calcium (Ca)	48/48	388-120000	19516	NA	NA	NA	NA	NO
Chromium (Cr)	48/48	1.77-40.3	16.6	39.0	34.8	1	38	YES
Cobalt (Co)	44/48	0.600-7.96	2.34	470	15.1	0	2000 c	NO
Copper (Cu)	44/48	1.64-114	18.3	310	48.2	0	11200 c	NO

Table 10.6.2
SWMU 37, Zone L, Subzone F
Inorganic Detections for DPT Soil

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Reference Conc.	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Iron (Fe)	48/48	464-32000	10734	2300	NA	45	NA	NO
Lead (Pb)	48/48	1.95-385	43.2	400	180	0	400	NO
Magnesium (Mg)	48/48	46.2-4650	1363.7	NA	NA	NA	NA	NO
Manganese (Mn)	48/48	2.36-339	100.6	160	307	11	950 c	NO
Mercury (Hg)	32/48	0.040-1.85	0.306	NA	0.62	NA	2	NO
Nickel (Ni)	47/48	0.960-15.5	5.51	160	12.6	0	130	NO
Potassium (K)	47/48	59.7-2420	594.7	NA	NA	NA	NA	NO
Selenium (Se)	23/48	0.590-1.61	0.985	39.0	1.15	0	5	NO
Sodium (Na)	48/48	133-2150	400	NA	NA	NA	NA	NO
Thallium (Tl)	2/48	2.02-2.14	2.08	0.55	ND	2	0.7	YES
Tin (Sn)	3/48	3.39-10.5	6.46	4700	9.38	0	11000 c	NO
Vanadium (V)	48/48	2.01-67.9	21.7	55.0	48.9	1	6000	NO
Zinc (Zn)	48/48	2.48-400	72.9	2300	198	0	12000	NO

Notes:

- mg/kg = Milligrams per kilogram
- RBC = Risk-based concentration
- NA = Not applicable
- ND = Not detected
- GW = Groundwater
- SSL = Soil screening level
- c = Calculated SSL
- Soil to GW = Generic SSLs based on DAF = 20, adapted from *USEPA Soil Screening Guidance: Technical Background Document*, May 1996 (first preference), or calculated using values from Table 6.2 in Zone F RFI Report

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Table 10.6.3
 SWMU 37, Zone L, Subzone F, DPT Soil Sample Locations with
 Inorganics Detections Exceeding RBCs and/or SSLs

Metal	Sample ID	Concentration Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Aluminum	037SP001F1	8520	Y	N	7800	1.0E+06
	037SP002F1	9400	Y	N		
	037SP010F1	9820	Y	N		
	037SP013F1	8110	Y	N		
	037SP014F1	10400	Y	N		
	037SP015F1	9350	Y	N		
	037SP016F1	8470	Y	N		
	037SP020F1	17100	Y	N		
	037SP022F1	16400	Y	N		
	037SP023F1	11700	Y	N		
	037SP025F1	17000	Y	N		
	037SP026F1	23800	Y	N		
	037SP027F1	12600	Y	N		
	037SP028F1	15200	Y	N		
	037SP030F1	8240	Y	N		
	037SP031F1	16100	Y	N		
	037SP032F1	15500	Y	N		
	037SP036F1	7890	Y	N		
	037SP037F1	8500	Y	N		
	037SP041F1	9540	Y	N		
	037SP042F1	8610	Y	N		
	037SP044F1	14000	Y	N		

Table 10.6.3
SWMU 37, Zone L, Subzone F, DPT Soil Sample Locations with
Inorganics Detections Exceeding RBCs and/or SSLs

Metal	Sample ID	Concentration Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Arsenic	037SP001F1	10.6	Y	N	0.43	29
	037SP002F1	3.58	Y	N		
	037SP005F1	5.39	Y	N		
	037SP006F1	2.76	Y	N		
	037SP008F1	3.45	Y	N		
	037SP009F1	7.87	Y	N		
	037SP010F1	1.51	Y	N		
	037SP011F1	1.78	Y	N		
	037SP012F1	2.45	Y	N		
	037SP013F1	5.12	Y	N		
	037SP014F1	12.3	Y	N		
	037SP015F1	7.11	Y	N		
	037SP016F1	6.39	Y	N		
	037SP017F1	6.45	Y	N		
	037SP018F1	1.84	Y	N		
	037SP019F1	3.86	Y	N		
	037SP020F1	10.4	Y	N		
	037SP021F1	4.13	Y	N		
	037SP022F1	4.03	Y	N		
	037SP023F1	15.1	Y	N		
	037SP024F1	1.52	Y	N		
	037SP025F1	17.2	Y	N		
	037SP026F1	27.4	Y	N		
	037SP027F1	7.50	Y	N		
	037SP028F1	10.1	Y	N		
	037SP029F1	17.8	Y	N		
	037SP030F1	14.2	Y	N		
	037SP031F1	15.4	Y	N		
	037SP032F1	33.3	Y	Y		
	037SP033F1	5.61	Y	N		
	037SP034F1	3.72	Y	N		
	037SP035F1	18.0	Y	N		
	037SP036F1	35.9	Y	Y		
	037SP037F1	7.41	Y	N		
	037SP038F1	5.66	Y	N		
	037SP039F1	1.68	Y	N		
	037SP040F1	6.34	Y	N		
	037SP041F1	3.24	Y	N		
	037SP042F1	7.10	Y	N		
	037SP043F1	8.53	Y	N		
037SP044F1	7.25	Y	N			
037SP046F1	9.49	Y	N			
037SP048F1	5.84	Y	N			
Barium	037SP030F1	618	Y	N	550	1600
Chromium	037SP020F1	38.6	N	Y	39	38
	037SP026F1	40.3	Y	Y		

Table 10.6.3
 SWMU 37, Zone L, Subzone F, DPT Soil Sample Locations with
 Inorganics Detections Exceeding RBCs and/or SSLs

Metal	Sample ID	Concentration Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Iron	037SP001F1	21800	Y	N	2300	NA
	037SP002F1	8350	Y	N		
	037SP003F1	2930	Y	N		
	037SP004F1	2860	Y	N		
	037SP005F1	8400	Y	N		
	037SP006F1	3390	Y	N		
	037SP008F1	11800	Y	N		
	037SP009F1	6640	Y	N		
	037SP010F1	5750	Y	N		
	037SP011F1	2390	Y	N		
	037SP012F1	4630	Y	N		
	037SP013F1	7210	Y	N		
	037SP014F1	23200	Y	N		
	037SP015F1	10600	Y	N		
	037SP016F1	11100	Y	N		
	037SP017F1	8410	Y	N		
	037SP018F1	5290	Y	N		
	037SP019F1	5090	Y	N		
	037SP020F1	21700	Y	N		
	037SP021F1	7450	Y	N		
	037SP022F1	14900	Y	N		
	037SP023F1	15700	Y	N		
	037SP024F1	3140	Y	N		
	037SP025F1	22300	Y	N		
	037SP026F1	32000	Y	N		
	037SP027F1	15400	Y	N		
	037SP028F1	20100	Y	N		
	037SP029F1	12400	Y	N		
	037SP030F1	15600	Y	N		
	037SP031F1	17400	Y	N		
	037SP032F1	30400	Y	N		
	037SP033F1	6180	Y	N		
	037SP034F1	5850	Y	N		
	037SP035F1	16800	Y	N		
	037SP036F1	13500	Y	N		
	037SP037F1	7970	Y	N		
	037SP038F1	7770	Y	N		
	037SP039F1	7660	Y	N		
	037SP040F1	9590	Y	N		
	037SP041F1	10300	Y	N		
	037SP042F1	10300	Y	N		
	037SP043F1	6620	Y	N		
	037SP044F1	11900	Y	N		
	037SP046F1	12000	Y	N		
	037SP048F1	7060	Y	N		

Table 10.6.3
SWMU 37, Zone L, Subzone F, DPT Soil Sample Locations with
Inorganics Detections Exceeding RBCs and/or SSLs

Metal	Sample ID	Concentration Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Manganese	037SP020F1	212	Y	N	160	950
	037SP023F1	215	Y	N		
	037SP025F1	251	Y	N		
	037SP026F1	339	Y	N		
	037SP027F1	174	Y	N		
	037SP028F1	207	Y	N		
	037SP030F1	178	Y	N		
	037SP031F1	272	Y	N		
	037SP032F1	298	Y	N		
	037SP036F1	186	Y	N		
	037SP040F1	216	Y	N		
Thallium	037SP001F1	2.02	Y	N	0.55	0.70
	037SP014F1	2.14	Y	N		
Vanadium	037SP026F1	67.9	Y	N	55	6000

Notes:
 mg/kg = Milligrams per kilogram
 RBC = Risk-based concentration
 SSL = Soil screening level

10.6.1.2 Nature of Contamination in Subzone F, SWMU 37, DPT Groundwater

Sixty-three DPT groundwater samples were analyzed for VOCs, metals, and cyanide. Results for detected compounds are shown in Tables 10.6.4 (organics) and 10.6.6 (inorganics).

Volatile Organic Compounds in DPT Groundwater

In the 63 DPT groundwater samples, 15 VOC compounds were detected, ten of which had concentrations exceeding the RBC and/or MCL values. Concentrations exceeding RBC values are 1,1,2-trichloroethane (1/63), 1,1-dichloroethene (1/63), 1,2-dichloroethane (1/63), benzene (2/63), chlorobenzene (1/63), ethylbenzene (2/63), tetrachloroethene (8/63), trichloroethene (4/63), vinyl chloride (3/63), and cis-1,2-dichloroethene (5/63). Compounds exceeding MCL values are 1,1,2-trichloroethane (1/63), 1,2-dichloroethane (1/63), benzene(2/63), tetrachloroethene (8/63), trichlorethene (4/63), vinyl chloride (3/63), and cis-1,2-dichloroethene (2/63). Sampling locations exceeding the RBC and MCL are presented in Table 10.6.5.

Table 10.6.4
SWMU 37, Zone L, Subzone F
Organic Compounds Detected in DPT Groundwater

Compound	Freq of Detection	Range of Detected Conc.	Mean of Detected Conc.	Tap Water RBC	MCL	Number of Samples Exceeding RBC	Salt Wtr. Surf. Wtr. Chronic	Ground-water Migration Concern	Surface Water Migration Concern
Volatiles Compounds ($\mu\text{g/L}$)									
1,1,2-Trichloroethane	1/63	56.2	56.2	0.19	5.00	1	NA	YES	NO
1,1-Dichloroethane	1/63	27.5	27.5	80.0	NA	0	NA	NO	NO
1,1-Dichloroethene	1/63	5.97	5.97	0.044	7.00	1	2240	YES	NO
1,2-Dichloroethane	1/63	25.0	25.0	0.12	5.00	1	1130	YES	NO
Acetone	3/63	5.63-65.8	26.2	370	NA	0	NA	NO	NO
Benzene	2/63	538-951	745	0.36	5.00	2	109	YES	YES
Chlorobenzene	1/63	15.5	15.5	3.50	NA	1	105	YES	NO
Ethylbenzene	5/63	7.05-207	76.7	130	700	2	4.3	YES	YES
Styrene	1/63	5.95	5.95	160	100	0	NA	NO	NO
Tetrachloroethene	8/63	7.31-15100	2058.8	1.10	5.00	8	45	YES	YES
Toluene	2/63	13.9-54.7	34.3	75.0	1000	0	37	NO	YES
Trichloroethene	4/63	24.7-538	288.6	1.60	5.00	4	NA	YES	NO
Vinyl chloride	3/63	17.1-35.6	29.1	0.019	2.00	3	NA	YES	NO
Xylenes (Total)	2/63	46.2-609	327.6	1200	10000	0	NA	NO	NO
cis-1,2-Dichloroethene	5/63	12.9-330	107.8	6.10	70.0	5	NA	YES	NO

Notes:
 $\mu\text{g/L}$ = Micrograms per liter
 RBC = Risk-based concentration
 MCL = Maximum contaminant level
 NA = Not applicable

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Table 10.6.5
SWMU 37, Zone L, Subzone F DPT Groundwater Sample Locations with
VOC Detections Exceeding RBCs and/or MCLs

VOC	Sample ID	Concentration Detected ($\mu\text{g/L}$)	RBC Exceeded (Y/N)	MCL Exceeded (Y/N)	RBC ($\mu\text{g/L}$)	MCL ($\mu\text{g/L}$)
1,1,2-Trichloroethane	037GP017F1	56.2	Y	Y	0.19	5.00
1,1-Dichloroethene	037GP008F1	5.97	Y	N	0.04	7.00
1,2-Dichloroethane	037GP018F1	25.0	Y	Y	0.12	5.00
Benzene	037GP017F1	951	Y	Y	0.36	5.00
	037GP018F1	538	Y	Y		
Chlorobenzene	037GP037F1	15.5	Y	N	3.50	NA
Ethylbenzene	037GP017F1	155	Y	N	130	700
	037GP018F1	207	Y	N		
Tetrachloroethene	037GP006F1	36.7	Y	Y	1.10	5.00
	037GP007F1	567	Y	Y		
	037GP008F1	1.51E+04	Y	Y		
	037GP009F1	570.	Y	Y		
	037GP010F1	60.1	Y	Y		
	037GP011F1	90.9	Y	Y		
	037GP012F1	7.31	Y	Y		
	037GP07AF1	38.3	Y	Y		
Trichloroethene	037GP007F1	513	Y	Y	1.60	5.00
	037GP008F1	538	Y	Y		
	037GP009F1	78.8	Y	Y		
	037GP07AF1	24.7	Y	Y		
Vinyl Chloride	037GP007F1	35.6	Y	Y	0.02	2.00
	037GP008F1	34.5	Y	Y		
	037GP037F1	17.1	Y	Y		
cis-1,2-dichloroethene	037GP007F1	330.	Y	Y	6.10	70.0
	037GP008F1	135	Y	Y		
	037GP009F1	12.9	Y	N		
	037GP037F1	13.3	Y	N		
	037GP07AF1	47.7	Y	N		

Notes:

VOC = Volatile organic compound
 $\mu\text{g/L}$ = Micrograms per liter
 RBC = Risk-based concentration
 MCL = Maximum contaminant limit

Metals/Cyanide Detected in DPT Groundwater

Analytical results for metals and cyanide in DPT groundwater samples are presented in Table 10.6.6. As stated in Section 10.0, inorganic results from DPT groundwater samples were not compared to RBCs or MCLs.

Table 10.6.6
SWMU 37, Zone L, Subzone F
Inorganic Detections for DPT Groundwater

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.
Inorganic Elements (µg/L)			
Cyanide (CN)	2/63	5.10-91.8	48.5
Aluminum (Al)	63/63	1250-448000	88961
Antimony (Sb)	12/63	8.40-25.8	13.4
Arsenic (As)	59/63	11.5-486	95.6
Barium (Ba)	63/63	39.4-3320	420.9
Beryllium (Be)	43/63	2.00-46.1	9.29
Cadmium (Cd)	16/63	3.50-62.0	13.7
Calcium (Ca)	63/63	45000-2500000	390160
Chromium (Cr)	61/63	6.80-2030	262.7
Cobalt (Co)	58/63	5.70-220	52.4
Copper (Cu)	52/63	7.90-9150	235.6
Iron (Fe)	63/63	2050-700000	106321
Lead (Pb)	60/63	5.80-32600	654.1
Magnesium (Mg)	63/63	5510-1150000	124133
Manganese (Mn)	63/63	116-9950	2201
Mercury (Hg)	34/63	0.250-3.20	0.687
Nickel (Ni)	61/63	4.10-274	73.2
Potassium (K)	63/63	3800-264000	36796
Selenium (Se)	33/63	5.20-55.8	14.9
Silver (Ag)	1/63	8.70	8.70
Sodium (Na)	63/63	14700-8410000	1057448

Table 10.6.6
SWMU 37, Zone L, Subzone F
Inorganic Detections for DPT Groundwater

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.
Thallium (Tl)	8/63	10.1-26.4	15.6
Tin (Sn)	1/63	653	653
Vanadium (V)	60/63	6.50-1020	202.7
Zinc (Zn)	57/63	35.7-42000	1069.7

Notes:
 µg/L = Micrograms per liter

10.6.2 Subzone F, AOC 699

AOC 699 sampling in Subzone F consisted of 33 DPT soil samples and 49 DPT groundwater samples analyzed for VOCs, metals, and cyanide. Sampling locations are presented in Figures 10.6.8 through 10.6.16.

10.6.2.1 Nature of Contamination in Subzone F, AOC 699, DPT Soil

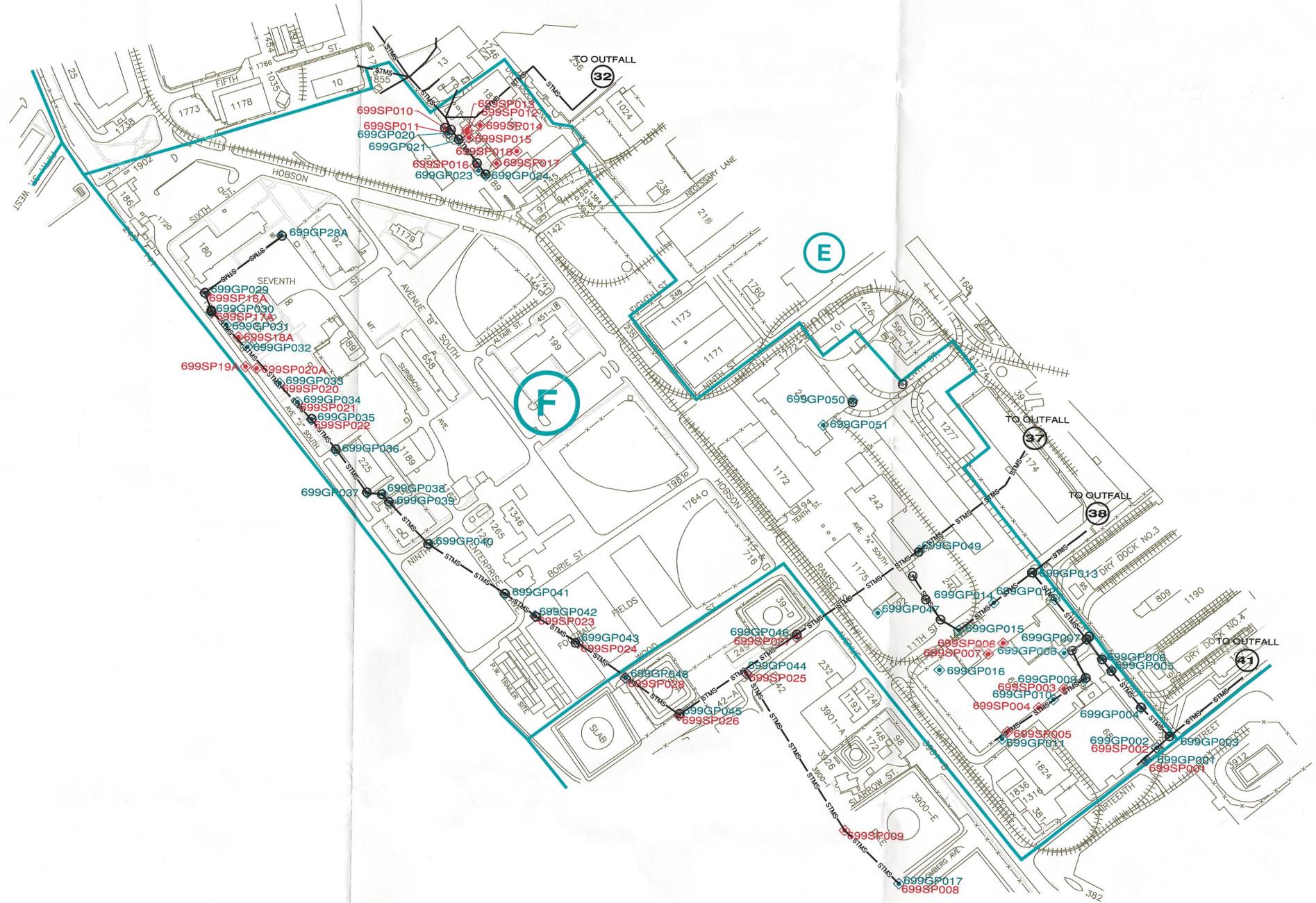
Organic compound analytical results for soil obtained from DPT are summarized in Table 10.6.7. Inorganic analytical results are summarized in Table 10.6.8. Appendix C contains the complete data report for all samples collected in Zone L.

Volatile Organic Compounds Detected in DPT Soil

Two VOCs were detected in the 33 DPT soil samples. None exceeded the RBC values.

Metals/Cyanide Detected in DPT Soil

Aluminum (10/33), antimony (1/33), arsenic (31/33), chromium (3/33), iron (31/33), manganese (6/33), thallium (5/33), and vanadium (1/33) exceeded RBC values. Chromium (2/33), manganese (1/33), and thallium (5/33) exceeded SSL values. Locations of DPT soil samples that exceeded RBCs and/or SSLs are provided in Table 10.6.9.



- LEGEND:**
- 699GP014 DPT GROUNDWATER SAMPLE W/ ID NUMBER
 - 699SP005 DPT SOIL SAMPLE W/ ID NUMBER
 - M STORM SEWER MANHOLE
 - STMS STORM SEWER LINE
 - F STUDY ZONE BOUNDARY WITH LETTER DESIGNATION



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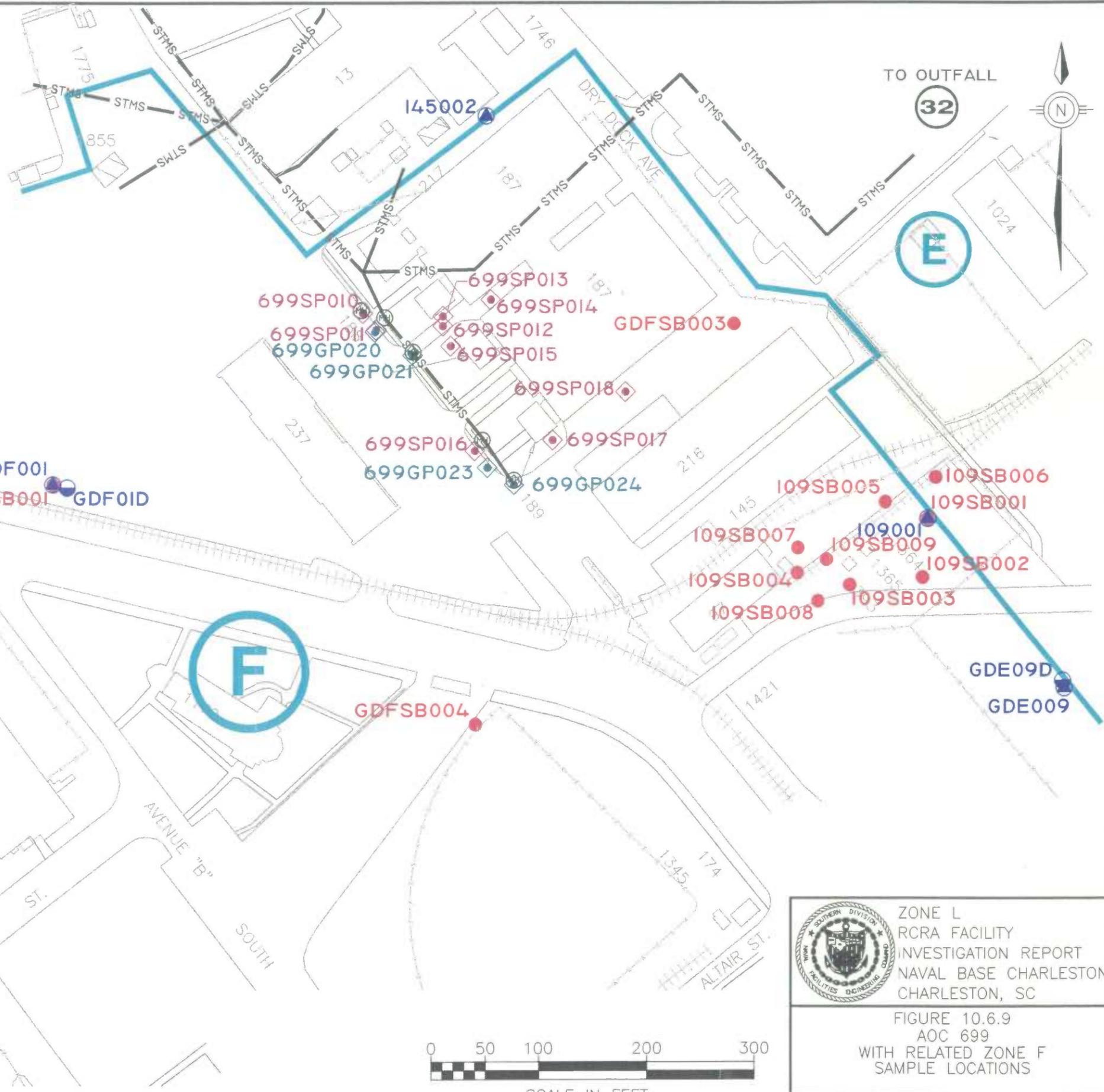
FIGURE 10.6.8
 AOC 699 (STORM SEWER SYSTEM)
 SAMPLING LOCATIONS
 SUBZONE F

Dr by: W. FAULK	Tr by: -
Ck by: C. VERNOY	Appr by: T. HAVERKOST
Date: 11/24/98	DWG Name: 2912C074

Sheet 1 of 1

LEGEND:

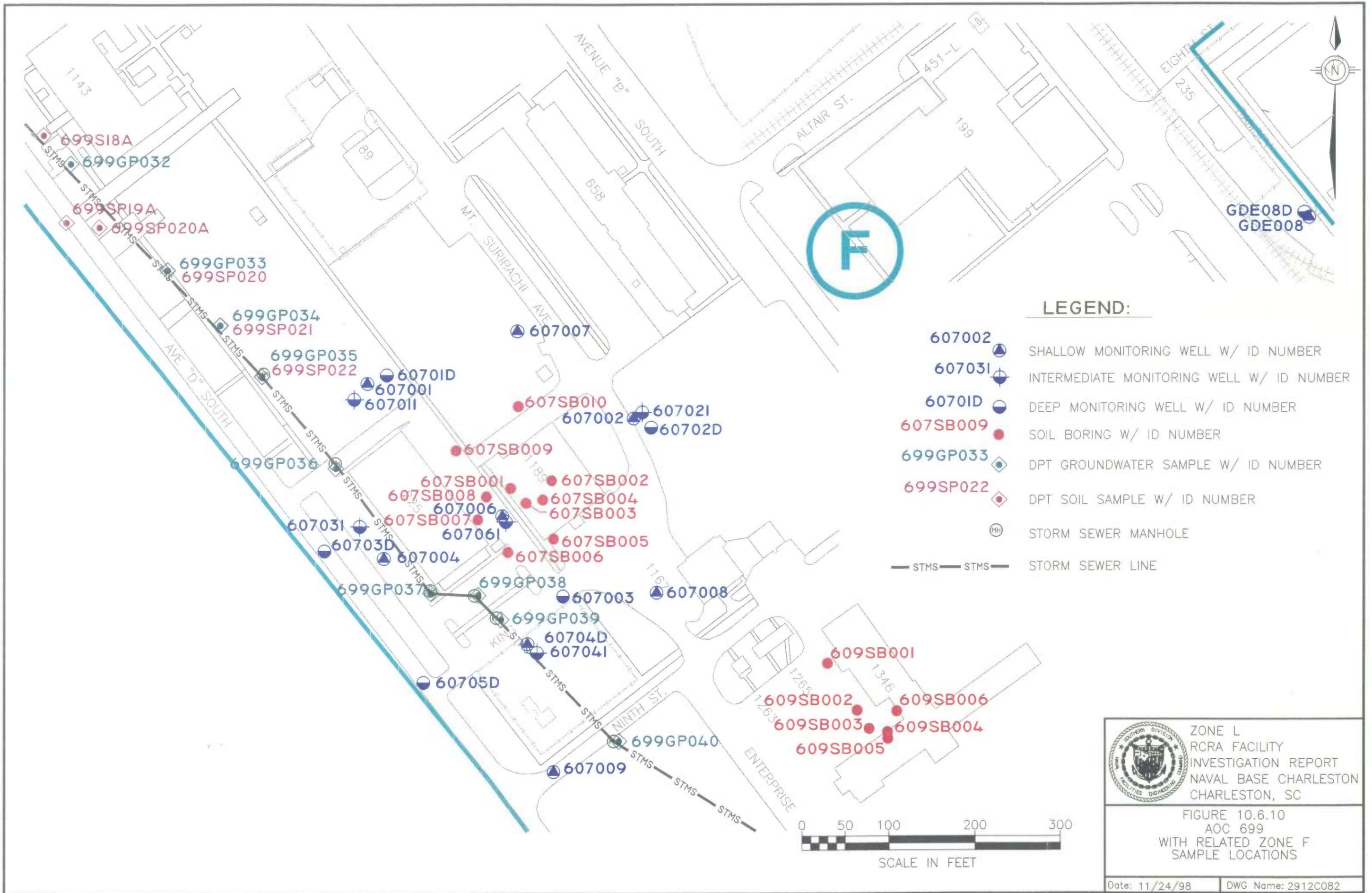
- ▲ 145002 SHALLOW MONITORING WELL W/ ID NUMBER
- GDE09D SHALLOW MONITORING WELL W/ ID NUMBER
- GDFSB003 SOIL BORING W/ ID NUMBER
- ◆ 699GP023 DPT GROUNDWATER SAMPLE W/ ID NUMBER
- ◆ 699SP016 DPT SOIL SAMPLE W/ ID NUMBER
- MH STORM SEWER MANHOLE
- STMS STORM SEWER LINE



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FIGURE 10.6.9
AOC 699
WITH RELATED ZONE F
SAMPLE LOCATIONS

Date: 11/24/98
DWG Name: 2912C081

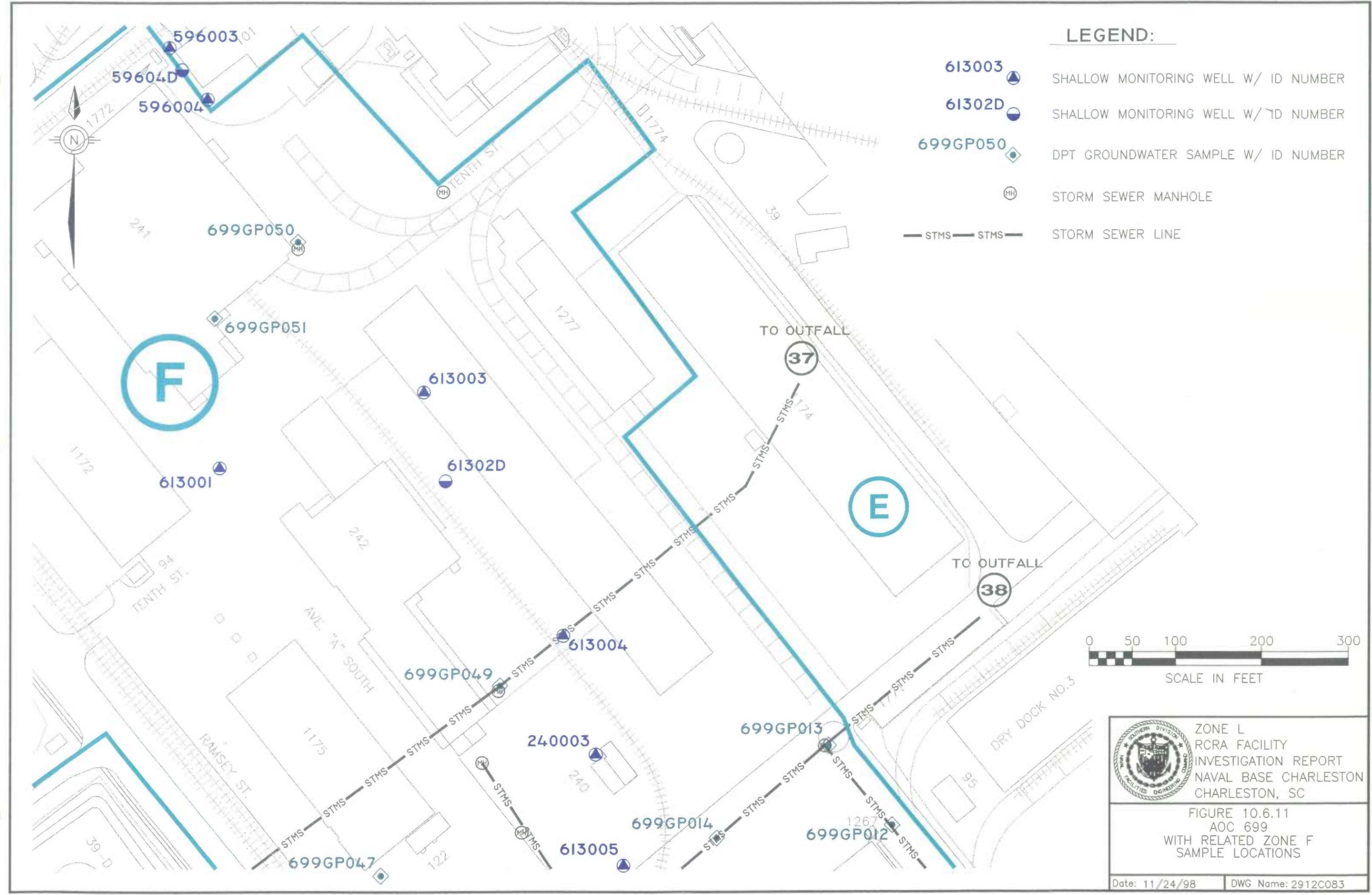



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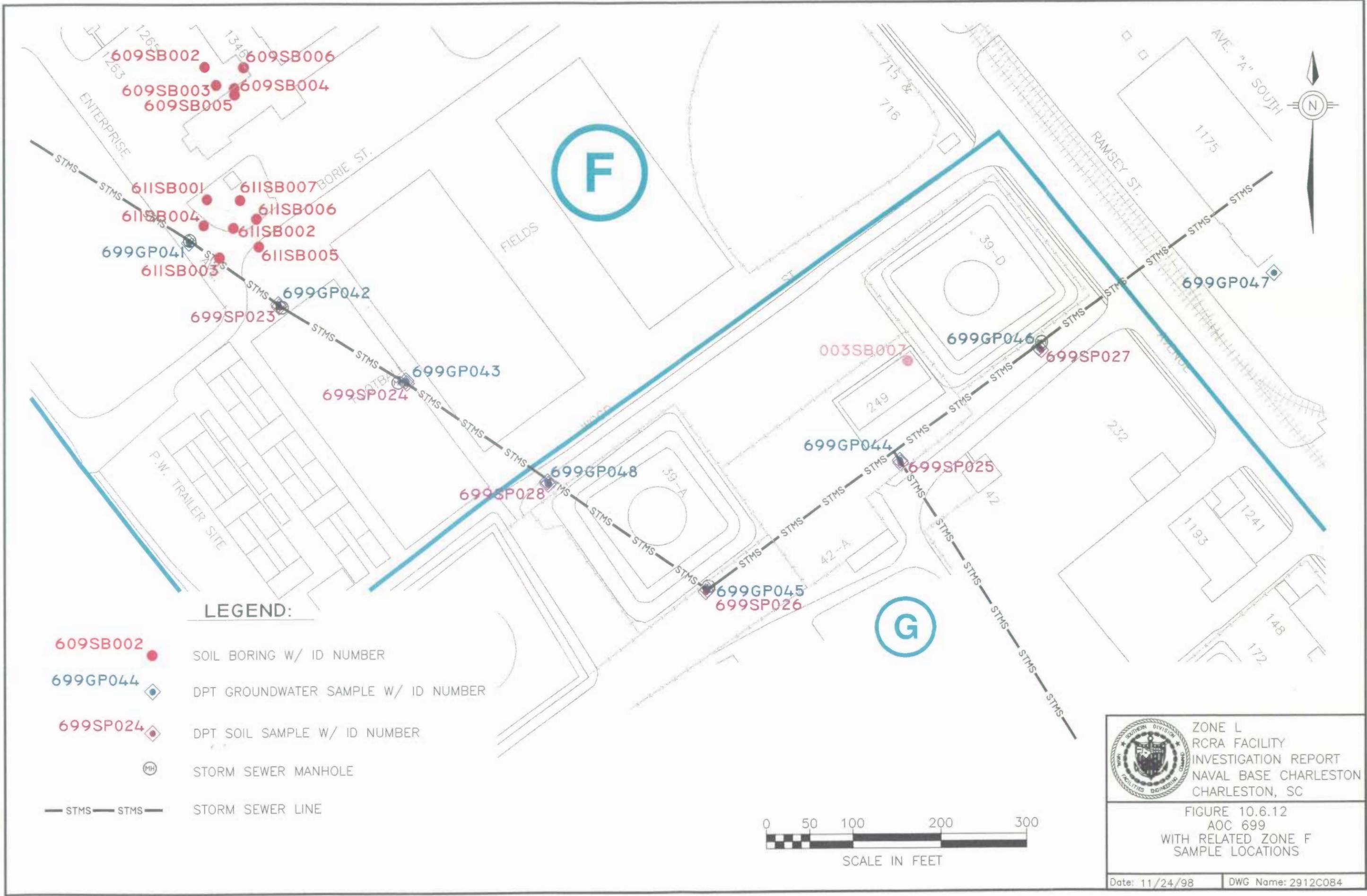
FIGURE 10.6.10
 AOC 699
 WITH RELATED ZONE F
 SAMPLE LOCATIONS

LEGEND:

- 613003  SHALLOW MONITORING WELL W/ ID NUMBER
- 61302D  SHALLOW MONITORING WELL W/ ID NUMBER
- 699GP050  DPT GROUNDWATER SAMPLE W/ ID NUMBER
-  STORM SEWER MANHOLE
-  STORM SEWER LINE



	ZONE L RCRA FACILITY INVESTIGATION REPORT NAVAL BASE CHARLESTON CHARLESTON, SC
	FIGURE 10.6.11 AOC 699 WITH RELATED ZONE F SAMPLE LOCATIONS
Date: 11/24/98	DWG Name: 2912C083

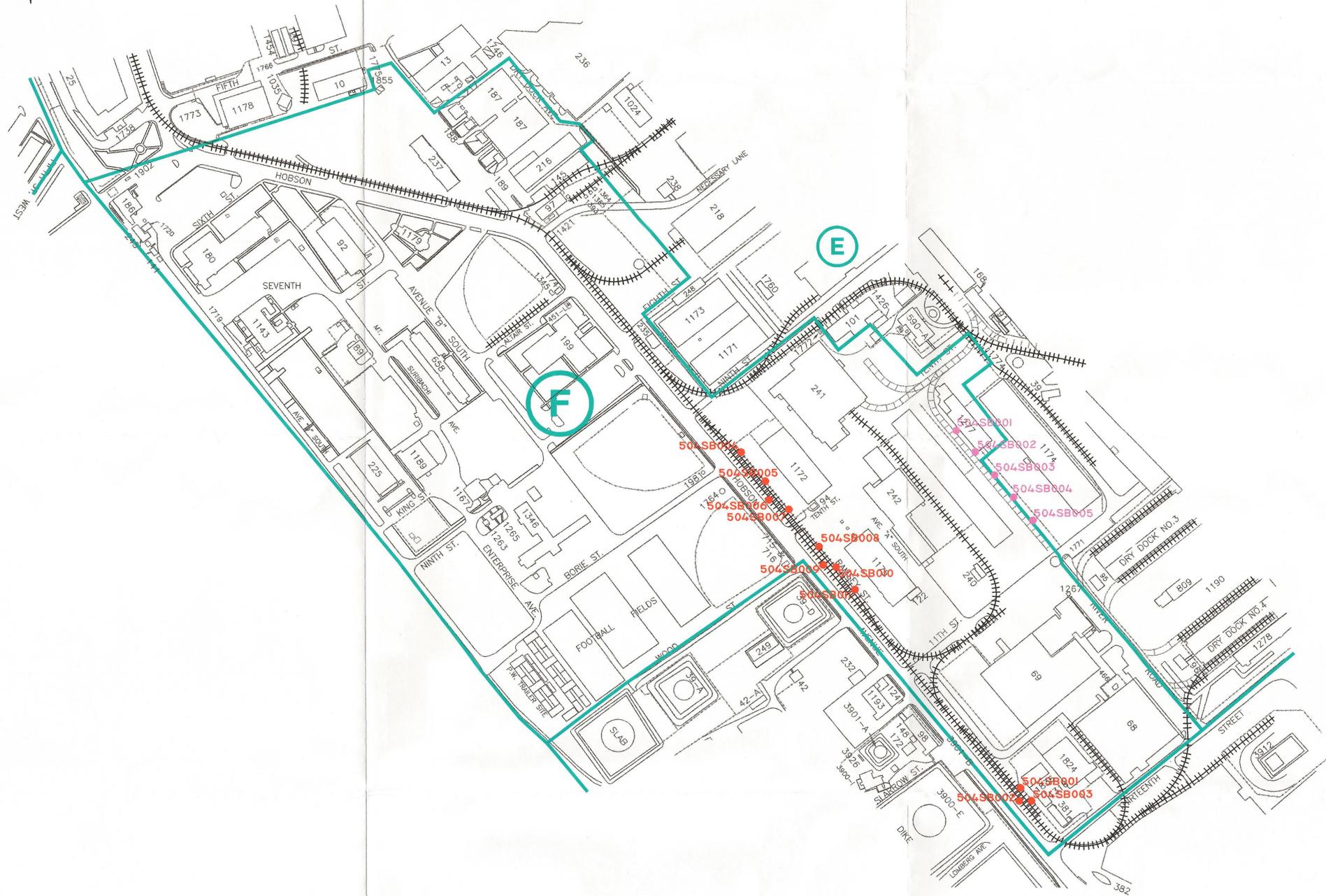


LEGEND:

- 609SB002 ● SOIL BORING W/ ID NUMBER
- 699GP044 ◆ DPT GROUNDWATER SAMPLE W/ ID NUMBER
- 699SP024 ◆ DPT SOIL SAMPLE W/ ID NUMBER
- Ⓜ STORM SEWER MANHOLE
- STMS — STMS — STORM SEWER LINE



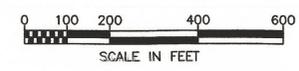
	ZONE L RCRA FACILITY INVESTIGATION REPORT NAVAL BASE CHARLESTON CHARLESTON, SC
	FIGURE 10.6.12 AOC 699 WITH RELATED ZONE F SAMPLE LOCATIONS
Date: 11/24/98	DWG Name: 2912C084



LEGEND:

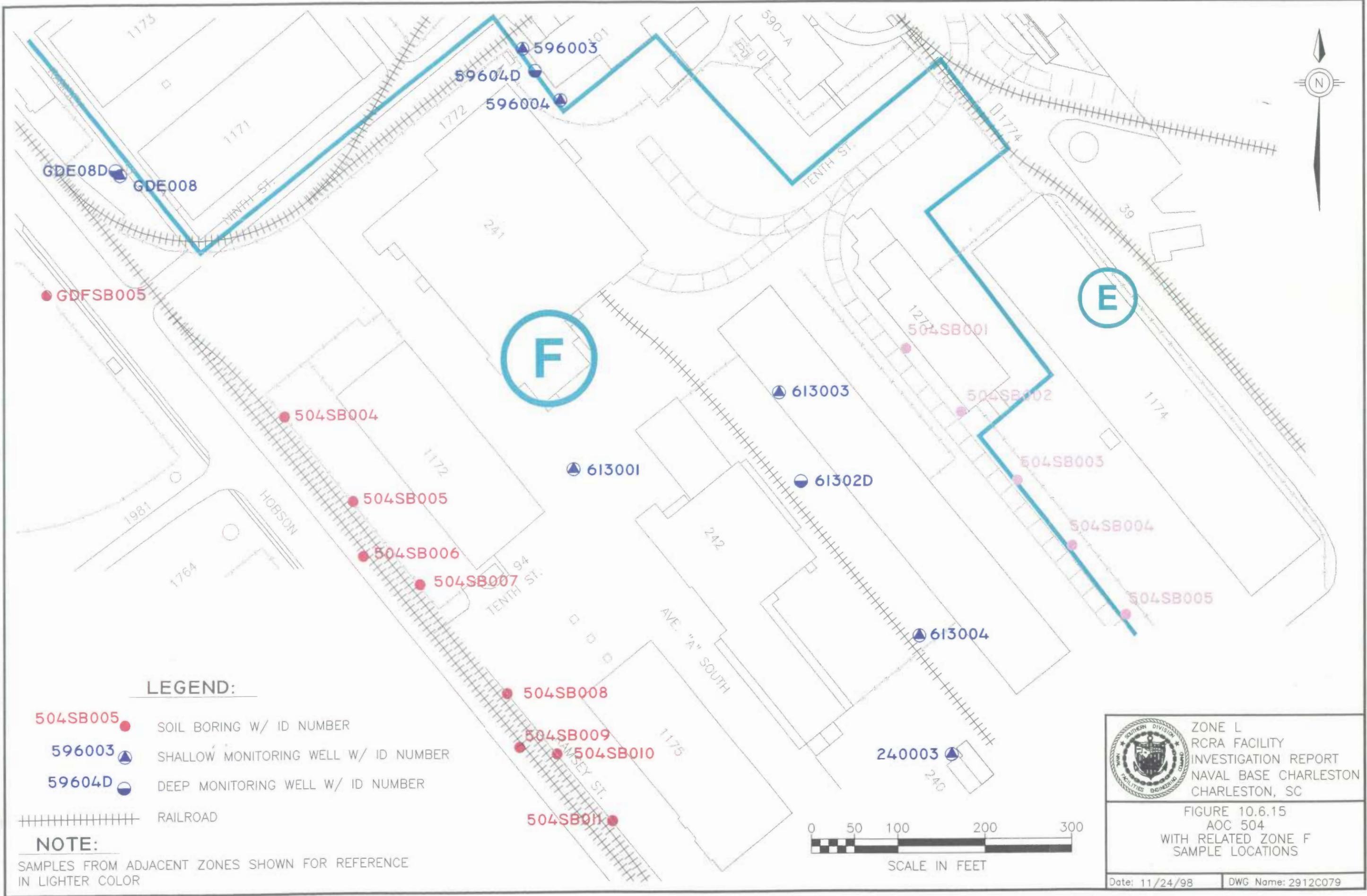
- 504SB002 ● SOIL BORING W/ ID NUMBER
- +++++ RAILROAD
- E STUDY ZONE BOUNDARY WITH LETTER DESIGNATION

NOTE:
 SAMPLES FROM ADJACENT ZONES SHOWN FOR REFERENCE
 IN LIGHTER COLOR



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Dr by: W. FAULK	Tr by: —	
Ck by: C. VERNOY	Appr by: T. HAVERKOST	
Date: 11/24/98	DWG Name: 2912C073	



LEGEND:

- 504SB005 ● SOIL BORING W/ ID NUMBER
- 596003 ▲ SHALLOW MONITORING WELL W/ ID NUMBER
- 59604D ● DEEP MONITORING WELL W/ ID NUMBER
- ||||| RAILROAD

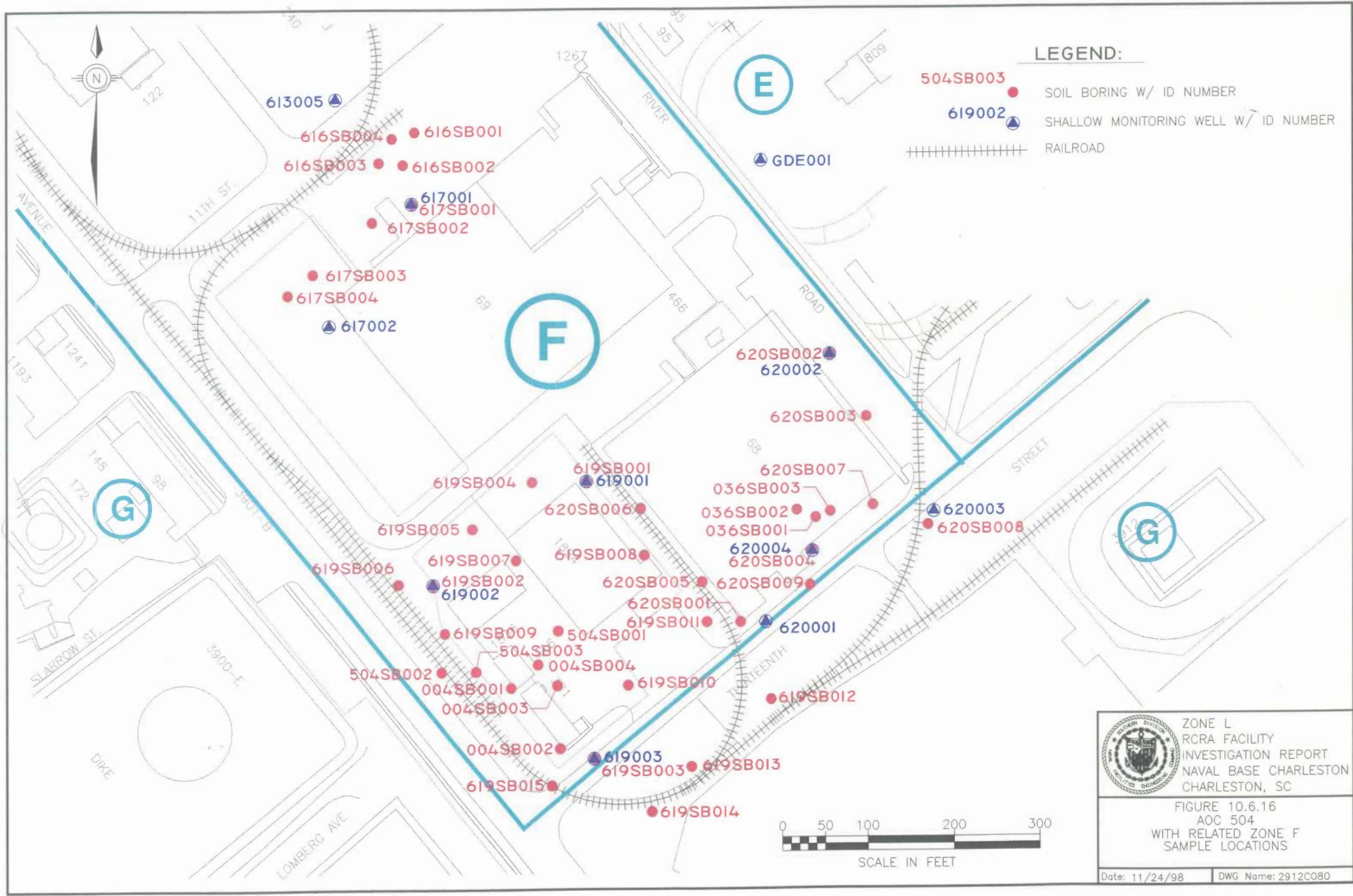
NOTE:

SAMPLES FROM ADJACENT ZONES SHOWN FOR REFERENCE IN LIGHTER COLOR




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FIGURE 10.6.15
 AOC 504
 WITH RELATED ZONE F
 SAMPLE LOCATIONS



LEGEND:

- 504SB003 SOIL BORING W/ ID NUMBER
- 619002 SOIL BORING W/ ID NUMBER
- ▲ 619002 SHALLOW MONITORING WELL W/ ID NUMBER
- ++++ RAILROAD



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FIGURE 10.6.16
 AOC 504
 WITH RELATED ZONE F
 SAMPLE LOCATIONS



Table 10.6.7
AOC 699, Zone L, Subzone F
Organic Compounds Detected in DPT Soil

Compound	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Volatile Organic Compounds ($\mu\text{g}/\text{kg}$)							
2-Butanone (MEK)	2/33	10.9-19.9	15.4	4700000	0	7800 c	NO
Acetone	5/33	11.6-121	58.7	780000	0	16000	NO

Notes:

- $\mu\text{g}/\text{kg}$ = Micrograms per kilogram
- RBC = Risk-based concentration
- GW = Groundwater
- SSL = Soil screening level
- c = Calculated SSL
- Soil to GW = Generic SSLs based on DAF = 20, adapted from *USEPA Soil Screening Guidance: Technical Background Document*, May 1996 (first preference), or calculated using values from Table 6.2 in Zone F RFI Report

Table 10.6.8
AOC 699, Zone L, Subzone F
Inorganic Detections for DPT Soil

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Reference Conc.	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Inorganic Elements (mg/kg)								
Cyanide (CN)	2/33	0.330-0.470	0.40	160	0.29	0	40	NO
Aluminum (Al)	33/33	1960-28100	7232	7800	18500	10	1000000 c	NO
Antimony (Sb)	2/33	2.67-4.28	3.48	3.10	19.9	1	5	NO
Arsenic (As)	31/33	1.66-23.0	5.83	0.430	19.9	31	29	NO
Barium (Ba)	33/33	4.72-56.1	23.9	550	61.5	0	1600	NO
Beryllium (Be)	23/33	0.220-1.43	0.479	16.0	1.05	0	63	NO
Cadmium (Cd)	3/33	0.430-2.20	1.06	7.80	0.26	0	8	NO
Calcium (Ca)	33/33	940-166000	13361	NA	NA	NA	NA	NO
Chromium (Cr)	33/33	3.57-81.4	16.7	39.0	34.8	3	38	YES
Cobalt (Co)	31/33	0.600-10.3	1.95	470	15.1	0	2000 c	NO
Copper (Cu)	32/33	1.82-116	14.6	310	48.2	0	11200 c	NO
Iron (Fe)	33/33	1650-34900	8765	2300	NA	31	NA	NO

Table 10.6.9
AOE 699, Zone L, Subzone F, DPT Soil Sample Locations with
Metals Detections Exceeding RBCs and/or SSLs

Metal	Sample ID	Concentration Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Aluminum	669SP007F1	8280	Y	N	7800	1.0E+06
	669SP008F1	9540	Y	N		
	669SP009F1	11100	Y	N		
	669SP014F1	8090	Y	N		
	669SP017F1	13000	Y	N		
	669SP020F1	16100	Y	N		
	669SP022F1	9460	Y	N		
	669SP023F1	28100	Y	N		
	669SP024F1	13500	Y	N		
	669SP20AF1	9910	Y	N		
Antimony	669SP002F1	4.28	Y	N	3.10	5.00
Arsenic	669SP001F1	14.4	Y	N	0.43	29
	669SP002F1	4.17	Y	N		
	669SP003F1	3.06	Y	N		
	669SP005F1	2.13	Y	N		
	669SP006F1	5.80	Y	N		
	669SP007F1	3.41	Y	N		
	669SP008F1	5.91	Y	N		
	669SP009F1	6.10	Y	N		
	669SP010F1	1.66	Y	N		
	669SP011F1	2.31	Y	N		
	669SP013F1	3.42	Y	N		
	669SP013F1	3.09	Y	N		
	669SP014F1	3.09	Y	N		
	669SP015F1	2.86	Y	N		
	669SP016F1	7.94	Y	N		
	669SP017F1	9.37	Y	N		
	669SP019F1	7.42	Y	N		
	669SP020F1	11.8	Y	N		
	669SP021F1	7.53	Y	N		
	669SP022F1	5.15	Y	N		
669SP023F1	23.0	Y	N			
669SP024F1	10.4	Y	N			
669SP025F1	2.55	Y	N			
669SP026F1	2.73	Y	N			
669SP027F1	2.88	Y	N			
669SP028F1	8.50	Y	N			
669SP16AF1	2.06	Y	N			
669SP17AF1	1.66	Y	N			
669SP18AF1	4.82	Y	N			
669SP19AF1	2.58	Y	N			
669SP20AF1	9.04	Y	N			
Chromium	669SP001F1	81.4	Y	Y	39	38
	669SP002F1	67.6	Y	Y		

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Table 10.6.9
AOC 699, Zone L, Subzone F, DPT Soil Sample Locations with
Metals Detections Exceeding RBCs and/or SSLs

Metal	Sample ID	Concentration Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Iron	669SP001F1	8220	Y	N	2300	NA
	669SP002F1	5250	Y	N		
	669SP003F1	4400	Y	N		
	669SP005F1	3710	Y	N		
	669SP006F1	8030	Y	N		
	669SP007F1	7490	Y	N		
	669SP008F1	10400	Y	N		
	669SP009F1	18000	Y	N		
	699SP010F1	3160	Y	N		
	699SP011F1	2520	Y	N		
	699SP012F1	5300	Y	N		
	699SP013F1	3310	Y	N		
	699SP014F1	8060	Y	N		
	699SP015F1	4910	Y	N		
	699SP016F1	7180	Y	N		
	699SP017F1	14200	Y	N		
	699SP018F1	2340	Y	N		
	699SP019F1	8900	Y	N		
	699SP020F1	22500	Y	N		
	699SP021F1	8260	Y	N		
	699SP022F1	9750	Y	N		
	699SP023F1	34900	Y	N		
	699SP024F1	22000	Y	N		
	699SP025F1	4560	Y	N		
699SP026F1	4660	Y	N			
699SP027F1	8050	Y	N			
699SP028F1	7090	Y	N			
699SP16AF1	3770	Y	N			
699SP18AF1	8770	Y	N			
699SP19AF1	4140	Y	N			
699SP20AF1	22000	Y	N			
Manganese	699SP06F1	184	Y	N	160	950
	699SP017F1	228	Y	N		
	699SP020F1	302	Y	N		
	699SP023F1	2660	Y	Y		
	699SP024F1	205	Y	N		
	699SP025F1	258	Y	N		
Thallium	699SP017F1	1.67	Y	Y	0.55	0.70
	699SP020F1	2.14	Y	Y		
	699SP023F1	4.56	Y	Y		
	699SP024F1	2.56	Y	Y		
	699SP20AF1	2.20	Y	Y		

Notes:
 mg/kg = Milligrams per kilogram
 RBC = Risk-based concentration
 SSL = Soil screening level
 GW = Groundwater
 Soil to GW = Generic SSLs based on DAF = 10, adapted from *USEPA Soil Screening Guidance: Technical Background Document*, May 1996 (first preference), or calculated using values from Table 6.2 in Zone F RFI Report.

10.6.2.2 Nature of Contamination in Subzone F, AOC 699, DPT Groundwater

Forty-nine DPT groundwater samples were analyzed for VOCs, metals, and cyanide. Results are shown in Table 10.6.10 for detected VOCs and in Table 10.6.11 for inorganic chemicals.

Volatile Organic Compounds in DPT Groundwater

Two VOCs were detected in the 49 samples collected. Cis-1,2-dichloroethene was found at location 699SP007F1 at a concentration of 9.97 µg/L, exceeding the RBC of 6.10 µg/L. Vinyl chloride was detected at 699SP007F1 at a concentration of 7.84 µg/L, exceeding both the RBC of 0.02 µg/L and the MCL of 2.00 µg/L.

Metals/Cyanide Detected in AOC 699, Subzone F, DPT Groundwater

Analytical results for metals and cyanide in DPT groundwater samples are shown in Table 10.6.11. As stated in Section 10.0, results from DPT groundwater were not compared to RBC or MCL values.

Table 10.6.10
 AOC 699, Zone L, Subzone F
 Organic Compounds Detected in DPT Groundwater

Compound	Freq of Detection	Range of Detected Conc.	Mean of Detected Conc.	Tap Water RBC	MCL	Number of Samples Exceeding RBC	Salt Wtr. Surf. Wtr. Chronic	Ground-water Migration Concern	Surface Water Migration Concern
Volatile Compounds (µg/L)									
cis-1,2-Dichloroethene	1/49	9.97	9.97	6.10	70.0	1	NA	YES	NO
Vinyl chloride	1/49	7.84	7.84	0.019	2.00	1	NA	YES	NO

Notes:
 µg/L = Micrograms per liter
 RBC = Risk-based concentration
 MCL = Maximum contaminant level

Table 10.6.11
AOC 699, Zone L, Subzone F
Inorganic Detections for DPT Groundwater

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.
Inorganic Elements ($\mu\text{g/L}$)			
Cyanide (CN)	3/49	5.40-24.0	12.2
Aluminum (Al)	49/49	766-374000	60380
Antimony (Sb)	6/49	8.50-21.9	13.3
Arsenic (As)	42/49	10.6-194	62.2
Barium (Ba)	49/49	17.9-1950	286.5
Beryllium (Be)	23/49	2.00-23.4	7.71
Cadmium (Cd)	4/49	6.90-135	41.5
Calcium (Ca)	49/49	3540-1060000	192356
Chromium (Cr)	48/49	5.40-1180	157.5
Cobalt (Co)	39/49	5.40-234	43.1
Copper (Cu)	40/49	7.00-156	38.8
Iron (Fe)	49/49	3580-637000	91039
Lead (Pb)	46/49	3.50-511	57.5
Magnesium (Mg)	49/49	2380-539000	110142
Manganese (Mn)	49/49	102-12600	1589.7
Mercury (Hg)	20/49	0.200-0.860	0.393
Nickel (Ni)	46/49	4.60-1320	71.6
Potassium (K)	49/49	1110-167000	36466
Selenium (Se)	12/49	5.00-23.9	10.8
Sodium (Na)	49/49	10700-4930000	1055210
Thallium (Tl)	12/49	10.1-17.1	12.6
Vanadium (V)	48/49	6.90-776	137.4
Zinc (Zn)	46/49	25.0-427000	9479.7

Notes:
 $\mu\text{g/L}$ = Micrograms per liter

10.6.3 Subzone F, AOC 504

AOC 504 sampling in Subzone F consisted of 18 soil samples (11 upper-interval and seven lower-interval) collected using a hand auger. Samples were analyzed for VOCs, SVOCs, chlorinated pesticides, PCBs, metals, and cyanide. Sampling locations are presented in Figures 10.6.14 through 10.6.16.

10.6.3.1 Nature of Contamination in Subzone F, AOC 504, Soil Borings

Analytical results of the soil borings are summarized in Tables 10.6.12 (organics) and 10.6.13 (inorganics). Results for detected compounds from surface soil were compared to RBC values, and results for detected compounds from subsurface soil were compared to SSL values. Appendix C contains the complete data report for all samples collected in Zone L.

Volatile Organic Compounds Detected in Soil Borings

Six VOCs were detected in the soil samples. None exceeded the RBC values.

Semivolatile Organic Compounds Detected In Soil Borings

Twenty SVOCs were detected in the surface soil borings. Benzo(a)pyrene (10/11) at locations 504SB001F1, 504SB002F1, 504SB003F1, 504SB004F1, 504SB005F1, 504SB007F1, 504SB008F1, 504SB009F1, 504SB010F1, and 504SB011F1 exceeded the RBC value of 88 $\mu\text{g}/\text{kg}$. Dibenz(a,h)anthracene (5/11) at locations 504SB004F1, 504SB005F1, 504SB007F1, 504SB010F1, and 504SB011F1 also exceeded the RBC value of 88 $\mu\text{g}/\text{kg}$.

Chlorinated Pesticides Detected in Soil Borings

None of the eight chlorinated pesticides detected in surface soil samples exceeded the RBC value.

Metals/Cyanide Detected in Soil Borings

Aluminum (7/11), antimony (1/11), arsenic (11/11), chromium (2/11), copper (1/11), iron (10/11), lead (1/11), manganese (6/11), thallium (8/11), and vanadium (1/11) exceeded the RBC

values. Arsenic (1/7), chromium (4/7), and thallium (7/7) also exceeded the SSL values. Sampling locations where these exceedances occurred are summarized in Table 10.6.14.

Sample locations with detected concentrations of analytes that exceed either RBC, SSL, or MCL values are shown in Figure 10.6.17 through 10.6.69.

Table 10.6.12
AOC 504, Zone L, Subzone F
Organic Compounds Detected in Soil Borings

Compound	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Volatile Organic Compounds (µg/kg)								
2-Butanone (MEK)	Upper	1/11	130	130	4700000	0	7800 c	NO
4-Methyl-2-Pentanone (MIBK)	Upper	1/11	10.0	10.0	NA	NA	13000 c	NO
Acetone	Upper	1/11	460	460	780000	0	16000	NO
Ethylbenzene	Upper	1/11	2.00	2.00	780000	0	13000	NO
Toluene	Upper	1/11	2.00	2.00	1600000	0	12000	NO
	Lower	1/7	2.00	2.00	NA	NA		
Xylene (Total)	Upper	1/11	7.00	7.00	16000000	0	140000 c	NO
Semivolatile Compounds (µg/kg)								
2-Methylnaphthalene	Upper	2/11	2200-3000	2600	310000	0	460000 c	NO
Acenaphthene	Upper	2/11	360-550	455	47000	0	570000	NO
Acenaphthylene	Upper	2/11	55.0-72.0	63.5	310000	0	190000 c	NO
	Lower	1/7	51.0	51.0	NA	NA		
Anthracene	Upper	5/11	70.0-400	170.6	2300000	0	1200000	NO
B(a)P Equiv.	Upper	11/11	81.6-671	472.8	88	10	3200 c	NO
	Lower	6/7	6.50-420	145	NA	NA		
Benzo(a)anthracene	Upper	11/11	48.0-550	257.5	880	0	2000	NO
	Lower	4/7	52.0-160	100.3	NA	NA		
Benzo(a)pyrene	Upper	11/11	64.0-500	312.9	88	10	8000	NO
	Lower	5/7	58.0-250	119.6	NA	NA		

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Table 10.6.12
AOC 504, Zone L, Subzone F
Organic Compounds Detected in Soil Borings

Compound	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Benzo(b)fluoranthene	Upper	10/11	78.0-590	427.8	880	0	5000	NO
	Lower	6/7	63.0-570	185.3	NA	NA		
Benzo(g,h,i)perylene	Upper	11/11	48.0-450	253.1	310000	0	23000000 c	NO
	Lower	3/7	68.0-180	126.0	NA	NA		
Benzo(k)fluoranthene	Upper	9/11	65.0-610	385.0	8800	0	49000	NO
	Lower	4/7	64.0-200	128.5	NA	NA		
Butylbenzylphthalate	Upper	1/11	690	690	1600000	0	930000	NO
Chrysene	Upper	11/11	70.0-910	359.1	88000	0	160000	NO
	Lower	5/7	52.0-220	118.0	NA	NA		
Dibenz(a,h)anthracene	Upper	7/11	61.0-160	112.3	88	0	2000	NO
	Lower	1/7	81.0	81.0	NA	NA		
Fluoranthene	Upper	11/11	73.0-560	280.3	310000	0	4300000	NO
	Lower	4/7	70.0-230	118.8	NA	NA		
Fluorene	Upper	2/11	550-1000	775	310000	0	560000	NO
Indeno(1,2,3-cd)pyrene	Upper	11/11	43.0-370	203	880	0	14000	NO
	Lower	3/7	61.0-160	113.7	NA	NA		
Naphthalene	Upper	2/11	150-180	165	310000	0	84000	NO
Phenanthrene	Upper	8/11	74.0-2400	565.6	310000	0	1300000 c	NO
	Lower	1/7	60.0	60.0	NA	NA		
Phenol	Upper	1/11	210	210	4700000	0	100000	NO
Pyrene	Upper	11/11	75.0-2400	495.9	230000	0	4200000	NO
	Lower	5/7	46.0-280	117.4	NA	NA		
bis(2-Ethylhexyl)phthalate (BEHP)	Upper	4/11	49.0-420	151.3	46000	0	3600000	NO
	Lower	2/7	71.0-72.0	71.5	NA	NA		

Table 10.6.12
AOC 504, Zone L, Subzone F
Organic Compounds Detected in Soil Borings

Compound	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Chlorinated Pesticides ($\mu\text{g}/\text{kg}$)								
4,4'-DDD	Upper	5/11	4.50-58.0	16.9	2700	0	16000	NO
	Lower	2/7	4.50-5.60	5.05	NA	NA		
4,4'-DDE	Upper	10/11	4.10-34.0	13.4	1900	0	54000	NO
	Lower	4/7	4.70-27.0	15.5	NA	NA		
4,4'-DDT	Upper	7/11	4.00-40.0	15.7	1900	0	32000	NO
	Lower	3/7	5.20-18.75	13.9	NA	NA		
Endrin	Upper	3/11	3.00-6.10	4.17	2300	0	1000	NO
Endrin aldehyde	Upper	1/11	5.20	5.20	2300	0	1000	NO
Heptachlor epoxide	Upper	3/11	1.70-6.10	3.23	70	0	700	NO
	Lower	2/7	3.40-4.20	3.80	NA	NA		
Methoxychlor	Upper	2/11	33.0-39.0	36.0	39000	0	160000	NO
gamma-Chlordane	Upper	5/11	2.00-6.70	3.50	490	0	10000	NO
	Lower	2/7	2.30-3.20	2.75	NA	NA		

Notes:

- $\mu\text{g}/\text{kg}$ = Micrograms per kilograms
- RBC = Risk-based concentration
- NA = Not applicable
- GW = Groundwater
- SSL = Soil screening level
- c = Calculated SSL
- Soil to GW = Generic SSLs based on DAF = 20, adapted from USEPA Soil Screening Guidance: Technical Background Document, May 1996 (first preference), or calculated using values from Table 6.2 in Zone F RFI Report

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**Table 10.6.13
AOC 504, Zone L, Subzone F
Inorganic Detections for Soil Borings**

Element	Sample Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Reference Conc.	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Inorganic Elements (mg/kg)									
Aluminum (Al)	Upper	11/11	1900-26700	12142	7800	18500	7	1000000 c	NO
	Lower	7/7	15900-34400	26971	NA	17100	NA		
Antimony (Sb)	Upper	10/11	0.860-4.30	1.96	3.10	0.79	1	5	NO
	Lower	7/7	1.10-2.40	1.58	NA	ND	NA		
Arsenic (As)	Upper	11/11	3.40-137	42.2	0.430	19.9	11	29	YES
	Lower	7/7	12.8-34.1	24.6	NA	18.2	NA		
Barium (Ba)	Upper	11/11	7.20-79.9	41.8	550	61.5	0	1600	NO
	Lower	7/7	34.5-58.8	43.6	NA	51.8	NA		
Beryllium (Be)	Upper	7/11	0.450-1.30	0.887	16.0	1.05	0	63	NO
	Lower	7/7	0.900-1.70	1.34	NA	1.20	NA		
Cadmium (Cd)	Upper	9/11	0.120-0.680	0.312	7.80	0.26	0	8	NO
	Lower	7/7	0.080-0.310	0.143	NA	0.09	NA		
Calcium (Ca)	Upper	11/11	670-18300	5586	NA	NA	NA	NA	NO
	Lower	7/7	4930-16800	7739	NA	NA	NA		
Chromium (Cr)	Upper	11/11	4.80-44.5	24.7	39	34.8	2	38	YES
	Lower	7/7	25.7-51.6	40.9	NA	32.2	NA		
Cobalt (Co)	Upper	9/11	1.80-7.60	4.53	470	15.1	0	2000 c	NO
	Lower	7/7	4.80-9.80	7.76	NA	6.85	NA		
Copper (Cu)	Upper	11/11	6.60-441	68.6	310	48.2	1	11200 c	NO
	Lower	7/7	22.1-67.4	35.6	NA	30.4	NA		
Iron (Fe)	Upper	11/11	1420-33700	16014	2300	NA	10	NA	NO
	Lower	7/7	21700-43500	34086	NA	NA	NA		
Lead (Pb)	Upper	11/11	12.7-1670	217.6	400	180	1	400	YES
	Lower	7/7	47.2-110	67.8	NA	51.7	NA		
Magnesium (Mg)	Upper	11/11	69.2-4530	1624.2	NA	NA	NA	NA	NO
	Lower	7/7	2230-4650	3556	NA	NA	NA		
Manganese (Mn)	Upper	11/11	6.90-612	245.9	160	307	6	950 c	NO
	Lower	7/7	273-798	567.7	NA	469	NA		

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Table 10.6.13
AOC 504, Zone L, Subzone F
Inorganic Detections for Soil Borings

Element	Sample Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Reference Conc.	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Mercury (Hg)	Upper	7/11	0.210-0.740	0.380	NA	0.62	NA	2	NO
	Lower	7/7	0.260-0.670	0.411	NA	0.23	NA		
Nickel (Ni)	Upper	11/11	1.80-16.1	9.67	160	12.6	0	130	NO
	Lower	7/7	8.70-18.4	14.4	NA	8.85	NA		
Potassium (K)	Upper	10/11	132-1980	903	NA	NA	NA	NA	NO
	Lower	7/7	1030-2190	1716	NA	NA	NA		
Sodium (Na)	Upper	9/11	175-1020	353	NA	NA	NA	NA	NO
	Lower	4/7	317-1290	635	NA	NA	NA		
Thallium (Tl)	Upper	8/11	0.960-2.30	1.38	0.55	ND	8	0.7	YES
	Lower	7/7	1.10-3.60	2.49	NA	1.24	NA		
Tin (Sn)	Upper	1/11	2.60	2.60	4700	9.38	0	11000 c	NO
Vanadium (V)	Upper	11/11	3.80-64.8	33.0	55	48.9	1	6000	NO
	Lower	7/7	44.3-91.6	69.0	NA	49.4	NA		
Zinc (Zn)	Upper	11/11	20.6-232	134.7	2300	198	0	12000	NO
	Lower	7/7	83.4-160	122.9	NA	84.2	NA		

Notes:
 mg/kg = Milligrams per kilogram
 RBC = Risk-based concentration
 NA = Not applicable
 ND = Not detected
 GW = Groundwater
 SSL = Soil screening level
 c = Calculated SSL
 Soil to GW = Generic SSLs based on DAF = 20, adapted from *USEPA Soil Screening Guidance: Technical Background Document*, May 1996 (first preference), or calculated using values from Table 6.2 in Zone F RFI Report

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Table 10.6.14
AOC 504, Zone L, Subzone F, Soil Boring Sample Locations with
Metals Detections which exceed RBCs or SSLs

Metal	Sample ID	Concentration Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Aluminum	504SB003F1	9080	Y	N	7800	1.0E+06
	504SB004F1	18400	Y	N		
	504SB005F1	21400	Y	N		
	504SB007F1	15700	Y	N		
	504SB008F1	12000	Y	N		
	504SB009F1	14400	Y	N		
	504SB011F1	26700	Y	N		
Arsenic	504SB001F1	3.40	Y	N	0.43	29
	504SB002F1	86.7	Y	N		
	504SB003F1	7.40	Y	N		
	504SB004F1	40.4	Y	N		
	504SB005F1	21.3	Y	N		
	504SB006F1	137	Y	N		
	504SB007F1	23.2	Y	N		
	504SB008F1	27.0	Y	N		
	504SB009F1	24.6	Y	N		
	504SB010F1	65.0	Y	N		
	504SB010F2	34.1	N	Y		
504SB011F1	27.8	Y	N			
Chromium	504SB007F1	42.9	Y	N	39	38
	504SB007F2	51.6	N	Y		
	504SB008F2	49.2	N	Y		
	504SB010F2	48.3	N	Y		
	504SB011F1	44.5	Y	N		
	504SB011F2	47.5	N	Y		
Copper	504SB007F1	441	Y	N	310	1.12E+04
Iron	504SB001F1	6130	Y	N	2300	NA
	504SB002F1	10200	Y	N		
	504SB003F1	12500	Y	N		
	504SB004F1	26400	Y	N		
	504SB005F1	25100	Y	N		
	504SB006F1	5700	Y	N		
	504SB007F1	23500	Y	N		
	504SB008F1	16100	Y	N		
	504SB009F1	15400	Y	N		
	504SB011F1	33700	Y	N		
	Lead	504SB004F1	1670	Y		
Manganese	504SB004F1	612	Y	N	160	935
	504SB005F1	345	Y	N		
	504SB007F1	336	Y	N		
	504SB008F1	436	Y	N		
	504SB009F1	213	Y	N		
	504SB011F1	395	Y	N		

Table 10.6.14
AOC 504, Zone L, Subzone F, Soil Boring Sample Locations with
Metals Detections which exceed RBCs or SSLs

Metal	Sample ID	Concentration Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Thallium	504SB002F1	0.96	Y	N	0.55	0.70
	504SB003F1	1.00	Y	N		
	504SB004F1	2.30	Y	N		
	504SB005F1	1.40	Y	N		
	504SB005F2	1.80	N	Y		
	504SB006F2	2.15	N	Y		
	504SB007F1	1.30	Y	N		
	504SB007F2	3.10	N	Y		
	504SB008F1	1.10	Y	N		
	504SB008F2	3.60	N	Y		
	504SB009F1	1.10	Y	N		
	504SB009F2	1.10	N	Y		
	504SB010F2	3.10	N	Y		
	504SB011F1	1.90	Y	N		
	504SB011F2	2.60	N	Y		

Notes:
 mg/kg = Milligrams per kilogram
 RBC = Risk-based concentration
 SSL = Soil Screening Level
 NA = Not applicable
 GW = Groundwater
 Soil to GW = Generic SSL based on DAF = 10, adapted from *USEPA Soil Screening Guidance: Technical Background Document*, May 1996 (first preference), or calculated using values from Table 6.2 in Zone F RFI Report.

10.6.4 Fate and Transport Assessment for SWMU 37 and AOCs 504, 699 in Subzone F

Section 10.6 contains short descriptions of the portions of SWMU 37 and AOCs 504 and 699 within Subzone F. Environmental media sampled as part of the RFI for these sites include surface soil, subsurface soil (soil borings and DPT samples), and shallow groundwater (monitoring wells and DPT samples). Potential constituent migration pathways investigated for SWMU 37 and AOCs 504 and 699 include soil to groundwater and groundwater to surface water. Soil to air and soil to sediment cross media fate and transport were determined not to be a concern.

The fate and transport screening comparison for SWMU 37, AOC 504, and AOC 699 soil and groundwater samples included referencing of previous Zone RFI Reports when applicable. Contaminants of potential concern were identified for each sample media and sampling method in Section 10.6. The Zone F RFI Report was consulted to identify any sites within the subzone F

that are associated geographically with the Zone L sample points. Analytical results from samples with overlapping sites were compared to data generated during the Zone F RFI. If concentrations at Zone L sample points associated with overlapping sites were higher than those of the referenced Zone F RFI Report or if new fate and transport COPCs were identified, further evaluation will be deferred to the Zone F RFI and included as an addendum. If Zone L sample concentrations were less than or equal to those in the Zone F RFI Report, it was assumed that the Zone L fate and transport conclusions would be similar to those of the Zone F RFI and no further evaluation is needed. Zone L sampling locations that are not associated with any overlapping sites are summarized in the fate and transport COPC tables and fate and transport evaluations provided in the following sections.

10.6.4.1 Soil to Groundwater Cross-Media Transport

SWMU 37

In Section 10.6, Tables 10.6.1 and 10.6.2 compare maximum detected organic and inorganic constituent concentrations in DPT soil samples from SWMU 37 to SSLs considered protective of groundwater. To provide a conservative screen, generic soil screening levels were used; leachate entering the aquifer was assumed to be diluted by a ratio of 20:1, with no attenuation of constituents in soil (DAF=20). Background reference values for inorganics were noted but did not enter into the screening process.

The screening comparisons in the two tables mentioned above identify the constituents with the potential to impact groundwater quality. Table 10.6.15 provides a summary of SWMU 37 soil samples reporting SSL exceedances, along with the names of associated Zone F sites overlapping the areas where some of these soil samples were collected. For samples with no overlapping Zone F sites, fate and transport concerns are evaluated below. In these evaluations, shallow groundwater monitoring wells within 200 feet downgradient of Zone L sampling locations were used for comparing local groundwater quality to soil concentrations.

Table 10.6.15
SMWU 37, Zone L, Subzone F
Fate and Transport COPCs

Exceedance Location	Overlapping Site	Fate and Transport COPCs	COPCs to be further Evaluated?	Reference Document
DPT Soil				
037SP001	Zone E, AOC 579	Thallium	Yes	Table 10.39.4.1 ^f
037SP014	None	Thallium	Yes	None
037SP020	Zone E, AOC 596	Chromium	No ^a	Table 10.45.6.1 ^f
037SP026	SWMU 175, AOCs 613, 615	Chromium	No ^a	Table 10.7.12*
037SP032	AOC 620	Arsenic	Yes	Table 10.2.9*
037SP036	FDS	Arsenic	Yes	None
DPT Groundwater				
037GP006	AOC 607	Tetrachloroethene	No ^a	Table 10.4.17*
037GP007	AOC 607	Tetrachloroethene	No ^a	Table 10.4.17*
		Trichloroethene	No ^a	Table 10.4.17*
		Vinyl chloride	Yes	Table 10.4.17*
		cis-1,2-Dichloroethene	No ^a	Table 10.4.17*
037GP07A	AOC 607	Tetrachloroethene	No ^a	Table 10.4.17*
		Trichloroethene	No ^a	Table 10.4.17*
037GP008	AOC 607	1,1-Dichloroethene	Yes	Table 10.4.17*
		Tetrachloroethene	No ^a	Table 10.4.17*
		Trichloroethene	No ^a	Table 10.4.17*
		Vinyl chloride	Yes	Table 10.4.17*
		cis-1,2-Dichloroethene	No ^a	Table 10.4.17*
037GP009	AOC 607	Tetrachloroethene	No ^a	Table 10.4.17*
		Trichloroethene	No ^a	Table 10.4.17*
037GP010	None	Tetrachloroethene	Yes	None
037GP011	None	Tetrachloroethene	Yes	None
037GP012	None	Tetrachloroethene	Yes	None
037GP017	AOC 607	1,1,2-Trichloroethane	Yes	Table 10.4.17*
		Benzene	Yes	Table 10.4.17*
037GP018	AOC 607	1,2-Dichloroethane	Yes	Table 10.4.17*
		Benzene	Yes	Table 10.4.17*
		Toluene	No ^a	Table 10.4.17*

Table 10.6.15
SMWU 37, Zone L, Subzone F
Fate and Transport COPCs

Exceedance Location	Overlapping Site	Fate and Transport COPCs	COPCs to be further Evaluated?	Reference Document
037GP037	AOCs 613, 615; AOC 240	Vinyl chloride	Yes	Table 10.7.12*

Notes:

*Zone E RFI Report (EnSafe, 1997)

*Zone F RFI Report (EnSafe, 1997)

*Zone L concentrations are within the range of those in reference document.

Thallium was detected in two of 48 DPT soil samples and exceeded its soil to groundwater SSL of 0.70 mg/kg in one sample, 037SP014 at 2.14 mg/kg. No shallow groundwater monitoring wells exist within 200 feet downgradient of this DPT soil sample from which to evaluate the soil to groundwater pathway. This thallium concentration exceeds the Zone F thallium background concentration for subsurface soil of 1.24 mg/kg.

AOC 504

In Section 10.6, Tables 10.6.12 and 10.6.13 compare maximum detected organic and inorganic constituent concentrations in soil boring samples from AOC 504 to SSLs considered protective of groundwater, using the conventions described above. Table 10.6.16 provides a summary of AOC 504 soil samples reporting SSL exceedances, along with the names of any overlapping Zone F sites. For samples with no overlapping Zone F sites, fate and transport concerns are evaluated below. In these evaluations, shallow groundwater monitoring wells within 200 feet downgradient of Zone L sampling locations were used for comparing local groundwater quality to soil concentrations.

Table 10.6.16
AOC 504, Zone L, Subzone F
Fate and Transport COPCs

Exceedance Location	Overlapping Site	Fate and Transport COPCs	COPCs to be further Evaluated?	Reference Document
Soil Borings				
504SB002	SWMU 4/AOC 19; AOC 620	Arsenic Thallium	Yes; Yes Yes; Yes	Table 10.1.12; 10.2.9* Table 10.1.12; 10.2.9*
504SB003	SWMU 4/AOC 19; AOC 620	Thallium	Yes; Yes	Table 10.1.12; 10.2.9*
504SB004	None	Arsenic Lead Thallium	Yes Yes Yes	None None None
504SB005	None	Thallium	Yes	None
504SB006	None	Arsenic Thallium	Yes Yes	None None
504SB007	None	Chromium Thallium	Yes Yes	None None
504SB008	None	Chromium Thallium	Yes Yes	None None
504SB009	None	Thallium	Yes	None
504SB010	None	Arsenic Chromium Thallium	Yes Yes Yes	None None None
504SB011	None	Chromium Thallium	Yes Yes	None None

Notes:

*Zone F RFI Report (EnSafe, 1997)

Arsenic was detected in all 11 upper-interval soil samples and all seven lower-interval soil samples and exceeded its soil to groundwater SSL of 29 mg/kg at three locations. The arsenic exceedances were encountered at 504SB004 (upper-interval 40.4 mg/kg), 504SB006 (upper-interval 137 mg/kg, lower-interval 26.9 mg/kg), and 504SB010 (upper-interval 65 mg/kg, lower-interval 34.1 mg/kg). No shallow groundwater monitoring wells exist within 200 feet downgradient of any of these three soil boring samples from which to evaluate the soil to groundwater pathway. All five reported

arsenic detections at these three soil boring locations exceeded the Zone F arsenic background concentration for surface soil (19.9 mg/kg) and subsurface soil (18.2 mg/kg).

Chromium was detected in all 11 upper-interval soil samples and all seven lower-interval soil samples and exceeded its soil to groundwater SSL of 38 mg/kg at four locations. The chromium exceedances were encountered at 504SB007 (upper-interval 42.9 mg/kg, lower-interval 51.6 mg/kg), 504SB008 (lower-interval 49.2 mg/kg), 504SB010 (lower-interval 48.3 mg/kg), and 504 SB011 (upper-interval 44.5 mg/kg, lower-interval 47.5 mg/kg). No shallow groundwater monitoring wells exist within 200 feet downgradient of any of these four soil boring samples from which to evaluate the soil to groundwater pathway. All six chromium detections at these four soil boring locations exceed the Zone F chromium background concentration for surface soil (34.8 mg/kg) and subsurface soil (32.2 mg/kg).

Lead was detected in all 11 upper-interval soil samples and all seven lower-interval soil samples and exceeded its soil to groundwater SSL of 400 mg/kg at one location, 504SB004 (upper-interval 1,670 mg/kg). No shallow groundwater monitoring wells exist within 200 feet downgradient of this soil boring from which to evaluate the soil to groundwater pathway. This result exceeds the Zone F lead background concentration for surface soil of 180 mg/kg.

Thallium was detected in eight of 11 upper-interval soil samples and all seven lower-interval soil samples and exceeded its soil to groundwater SSL of 0.70 mg/kg at eight locations. The thallium exceedances were encountered at 504SB004 (upper-interval 2.30 mg/kg), 504SB005 (upper-interval 1.40 mg/kg, lower-interval 1.80 mg/kg), 504SB006 (lower-interval 2.15 mg/kg), 504SB007 (upper-interval 1.30 mg/kg, lower-interval 3.10 mg/kg), 504SB008 (upper-interval 1.10 mg/kg, lower-interval 3.60 mg/kg), 504SB009 (upper-interval 1.10 mg/kg, lower-interval 1.10 mg/kg), 504SB010 (lower-interval 3.10 mg/kg), and 504SB011 (upper-interval 1.90 mg/kg, lower-interval 2.60 mg/kg). No shallow groundwater monitoring wells exist within 200 feet downgradient of any of these eight soil borings from which to evaluate the soil to groundwater

pathway. All six upper-interval thallium exceedances also exceed the non-detect Zone F thallium background concentration for surface soil. Six of seven lower-interval thallium exceedances also exceed the Zone F thallium background concentration for subsurface soil of 1.24 mg/kg.

AOC 699

In Section 10.6, Tables 10.6.7 and 10.6.8 compare maximum detected organic and inorganic constituent concentrations in DPT soil samples from AOC 699 to risk-based soil screening levels considered protective of groundwater, using the conventions described above. Table 10.6.17 provides a summary of AOC 699 DPT soil samples reporting SSL exceedances, along with the names of any overlapping Zone F sites. Fate and transport concerns at Zone L sample locations not associated with any overlapping Zone F sites are evaluated below. In these evaluations, shallow groundwater monitoring wells within 200 feet downgradient of Zone L sampling locations were used for comparing local groundwater quality to soil concentrations.

Thallium was detected in 5 of 33 DPT soil samples and exceeded its soil to groundwater SSL of 0.70 mg/kg at five locations. The thallium exceedances were encountered at 699SP017 (1.67 mg/kg), 699SP020 (2.14 mg/kg), 699SP20A (2.20 mg/kg), 699SP023 (4.56 mg/kg), and 699SP024 (2.56 mg/kg). No shallow groundwater monitoring wells exist within 200 feet downgradient of any of these five DPT soil sample locations from which to evaluate the soil to groundwater pathway. All five thallium exceedances are greater than the Zone F thallium background concentration for subsurface soil of 1.24 mg/kg.

Manganese was detected in all 33 DPT soil samples and exceeded its soil to groundwater SSL of 950 mg/kg at one location, 699SP023 at 2,660 mg/kg. No shallow groundwater monitoring wells exist within 200 feet downgradient of this DPT soil sample location from which to evaluate the soil to groundwater pathway. The manganese exceedance at 699SP023 is also greater than the Zone F manganese background for subsurface soil of 469 mg/kg.

Table 10.6.17
AOC 699, Zone L, Subzone F
Fate and Transport COPCs

Exceedance Location	Overlapping Site	Fate and Transport COPCs	COPCs to be further Evaluated?	Reference Document
DPT Soil				
699SP001	SWMU 36; AOC 620	Chromium	No ^a	Table 10.2.9*
699SP002	SWMU 36; AOC 620	Chromium	No ^a	Table 10.2.9*
699SP017	None	Thallium	Yes	None
699SP020	None	Thallium	Yes	None
699SP20A	None	Thallium	Yes	None
699SP023	None	Chromium Manganese Thallium	Yes Yes Yes	None None None
699SP024	None	Thallium	Yes	None
DPT Groundwater				
699GP007	AOCs 617; 620	Vinyl Chloride	Yes	Table 10.9.9; 10.2.9*

Notes:

*Zone F RFI Report (EnSafe, 1997)

* Zone L concentrations are within the range of those in reference document.

Chromium was detected in all 33 DPT soil samples and exceeded its soil to groundwater SSL of 38 mg/kg at one location, 699SP023 at 47.3 mg/kg. No shallow groundwater monitoring well exists within 200 feet of this DPT soil sample location from which to evaluate the soil to groundwater pathway. The chromium exceedance at this point is greater than the Zone F chromium background concentration for subsurface soil of 32.3 mg/kg.

10.6.4.2 Groundwater to Surface Water Cross-Media Transport

SWMU 37

In Section 10.6, Tables 10.6.4 and 10.6.6 compare maximum detected organic and inorganic constituent concentrations in DPT groundwater samples from SWMU 37 to RBCs, and to chronic

ambient saltwater quality criteria values for the protection of aquatic life (saltwater surface water chronic screening values). For inorganics, maximum concentrations in groundwater are compared to the greater of (a) RBCs, or (b) background reference concentrations for groundwater, as well as to the saltwater surface water chronic values. To provide a conservative screen, no attenuation or dilution of constituents in groundwater is assumed before comparison to the relevant standards.

The screening comparisons in the two tables mentioned above identify the constituents with the potential to impact downgradient groundwater quality and surface water quality. Table 10.6.15 provides a summary of SWMU 37 groundwater samples reporting exceedances of RBCs or surface water screening levels, along with the names of overlapping Zone F sites. Fate and transport concerns at Zone L groundwater sampling locations not associated with any overlapping Zone F sites are evaluated below. In these evaluations, shallow groundwater monitoring wells within 200 feet of the Zone L sampling location were used for comparison since the Zone L sampling point may be downgradient or cross-gradient from similar groundwater concentrations.

Tetrachloroethene was detected at eight of 63 DPT groundwater samples and exceeded its RBC of 1.10 $\mu\text{g/l}$ at three DPT locations: 037GP010 (60.1 $\mu\text{g/l}$), 037GP011 (90.9 $\mu\text{g/l}$), and 037GP012 (7.31 $\mu\text{g/l}$). Since no shallow groundwater monitoring wells exist within a 200 foot radius of any of these three DPT locations, the persistence of tetrachloroethene in groundwater cannot be evaluated. DPT soil samples taken within 10 feet of 037GP010 (037SP009) and 037GP012 (037SP011) had detections of tetrachloroethene in soil of 31.60 $\mu\text{g/kg}$ and 15.60 $\mu\text{g/kg}$, respectively, which are below tetrachloroethene's soil to groundwater SSL of 60 $\mu\text{g/kg}$.

AOC 699

In Section 10.6, Tables 10.6.10 and 10.6.11 compare maximum detected organic and inorganic constituent concentrations in DPT groundwater samples from AOC 699 to RBCs, and to chronic ambient saltwater quality criteria values for the protection of aquatic life (saltwater surface water chronic screening values) using the conventions described in the previous subsection.

Table 10.6.17 provides a summary of AOC 699 groundwater samples reporting exceedances of RBCs or surface water screening levels, along with the names of overlapping Zone F sites. All AOC 699 DPT groundwater samples with exceedances are associated with overlapping Zone F sites.

10.6.4.3 Fate and Transport Summary

Five inorganics – thallium, arsenic, chromium, manganese, and lead – were reported at concentrations exceeding their soil to groundwater SSLs and corresponding background concentrations in soil from Subzone F soil sample locations not associated with existing Zone F sites. Of these five, thallium, arsenic, and chromium were encountered at more widespread occurrences in Subzone F. The soil to groundwater pathway could not be evaluated for distances less than 200 feet at any of the locations with exceedances due to the lack of monitoring well groundwater data.

Tetrachloroethene was the only organic compound detected in groundwater samples exceeding its RBC at three locations. Soil samples within 10 feet of these samples had tetrachloroethene concentration in soil less than the compound’s SSL. This area was further investigated in second round groundwater sampling which is discussed in Section 10.10.3.

Samples collected from locations with overlapping Zone E and F sites will be evaluated in an addendum to the appropriate Zone RFI report.

10.6.5 Human Health Risk Assessment for SWMU 37, AOC 699, and AOC 504, Subzone F

10.6.5.1 Site Background and Investigative Approach

Section 10.6 provides a description for SWMU 37, AOC 699, and AOC 504 as well as a discussion of the sampling activities that took place during the Zone L RFI activities.

10.6.5.2 COPC Identification

SWMU 37 Soil

Based on the screening comparisons described in Section 7 of this RFI and presented in Table 10.6.2, aluminum, arsenic, chromium, , manganese, and vanadium were identified as COPCs for soil. Table 10.6.18 provides a summary of SWMU 37 soil samples that reported exceedances along with any associated sites that overlapped the area where these soil samples were taken. Except for soil sample 037SP014, all of the soil samples that reported exceedances were collected in the vicinity of and existing Zone F site. Thallium was the only COPC identified for sample 037SP014. A risk assessment is provided to evaluate the significance of thallium soil concentrations. For the remainder of the COPCs identified for SWMU 37 subzone F, data generated during the Zone L RFI were compared to data generated during the Zone F RFI and the results of these comparisons are provided on Table 10.6.18. A reference to the Zone F RFI report is also provided so that these comparisons can be easily verified. It was assumed that if the data generated during the Zone L RFI were less than or within the range of the data generated during the Zone F RFI, then the conclusions for Zone L would be the similar and therefore no further evaluation would be necessary. Conversely, if for any reason the data generated during the Zone L RFI revealed something that was not evaluated during the Zone F RFI (data reported higher than that presented in the Zone F RFI, or new COPCs), then further evaluation should be deferred to the Zone F RFI and included as an addendum. Recommendations are provided in Section 11.

Table 10.6.18
SWMU 37, Zone L, Subzone F
Risk Assessment COPCs

Exceedance Location	Overlapping Site	Risk Assessment COPCs	COPCs to be further Evaluated?	Reference Document
DPT Soil				
037SP001	Zone E; AOC 579	Thallium	Yes	Table 10.39.4.1*
037SP014	None	Thallium	Yes	None
037SP020	Zone E; AOC 596	Chromium	No*	Table 10.45.6.1*

Table 10.6.18
SWMU 37, Zone L, Subzone F
Risk Assessment COPCs

Exceedance Location	Overlapping Site	Risk Assessment COPCs	COPCs to be further Evaluated?	Reference Document
037SP026	SWMU 175, AOCs 613 & 615	Aluminum	No ^a	Table 10.7.14*
		Arsenic	No ^a	Table 10.7.14*
		Chromium	No ^a	Table 10.7.14*
		Manganese	No ^a	Table 10.7.14*
		Vanadium	No ^a	Table 10.7.14*
037SP030	AOC 620	Barium	Yes	Table 10.2.11*
037SP032	AOC 620	Arsenic	Yes	Table 10.2.11*
037SP036	FDS	Arsenic	Yes	None
DPT Groundwater				
037GP006	AOC 607	Tetrachloroethene	No ^a	Table 10.4.20*
037GP007	AOC 607	Tetrachloroethene	No ^a	Table 10.4.20*
		Trichloroethene	No ^a	Table 10.4.20*
		Vinyl Chloride	Yes	Table 10.4.20*
		cis-1,2-Dichloroethene	No ^a	Table 10.4.20*
037GP07A	AOC 607	Tetrachloroethene	No ^a	Table 10.4.20*
		Trichloroethene	No ^a	Table 10.4.20*
		cis-1,2-Dichloroethene	No ^a	Table 10.4.20*
037GP008	AOC 607	1,1-Dichloroethene	Yes	Table 10.4.20*
		Tetrachloroethene	No ^a	Table 10.4.20*
		Trichloroethene	No ^a	Table 10.4.20*
		Vinyl chloride	Yes	Table 10.4.20*
		cis-1,2-Dichloroethene	No ^a	Table 10.4.20*
037GP009	AOC 607	Tetrachloroethene	No ^a	Table 10.4.20*
		cis-1,2-Dichloroethene	No ^a	Table 10.4.20*
037GP010	None	Tetrachloroethene	Yes	None
037GP011	None	Tetrachloroethene	Yes	None
037GP012	None	Tetrachloroethene	Yes	None
037GP017	AOC 607	1,1,2-Trichloroethane	Yes	Table 10.4.20*
		Benzene	Yes	Table 10.4.20*
		Ethylbenzene	Yes	Table 10.4.20*
037GP018	AOC 607	1,2-Dichloroethane	Yes	Table 10.4.20*
		Benzene	Yes	Table 10.4.20*
		Ethylbenzene	Yes	Table 10.4.20*
037GP019	AOC 607	Ethylbenzene	Yes	Table 10.4.20*

Table 10.6.18
SWMU 37, Zone L, Subzone F
Risk Assessment COPCs

Exceedance Location	Overlapping Site	Risk Assessment COPCs	COPCs to be further Evaluated?	Reference Document
037GP020	AOC 607	Ethylbenzene	Yes	Table 10.4.20*
037GP037	AOCs 613, 615 and 240	Chlorobenzene Vinyl chloride cis-1,2-Dichloroethene	Yes Yes Yes	Table 10.7.15* Table 10.7.15* Table 10.7.15*
037GP056	FDS	Ethylbenzene	Yes	None

Notes:

*Zone F RFI Report (EnSafe, 1997)

* Zone L concentrations are within the range of those in reference document.

AOC 699 Soil

Based on the screening comparisons described in Section 7 of this RFI and presented in Table 10.6.8, aluminum, arsenic, chromium, manganese, thallium, and vanadium were identified as COPCs for soil. Table 10.6.19 provides a summary of AOC 699 soil samples that reported exceedances along with any associated sites that overlapped the area where these soil samples were taken. Except for two soil samples (699SP001 and 699SP002), none of the soil samples reporting exceedances were collected in the vicinity of any existing SWMU or AOC. Isolated occurrences

Table 10.6.19
AOC 699, Zone L, Subzone F
Risk Assessment COPCs

Exceedance Location	Overlapping Site	Risk Assessment COPCs	COPCs to be further Evaluated?	Reference Document
DPT Soil				
699SP001	SWMU 36; AOC 620	Chromium	Yes	Table 10.2.11*
699SP002	SWMU 36; AOC 620	Chromium	Yes	Table 10.2.11*
699SP017	None	Thallium	Yes	None
699SP020	None	Thallium	Yes	None

Table 10.6.19
AOC 699, Zone L, Subzone F
Risk Assessment COPCs

Exceedance Location	Overlapping Site	Risk Assessment COPCs	COPCs to be further Evaluated?	Reference Document
699SP20A	None	Thallium	Yes	None
699SP023	None	Aluminum	Yes	None
		Arsenic	Yes	None
		Chromium	Yes	None
		Manganese	Yes	None
		Thallium	Yes	None
		Vanadium	Yes	None
699SP024	None	Thallium	Yes	None
DPT Groundwater				
699GP007	AOCs 617, 620	cis-1,2-Dichloroethene	Yes	Tables 10.9.10; 10.2.12*
		Vinyl chloride	Yes	Tables 10.9.10; 10.2.12*
699GP038	AOC 607	cis-1,2-Dichloroethene	No ^a	Table 10.4.20*

Notes:

*Zone F RFI Report (EnSafe, 1997)

^a Zone L concentrations are within the range of those in reference document.

of thallium reported in soil at concentrations above its RBC were scattered throughout AOC 699. 1
 As a result, thallium data from all of the AOC 699 soil samples were added to thallium data 2
 generated for the SWMU 37 and AOC 504, Subzone F investigations and were used to assess soil 3
 pathways for Subzone F. The data from DPT soil sample 699SP023 were added to the data 4
 generated during the SWMU 37 and AOC 699 Subzone F investigations and were used to evaluate 5
 the soil pathways for the COPCs represented by combining the COPCs listed for each Zone L 6
 SWMU and AOC. 7

AOC 504 Soil 9

Based on the screening comparisons described in Section 7 of this RFI and presented in 10
 Tables 10.6.12 and 10.6.13, aluminum, antimony, arsenic, BEQs, chromium, copper, lead, 11
 manganese, thallium, and vanadium were identified as COPCs for soil. Table 10.6.20 provides 12

a summary of AOC 504 soil samples that reported exceedances along with any associated sites that overlapped the area where these soil samples were taken. Except for three soil samples (504SB001, 504SB002, and 504SB003), none of the soil samples reporting exceedances were collected in the vicinity of any existing SWMU or AOC. The data from the remaining samples were used to evaluate the risk and hazard associated with soil concentrations of AOC 504 soil COPCs listed above.

SWMU 37 Groundwater

Based on the screening comparisons described in Section 7 of this RFI and presented in Table 10.6.4, benzene, chlorobenzene, 1,2-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, ethylbenzene, tetrachloroethene, 1,1,2-trichloroethane, trichloroethene, and vinyl chloride were identified as COPCs for groundwater. Table 10.6.18 provides a summary of SWMU 37 groundwater samples that reported exceedances along with any associated sites that overlapped the area where these samples were taken. Except for three DPT groundwater samples (037GP010, 037GP011, and 037GP012), all were collected in the vicinity of existing Zone F sites. Tetrachloroethene was the only COPC identified for DPT groundwater sample 037GP010, 037GP011, and 037GP012. As a result, point risk/hazard estimates are provided to evaluate the significance of tetrachloroethene concentrations reported in groundwater at these three locations.

Table 10.6.20
AOC 504, Zone L, Subzone F
Risk Assessment COPCs

Exceedance Location	Overlapping Site	Risk Assessment COPCs	COPCs to be further Evaluated?	Reference Document
Soil Boring				
504SB001	SWMU 4/AOC 19; AOC 620	BEQs	Yes; No ^a	Table 10.1.14; 10.2.11*
504SB002	SWMU 4/AOC 19; AOC 620	Arsenic BEQs Thallium	Yes; Yes Yes; No ^a Yes; Yes	Table 10.1.14; 10.2.11* Table 10.1.14; 10.2.11* Table 10.1.14; 10.2.11*

Table 10.6.20
AOC 504, Zone L, Subzone F
Risk Assessment COPCs

Exceedance Location	Overlapping Site	Risk Assessment COPCs	COPCs to be further Evaluated?	Reference Document
504SB003	SWMU 4/AOC 19; AOC 620	BEQs Thallium	Yes; No* Yes; Yes	Table 10.1.14; 10.2.11* Table 10.1.14; 10.2.11*
504SB004	None	Arsenic BEQs Lead Manganese Thallium	Yes Yes Yes Yes Yes	None None None None None
504SB005	None	Aluminum Arsenic BEQs Manganese Thallium	Yes Yes Yes Yes Yes	None None None None None
504SB006	None	Arsenic	Yes	None
504SB007	None	Arsenic BEQs Chromium Copper Manganese Thallium	Yes Yes Yes Yes Yes Yes	None None None None None None
504SB008	None	Arsenic BEQs Manganese Thallium	Yes Yes Yes Yes	None None None None
504SB009	None	Arsenic BEQs Thallium	Yes Yes Yes	None None None
504SB010	None	Arsenic BEQs	Yes Yes	None None
504SB011	None	Aluminum Antimony Arsenic BEQs Chromium Manganese Thallium Vanadium	Yes Yes Yes Yes Yes Yes Yes Yes	None None None None None None None None

Notes:

*Zone F RFI Report (EnSafe, 1997)

* Zone L concentrations are within the range of those in reference document.

For the remaining COPCs, data generated during the Zone L RFI were compared to data generated during the Zone F RFI and the results of these comparisons are provided on Table 10.6.18. A reference to the Zone F RFI report is also provided so that these comparisons can be easily verified. It was assumed that if the data generated during the Zone L RFI were less than or within the range of the data generated during the Zone F RFI, then the conclusions for Zone L would be the similar and therefore no further evaluation would be necessary. Conversely, if for any reason the data generated during the Zone L RFI revealed something that was not evaluated during the Zone F RFI (data reported higher than that presented in the Zone F RFI, or new COPCs), then further evaluation should be deferred to the Zone F RFI and included as an addendum. Recommendations are provided in Section 11.

AOC 699 Groundwater

Based on the screening comparisons described in Section 7 of this RFI and presented in Table 10.6.10, cis-1,2-dichloroethene and vinyl chloride were identified as COPCs for groundwater. Table 10.6.14 provides a summary of AOC 699 groundwater samples that reported exceedances along with any associated sites that overlapped the area where these samples were taken. All of the DPT groundwater samples were collected in the vicinity of existing Zone F sites. Data generated during the Zone L RFI were compared to data generated during the Zone F RFI and the results of these comparisons are provided on Table 10.6.19. A reference to the Zone F RFI report is also provided so that these comparisons can be easily verified. It was assumed that if the data generated during the Zone L RFI were less than or within the range of the data generated during the Zone F RFI, then the conclusions for Zone L would be the similar and therefore no further evaluation would be necessary. Conversely, if for any reason the data generated during the Zone L RFI reveals something that was not evaluated during the Zone F RFI (data reported higher than that presented in the Zone F RFI, or new COPCs), then further evaluation should be deferred to the Zone F RFI and included as an addendum. Recommendations are provided in Section 11.

10.6.5.3 Exposure Assessment

Potentially Exposed Populations

Potentially exposed populations are current and future site workers and hypothetical future site residents. Future site resident and worker exposure scenarios were addressed in this risk assessment. The hypothetical future site worker scenario assumed continuous exposure to surface soil conditions and the use of shallow groundwater as a potable water source. Current site workers' exposure would be less than that assumed for the hypothetical future site worker scenario because of their limited soil contact and the fact that groundwater is not currently used onsite as a source of potable or process water. Therefore, future worker assessment is considered to be conservatively representative of current site use. The future site resident scenario was built on the premise that current buildings would be removed and replaced with dwellings. In addition, the future site residents were assumed to use the shallow aquifer onsite as a source of drinking water.

Exposure Pathways

Exposure pathways for the site workers are dermal contact, incidental ingestion of surface soils, and ingestion of groundwater through potable use. Volatile organic compounds were reported in the groundwater; thus, inhalation of volatilized groundwater contaminants was also considered a viable exposure pathway. The exposure pathways for future residential land use are the same as those for the future site worker. In addition, the hypothetical future site worker scenario assumed continuous exposure to surface soil and groundwater conditions. Uniform exposure was assumed for all sample locations. Table 10.6.21 presents the justification for exposure pathways assessed in this HHRA.

Table 10.6.21
Exposure Pathways Summary – SWMU 37, AOC 699, and AOC 504
CNC – Subzone F
Charleston, South Carolina

Potentially Exposed Population	Medium and Exposure Pathway	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
Current Land Uses			
Current Site Users/Maintenance	Air, Inhalation of gaseous contaminants emanating from soil	No	Based on the COPCs identified in this HHRA, this would not be a significant pathway.
	Air, Inhalation of chemicals entrained in fugitive dust	No	This pathway was considered to be insignificant relative to the other soil pathways that were evaluated.
	Shallow groundwater, Ingestion of contaminants during potable or general use	No (Qualified)	Future land use assessment is considered to be conservatively representative of current receptors.
	Shallow groundwater, Inhalation of volatilized shallow groundwater contaminants	No (Qualified)	Future land use assessment is considered to be conservatively representative of current receptors.
	Soil, Incidental ingestion	No (Qualified)	Future land use assessment is considered to be conservatively representative of current receptors.
	Soil, Dermal contact	No (Qualified)	Future land use assessment is considered to be conservatively representative of current receptors.
Future Land Uses			
Future Site Residents (Child and Adult) and Future Site Worker	Air, Inhalation of gaseous contaminants emanating from soil	No	Based on the COPCs identified in this HHRA, this would not be a significant pathway.
	Air, Inhalation of chemicals entrained in fugitive dust	No	This pathway was considered to be insignificant relative to the other soil pathways that were evaluated.
	Shallow groundwater, Ingestion of contaminants during potable or general use	Yes	COPCs were identified subsequent to risk-based and background screening comparisons.
	Shallow groundwater, Inhalation of volatilized contaminants during domestic use	Yes	COPCs were identified subsequent to risk-based and background screening comparisons.

Table 10.6.21
Exposure Pathways Summary – SWMU 37, AOC 699, and AOC 504
CNC – Subzone F
Charleston, South Carolina

Potentially Exposed Population	Medium and Exposure Pathway	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
	Soil, Incidental ingestion	Yes	COPCs were identified subsequent to risk-based and background screening comparisons.
	Soil, Dermal contact	Yes	COPCs were identified subsequent to risk-based and background screening comparisons.
	Wild game or domestic animals, Ingestion of tissue impacted by media contamination	No	Hunting/taking of game and/or raising livestock is prohibited within the Charleston, South Carolina city limits.
	Fruits and vegetables, Ingestion of plant tissues grown in media	No	The potential for significant exposure via this pathway is low relative to that of other exposure pathways assessed.

Exposure Unit Area

With regard to soil pathways, the focus of the risk assessment for subzone F is the area along the railroad tracks running along Hobson Street just to the west of Buildings 1172 and 1175. SWMU 37 DPT soil sample 037SP014, AOC 504 soil samples 504SB004 through 504SB011(8 samples) and AOC 699 DPT soil sample 699SP023 were used to characterize the soil pathways for subzone F. Thallium exceedances occurred in various locations throughout AOC 699. As a result, all of the AOC 699 thallium data was combined with the thallium data generated for the sample listed for SWMU 37 and AOC 504 to evaluated the soil pathways for thallium. With respect to the groundwater pathways, DPT groundwater samples 037GP010, 037GP011, and 037GP012, located along Hobson Street from Building 1179 to Building 199 were used to characterize the groundwater pathways for subzone F.

Exposure Point Concentrations

As discussed in Section 7 of this RFI, UCLs were calculated for datasets consisting of at least 10 samples. Table 10.6.22 presents a statistical summary of the soil data used in the risk

Table 10.6.22
 Statistical Analysis of COPCs
 SWMU 37, AOC 699, and AOC 504, Subzone F
 Surface Soil
 Charleston Naval Complex
 Charleston, South Carolina

COPC	n	Natural Log Transformed			UCL (mg/kg)	MAX (mg/kg)	EPC (mg/kg)
		mean	SD	H-stat			
Aluminum	10	9.458	0.745	2.612	32344	26700	26700 MAX Used
Antimony	10	0.256	0.886	2.875	4.47	4.3	4.30 MAX Used
Arsenic	10	3.446	0.673	2.488	68.8	137	68.8 UCL Used
Benzo(a)pyrene equiv.	8	NA	NA	NA	NA	0.67	0.67 MAX Used
Chromium	10	3.189	0.702	2.536	56.2	47.3	47.3 MAX Used
Copper	10	3.423	1.155	3.435	224	441	224 UCL Used
Lead	10	4.196	1.359	3.887	973	1670	973 UCL Used
Manganese	10	5.366	1.621	4.492	9016	2660	2660 MAX Used
Thallium	42	-0.246	0.621	2.402	1.56	4.56	1.56 UCL Used
Vanadium	10	3.478	0.881	2.866	111	77.5	77.5 MAX Used

NOTES:

- mean arithmetic mean of the logtransformed data
- n number of samples analyzed
- SD standard deviation for a sample of data
- H-stat "H" statistic from Gilbert 1987; cuboidal interpolation was used to determine the value in accordance with USEPA Supplemental Guidance to RAGS, Calculating the Conc
- NA not applicable
- EPC exposure point concentration
- UCL 95 percentile upper confidence level mean
- MAX maximum reported concentration

assessment. As shown, the EPCs for arsenic and thallium were set equal to their respective 95 % UCLs. Maximum concentrations were used as EPC for aluminum, antimony, chromium, manganese, and vanadium because their UCLs exceeded their maximum concentrations. For BEQs, its maximum concentrations was used as the EPC because their were only eight data points. For groundwater pathways the maximum concentration of tetrachloroethene was used as its EPC because there were only three samples.

Quantification of Exposure

Soil

CDIs for ingestion and dermal contact with soils are shown in Tables 10.6.23 and 10.6.24 respectively.

Groundwater

The CDIs for groundwater ingestion are presented in Table 10.6.25. The CDI for inhalation of volatile constituents during use of groundwater is assumed to be equal to the CDI estimated for groundwater ingestion.

10.6.5.4 Toxicity Assessment

Toxicity assessment terms and methods are discussed in Section 7 of this report. Table 10.6.26 presents toxicological information specific to each COPC evaluated in this risk assessment. This information was used in the quantification of risk/hazard associated with soil contaminants. Brief toxicological profiles for are provided in the following paragraphs.

Aluminum is one of the most abundant metals in the earth's crust (7% aluminum), and it is ubiquitous in air and water, as well as soil. This metal is water-soluble, silvery, and ductile, which suggests its usefulness in many processes. Ingesting aluminum can affect the absorption of other elements within the gastrointestinal tract and can alter intestinal function. Aluminum can potentially interfere with the absorption of essential nutrients and cholesterol. Another effect on

Table 10.6.23
 Chronic Daily Intakes (CDI)
 Incidental Ingestion of Surface Soil
 SWMU 37, AOC 699, and AOC 504, Subzone F
 Charleston Naval Complex
 Charleston, South Carolina

Chemical	Fraction Ingested from Contaminated Source *	Exposure Point Concentration (mg/kg)	Future	Future	Future	Current	Current
			Resident adult H-CDI (mg/kg-day)	Resident child H-CDI (mg/kg-day)	Resident lwa C-CDI (mg/kg-day)	Worker adult H-CDI (mg/kg-day)	Worker adult C-CDI (mg/kg-day)
Aluminum	1	26700	3.66E-02	3.41E-01	4.18E-02	1.31E-02	4.67E-03
Antimony	1	4.30	5.89E-06	5.50E-05	6.73E-06	2.10E-06	7.51E-07
Arsenic	1	68.8	9.42E-05	8.79E-04	1.08E-04	3.36E-05	1.20E-05
Benzo(a)pyrene equiv.	1	0.67	9.20E-07	8.58E-06	1.05E-06	3.28E-07	1.17E-07
Chromium	1	47.3	6.48E-05	6.05E-04	7.41E-05	2.31E-05	8.26E-06
Copper	1	224.2	3.07E-04	2.87E-03	3.51E-04	1.10E-04	3.92E-05
Lead	1	972.7	1.33E-03	1.24E-02	1.52E-03	4.76E-04	1.70E-04
Manganese	1	2660	3.64E-03	3.40E-02	4.16E-03	1.30E-03	4.65E-04
Thallium	1	1.56	2.14E-06	1.99E-05	2.44E-06	7.63E-07	2.72E-07
Vanadium	1	77.5	1.06E-04	9.91E-04	1.21E-04	3.79E-05	1.35E-05

NOTES:

- lwa Lifetime weighted average; used to calculate carcinogenic CDI, RAGS Parts A and B
- CDI Chronic Daily Intake in mg/kg-day
- H-CDI CDI for hazard quotient
- C-CDI CDI for excess cancer risk
- * Reflects the estimated fraction of the site impacted by the corresponding COPC.

Table 10.3.24
 Chronic Daily Intakes (CDI)
 Dermal Contact with Surface Soil
 SWMU 37, AOC 699, and AOC 504, Subzone F
 Charleston Naval Complex
 Charleston, South Carolina

Chemical	Exposure Point Concentration (mg/kg)	Fraction Contacted from Contaminated Source *	Dermal Absorption Factor (unitless)	Future	Future	Future	Current	Current
				Resident adult H-CDI (mg/kg-day)	Resident child H-CDI (mg/kg-day)	Resident lwa C-CDI (mg/kg-day)	Worker adult H-CDI (mg/kg-day)	Worker adult C-CDI (mg/kg-day)
Aluminum	26700	1	0.001	1.50E-03	4.95E-03	9.39E-04	1.07E-03	3.83E-04
Antimony	4.30	1	0.001	2.42E-07	7.97E-07	1.51E-07	1.73E-07	6.16E-08
Arsenic	68.8	1	0.001	3.86E-06	1.27E-05	2.42E-06	2.76E-06	9.85E-07
Benzo(a)pyrene equiv.	0.67	1	0.01	3.77E-07	1.24E-06	2.36E-07	2.69E-07	9.62E-08
Chromium	47.3	1	0.001	2.66E-06	8.77E-06	1.66E-06	1.90E-06	6.78E-07
Copper	224	1	0.001	1.26E-05	4.16E-05	7.88E-06	8.99E-06	3.21E-06
Lead	973	1	0.001	5.46E-05	1.80E-04	3.42E-05	3.90E-05	1.39E-05
Manganese	2660	1	0.001	1.49E-04	4.93E-04	9.35E-05	1.07E-04	3.81E-05
Thallium	1.56	1	0.001	8.76E-08	2.89E-07	5.48E-08	6.25E-08	2.23E-08
Vanadium	77.5	1	0.001	4.35E-06	1.44E-05	2.72E-06	3.11E-06	1.11E-06

NOTES:

CDI Chronic Daily Intake in mg/kg-day

H-CDI CDI for hazard quotient

C-CDI CDI for excess cancer risk

- The dermal absorption factor was applied to the exposure point concentration to reflect the different trans-dermal migration of inorganic versus organic chemicals

* Reflects the estimated fraction of the site impacted by the corresponding COPC.

Table 10.6.25
 Chronic Daily Intakes (CDI)
 Ingestion of COPCs in Groundwater
 SWMU 37, AOC 699, and AOC 504, Subzone F
 Charleston Naval Complex
 Charleston, South Carolina

Chemical	Exposure Point Concentration (mg/liter)	Future	Future	Future	Future	Future
		Resident adult H-CDI (mg/kg-day)	Resident child H-CDI (mg/kg-day)	Resident lwa C-CDI (mg/kg-day)	Worker adult H-CDI (mg/kg-day)	Worker adult C-CDI (mg/kg-day)
Tetrachloroethene	0.0909	2.49E-03	5.81E-03	1.37E-03	8.89E-04	4.38E-04

NOTES:

- lwa Lifetime weighted average
- CDI Chronic Daily Intake
- H-CDI Non-carcinogenic hazard based Chronic Daily Intake
- C-CDI Carcinogenic risk based Chronic Daily Intake
- mg/kg-day milligrams per kilogram per day

Table 10.6.26
 Toxicological Database Information
 for Chemicals of Potential Concern
 SWMU 37, AOC 699, and AOC 504, Subzone F
 Charleston Naval Complex
 Charleston, South Carolina

Non-Carcinogenic Toxicity Data

Chemical	Oral			Critical Effect	Uncertainty Factor Oral	Inhalation			Uncertainty Factor Inhalation
	Reference Dose (mg/kg/day)	Confidence Level				Reference Dose (mg/kg/day)	Confidence Level	Critical Effect	
Inorganics									
Aluminum	1	c				ND			
Antimony	0.0004	a	L	Decreased lifespan	1000	ND			
Arsenic	0.0003	a	M	hyperpigmentation	3	ND			
Chromium (III)	1	a	L	No observable effects	100	ND			
Chromium (VI)	0.005	a	L	No observable effects	500	ND			
Copper	0.04	c				ND			
Lead	ND					ND			
Manganese	0.047	a	M	neurological effects	1	1.43E-05	a	Increased incidence of pneumonia	
Thallium	8E-05	a	L	Increased SGOT	3000	ND			
Vanadium	0.007	b			100	ND			
Carcinogenic PAHs/PCBs									
Benzo(a)pyrene equivalents	ND					ND			

NOTES:

- a Integrated Risk Information System (IRIS)
- b Health Effects Assessment Summary Tables (HEAST)
- c EPA Environmental Criteria and Assessment Office - Cincinnati (provisional)
- NA Not applicable or not available
- ND Not determined due to lack of information

Table 10.6.26 (continued)
 Toxicological Database Information
 for Chemicals of Potential Concern
 SWMU 37, AOC 699, and AOC 504, Subzone F
 Charleston Naval Complex
 Charleston, South Carolina

Chemical	Carcinogenic Toxicity Data		Weight of Evidence	Tumor Type
	Oral Slope Factor [(mg/kg/day)] ⁻¹	Inhalation Slope Factor [(mg/kg/day)] ⁻¹		
Aluminum	ND	ND		
Antimony	ND	ND		
Arsenic	1.5	15.1	a	A various
Chromium (III)	ND	ND		
Chromium (VI)	ND	42	b	A Lung cancer
Copper	ND	ND		
Lead	ND	ND		
Manganese	ND	ND	D	
Thallium	ND	ND		
Vanadium	ND	ND		
Carcinogenic PAHs/PCBs				
Benzo(a)pyrene equivalents	7.3	3.1	a	B2 Forestomach

NOTES:

- a Integrated Risk Information System (IRIS)
- b Health Effects Assessment Summary Tables (HEAST)
- e EPA Environmental Criteria and Assessment Office - Cincinnati (provisional)
- NA Not applicable or not available
- ND Not determined due to lack of information

the gastrointestinal system is the inhibition of acetylcholine-induced contractions, which are part of the neuromuscular system controlling bowel muscles. The effect could explain why aluminum-containing antacids often produce constipation. Aluminum dust is moderately flammable and explosive in heat. Inhaling this dust can cause fibrosis (aluminosis) (Klaassen, et al., 1986) (Dreisbach, et al., 1987). No data are available on an applicable SF or the USEPA cancer group. The USEPA Region IV Office of Health Assessment suggested using the provisional oral RfD of 1.0 mg/kg-day. The aesthetic-based SMCL for drinking water is 50 to 200 $\mu\text{g/L}$ (USEPA, Office of Water).

Antimony belongs to the same periodic group as arsenic. This element is absorbed slowly through the gastrointestinal tract, which is the target of this element. Another target is the blood, where antimony concentrates. Due to frequent industrial use, the primary exposure route for antimony to the general population is food. Antimony is also a common air pollutant from industrial emissions. USEPA has not classified antimony as a carcinogen, and the oral RfD is 0.0004 mg/kg-day (Klaassen, et al, 1986).

Arsenic exposure via the ingestion route causes darkening and hardening of the skin in chronically exposed humans. Inhalation exposure to arsenic causes neurological deficits, anemia, and cardiovascular effects. Arsenic's effects on the nervous and cardiovascular systems are primarily associated with acute exposure to higher levels. Exposure to arsenic containing materials has been shown to cause cancer in humans. Inhalation of these materials can lead to increased lung cancer risk, and ingestion of these materials is associated with increased skin cancer rates. Human milk contains about 3 $\mu\text{g/L}$ arsenic (Klaassen, et al, 1986). USEPA set 0.0003 mg/kg-day as the oral RfD for arsenic based on a NOAEL of 0.0008 mg/kg-day and an uncertainty factor of 3. The uncertainty accounts for insufficiencies in the data base and sensitive human subpopulations. The overall confidence in the oral RfD is medium. Arsenic has been classified as a group A

carcinogen with an oral slope factor of 1.5 (mg/kg-day)⁻¹. A inhalation slope factor of 15.1 (mg/kg-day)⁻¹ is calculated by converting the IRIS unit risk to dose units.

Benzo(a)pyrene equivalents include the following list of polynuclear aromatic hydrocarbons:

Benzo(a)anthracene	TEF	0.1	
Benzo(a)pyrene	TEF	1.0	
Benzo(b)fluoranthene	TEF	0.1	
Benzo(k)fluoranthene	TEF	0.01	
Chrysene	TEF	0.001	
Dibenz(a,h)anthracene	TEF	1.0	
Indeno(1,2,3-cd)pyrene	TEF	0.1	

Some PAHs are toxic to the liver, kidney, and blood. However, the toxic effects of the PAHs above have not been well established. There are no RfDs for the PAHs above due to a lack of data. All PAHs listed above are classified by USEPA as B2 carcinogens, and their carcinogenicity is addressed relative to that of benzo(a)pyrene, having an oral SF of 7.3 (mg/kg-day)⁻¹. Toxicity Equivalency Factors, also set by USEPA, are multipliers that are applied to the detected concentrations, which are subsequently used to calculate excess cancer risk. These multipliers are discussed further in the exposure and toxicity assessment sections. Most carcinogenic PAHs have been classified as carcinogenic due to animal studies using large doses of purified PAHs. There is some doubt as to the validity of these listings, and the SFs listed in USEPA's RBC table are provisional. However, these PAHs are carcinogens when the exposure involves a mixture of other carcinogenic substances (e.g., coal tar, soot, cigarette smoke). As listed in IRIS, the basis for the benzo(a)pyrene B2 classification is that human data specifically linking benzo(a)pyrene to a carcinogenic effect are lacking. There are, however, multiple animal studies in many species demonstrating benzo(a)pyrene to be carcinogenic by numerous routes.

Benzo(a)pyrene has produced positive results in numerous genotoxicity assays. At the June 1992 CRAVE Work Group meeting, a revised risk estimate for benzo(a)pyrene was verified (see Additional Comments for Oral Exposure). This section provides information on two aspects of the carcinogenic risk assessment for the agent in question: the USEPA classification and quantitative estimates of exposure. The classification reflects a weight-of-evidence judgment of the likelihood that the agent is a human carcinogen. The quantitative risk estimates are presented in application of a low-dose extrapolation procedure and presented as the risk per (mg/kg)-day. The unit risk is the quantitative estimate in terms of either risk per $\mu\text{g}/\text{L}$ drinking water or risk per $\mu\text{g}/\text{m}^3$ air breathed. The third form in which risk is presented is drinking water or air concentration providing cancer risks of 1 in 10,000 or 1 in 1,000,000. The Carcinogenicity Background Document provides details on the carcinogenicity values found in IRIS. Users are referred to the Oral Reference Dose and Reference Concentration sections for information on long-term toxic effects other than carcinogenicity.

As listed in IRIS, the basis for the dibenz(a,h)anthracene and benzo(b)fluoranthene B2 classification is because of no human data and there is not sufficient data from animal bioassays. Benzo(b)fluoranthene produced tumors in mice after lung implantation, intraperitoneal or subcutaneous injection, and skin painting. As listed in IRIS, the basis for the benzo(a)anthracene B2 classification is because no human data and there is not sufficient data from animal bioassays. Benzo(a)anthracene produced tumors in mice exposed by gavage; intraperitoneal, subcutaneous or intramuscular injection; and topical application. Benzo(a)anthracene produced mutations in bacteria and in mammalian cells, and transformed mammalian cells in culture. As listed in IRIS the basis for the benzo(k)fluoranthene B2 classification is because no human data and there is not sufficient data from animal bioassays. Benzo(k)fluoranthene produced tumors after lung implantation in mice and when administered with a promoting agent in skin-painting studies. Equivocal results have been found in a lung adenoma assay in mice. Benzo(k)fluoranthene is mutagenic in bacteria. (Klaassen, et al., 1986).

Chromium exists in two stable, natural forms: trivalent (CrIII), and hexavalent (CrVI). Acute exposure to chromium can result in kidney damage following oral exposure or damage to the nasal mucosa and septum following inhalation exposure. Chronic inhalation exposure to hexavalent chromium has resulted in kidney and respiratory tract damage, as well as excess lung cancer in both animals and humans following occupational exposure. Only hexavalent chromium is believed to be carcinogenic by inhalation (Gradient, 1991). Oral RfD values for both forms of chromium are 1.0 and 5E-3 (mg/kg-day). For trivalent chromium, the RfD is based on liver toxicity in rats. For the hexavalent form, the RfD is based on unspecified pathological changes observed in rat studies. In addition, hexavalent chromium is considered a group A carcinogen for inhalation exposures, and an oral SF of 42 (mg/kg-day)⁻¹ has been established for the hexavalent form. Vitamin supplements contain approximately 0.025 mg of chromium. As listed in IRIS, no critical effects were observed for chromium (III). The uncertainty factor was determined to be 100 and the modifying factor was determined to be 10. As listed in IRIS, no critical effects were observed for chromium (VI). The uncertainty factor was determined to be 500 and the modifying factor was determined to be 1.

Copper is a nutritionally essential element, necessary for many of the body's enzymes. In the past, lead pipes and solder were used for residential water pipes, and resulting lead concentrations in drinking water exceeded the guidelines set by the EPA. Copper has been used to replace water pipes in residences due to its lower toxicity to man. Short-term exposure to copper can result in anemia (the lack of iron), the breakdown of red blood cells, and liver and kidney lesions. The target organs for copper are the liver, kidney, and red blood cell. Vitamin C reduces copper uptake from the gut, and other substances can also influence copper uptake. Copper fumes can cause metal fume fever. A provisional oral RfD is provided by the National Criteria and Environmental Assessment group of 0.04 mg/kg-day, which is 2.6 mg/day for the average adult (70 kg). In typical vitamin supplements, 2 mg/day is the approximate dose (NRC, 1989) (Klaassen, et al, 1986).

Lead has been classified as a group B2 carcinogen by USEPA based on animal data. An RfD or slope factor has been set by USEPA. However, action levels for soil and groundwater have been proposed by USEPA Region IV at 400 mg/kg and 15 µg/L, respectively. An RfD and SF have not been set because of the confounding nature of lead toxicity. Lead accumulates in fat tissue, affects the brain, blood, and mental development of children. RfD's are based on the assumption that a threshold must be exceeded to result in toxic effects (other than carcinogenicity). Once lead accumulates in the body, other influences cause the actual levels in the blood to fluctuate—sometimes the lead is attached to binding sites, and sometimes lead is free flowing. If an exposed individual has previously been exposed to lead, this individual could lose weight, and set fat-bound lead free. This fluctuation and lack of previous lead exposure data are two of the reasons lead effects are difficult to predict (Klaassen, et al, 1986).

Manganese is an essential nutrient. Chronic exposure to manganese, 0.8 mg/kg-day, causes mental disturbances and various central nervous system effects. Studies have shown that manganese uptake from water is greater than manganese uptake from food, and the elderly appear to be more sensitive than children. The oral RfD is 0.14 mg/kg-day with uncertainty and modifying factors of 1. When assessing the potential for adverse health effects from nondietary intakes (ingestion of soil or drinking water) of manganese, a modifying factor of 3 is used which gives an oral RfD of 0.047 mg/kg-day. An additional consideration for increased uptake of manganese in infants and fasted individuals further reduces the oral RfD for water ingestion to 0.023 mg/kg-day. Inhalation of manganese dust causes neurological effects and increased incidence of pneumonia, and an inhalation RfD was set to 0.0000143 mg/kg-day. According to USEPA, manganese can not be classified as to its carcinogenicity. Therefore, the cancer class for manganese is group D. The typical vitamin supplement dose of manganese is 2.5 mg/day (Klaassen, et al, 1986) (Dreisbach, et al, 1987).

Thallium is readily absorbed through the gut and skin. Primary effects are stomach and bowel disturbances, kidney and liver damage, and neurological disturbances. Thallium was used in the past as a rodenticide and ant killer, and its use for these purposes is now prohibited. This element remains in the body for a relatively long time, and could accumulate if the chronic dose is large. USEPA's oral RfD for Thallium is 0.00008 mg/kg-day (Klaassen, et al, 1986) (Dreisbach, et al, 1987).

Vanadium is not readily absorbed through the skin or by oral ingestion and is ubiquitous. It is also a byproduct of petroleum refining. Vanadium is soluble in fats and oils (Klaassen, et al., 1986). Municipal water supplies contain 0.001 to 0.006 mg/L. The target organ is unclear, and the primary focus of toxicological information is inhalation of vanadium dust. Typical vitamin supplements contain approximately 0.010 mg in a daily dose. The oral RfD set by USEPA is 0.007 mg/kg-day.

10.6.5.5 Risk Characterization

Soil Pathways

Exposure to soil onsite was evaluated under both residential and site worker scenarios. For these scenarios, incidental ingestion and dermal contact exposure pathways were evaluated. For noncarcinogenic contaminants evaluated for future site residents, hazard was computed separately to address child and adult exposure. Tables 10.6.27 and 10.6.28 present the computed carcinogenic risks and/or HQs associated with incidental ingestion of and dermal contact with soils, respectively.

Hypothetical Site Residents

The ingestion and dermal contact ILCR (based on the adult and child lifetime weighted average) for soils are 2E-04 and 2E-05, respectively. Arsenic and BEQs were the primary contributors to risk projections.

Table 10.6.27
Hazard Quotients and Incremental Lifetime Cancer Risks
Incidental Surface Soil Ingestion
SWMU 37, AOC 699, and AOC 504, Subzone F
Charleston Naval Complex
Charleston, South Carolina

Chemical	Oral RfD Used (mg/kg-day)	Oral SF Used (mg/kg-day)-1	Future Resident adult Hazard Quotient	Future Resident child Hazard Quotient	Future Resident lwa ILCR	Current Worker adult Hazard Quotient	Current Worker adult ILCR
Aluminum	1	NA	0.037	0.34	ND	0.013	ND
Antimony	0.0004	NA	0.015	0.14	ND	0.0053	ND
Arsenic	0.0003	1.5	0.31	2.9	1.6E-04	0.11	1.8E-05
Benzo(a)pyrene equiv.	NA	7.3	ND	ND	7.7E-06	ND	8.6E-07
Chromium	0.005	NA	0.013	0.12	ND	0.0046	ND
Copper	0.04	NA	0.0077	0.072	ND	0.0027	ND
Lead	NA	NA	ND	ND	ND	ND	ND
Manganese	0.047	NA	0.078	0.72	ND	0.028	ND
Thallium	7E-05	NA	0.031	0.28	ND	0.011	ND
Vanadium	0.007	NA	0.015	0.14	ND	0.0054	ND
SUM Hazard Index/ILCR			0.5	5	2E-04	0.2	2E-05

NOTES:

- NA Not available
- ND Not Determined due to lack of available information
- lwa Lifetime weighted average; used to calculate excess carcinogenic risk derived from RAGS Part A
- ILCR Incremental Lifetime Cancer Risk

Table 10.6.28
Hazard Quotients and Incremental Lifetime Cancer Risks
Dermal Contact With Surface Soil
SWMU 37, AOC 699, and AOC 504, Subzone F
Charleston Naval Complex
Charleston, South Carolina

Chemical	Dermal Adjustment	Oral RfD Used (mg/kg-day)	Oral SF Used (mg/kg-day) ⁻¹	Future Resident adult Hazard Quotient	Future Resident child Hazard Quotient	Future Resident lwa ILCR	Current Worker adult Hazard Quotient	Current Worker adult ILCR
Aluminum	0.2	0.2	NA	0.0075	0.025	ND	0.0054	ND
Antimony	0.2	8E-05	NA	0.0030	0.010	ND	0.0022	ND
Arsenic	0.2	6E-05	7.5	0.064	0.21	1.8E-05	0.046	7.4E-06
Benzo(a)pyrene equiv.	0.5	NA	14.6	ND	ND	3.4E-06	ND	1.4E-06
Chromium	0.2	0.001	NA	0.0027	0.0088	ND	0.0019	ND
Copper	0.2	0.008	NA	0.0016	0.0052	ND	0.0011	ND
Lead	0.2	NA	NA	ND	ND	ND	ND	ND
Manganese	0.2	0.0094	NA	0.016	0.052	ND	0.011	ND
Thallium	0.2	1.4E-05	NA	0.0063	0.021	ND	0.0045	ND
Vanadium	0.2	0.0014	NA	0.0031	0.010	ND	0.0022	ND
SUM Hazard Index/ILCR				0.1	0.3	2E-05	0.07	9E-06

NOTES:

- NA Not available
- ND Not Determined due to lack of available information
- lwa Lifetime weighted average; used to calculate excess carcinogenic risk derived from RAGS Part A
- ILCR Incremental Lifetime Cancer Risk
 - Dermal to absorbed dose adjustment factor is applied to adjust for Oral SF and RfD (i.e., the oral RfD is based on oral absorption efficiency which should not be applied to dermal exposure and dermal CDI)

The computed hazard indices computed for soil based on the adult resident were 0.5 for the soil ingestion pathway and 0.1 for the dermal contact pathway. The computed hazard indices based on child resident were 5 for the soil ingestion pathway and 0.3 for the dermal contact pathway. Arsenic was the primary contributor to hazard index projections, aluminum, antimony, chromium, manganese, thallium and vanadium were the secondary contributors.

Hypothetical Site Workers

The site worker ILCRs for the ingestion and dermal contact pathways are 2E-05 and 9E-06, respectively. Arsenic and BEQs were the primary contributors for each pathway. Hazard indices for the ingestion and dermal pathways were 0.2 and 0.07, respectively.

Lead Toxicity

Background

Currently, USEPA has not established an SF reference dose for lead. USEPA believes that the available studies in animals and humans do not provide sufficient quantitative information for their calculation. Although lead is currently classified as a B2 carcinogen, USEPA considers the noncarcinogenic neurotoxic effects in children to be the critical toxic effect with respect to establishing health-based environmental cleanup objectives. The neurotoxic effects of chronic low-level lead exposure in children may occur at blood levels as low as 10 $\mu\text{g}/\text{dL}$.

In the absence of lead health criteria, USEPA Region IV's Office of Health Assessment sanctions the use of the Lead Uptake/Biokinetics Model (Version 0.99d) (Lead Model) to predict mean blood lead levels in children based on exposure to impacted environmental media. An alternative assessment was also provided using USEPA's *Interim Approach to Assessing Risk Associated with Adult Exposures to Lead in Soil* (December 1996) (Adult Lead Model) to evaluate health impact of lead under the more likely future industrial scenario. These models were used to assess the

potential health effects of elevated lead levels reported in soil for Zone L, subzone F. The maximum lead concentration reported in surface soil was 1,670 mg/kg at location 504SB004.

Future Residential Scenario

Lead model default concentrations were used for exposure to air (0.1 Pb grams per cubic meter [g/m³]) and maternal blood lead level (2.5 Pb per $\mu\text{g/dL}$). The 95% UCL soil lead concentration is 973 mg/kg was used as the input for soil and house dust. The default lead concentration (4 $\mu\text{g/L}$) was used as the input for drinking water. The Lead Model was run for a child ages 0-7 years using the inputs listed above. Table 10.6.29 presents the lead model output for a child 0 to 7 years old under these exposure conditions.

Figure 10.6.74 shows the probability percentage of blood lead levels for the hypothetical child receptor. Based on this model output using the mean soil lead concentration in the "hot spot", the geometric mean blood concentrations is estimated to be 10.5 $\mu\text{g/dL}$, and the probability of blood lead concentration exceeding 10 $\mu\text{g/dL}$ is 50%. USEPA generally considers that media concentrations resulting in probability percentage estimates of 5% or less sufficiently protect potential child receptors. As a result, soil lead would require corrective action under this hypothetical exposure scenario.

Groundwater Pathways

Exposure to groundwater was evaluated using point risk/hazard estimates under both residential and site worker scenarios. The groundwater pathways were evaluated assuming that site groundwater will be used for potable and/or domestic purposes and that an unfiltered well, drawing from the corresponding water-bearing zone, will be installed. For noncarcinogenic contaminants evaluated relative to future site residents, hazard was computed for a child resident.

Table 10.6.29
Lead Model Results
SWMU 37, AOC 699, and AOC 504, Subzone F
CNC
Charleston, South Carolina

LEAD MODEL Version 0.99d

AIR CONCENTRATION: 0.100 $\mu\text{g Pb/m}^3$ DEFAULT

Indoor AIR Pb Conc: 30.0 percent of outdoor.

Other AIR Parameters:

Age	Time Outdoors (hr)	Vent. Rate (m^3/day)	Lung Abs. (%)
0-1	1.0	2.0	32.0
1-2	2.0	3.0	32.0
2-3	3.0	5.0	32.0
3-4	4.0	5.0	32.0
4-5	4.0	5.0	32.0
5-6	4.0	7.0	32.0
6-7	4.0	7.0	32.0

DIET: DEFAULT

DRINKING WATER Conc: 4.00 $\mu\text{g Pb/L}$ DEFAULT

WATER Consumption: DEFAULT

SOIL & DUST:

Soil: constant conc.

Dust: constant conc.

Age	Soil ($\mu\text{g Pb/g}$)	House Dust ($\mu\text{g Pb/g}$)
0-7	973.0	973.0

Additional Dust Sources: None DEFAULT

PAINT Intake: 0.00 $\mu\text{g Pb/day}$ DEFAULT

MATERNAL CONTRIBUTION: Infant Model

Maternal Blood Conc: 2.50 $\mu\text{g Pb/dL}$

CALCULATED BLOOD Pb and Pb UPTAKES:

YEAR	Blood Level ($\mu\text{g/dL}$)	Total Uptake ($\mu\text{g/day}$)	Soil+Dust Uptake ($\mu\text{g/day}$)	Diet Uptake ($\mu\text{g/day}$)	Water Uptake ($\mu\text{g/day}$)	Paint Uptake ($\mu\text{g/day}$)	Air Uptake ($\mu\text{g/day}$)
0.5-1:	11.3	21.70	19.23	2.14	0.31	0.00	0.02
1-2:	13.1	32.31	29.37	2.15	0.75	0.00	0.03
2-3:	12.3	33.75	30.39	2.50	0.80	0.00	0.06
3-4:	11.9	34.77	31.38	2.48	0.84	0.00	0.07
4-5:	10.0	28.46	24.89	2.56	0.94	0.00	0.07
5-6:	8.5	26.89	23.01	2.78	1.02	0.00	0.09
6-7:	7.5	26.28	22.03	3.11	1.05	0.00	0.09

Tables 10.6.30 and 10.6.31 present the risk and hazard for the ingestion and inhalation exposure pathways, respectively.

Hypothetical Site Residents

The shallow groundwater ingestion ILCR for hypothetical site residents is $7E-05$ and the inhalation pathway ILCR is $3E-06$. For the ingestion pathway, the hazard indices for the adult and child resident are 0.2 and 0.6. Inhalation pathway hazard indices are 0.2 and 0.6 for adult and child receptors.

Hypothetical Site Workers

The shallow groundwater ingestion ILCR for hypothetical site workers is $7E-05$ and the inhalation pathway ILCR is $3E-06$. The hazard indices are 0.2 and 0.6 for the ingestion and inhalation pathways respectively.

COCs Identified

Chemicals of concern were identified based on cumulative (all pathway) risk and hazard projected for this site. USEPA has established a generally acceptable risk range of $1E-4$ to $1E-6$, and a hazard index threshold of 1.0 (unity). In accordance with SCDHEC guidance, a COC was considered to be any chemical contributing to a cumulative risk level of $1E-6$ or greater and/or a cumulative hazard index above 1.0, if its individual ILCR exceeded $1E-6$ or hazard quotient exceeded 0.1. For carcinogens, this approach is relatively conservative, because a cumulative risk level of $1E-4$ (and individual ILCR of $1E-6$) is recommended by USEPA Region IV as the trigger for establishing COCs. The COC selection method presented was used to provide a more comprehensive evaluation of chemicals contributing to carcinogenic risk or noncarcinogenic hazard during the remedial goal options development process. Table 10.6.32 presents the summary of COCs for Zone L, subzone F.

Table 10.6.30
 Hazard Quotients and Incremental Lifetime Cancer Risks
 Shallow Groundwater Ingestion
 SWMU 37, AOC 699, and AOC 504, Subzone F
 Charleston Naval Complex
 Charleston, South Carolina

Chemical	Oral RfD Used (mg/kg-day)	Oral SF Used (mg/kg-day) ⁻¹	Future Resident adult Hazard Quotient	Future Resident child Hazard Quotient	Future Resident lwa ILCR	Future Worker adult Hazard Quotient	Future Worker adult ILCR
Tetrachloroethene	0.01	0.052	0.25	0.58	7.1E-05	0.089	2.3E-05
SUM Hazard Index/ILCR			0.2	0.6	7E-05	0.09	2E-05

NOTES:

- NA Not available
- ND Not Determined due to lack of available information
- lwa Lifetime weighted average; used to calculate excess carcinogenic risk derived from RAGS Part A
- ILCR Incremental Lifetime Cancer Risk
- mg/kg-day milligrams per kilogram per day

Table 10.6.31

Hazard Quotients and Incremental Lifetime Cancer Risks
 Inhalation of Contaminants in Groundwater due to Domestic Use
 SWMU 37, AOC 699, and AOC 504, Subzone F
 Charleston Naval Complex
 Charleston, South Carolina

Chemical	Inhalation Rf Used (mg/kg-day)	Inhalation SF Used (mg/kg-day)-1	Future Resident adult Hazard Quotient	Future Resident child Hazard Quotient	Future Resident lwa ILCR	Future Worker adult Hazard Quotient	Future Worker adult ILCR
Tetrachloroethene	0.01	0.00203	0.25	0.58	2.8E-06	0.089	8.9E-07
SUM Hazard Index/ILCR			0.2	0.6	3E-06	0.09	9E-07

NOTES:

- NA Not available
- ND Not Determined due to lack of available information
- lwa Lifetime weighted average; used to calculate excess carcinogenic risk derived from RAGS Part A
- ILCR Incremental Lifetime Cancer Risk
- mg/kg-day milligrams per kilogram per day

Table 10.6.32

Summary of Risk and Hazard-based COCs
 SWMU 37, AOC 699, and AOC 504, Subzone F
 Charleston Naval Complex
 Charleston, South Carolina

Medium	Exposure Pathway		Future	Future	Future	Site Worker		Identification of COCs		
			Resident Adult Hazard Quotient	Resident Child Hazard Quotient	Resident Iwa ILCR	Hazard Quotient	ILCR			
Surface Soil	Incidental Ingestion	Aluminum	0.037	0.34	ND	0.013	ND	1		
		Antimony	0.015	0.14	ND	0.0053	ND	1		
		Arsenic	0.31	2.9	1.6E-04	0.11	1.8E-05	1	2	4
		Benzo(a)pyrene equiv.	ND	ND	7.7E-06	ND	8.6E-07	2		
		Chromium	0.013	0.12	ND	0.0046	ND	1		
		Copper	0.0077	0.072	ND	0.0027	ND			
		Lead	ND	ND	ND	ND	ND	*		
		Manganese	0.078	0.72	ND	0.028	ND	1		
		Thallium	0.031	0.28	ND	0.011	ND	1		
		Vanadium	0.015	0.14	ND	0.0054	ND	1		
	Dermal Contact	Aluminum	0.0075	0.025	ND	0.0054	ND			
		Antimony	0.0030	0.010	ND	0.0022	ND			
		Arsenic	0.064	0.21	1.8E-05	0.046	7.4E-06	1	2	4
		Benzo(a)pyrene equiv.	ND	ND	3.4E-06	ND	1.4E-06	2	4	
		Chromium	0.0027	0.0088	ND	0.0019	ND			
		Coppr	0.0016	0.0052	ND	0.0011	ND			
		Lead	ND	ND	ND	ND	ND			
		Manganese	0.016	0.052	ND	0.011	ND			
		Thallium	0.0063	0.021	ND	0.0045	ND			
		Vanadium	0.0031	0.010	ND	0.0022	ND			
Sum of All Pathways			0.6	5	2E-04	0.3	3E-05			
Groundwater	Ingestion	Tetrachloroethene	0.25	0.58	7.1E-05	0.089	2.3E-05	1	2	4
	Inhalation	Tetrachloroethene	0.25	0.58	2.8E-06	0.089	8.9E-07	1	2	
Groundwater Pathway Sum			0.5	1	7E-05	0.2	2E-05			

Notes:

ND Indicates not determined due to the lack of available risk information.

ILCR Indicates incremental excess lifetime cancer risk

HI Indicates hazard index

1- Chemical is a COC by virtue of projected child residence noncarcinogenic hazard.

2- Chemical is a COC by virtue of projected future resident lifetime ILCR.

3- Chemical is a COC by virtue of projected site worker noncarcinogenic hazard.

4- Chemical is a COC by virtue of projected site worker ILCR.

* - Lead was identified as a COC based on the results of the Lead Model

Soils

Hypothetical Site Residents

Aluminum, antimony, arsenic, BEQs, chromium, manganese, thallium, and vanadium were identified as the soil pathway COCs based on their contribution to cumulative ILCR and/or hazard index projections. Lead was identified as a COC based on the results of the Lead Model.

Hypothetical Site Workers

Arsenic and BEQs were identified as the soil pathway COCs based on their contribution to cumulative ILCR and/or hazard index projections.

Groundwater

Hypothetical Site Residents

Tetrachloroethene was identified as a groundwater pathway COC based on its contribution to cumulative ILCR and/or hazard index projections.

Hypothetical Site Workers

Tetrachloroethene was identified as a groundwater pathway COC based on its contribution to cumulative ILCR and/or hazard index projections.

10.6.5.6 Risk Uncertainty

Characterization of Exposure Setting and Identification of Exposure Pathways

The potential for high bias is introduced through the exposure setting and pathway selection due to the highly conservative assumptions (i.e., future residential use) recommended by USEPA Region IV when assessing potential future and current exposure. The exposure assumptions made in the site worker scenario are highly protective and would tend to overestimate exposure.

Residential use of the site would not be expected, based on current site uses. If this area were to be used as a residential site, the buildings and other structures would be demolished, and the soil conditions would likely change — the soils would be covered with landscaping soil and/or a house. Consequently, exposure to current soil conditions would not be likely under a true future residential scenario. Current site worker's contact with impacted media is much less than is assumed in the exposure model that was used to assess this pathway. These factors indicate that exposure pathways assessed in this HHRA would generally overestimate the risk and hazard posed to current site workers and future site residents.

A basewide system provides drinking and process water to buildings throughout Zone F. This system is slated to remain in operation under the current base reuse plan. As a result, groundwater would not be expected to be used under future site use scenarios. Therefore, the scenario established to project risk/hazard associated with groundwater exposure is highly conservative, and associated pathways are not expected to be completed in the future.

Determination of Exposure Point Concentrations

The exposure point concentrations were set equal to either the 95% UCL or maximum concentrations for COPCs identified for this site. The EPCs used in the risk assessment provide a reasonable maximum estimate of chronic daily intakes. As a result, the EPCs would tend to overestimate risk and hazard.

Uncertainty in the Data

All of the DPT data were provided at DQO level II which adds to the uncertainty associated with some of the data used in this risk assessment. Usually QA/QC required for risk assessment is DQO level III or higher. The risk and hazard estimates provided in this risk assessment could be considered over- or underestimates due to the use of DQO level II data.

10.6.5.7 Risk Summary

Risk and hazard were assessed for the hypothetical site worker and the hypothetical future site resident under reasonable maximum exposure assumptions. In soils, the incidental ingestion and dermal contact pathways were assessed in this HHRA. The ingestion and inhalation pathways were evaluated for groundwater. To add perspective to the risk assessment point risk and hazard maps are presented below for soil. Point risk maps are based on the unlikely assumption that potential future site resident will be chronically exposed to specific points. Exposure to soil conditions is more likely the result of uniform exposure to the soil conditions over the entire site rather than specific points. Risk maps are still useful because they allow the reader to visualize the contribution of risk or hazard index due to individual COCs.

Soil

Figures 10.6.70 and 10.6.71 illustrate point risk and point hazard estimates for soil pathways under a residential scenario. Table 10.6.33 provides the contribution of individual COCs to cumulative risk and hazard at each sample location for both the residential and site worker scenarios. As shown, concentrations of arsenic and/or BEQs contribute to risk projections above $1E-06$ for each soil location. Risk estimates range from $3E-05$ (037SB014) to $4E-04$ (504SB006) with a mean risk of $1E-04$. As shown, point hazard index estimates exceeded one soil locations. Arsenic was the primary contributor to hazard index estimates. Point hazard index estimates ranged from 0.3 (699SP017) to 7 (504SB006) with a mean hazard index of 2.

Figures 10.6.72 and 10.6.73 illustrate point risk and point hazard estimates for soil pathways under a site worker scenario. Table 10.6.33 provides the contribution of individual COCs to cumulative risk and hazard at each sample location for both the residential and site worker scenarios. As shown, concentrations of arsenic and/or BEQs contribute to risk projections above $1E-06$ for most soil locations. Risk estimate range from $5E-06$ (037SB014) to $5E-05$ (504SB006)

Table 10.6.33
 Point Estimates of Risk and Hazard
 SWMU 37, AOC 699, and AOC 504, Subzone F, Surface Soil
 Charleston Naval Complex
 Charleston, South Carolina

Site	Location	Parameter	Concentration	Units	Residential		Site Worker	
					Hazard Index	Risk (E-06)	Hazard Index	Risk (E-06)
504	B004	Aluminum (Al)	18400	mg/kg	0.252	NA	0.0127	NA
504	B004	Antimony (Sb)	2.6	mg/kg	0.089	NA	0.0045	NA
504	B004	Arsenic (As)	40.4	mg/kg	1.85	105.5	0.093	14.93
504	B004	Benzo(a)pyrene equiv.	539.4	ug/kg	NA	8.93	NA	1.82
504	B004	Chromium (Cr)	31.3	mg/kg	0.086	NA	0.0043	NA
504	B004	Manganese (Mn)	612	mg/kg	0.179	NA	0.0184	NA
504	B004	Thallium (Tl)	2.3	mg/kg	0.39	NA	0.020	NA
504	B004	Vanadium (V)	49.2	mg/kg	0.096	NA	0.0048	NA
Total					2.943	114.5	0.1574	16.7
504	B005	Aluminum (Al)	21400	mg/kg	0.293	NA	0.0148	NA
504	B005	Antimony (Sb)	1.2	mg/kg	0.041	NA	0.0021	NA
504	B005	Arsenic (As)	21.3	mg/kg	0.97	55.6	0.049	7.87
504	B005	Benzo(a)pyrene equiv.	600.46	ug/kg	NA	9.94	NA	2.02
504	B005	Chromium (Cr)	30.7	mg/kg	0.084	NA	0.0042	NA
504	B005	Manganese (Mn)	345	mg/kg	0.101	NA	0.0103	NA
504	B005	Thallium (Tl)	1.4	mg/kg	0.24	NA	0.012	NA
504	B005	Vanadium (V)	53.9	mg/kg	0.106	NA	0.0053	NA
Total					1.839	65.6	0.0978	9.9
504	B006	Aluminum (Al)	5770	mg/kg	0.079	NA	0.0040	NA
504	B006	Antimony (Sb)	1.8	mg/kg	0.062	NA	0.0031	NA
504	B006	Arsenic (As)	137	mg/kg	6.26	357.8	0.315	50.62
504	B006	Benzo(a)pyrene equiv.	461.62	ug/kg	NA	7.64	NA	1.55
504	B006	Chromium (Cr)	11.8	mg/kg	0.032	NA	0.0016	NA
504	B006	Manganese (Mn)	46.3	mg/kg	0.014	NA	0.0014	NA
504	B006	Vanadium (V)	14.6	mg/kg	0.029	NA	0.0014	NA
Total					6.477	365.5	0.3265	52.2
504	B007	Aluminum (Al)	15700	mg/kg	0.215	NA	0.0108	NA
504	B007	Antimony (Sb)	2.6	mg/kg	0.089	NA	0.0045	NA
504	B007	Arsenic (As)	23.2	mg/kg	1.06	60.6	0.053	8.57
504	B007	Benzo(a)pyrene equiv.	551.5	ug/kg	NA	9.13	NA	1.86
504	B007	Chromium (Cr)	42.9	mg/kg	0.118	NA	0.0059	NA
504	B007	Manganese (Mn)	336	mg/kg	0.098	NA	0.0101	NA
504	B007	Thallium (Tl)	1.3	mg/kg	0.22	NA	0.011	NA
504	B007	Vanadium (V)	42.4	mg/kg	0.083	NA	0.0042	NA
Total					1.886	69.7	0.1000	10.4
504	B008	Aluminum (Al)	12000	mg/kg	0.165	NA	0.0083	NA
504	B008	Antimony (Sb)	1.4	mg/kg	0.048	NA	0.0024	NA
504	B008	Arsenic (As)	27	mg/kg	1.23	70.5	0.062	9.98
504	B008	Benzo(a)pyrene equiv.	648.09	ug/kg	NA	10.73	NA	2.18
504	B008	Chromium (Cr)	28.5	mg/kg	0.078	NA	0.0039	NA
504	B008	Manganese (Mn)	436	mg/kg	0.127	NA	0.0131	NA
504	B008	Thallium (Tl)	1.1	mg/kg	0.19	NA	0.009	NA
504	B008	Vanadium (V)	32.8	mg/kg	0.064	NA	0.0032	NA
Total					1.905	81.3	0.1025	12.2
504	B009	Aluminum (Al)	14400	mg/kg	0.197	NA	0.0099	NA
504	B009	Antimony (Sb)	0.86	mg/kg	0.029	NA	0.0015	NA
504	B009	Arsenic (As)	24.6	mg/kg	1.12	64.3	0.057	9.09
504	B009	Benzo(a)pyrene equiv.	361.73	ug/kg	NA	5.99	NA	1.22
504	B009	Chromium (Cr)	22.6	mg/kg	0.062	NA	0.0031	NA
504	B009	Manganese (Mn)	213	mg/kg	0.062	NA	0.0064	NA
504	B009	Thallium (Tl)	1.1	mg/kg	0.19	NA	0.009	NA
504	B009	Vanadium (V)	35.6	mg/kg	0.070	NA	0.0035	NA
Total					1.734	70.2	0.0905	10.3
504	B010	Aluminum (Al)	2470	mg/kg	0.034	NA	0.0017	NA
504	B010	Arsenic (As)	65	mg/kg	2.97	169.8	0.149	24.02
504	B010	Benzo(a)pyrene equiv.	671.41	ug/kg	NA	11.12	NA	2.26
504	B010	Chromium (Cr)	4.8	mg/kg	0.013	NA	0.0007	NA
504	B010	Manganese (Mn)	6.9	mg/kg	0.002	NA	0.0002	NA
504	B010	Vanadium (V)	3.8	mg/kg	0.007	NA	0.0004	NA
Total					3.027	180.9	0.1524	26.3
504	B011	Aluminum (Al)	26700	mg/kg	0.366	NA	0.0184	NA
504	B011	Antimony (Sb)	4.3	mg/kg	0.147	NA	0.0074	NA
504	B011	Arsenic (As)	27.8	mg/kg	1.27	72.6	0.064	10.27
504	B011	Benzo(a)pyrene equiv.	609.79	ug/kg	NA	10.10	NA	2.05

Table 10.6.33
 Point Estimates of Risk and Hazard
 SWMU 37, AOC 699, and AOC 504, Subzone F, Surface Soil
 Charleston Naval Complex
 Charleston, South Carolina

Site	Location	Parameter	Concentration	Units	Residential		Site Worker	
					Hazard Index	Risk (E-06)	Hazard Index	Risk (E-06)
504	B011	Chromium (Cr)	44.5	mg/kg	0.122	NA	0.0061	NA
504	B011	Manganese (Mn)	395	mg/kg	0.115	NA	0.0118	NA
504	B011	Thallium (Tl)	1.9	mg/kg	0.33	NA	0.016	NA
504	B011	Vanadium (V)	64.8	mg/kg	0.127	NA	0.0064	NA
		Total			2.474	82.7	0.1305	12.3
037	P014	Aluminum (Al)	10400	mg/kg	0.143	NA	0.0072	NA
037	P014	Arsenic (As)	12.3	mg/kg	0.56	32.1	0.028	4.54
037	P014	Chromium (Cr)	22.4	mg/kg	0.061	NA	0.0031	NA
037	P014	Manganese (Mn)	91	mg/kg	0.027	NA	0.0027	NA
037	P014	Thallium (Tl)	2.14	mg/kg	0.37	NA	0.018	NA
037	P014	Vanadium (V)	34.7	mg/kg	0.068	NA	0.0034	NA
		Total			1.228	32.1	0.0631	4.5
699	P017	Thallium (Tl)	1.67	mg/kg	0.29	NA	0.014	NA
699	P020	Thallium (Tl)	2.14	mg/kg	0.37	NA	0.018	NA
699	P023	Aluminum (Al)	28100	mg/kg	0.385	NA	0.0194	NA
699	P023	Arsenic (As)	23	mg/kg	1.05	60.1	0.053	8.50
699	P023	Chromium (Cr)	47.3	mg/kg	0.130	NA	0.0065	NA
699	P023	Manganese (Mn)	2660	mg/kg	0.776	NA	0.0798	NA
699	P023	Thallium (Tl)	4.56	mg/kg	0.78	NA	0.039	NA
699	P023	Vanadium (V)	77.5	mg/kg	0.152	NA	0.0076	NA
		Total			3.276	60.1	0.2055	8.5
699	P024	Thallium (Tl)	2.56	mg/kg	0.44	NA	0.022	NA
699	P20A	Thallium (Tl)	2.2	mg/kg	0.38	NA	0.019	NA

with a mean risk of 2E-05. As shown, point hazard index estimates did not exceed one at any location.

10.6.5.8 Remedial Goal Options

Soil

Tables 10.6.34 and 10.6.35 present the RGOs for soil and groundwater, respectively. RGOs for carcinogens were based on the lifetime weighted average site resident or site workers and those for noncarcinogens were based on the resident child or the site worker.

Figure 10.6.74

Blood Lead Concentration

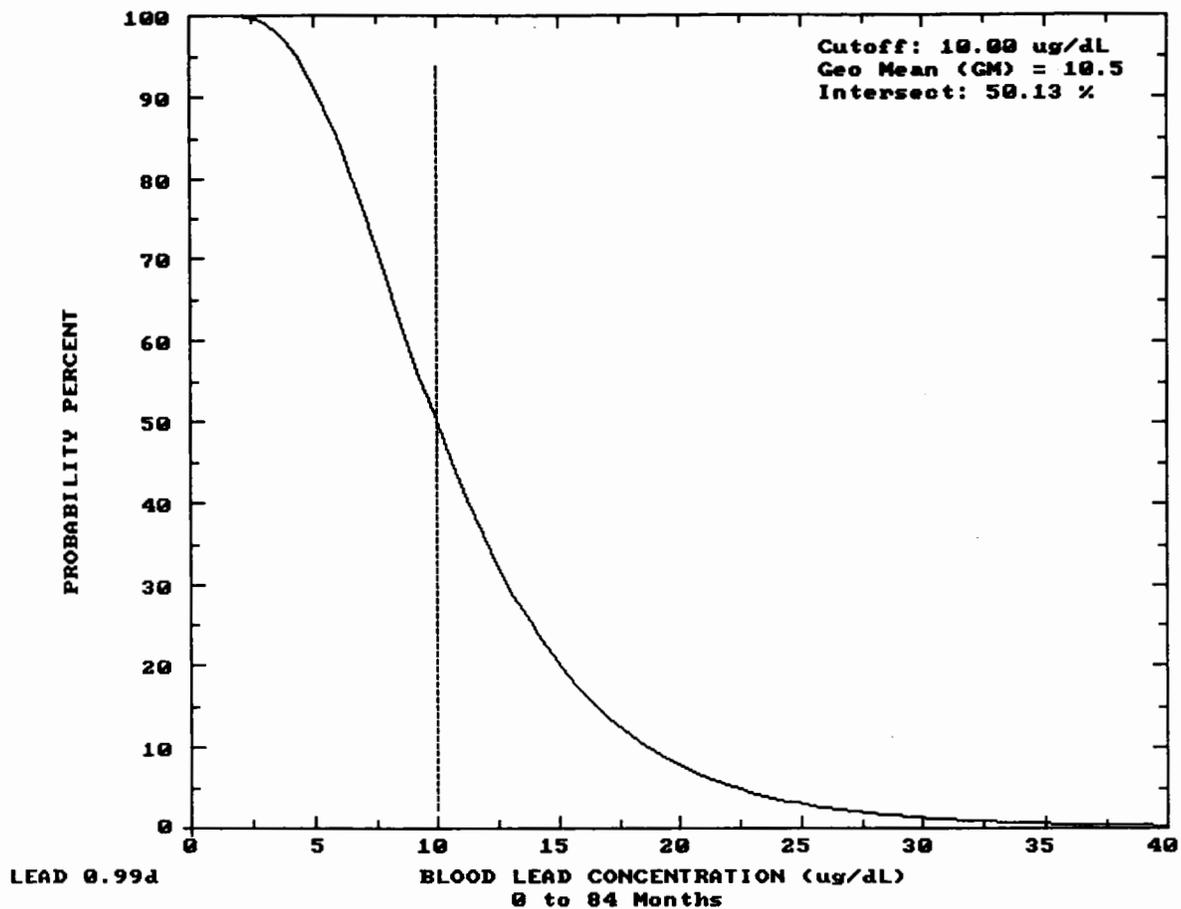


Table 10.6.34

Remedial Goal Options Surface Soil
 SWMU 37, AOC 699, and AOC 504, Subzone F
 Charleston Naval Complex
 Charleston, South Carolina

Residential-Based Remedial Goal Options

Chemical	Slope Factor (mg/kg-day) ⁻¹	Reference Dose (mg/kg-day)	EPC mg/kg	Hazard-Based Remedial Goal Options			Risk-Based Remedial Goal Options			Background Concentration mg/kg
				3 mg/kg	1 mg/kg	0.1 mg/kg	1E-06 mg/kg	1E-05 mg/kg	1E-04 mg/kg	
Aluminum	NA	1	26700	218781	72927	7293	ND	ND	ND	18500
Antimony	NA	0.0004	4.3	88	29	2.9	ND	ND	ND	0.79
Arsenic	1.5	0.0003	69	66	22	2.2	0.38	3.8	38	19.9
Benzo(a)pyrene equiv.	7.3	NA	0.67	ND	ND	ND	0.060	0.60	6.0	NA
Chromium	NA	0.005	47	1094	365	36	ND	ND	ND	34.8
Manganese	NA	0.047	2660	10283	3428	343	ND	ND	ND	307
Thallium	NA	7E-05	1.6	15	5.1	0.51	ND	ND	ND	NA
Vanadium	NA	0.007	78	1531	510	51	ND	ND	ND	48.9

Worker-Based Remedial Goal Options

Chemical	Slope Factor (mg/kg-day) ⁻¹	Reference Dose (mg/kg-day)	EPC mg/kg	Hazard-Based Remedial Goal Options			Risk-Based Remedial Goal Options			Background Concentration mg/kg
				3 mg/kg	1 mg/kg	0.1 mg/kg	1E-06 mg/kg	1E-05 mg/kg	1E-04 mg/kg	
Arsenic	1.5	0.0003	69	1305	435	43.5	2.7	27	271	19.9
Benzo(a)pyrene equiv.	7.3	NA	0.67	ND	ND	ND	0.30	3.0	30	NA

NOTES:

- EPC Exposure point concentration
- NA Not applicable
- ND Not determined
- Remedial goal options were based on the residential lifetime weighted average for carcinogens and the child resident or site worker for noncarcinogens
- mg/kg-day milligrams per kilogram per day
- mg/kg milligrams per kilogram

Table 10.6.35
 Remedial Goal Options for Groundwater
 SWMU 37, AOC 699, and AOC 504, Subzone F
 Charleston Naval Complex
 Charleston, South Carolina

Residential-Based Remedial Goal Options

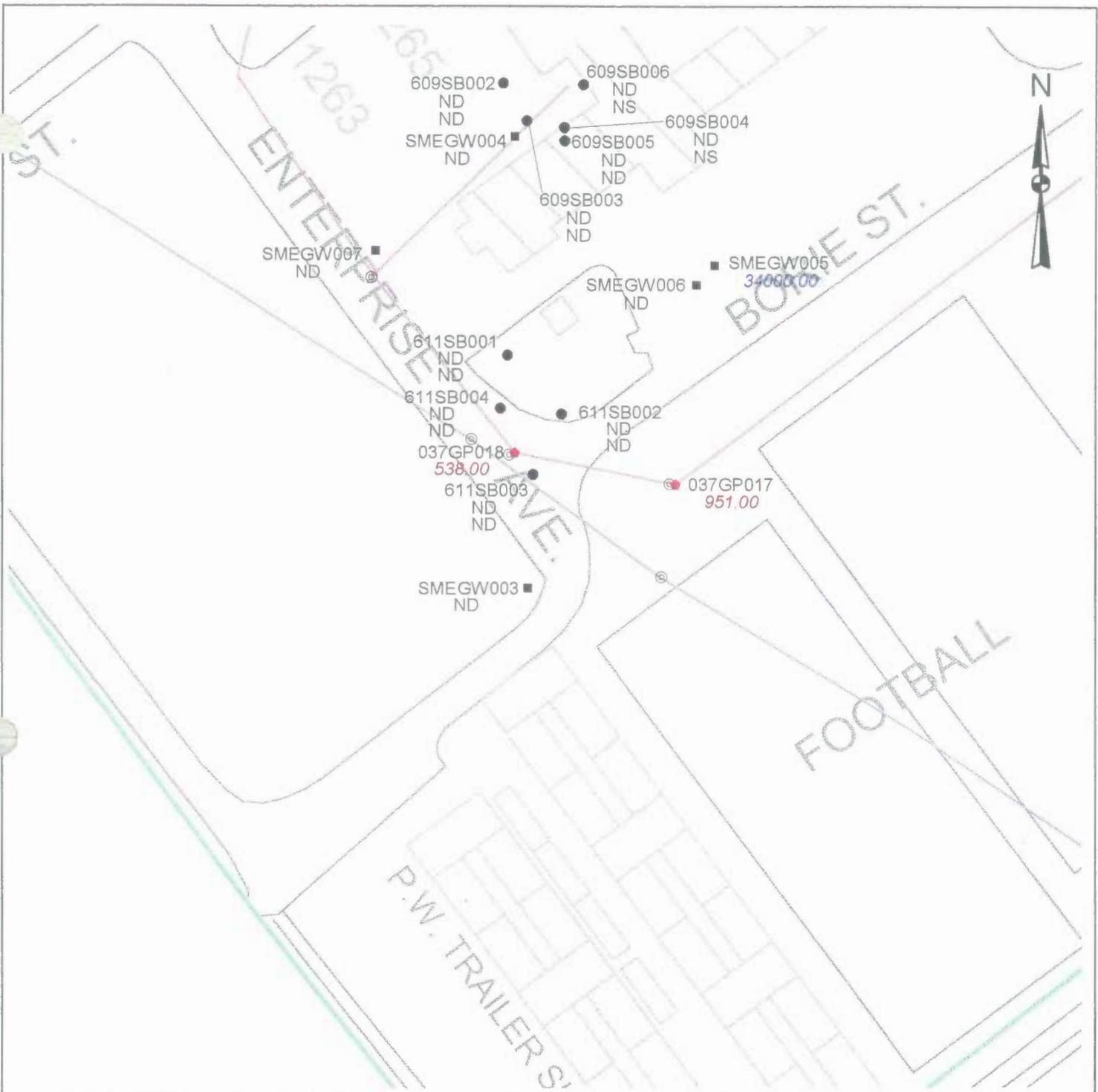
Chemical	Oral SF (mg/kg-day) ⁻¹	Oral RfD (mg/kg-day)	EPC mg/l	Hazard-Based Remedial Goal Options			Risk-Based Remedial Goal Options			MCL mg/l
				0.1 mg/l	1.0 mg/l	3 mg/l	1E-06 mg/l	1E-05 mg/l	1E-04 mg/l	
Tetrachloroethene	0.052	0.01	0.0909	0.0078	0.078	0.23	0.0012	0.012	0.12	0.005

Worker-Based Remedial Goal Options

Chemical	Oral SF (mg/kg-day) ⁻¹	Oral RfD (mg/kg-day)	EPC mg/l	Hazard-Based Remedial Goal Options			Risk-Based Remedial Goal Options			MCL mg/l
				0.1 mg/l	1 mg/l	3 mg/l	1E-06 mg/l	1E-05 mg/l	1E-04 mg/l	
Tetrachloroethene	0.052	0.01	0.0909	0.051	0.51	1.5	0.0038	0.038	0.38	NA

NOTES:

- EPC Exposure point concentration
- NA Not applicable
- ND Not determined
- Remedial goal options were based on the residential lifetime weighted average for carcinogens and the child resident or site worker for noncarcinogens
- mg/kg-day milligrams per kilogram per day
- mg/l milligrams per liter



LEGEND

- ZONE L DPT GROUNDWATER LOCATION
- 12.30 ZONE L DPT GROUNDWATER CONC. (ug/L)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

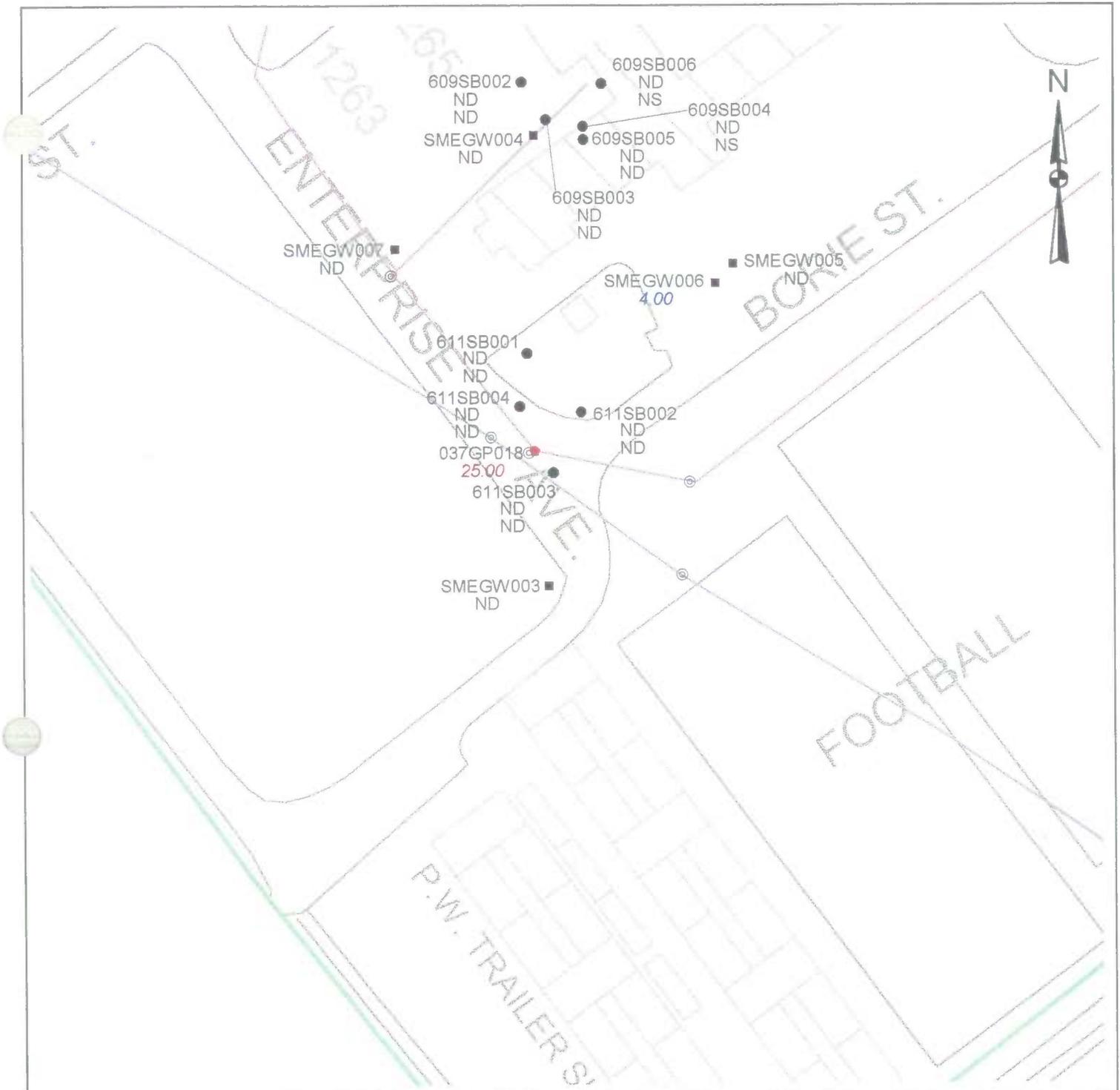
70 0 70 140 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.17
ZONE L - SUBZONE F
BENZENE
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=22000 ug/kg SSL=30.0 ug/kg MCL=5.00 ug/L



LEGEND

- ZONE L DPT GROUNDWATER LOCATION
- 12.30 ZONE L DPT GROUNDWATER CONC. (ug/L)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

SUBZONE BOUNDARY
 RAILROAD
 ☉ MANHOLE
 SANITARY SEWER LINE
 STORM SEWER LINE

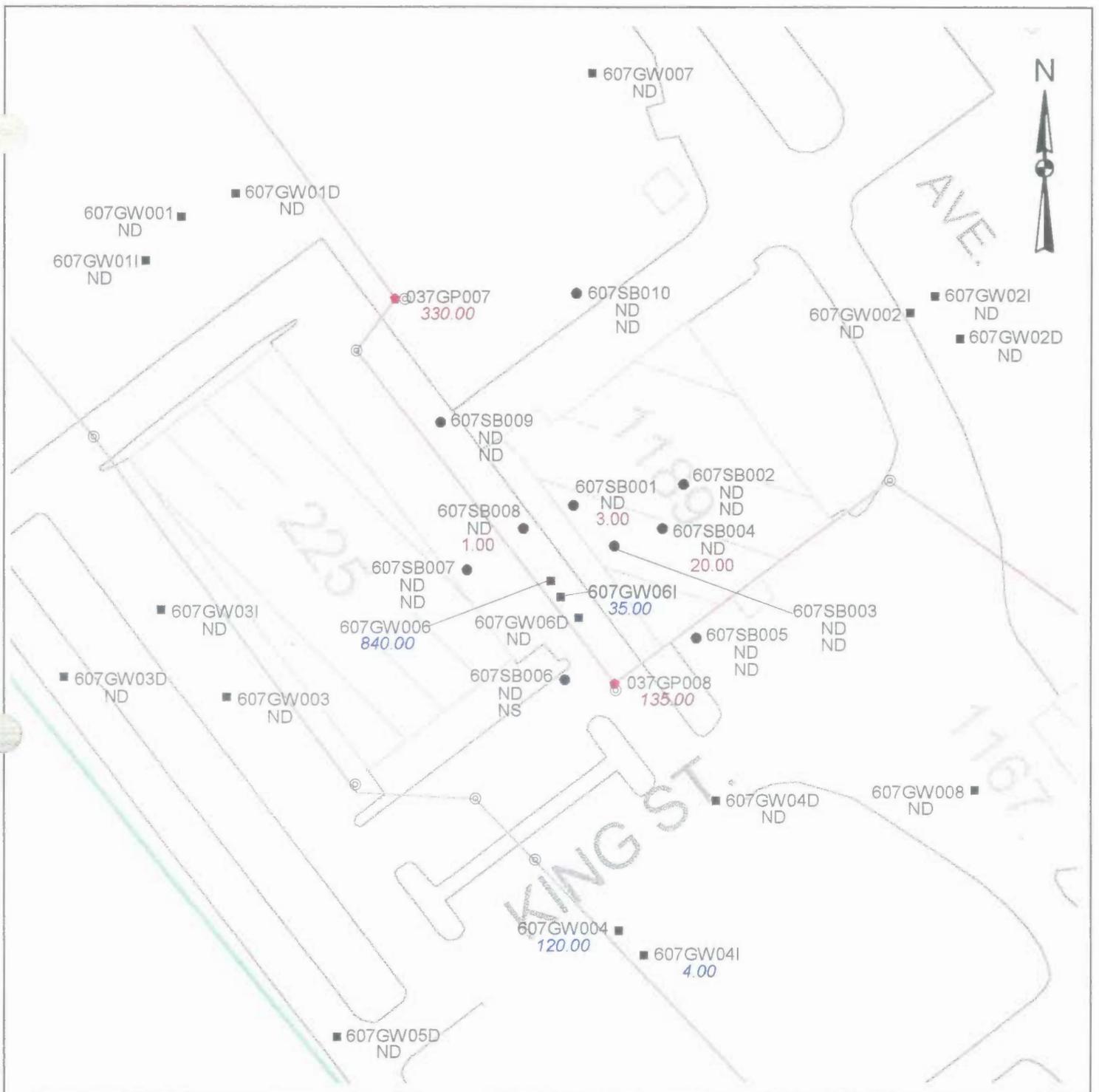
70 0 70 140 Feet



ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.6.18
 ZONE L - SUBZONE F
 1,2-DICHLOROETHANE (EDC)
 ZONE L EXCEEDANCES WITH ZONE F
 SOIL AND GW CONCENTRATIONS

RBC=7000 ug/kg SSL=20.0 ug/kg MCL=5.00 ug/L



LEGEND

- ◆ ZONE L DPT GROUNDWATER LOCATION
- 12.30 ZONE L DPT GROUNDWATER CONC. (ug/L)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

50 0 50 100 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.19
ZONE L - SUBZONE F
CIS-1,2-DICHLOROETHENE
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=78000 ug/kg SSL=400 ug/kg MCL=70.0 ug/L



LEGEND

● ZONE L DPT GROUNDWATER LOCATION

 SUBZONE BOUNDARY
  RAILROAD
  MANHOLE
 SANITARY SEWER LINE
  STORM SEWER LINE

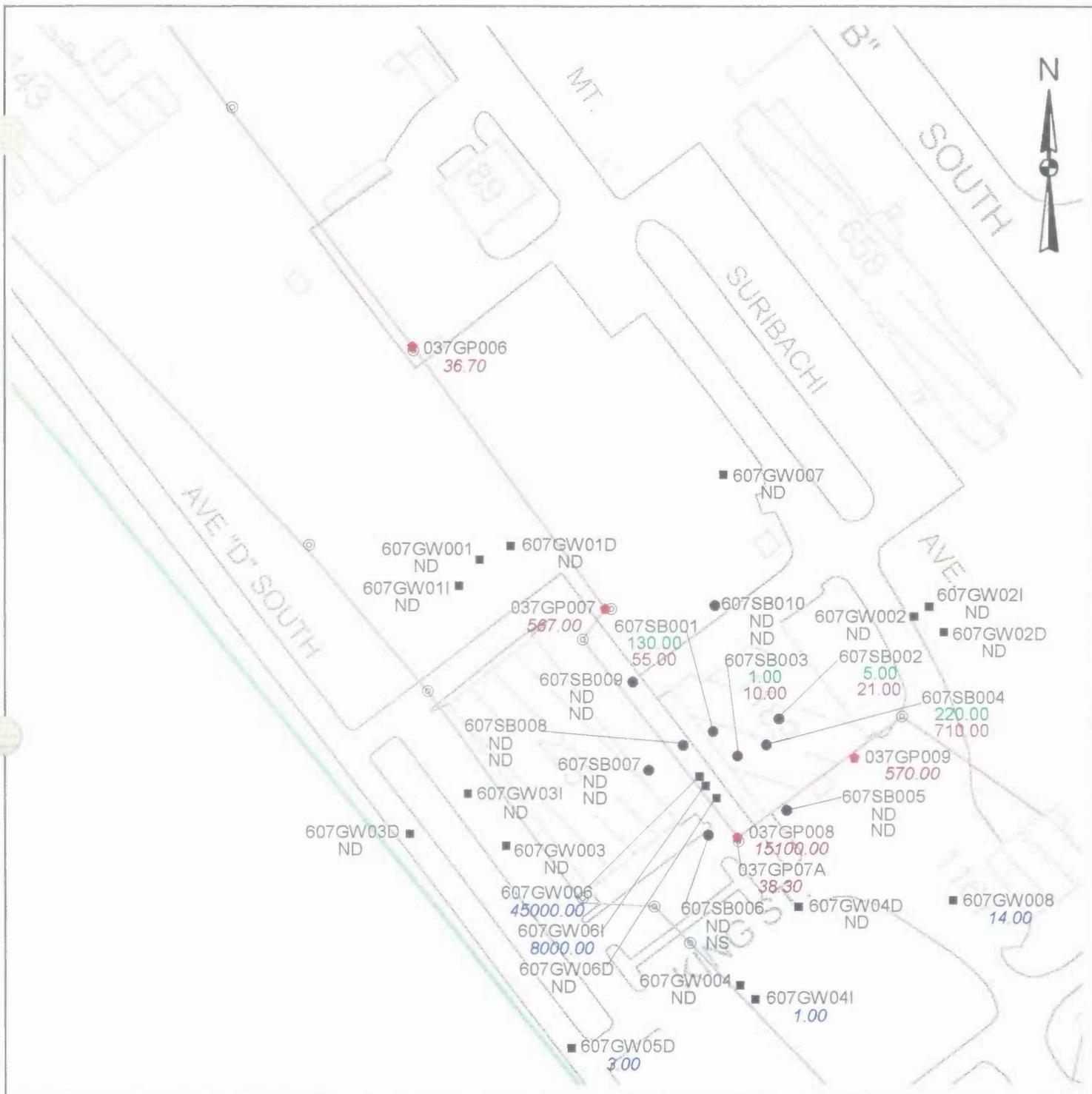
500 0 500 1000 Feet




ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.6.20
 ZONE L - SUBZONE F
 TETRACHLOROETHENE
 ZONE L EXCEEDANCES

RBC=12000 ug/kg SSL=60.0 ug/kg MCL=5.00 ug/L



LEGEND

- ZONE L DPT GROUNDWATER LOCATION
- 12.30 ZONE L DPT GROUNDWATER CONC. (ug/L)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

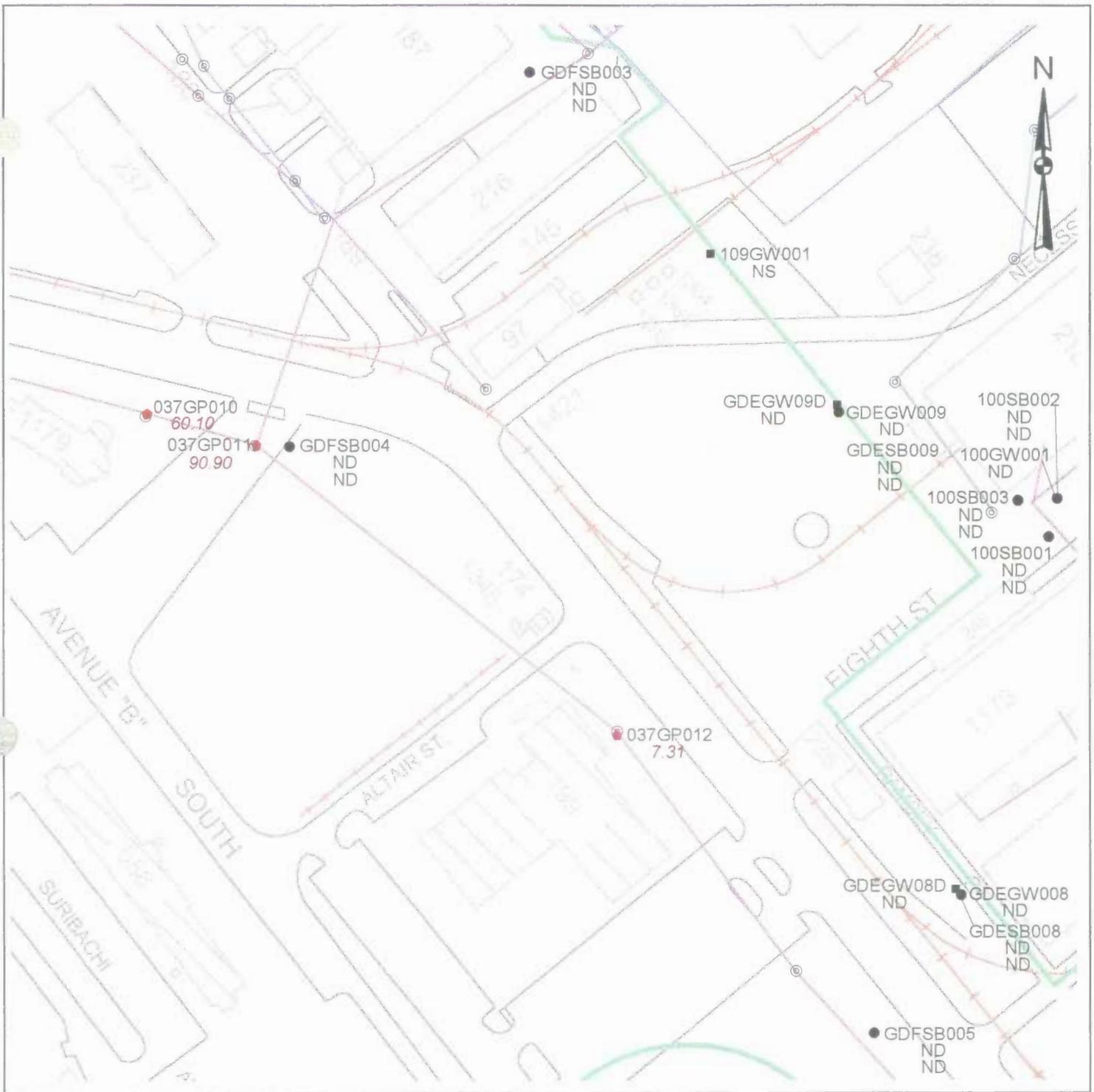
80 0 80 160 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.21
ZONE L - SUBZONE F
TETRACHLOROETHENE
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=12000 ug/kg SSL=60.0 ug/kg MCL=5.00 ug/L



LEGEND

- ZONE L DPT GROUNDWATER LOCATION
- 12.30 ZONE L DPT GROUNDWATER CONC. (ug/L)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- SANITARY SEWER LINE
- RAILROAD
- STORM SEWER LINE
- MANHOLE

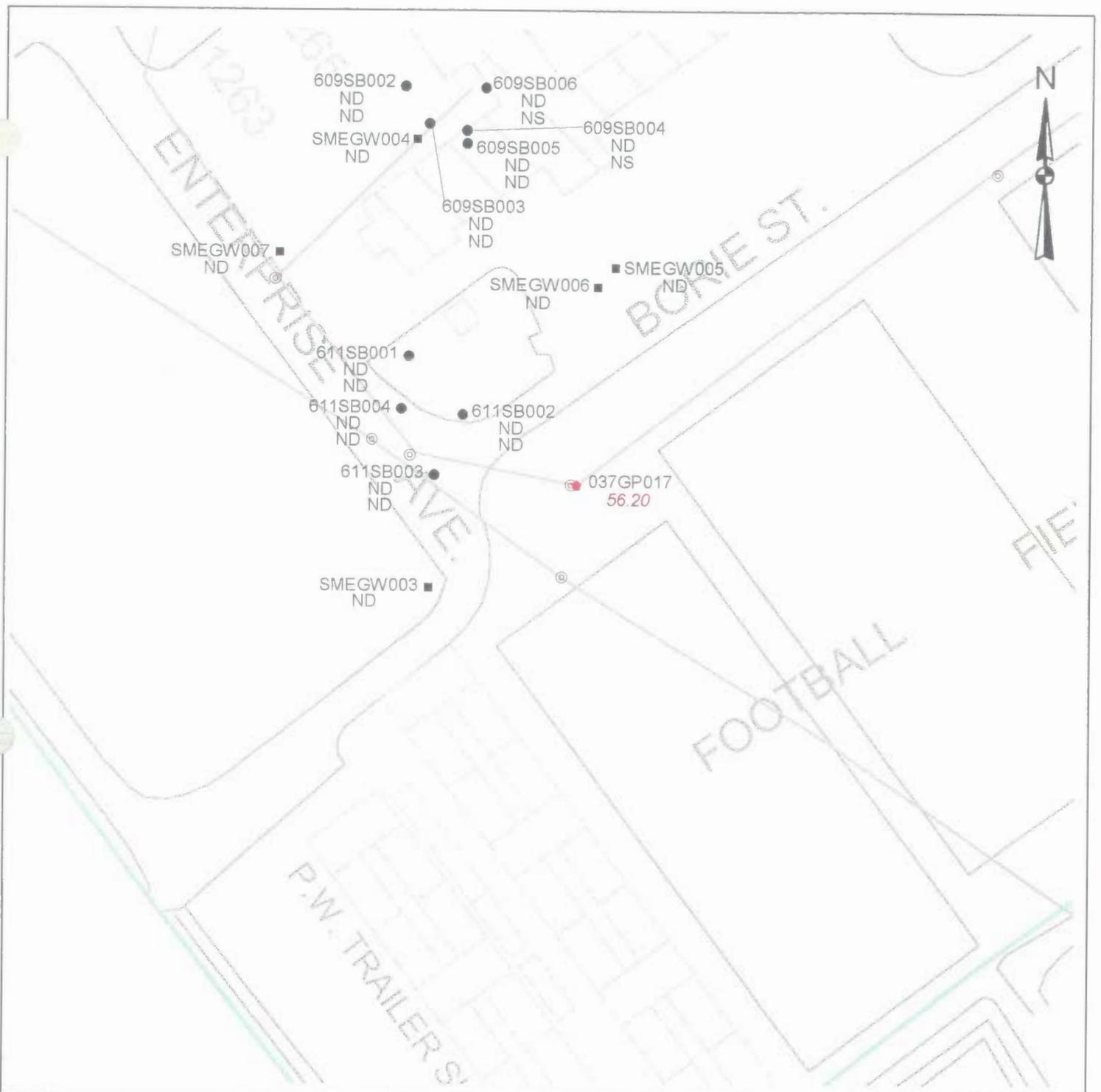
100 0 100 200 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.22
ZONE L - SUBZONE F
TETRACHLOROETHENE
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=12000 ug/kg SSL=60.0 ug/kg MCL=5.00 ug/L



LEGEND

- ZONE L DPT GROUNDWATER LOCATION
- 12.30 ZONE L DPT GROUNDWATER CONC. (ug/L)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- ▬ SUBZONE BOUNDARY
- ▬ RAILROAD
- ⊙ MANHOLE
- ▬ SANITARY SEWER LINE
- ▬ STORM SEWER LINE

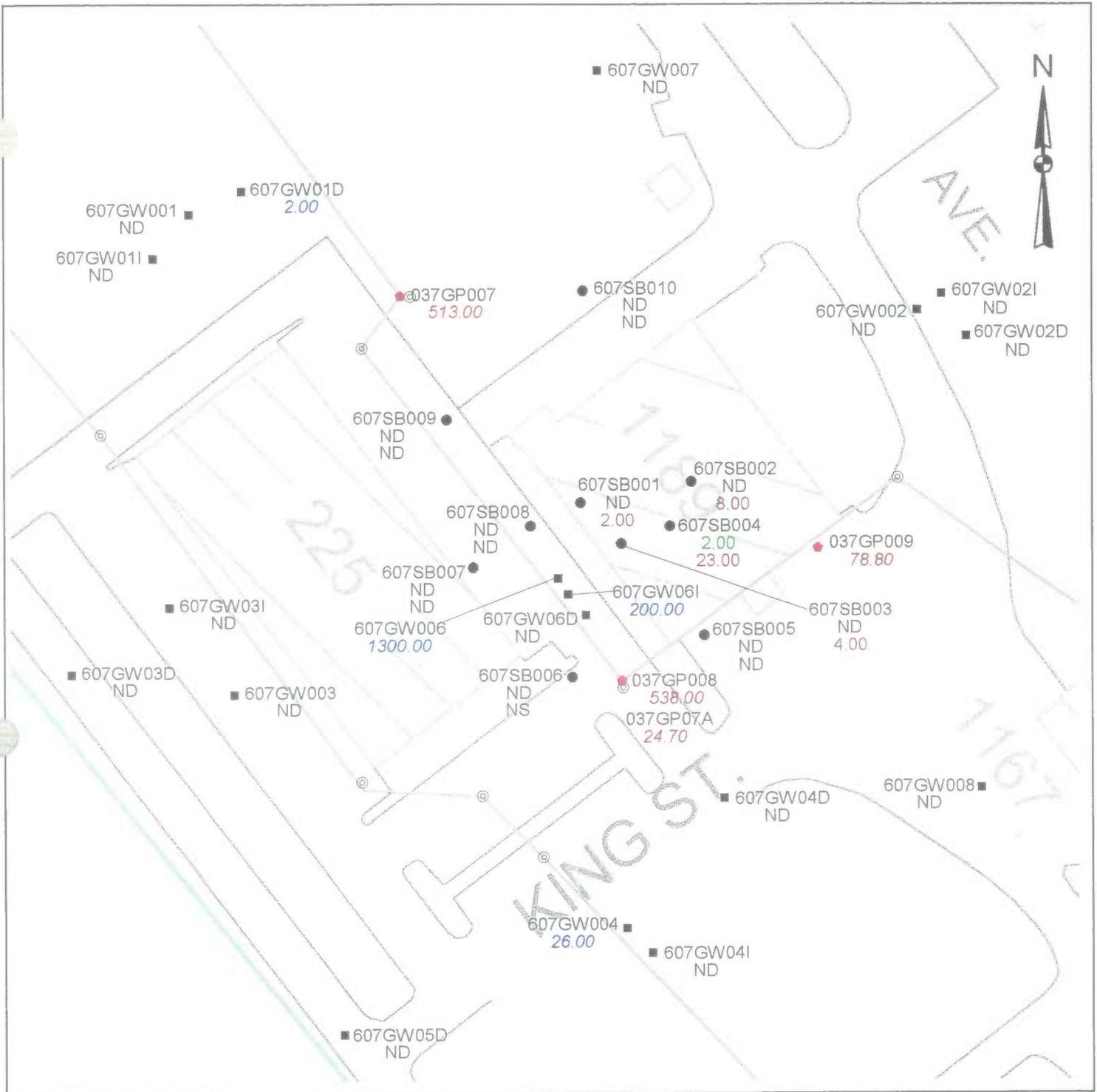
70 0 70 140 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.23
ZONE L - SUBZONE F
1,1,2-TRICHLOROETHANE
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=11000 ug/kg SSL=20.0 ug/kg MCL=5.00 ug/L



LEGEND

- ZONE L DPT GROUNDWATER LOCATION
- 12.30 ZONE L DPT GROUNDWATER CONC. (ug/L)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
 - RAILROAD
 - ⊙ MANHOLE
 - SANITARY SEWER LINE
 - STORM SEWER LINE
- 50 0 50 100 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.24
ZONE L - SUBZONE F
TRICHLOROETHANE
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=58000 ug/kg SSL=60.0 ug/kg MCL=5.00 ug/L



LEGEND

● ZONE L SOIL BORING LOCATION

— SUBZONE BOUNDARY
 — RAILROAD
 ⊙ MANHOLE
— SANITARY SEWER LINE
— STORM SEWER LINE

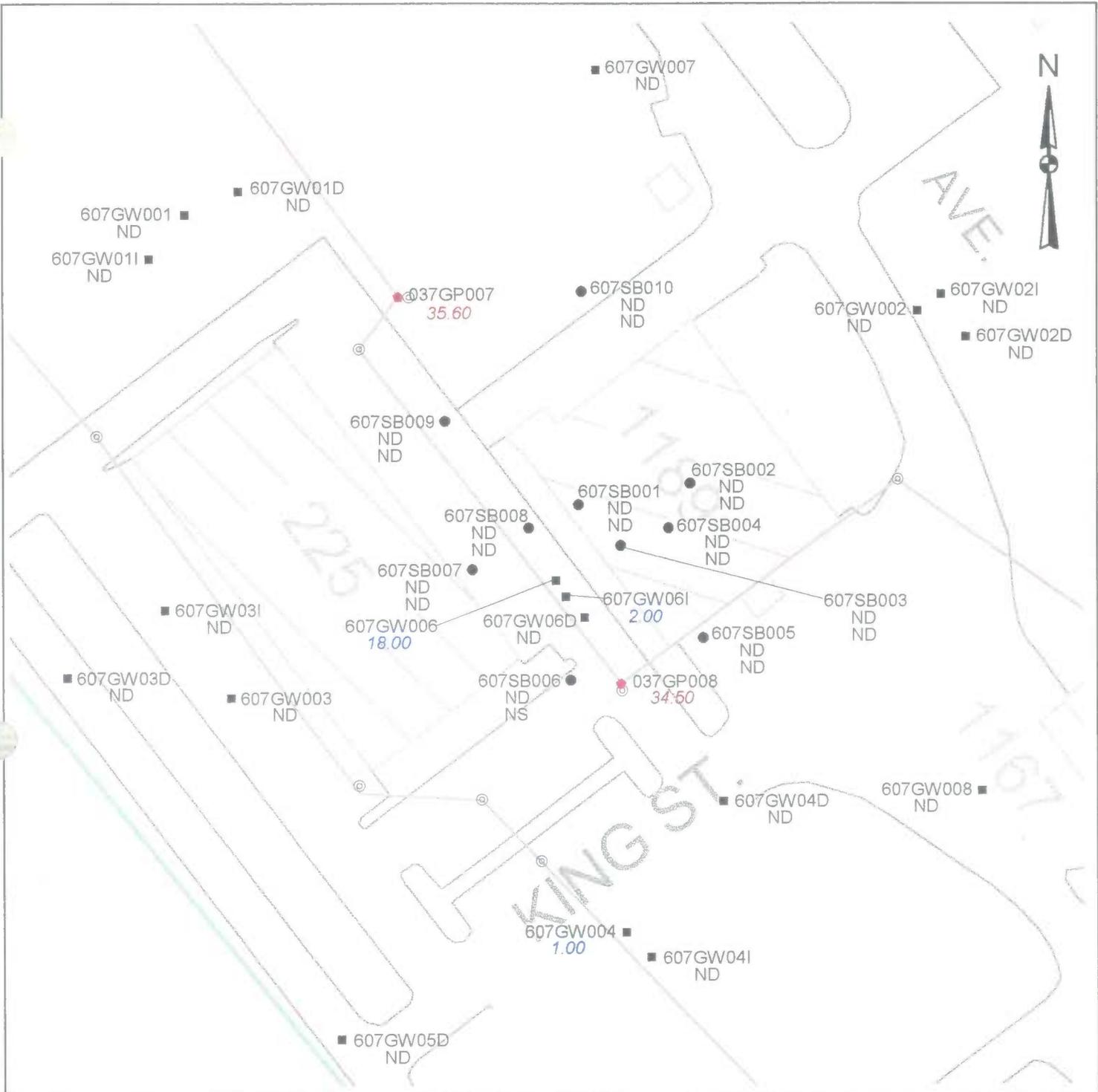
500 0 500 1000 Feet



ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.6.25
 ZONE L - SUBZONE F
 VINYL CHLORIDE
 ZONE L EXCEEDANCES

RBC=340 ug/kg SSL=10.0 ug/kg MCL=2.00 ug/L



LEGEND

- ZONE L DPT GROUNDWATER LOCATION
- 12.30 ZONE L DPT GROUNDWATER CONC. (ug/L)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- SANITARY SEWER LINE
- RAILROAD
- STORM SEWER LINE
- MANHOLE

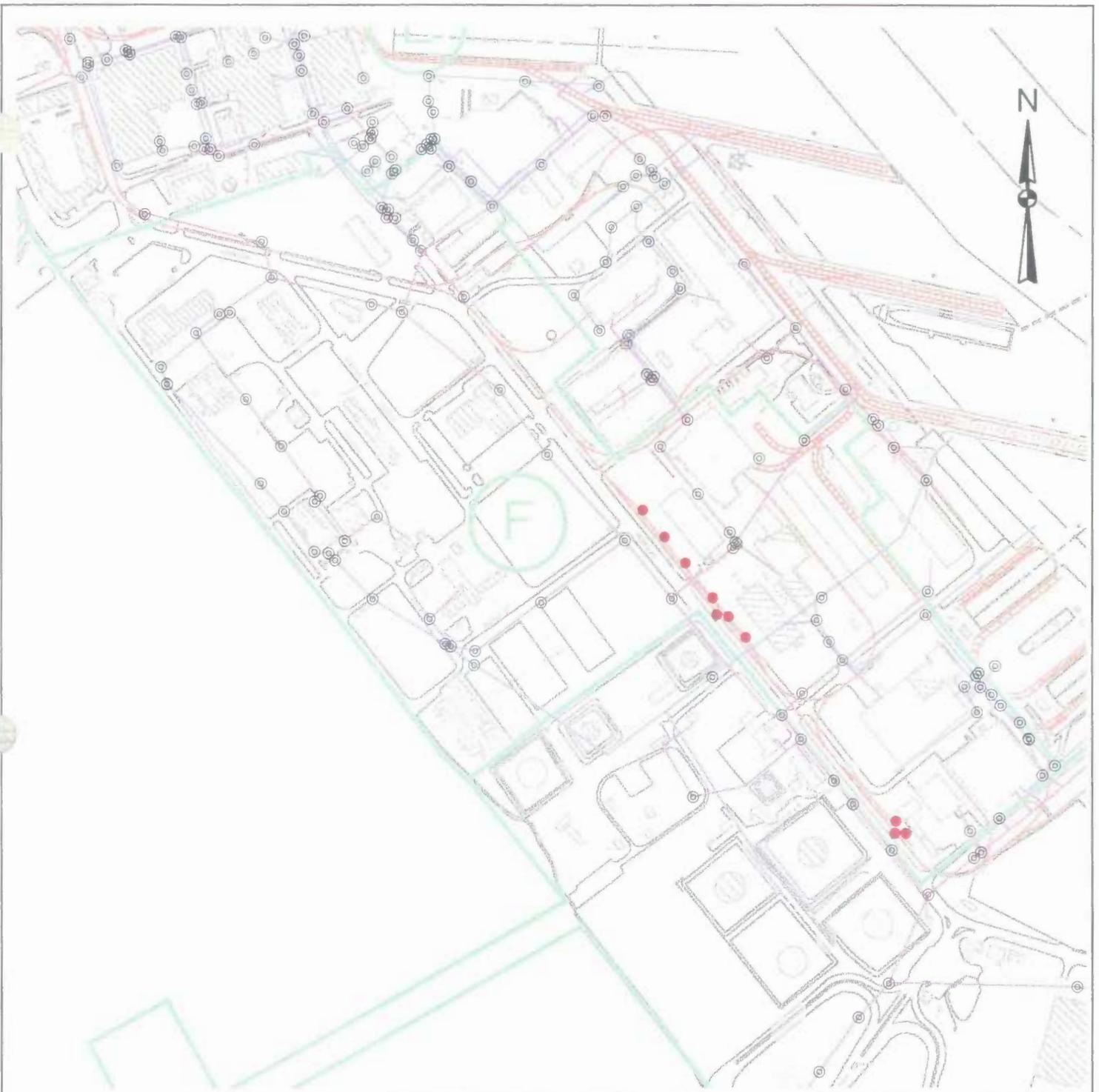
50 0 50 100 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.26
ZONE L - SUBZONE F
VINYL CHLORIDE
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=340 ug/kg SSL=10.0 ug/kg MCL=2.00 ug/L



LEGEND

● ZONE L SOIL BORING LOCATION

 SUBZONE BOUNDARY
  RAILROAD
  MANHOLE
 SANITARY SEWER LINE
  STORM SEWER LINE

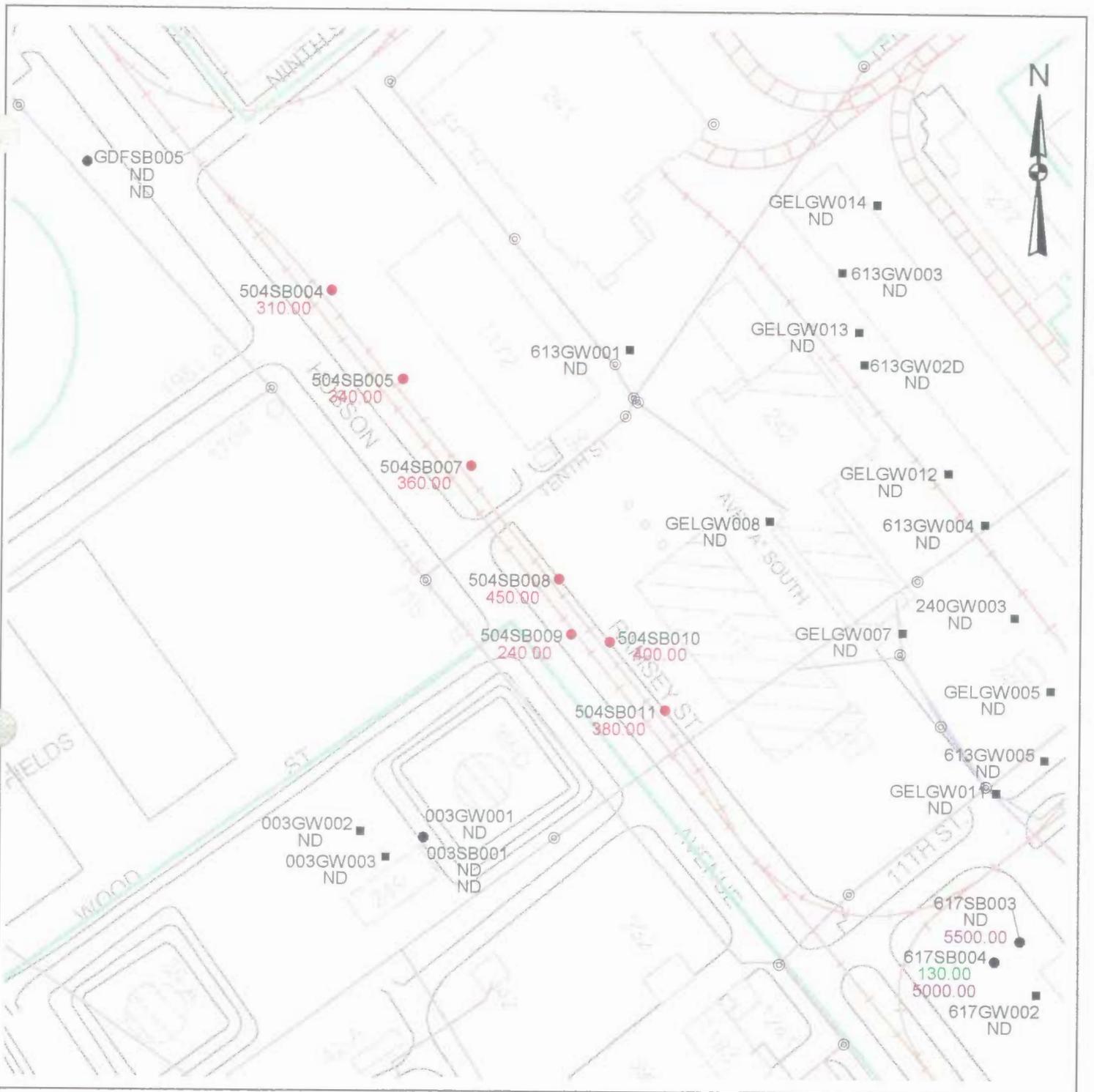
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ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.6.28
 ZONE L - SUBZONE F
 BENZO(A)PYRENE
 ZONE L EXCEEDANCES

RBC=88.0 ug/kg SSL=8000 ug/kg MCL=0.20 ug/L



LEGEND

- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (ug/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

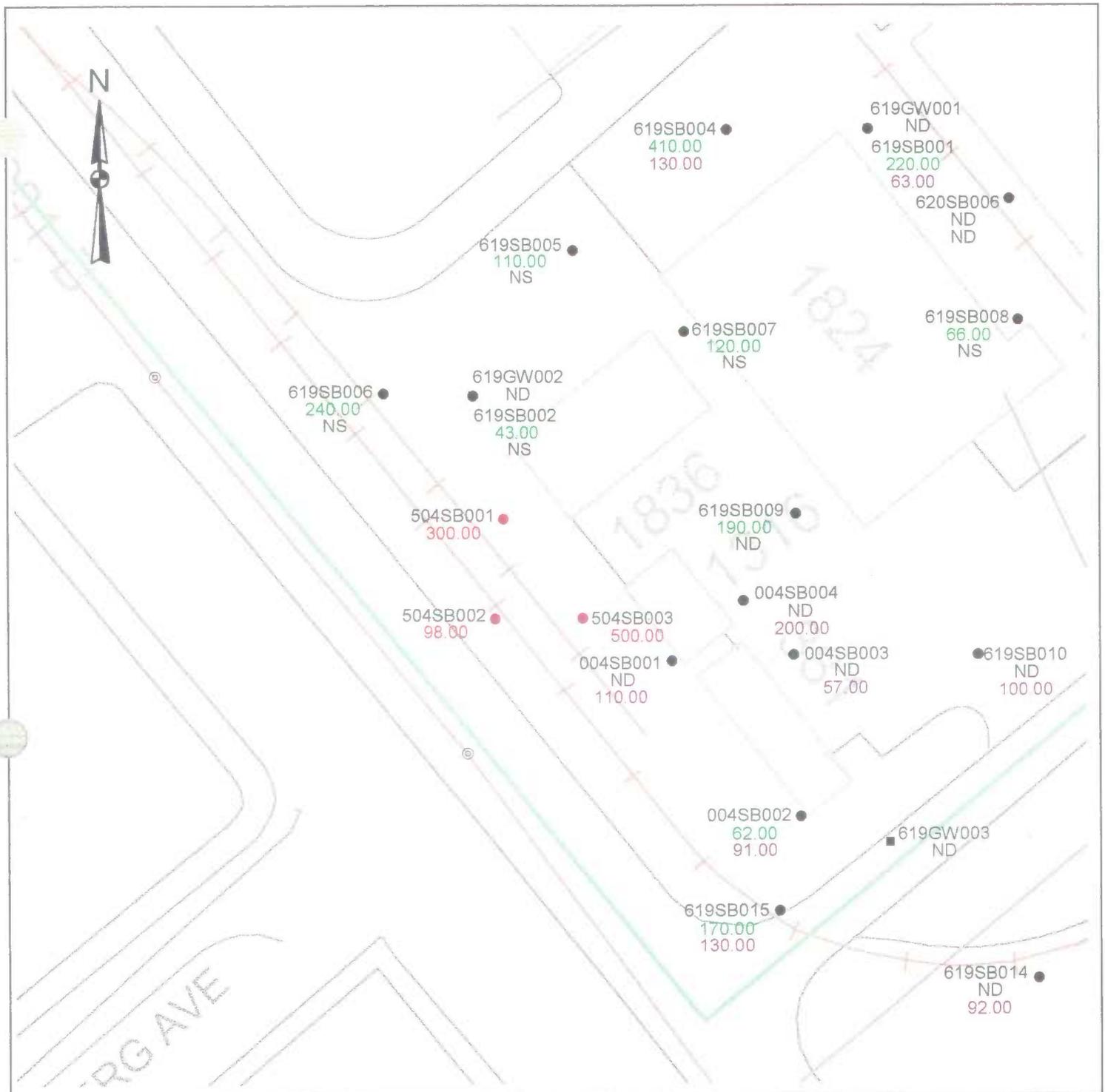
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ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.29
ZONE L - SUBZONE F
BENZO(A)PYRENE
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=88.0 ug/kg SSL=8000 ug/kg MCL=0.20 ug/L



LEGEND

- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (ug/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- ▬ SUBZONE BOUNDARY
- ▬ RAILROAD
- ⊙ MANHOLE
- ▬ SANITARY SEWER LINE
- ▬ STORM SEWER LINE

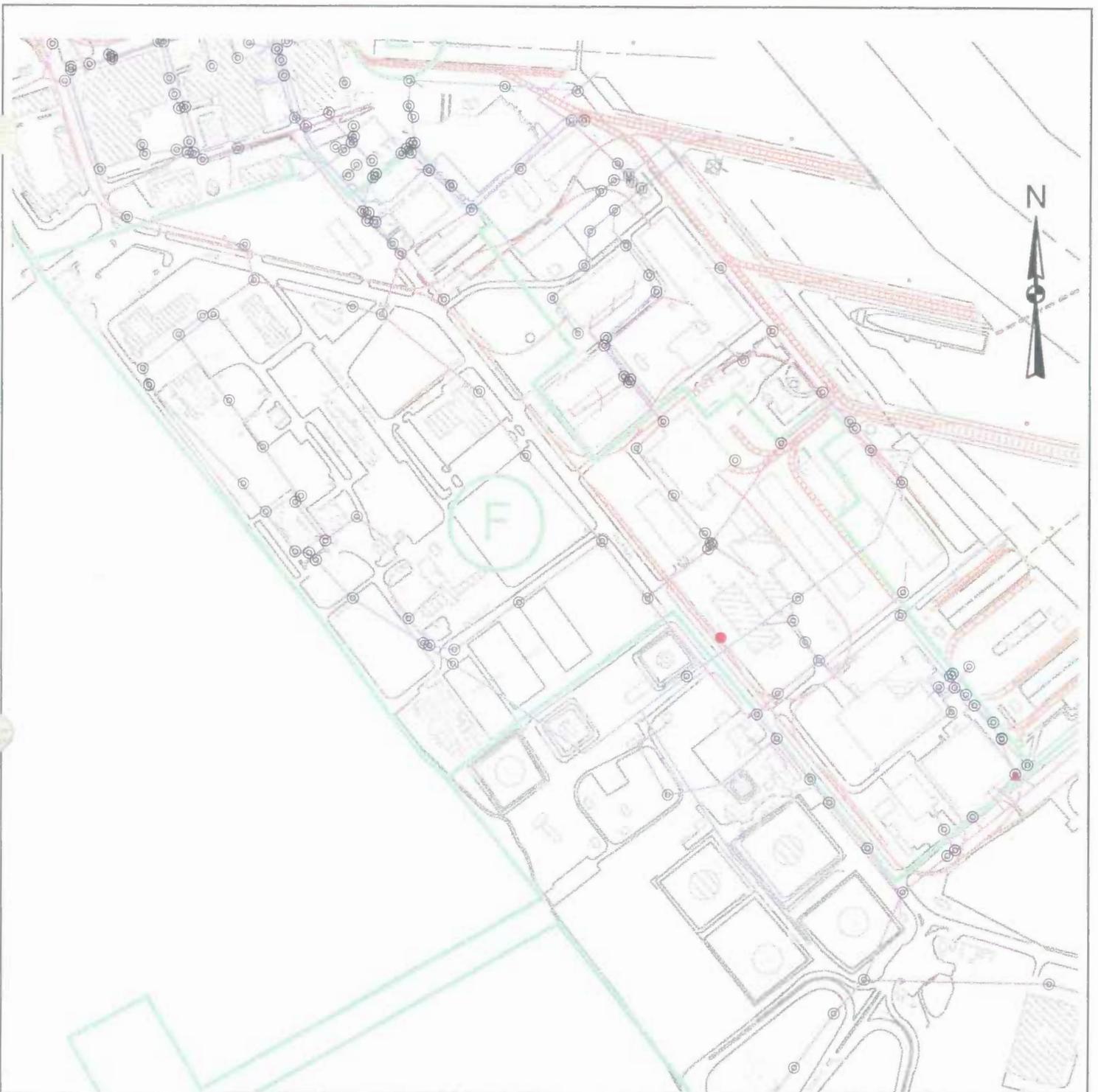
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ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.30
ZONE L - SUBZONE F
BENZO(A)PYRENE
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=88.0 ug/kg SSL=8000 ug/kg MCL=0.20 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION

- ▭ SUBZONE BOUNDARY
- ▭ SANITARY SEWER LINE
- ▭ RAILROAD
- ▭ STORM SEWER LINE
- ⊙ MANHOLE

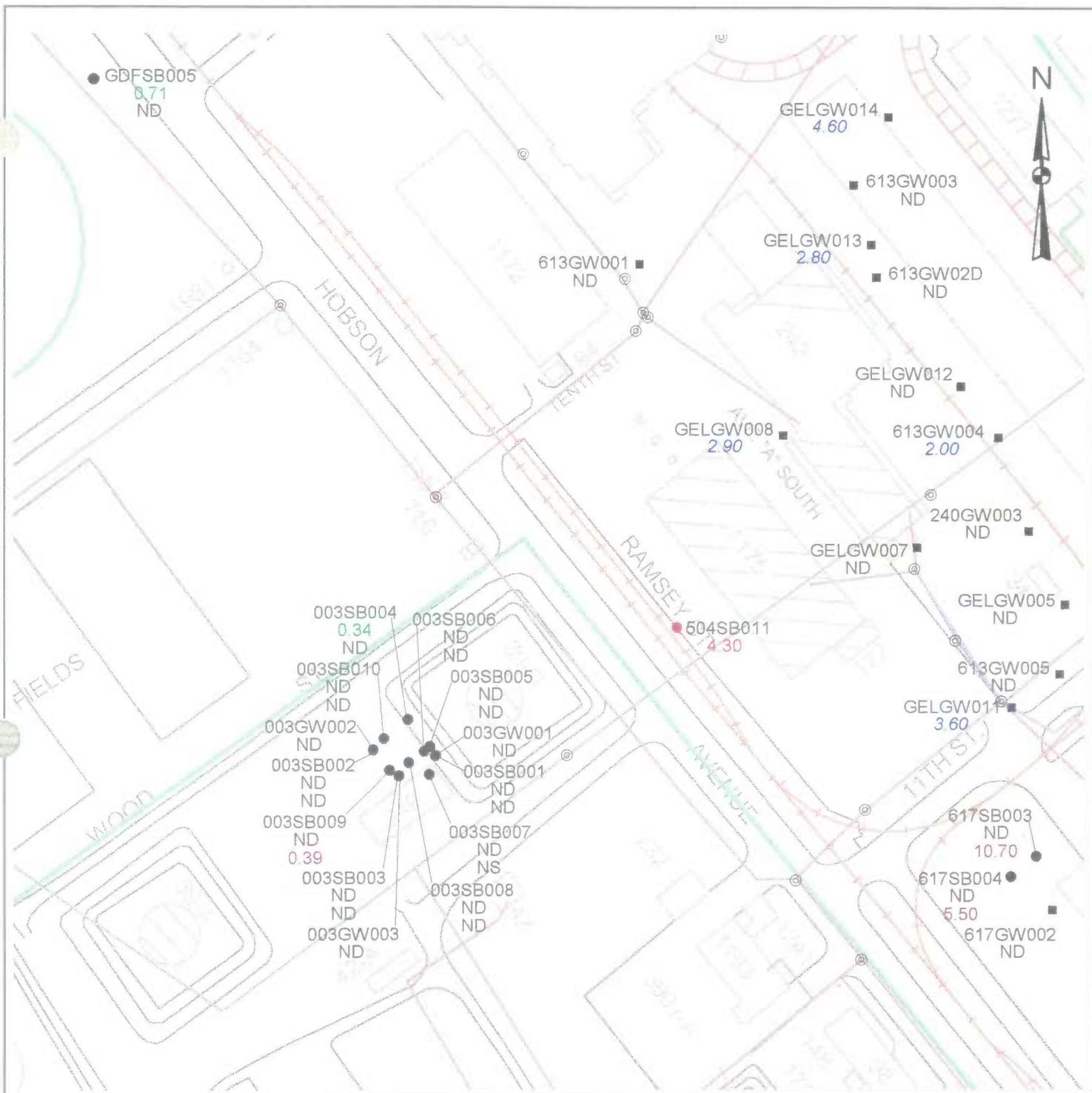
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ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.31
ZONE L - SUBZONE F
ANTIMONY
ZONE L EXCEEDANCES

RBC=3.10 mg/kg SSL=5.00 mg/kg MCL=6.00 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- W SUBZONE BOUNDARY
- R RAILROAD
- SS SANITARY SEWER LINE
- SS STORM SEWER LINE
- ⊙ MANHOLE

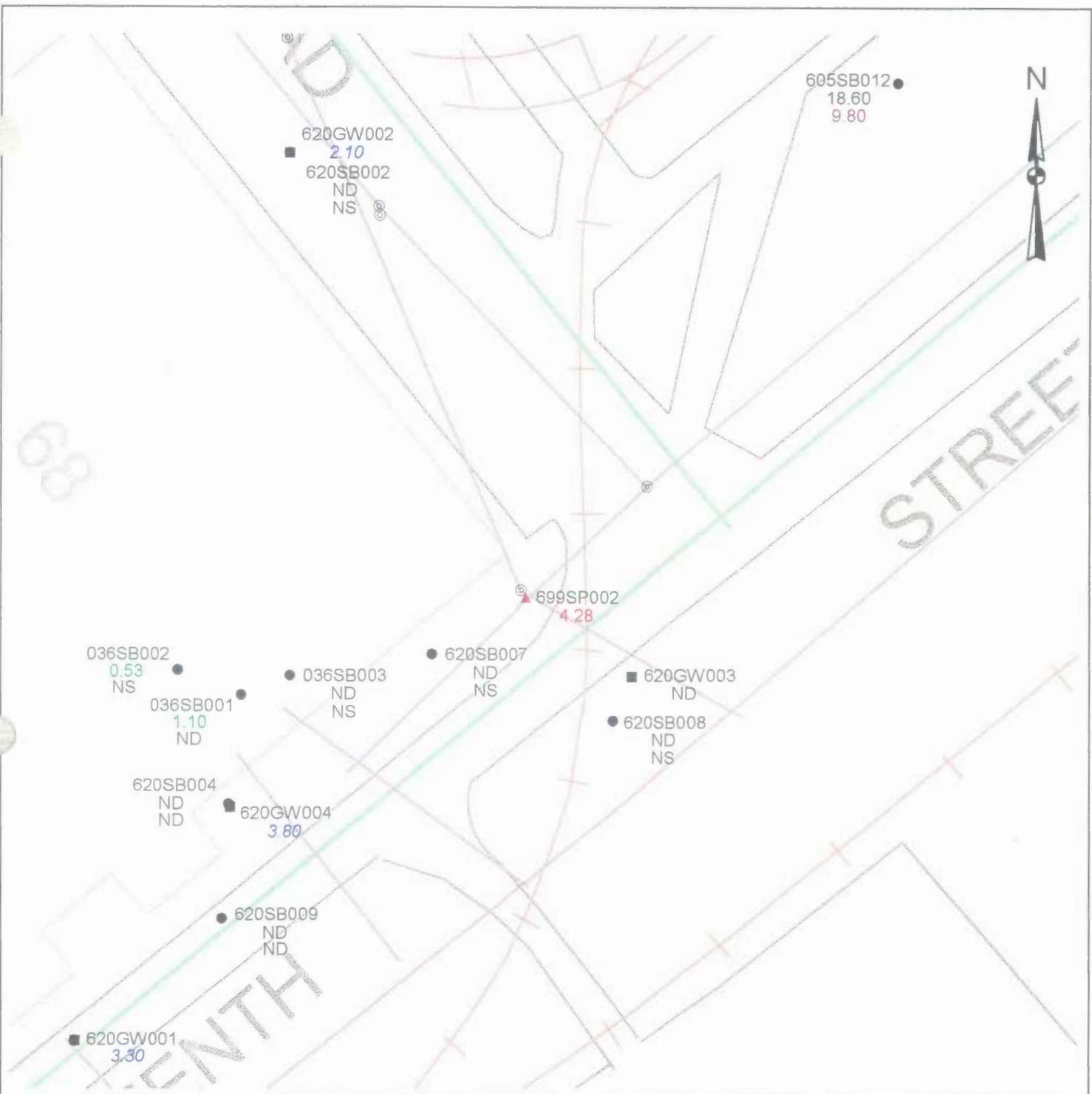
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ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.32
ZONE L - SUBZONE F
ANTIMONY
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=3.10 mg/kg SSL=5.00 mg/kg MCL = 6.00 ug/L



LEGEND

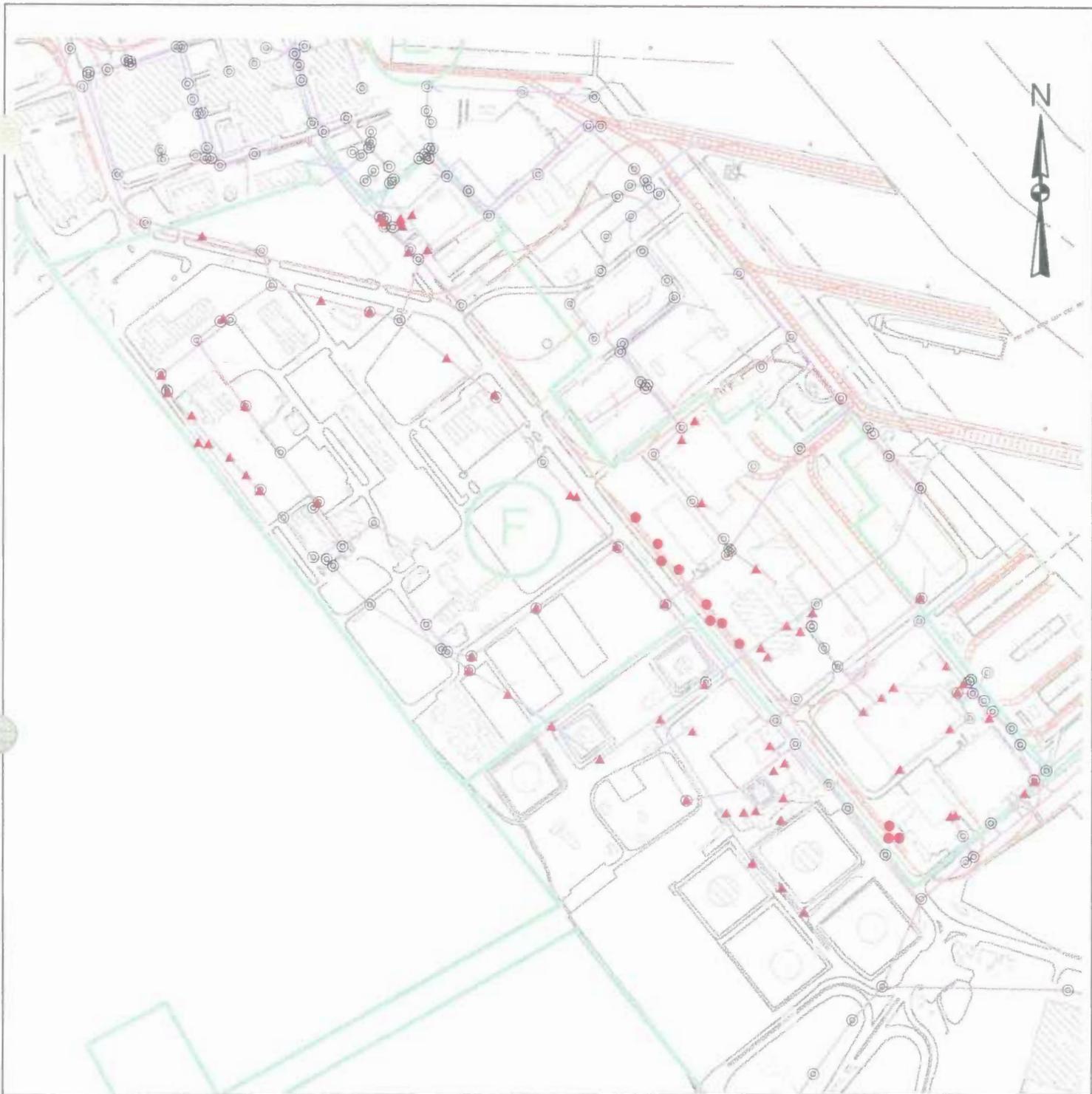
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- W SUBZONE BOUNDARY
- RAILROAD
- ◎ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.33
ZONE L - SUBZONE F
ANTIMONY
ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=3.10 mg/kg SSL=5.00 mg/kg MCL = 6.00 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION

- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

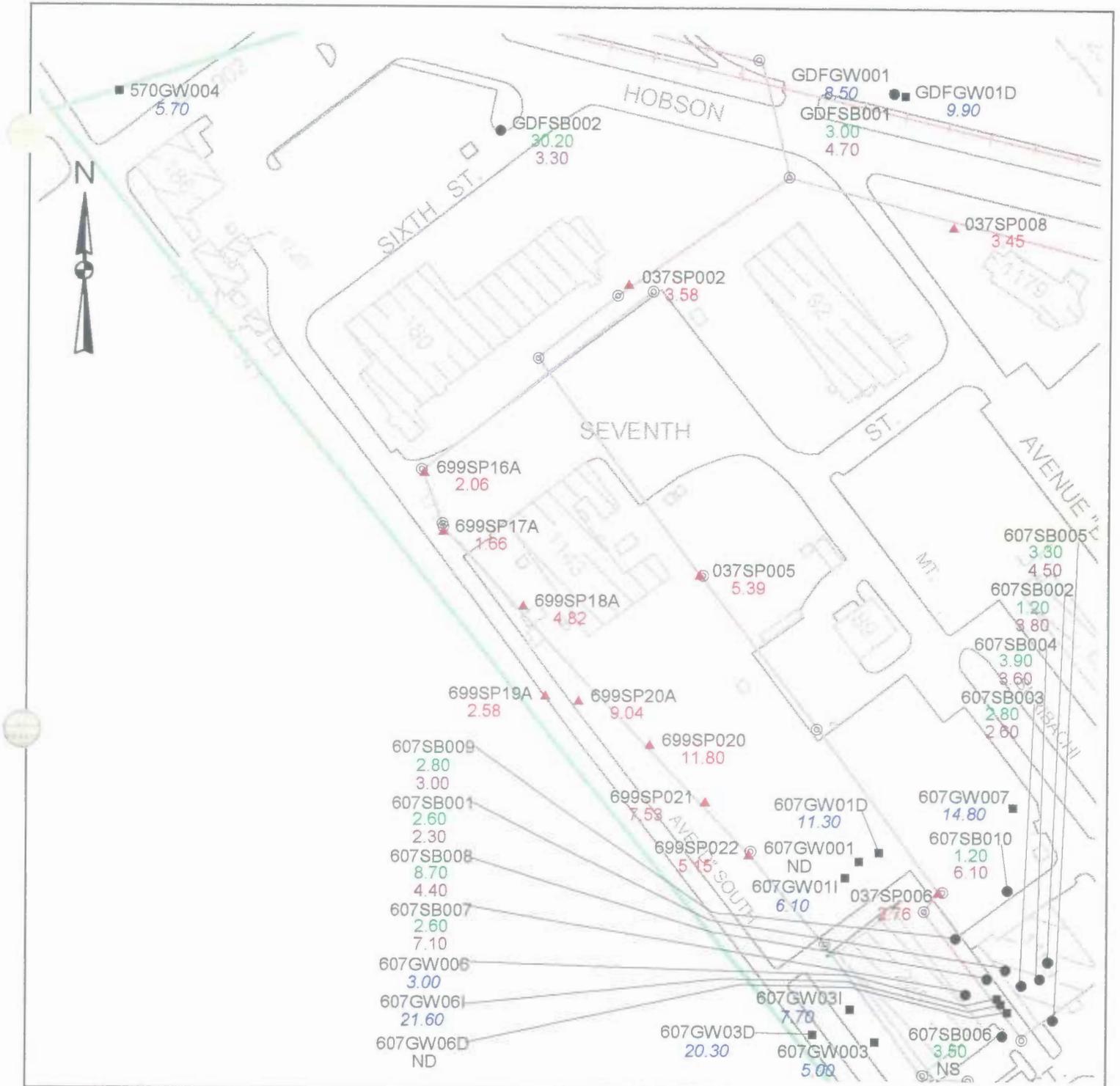
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ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.34
ZONE L - SUBZONE F
ARSENIC
ZONE L EXCEEDANCES

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

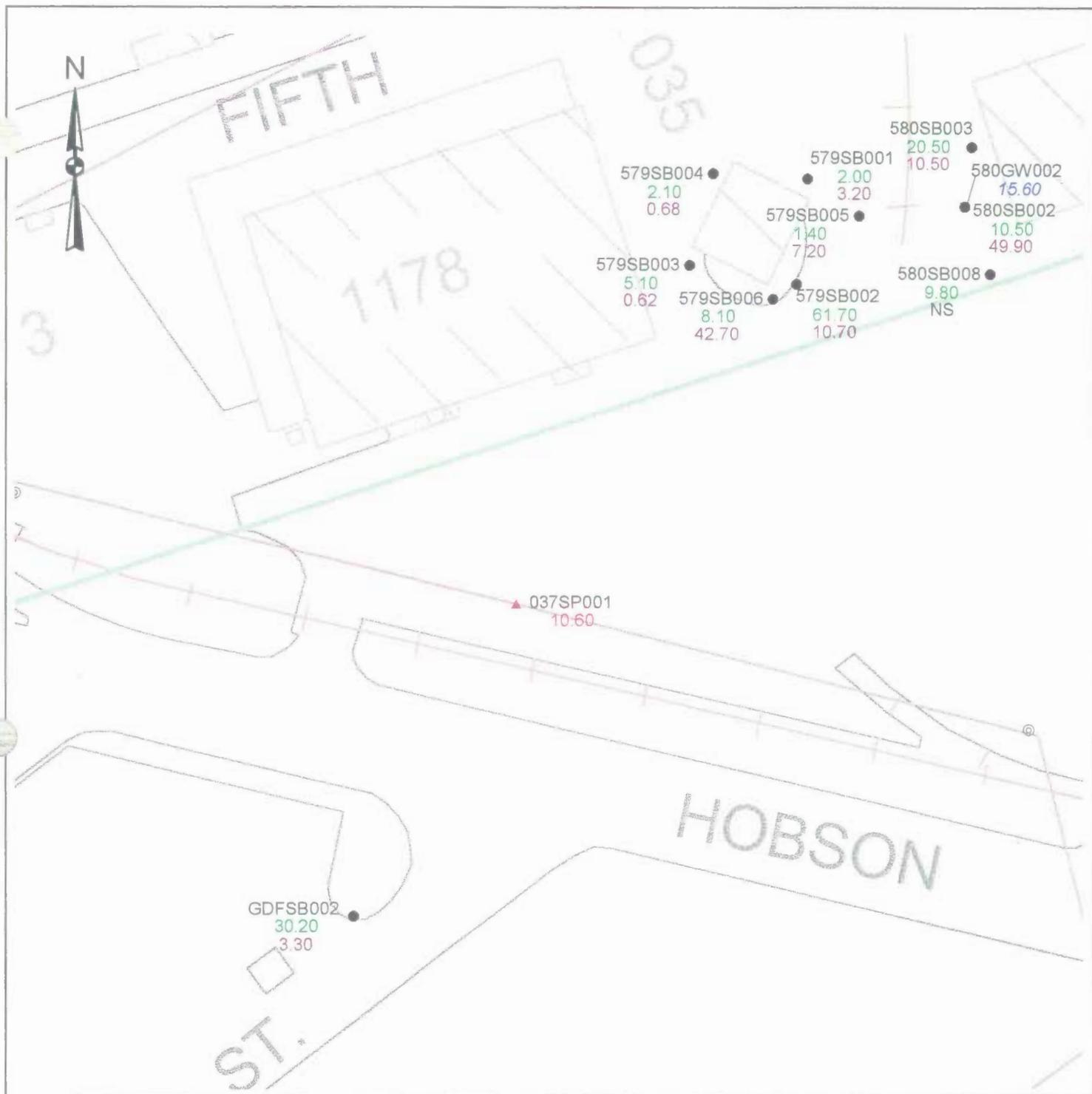
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.35
ZONE L - SUBZONE F
ARSENIC
ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

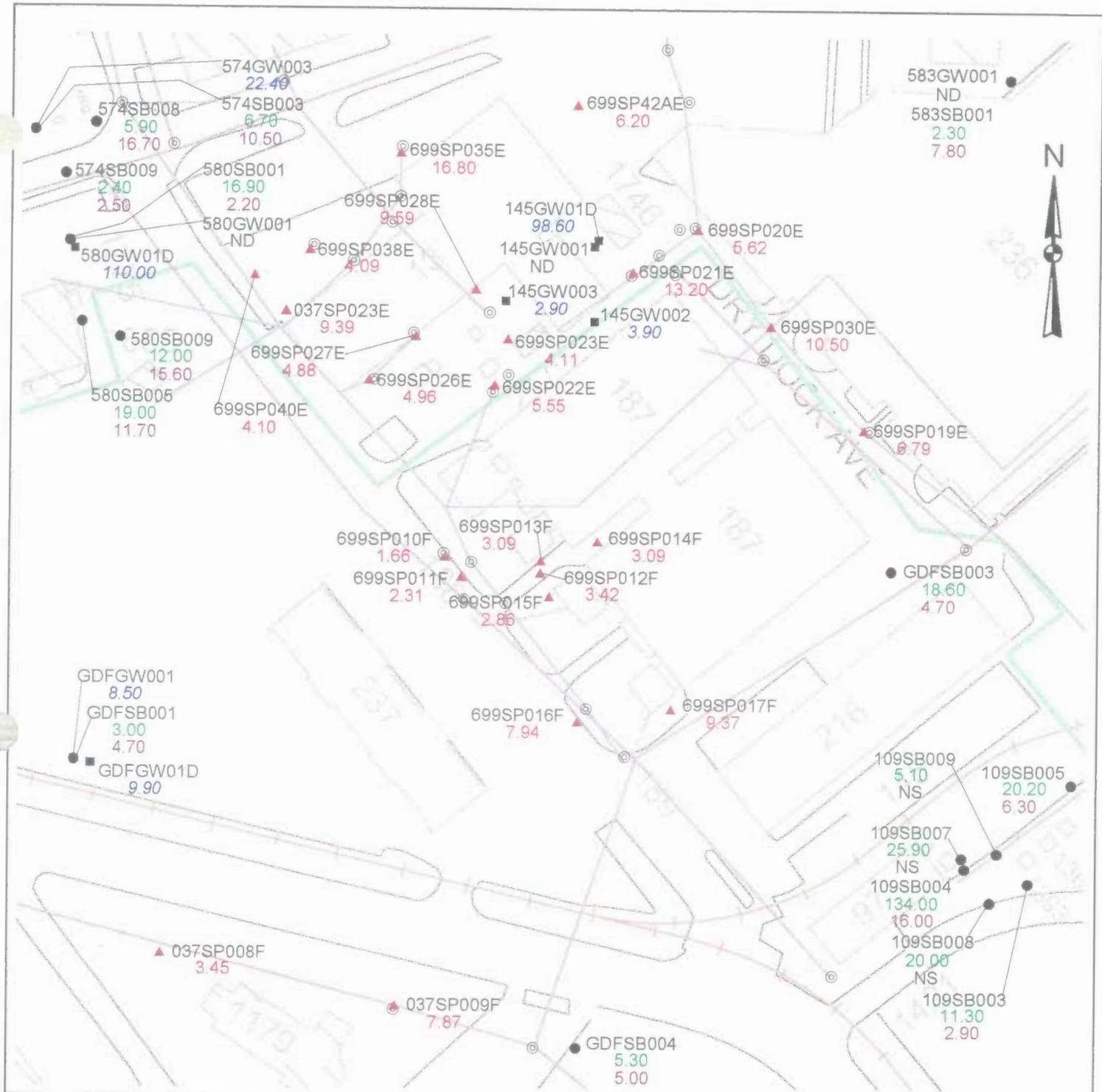
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ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.36
ZONE L - SUBZONE F
ARSENIC
ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

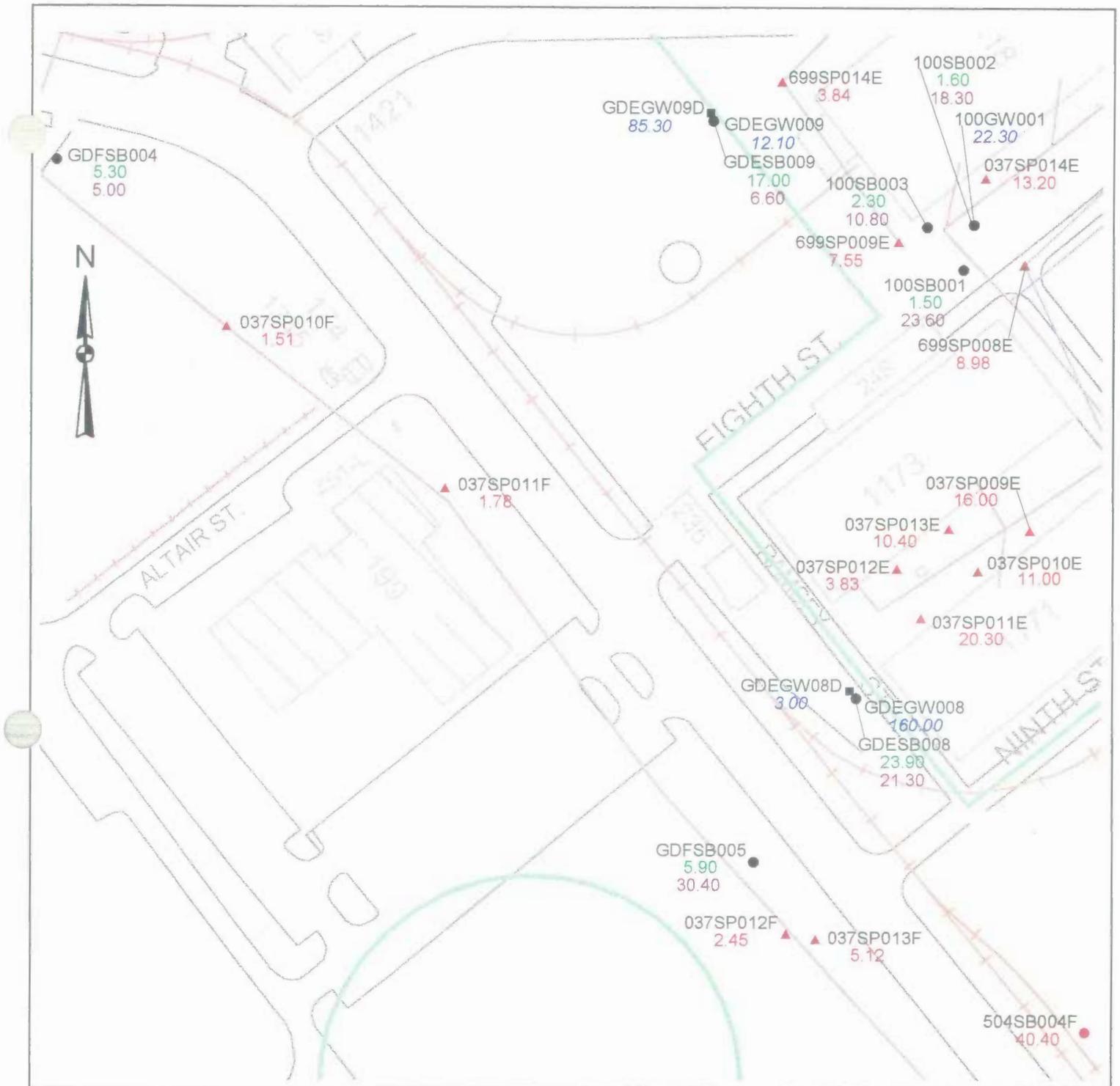


ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.37
ZONE L - SUBZONE F
ARSENIC
ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L





LEGEND

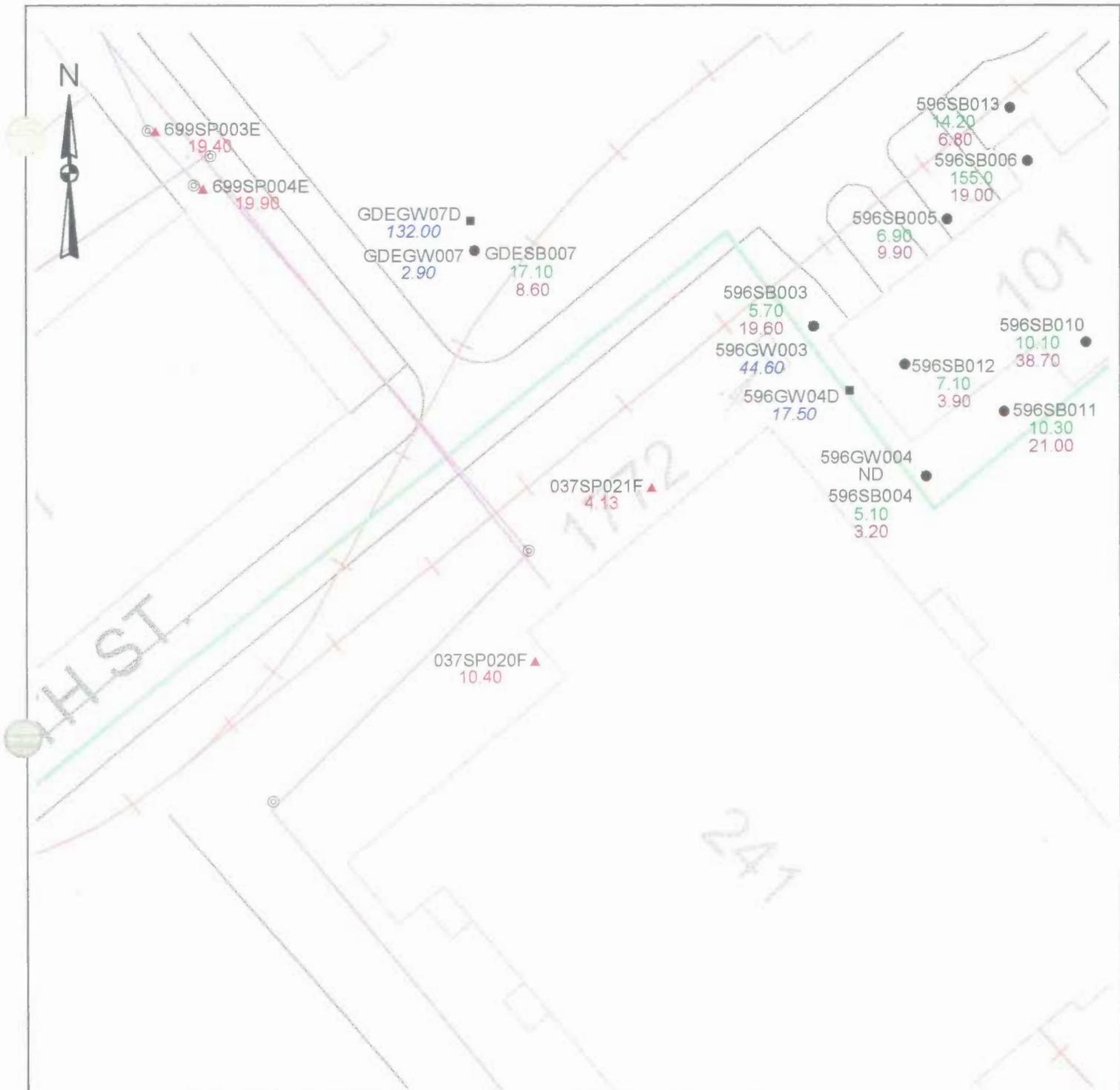
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.38
ZONE L - SUBZONE F
ARSENIC
ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

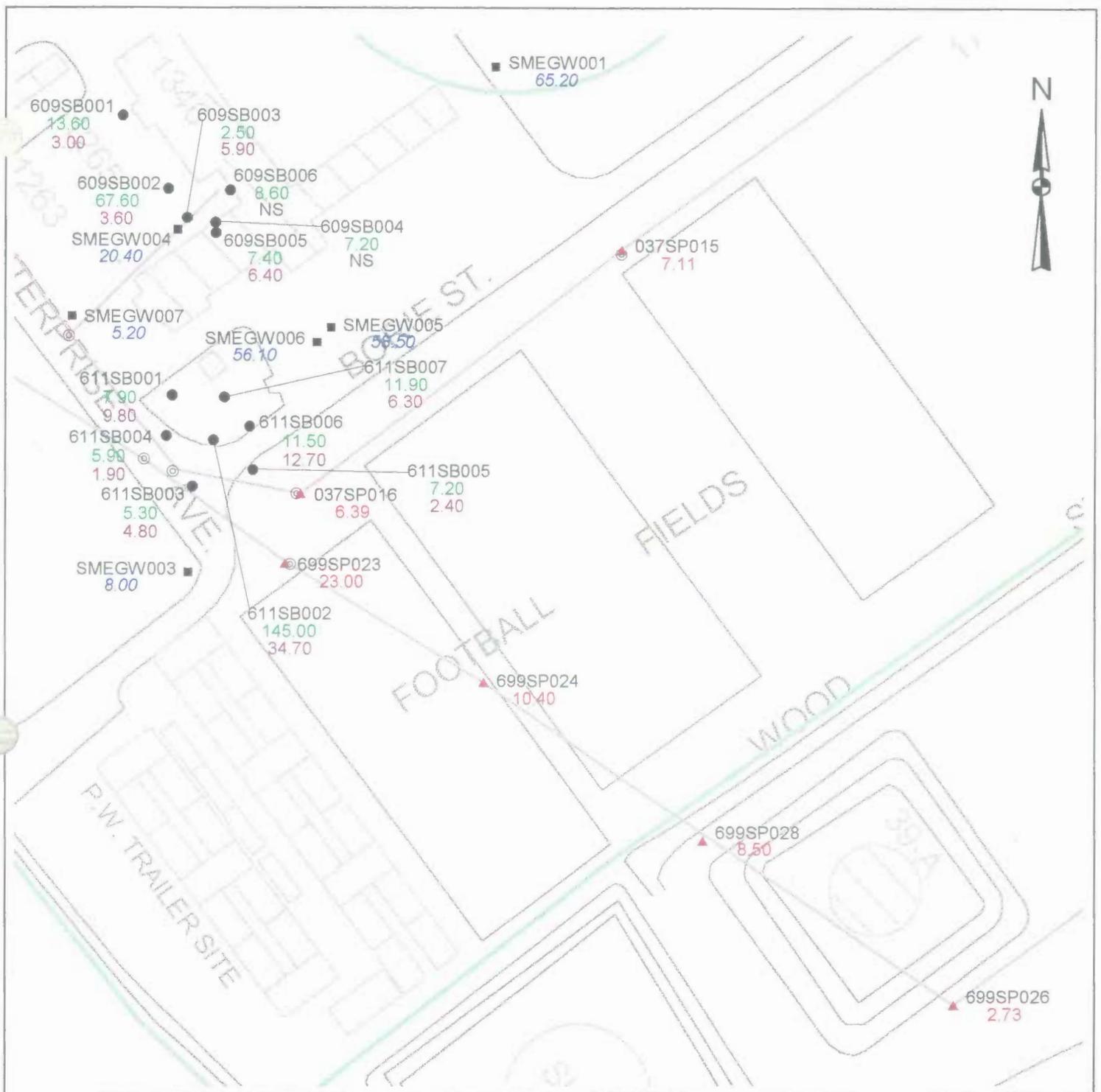
50 0 50 100 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.39
ZONE L - SUBZONE F
ARSENIC
ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

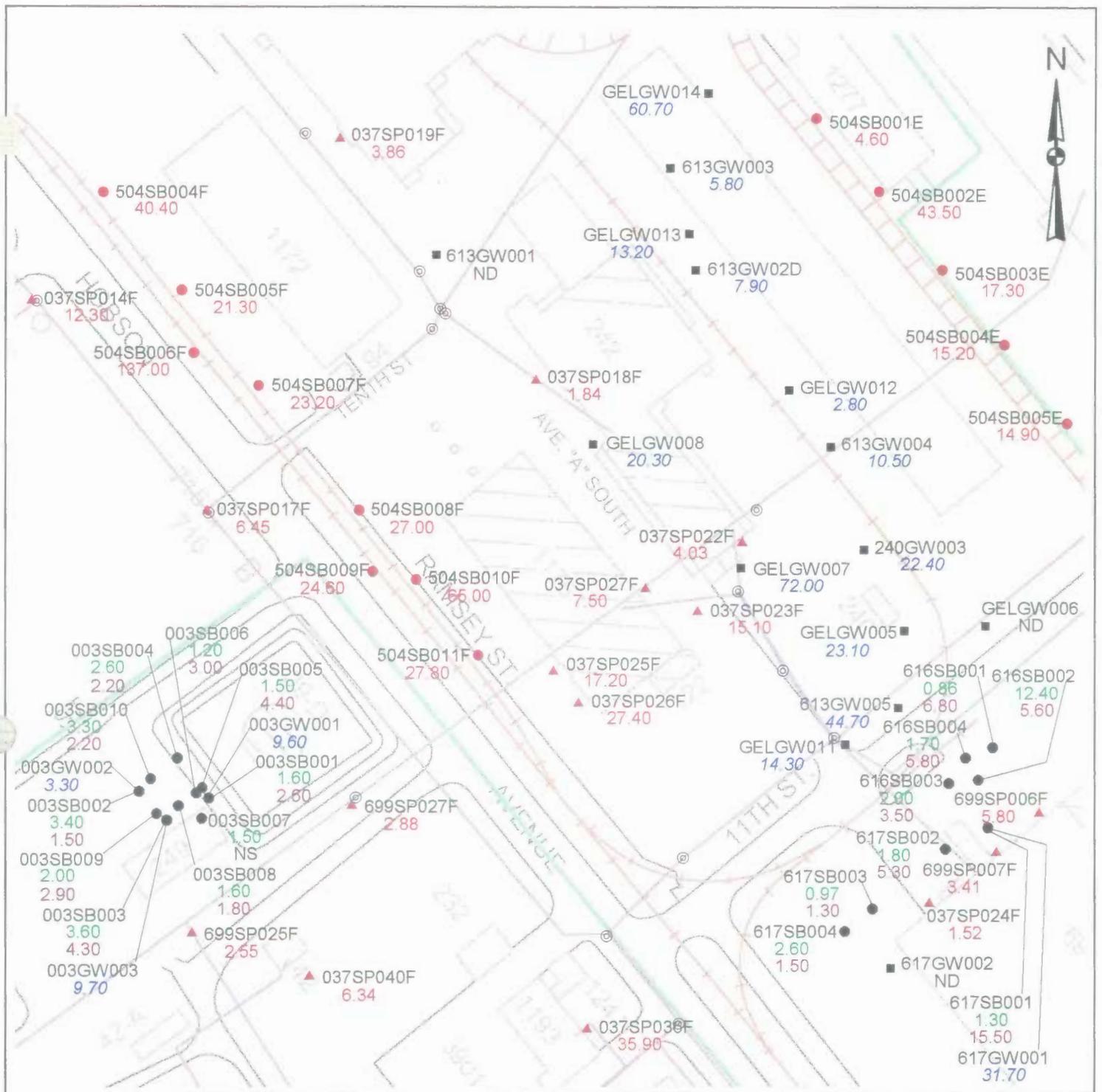
90 0 90 180 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.40
ZONE L - SUBZONE F
ARSENIC
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

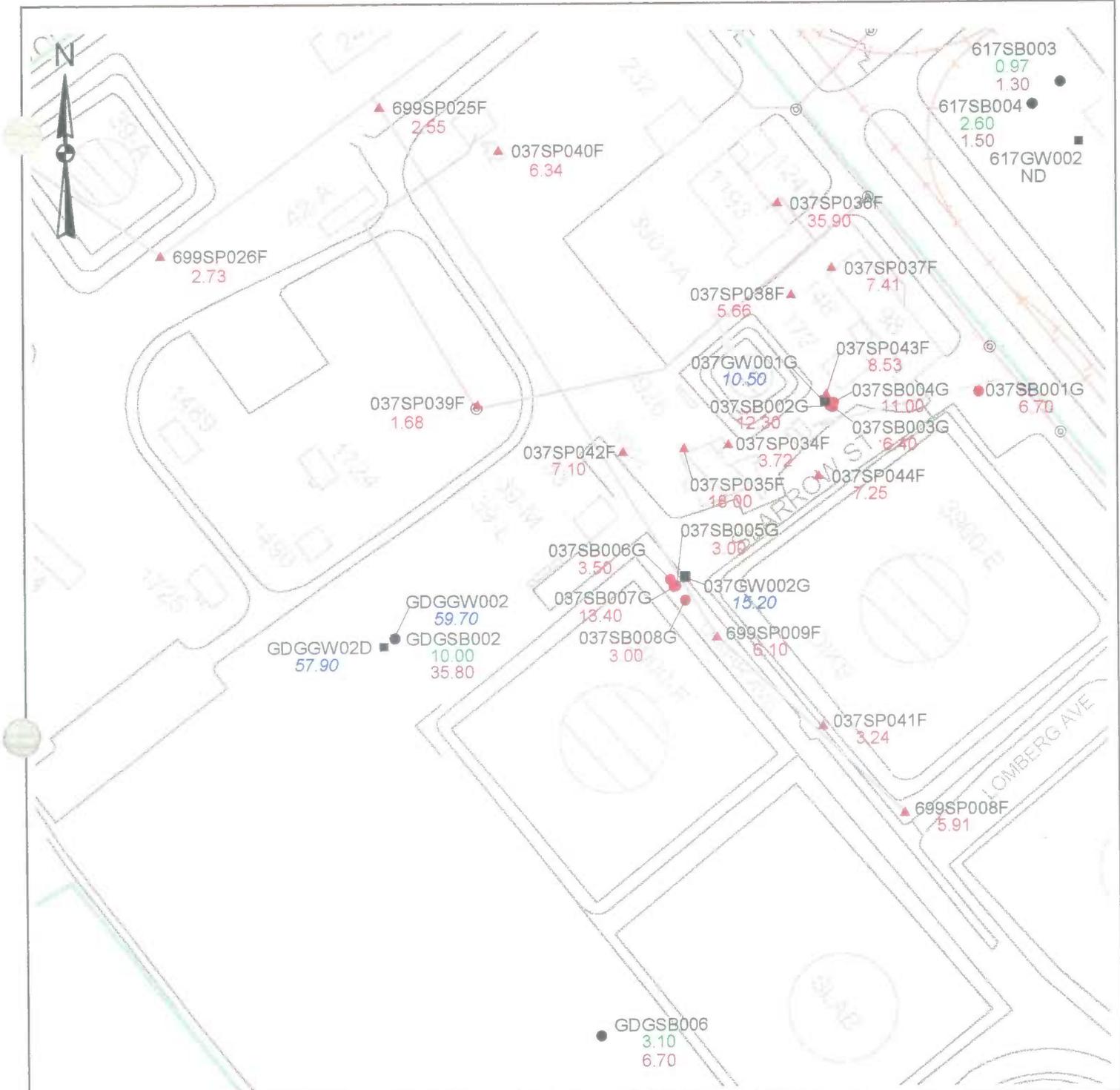
100 0 100 200 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.41
ZONE L - SUBZONE F
ARSENIC
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

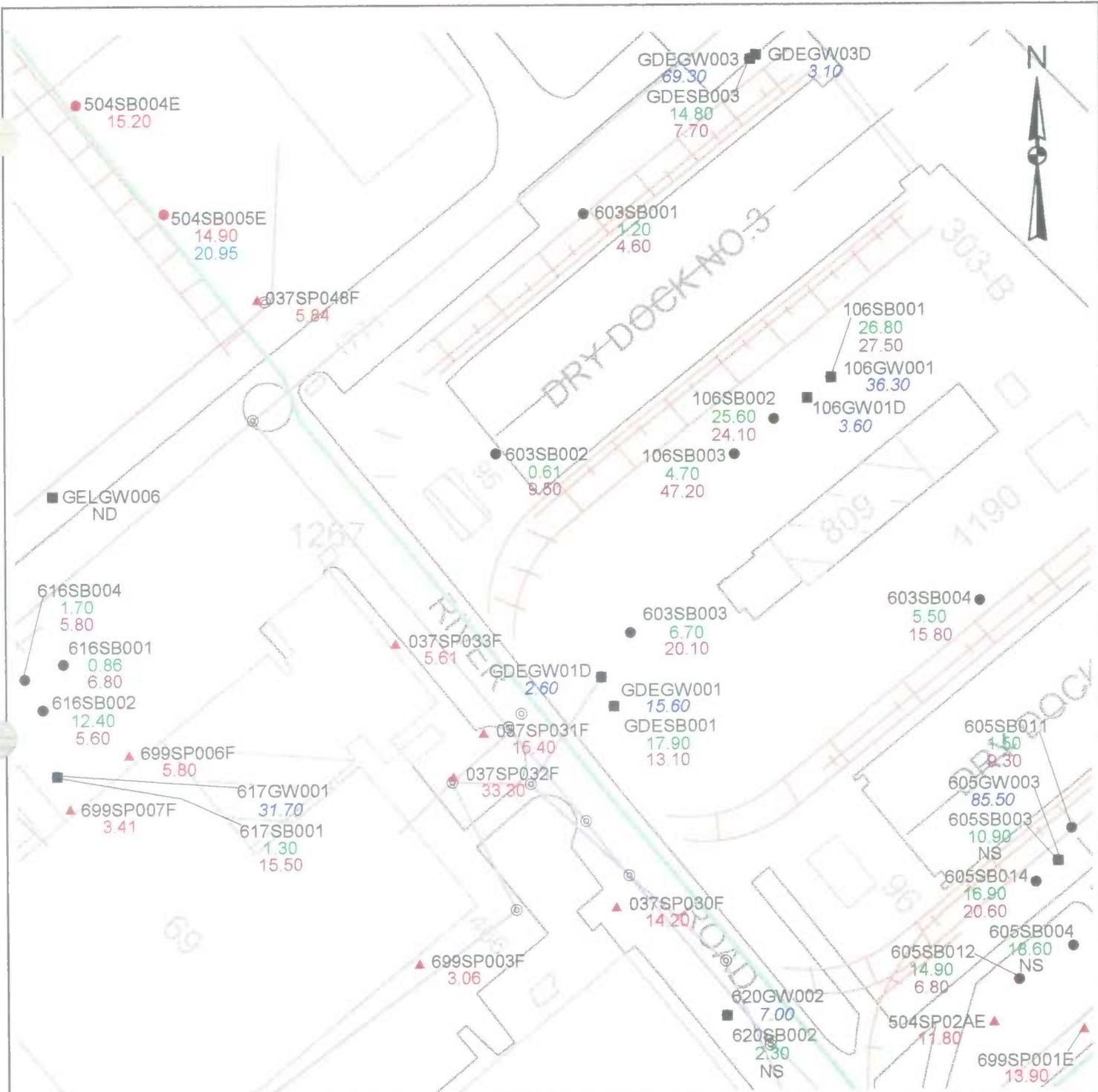
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.42
ZONE L - SUBZONE F
ARSENIC
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

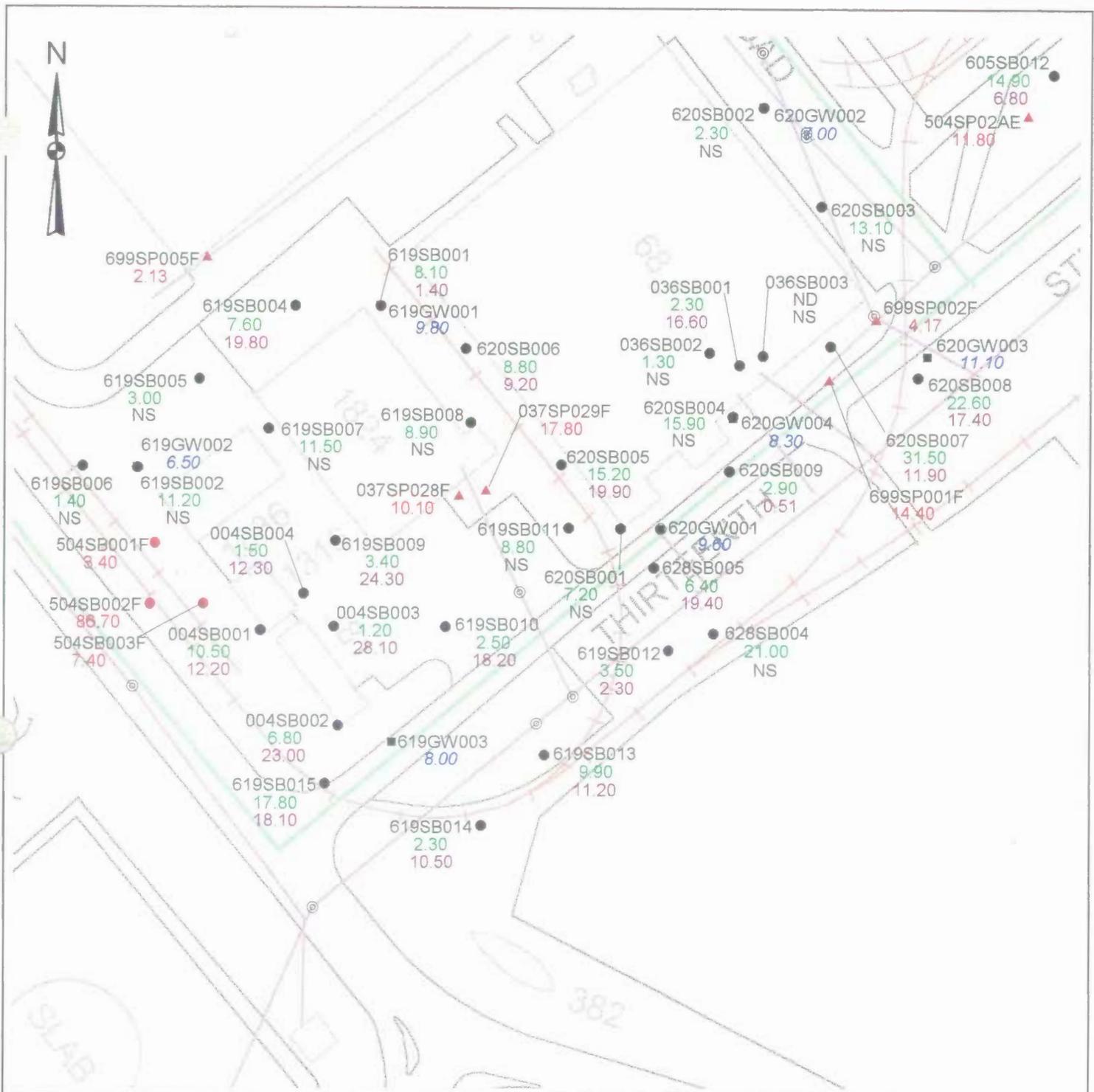
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.43
ZONE L - SUBZONE F
ARSENIC
ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

100 0 100 200 Feet

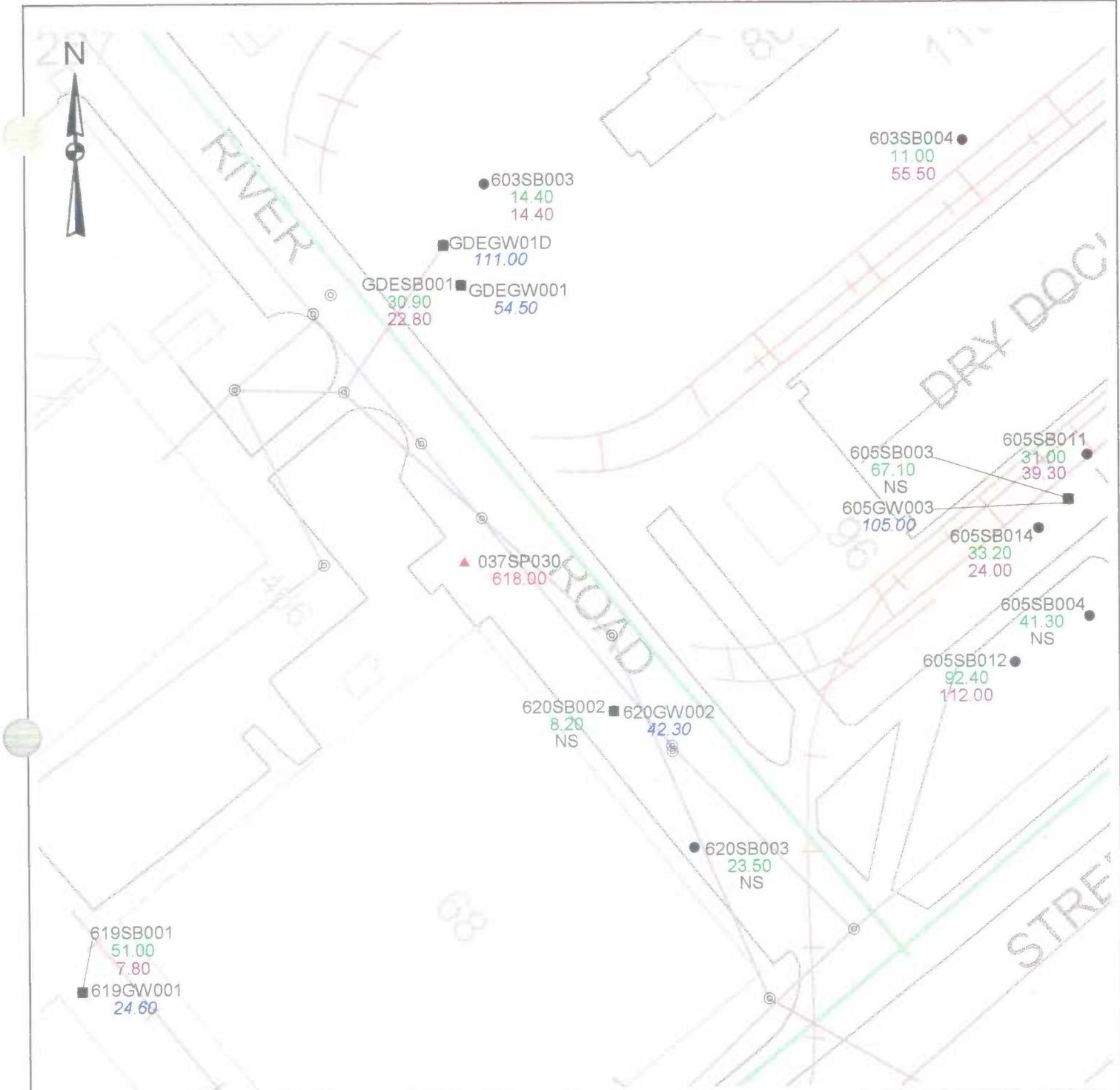


ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.44
ZONE L - SUBZONE F
ARSENIC

ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

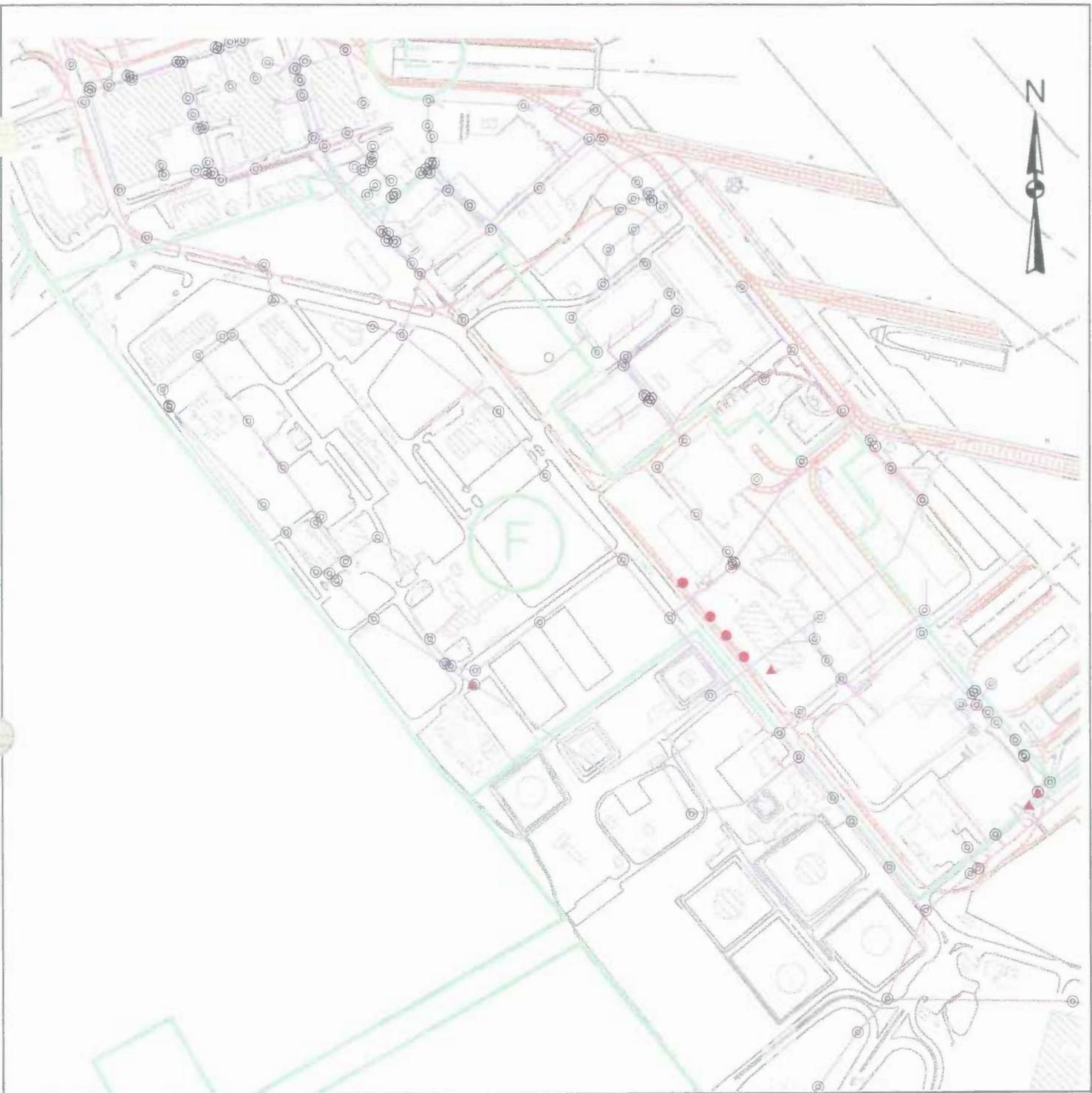
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.45
ZONE L - SUBZONE F
BARIUM
ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=550 mg/kg SSL=1600 mg/kg MCL=2000 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION

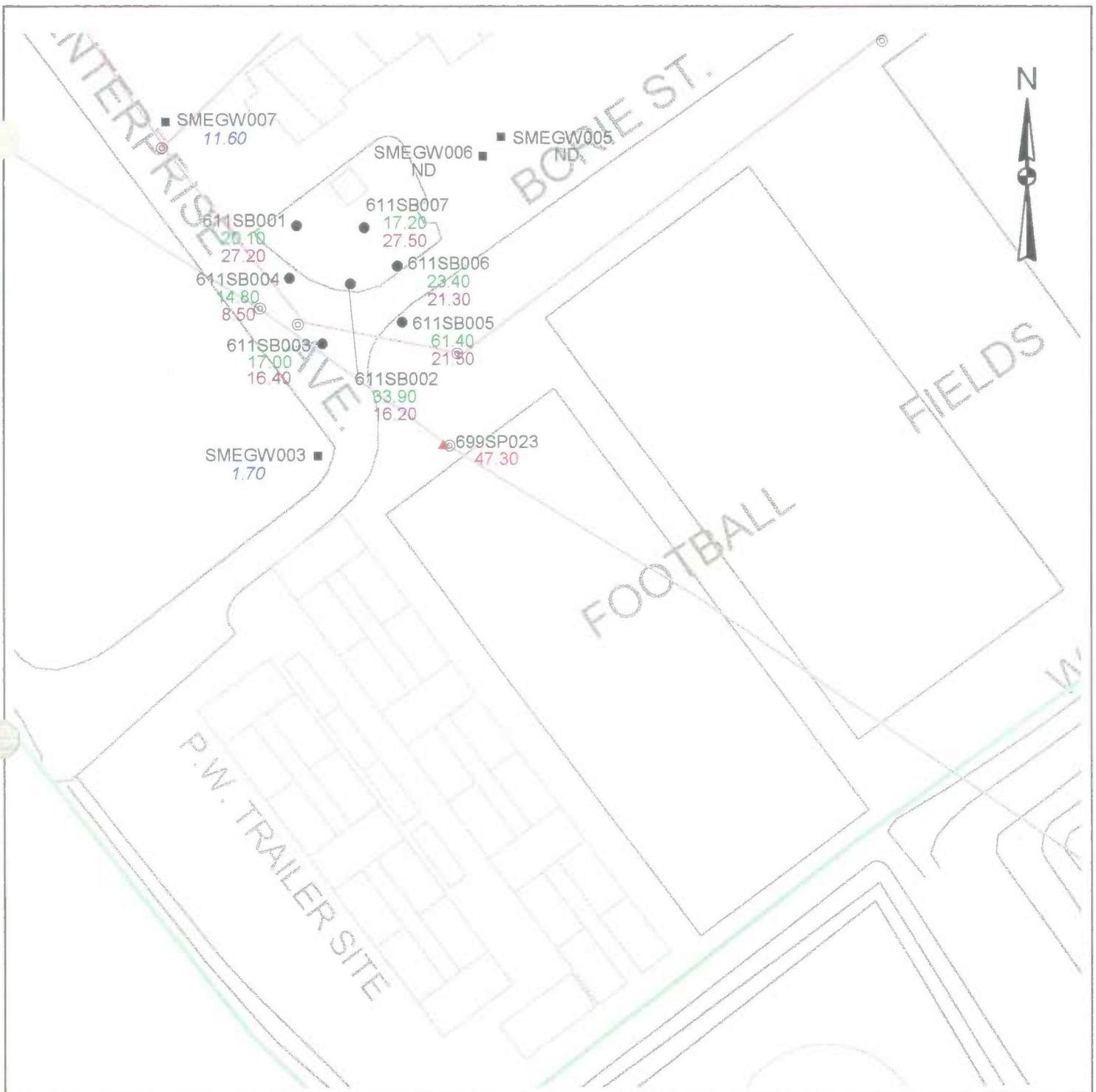
SUBZONE BOUNDARY	RAILROAD	MANHOLE
SANITARY SEWER LINE	STORM SEWER LINE	
500 0 500 1000 Feet		



ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.6.46
 ZONE L - SUBZONE F
 CHROMIUM
 ZONE L EXCEEDANCES

RBC=39.0 mg/kg SSL=38.0 mg/kg MCL=100 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

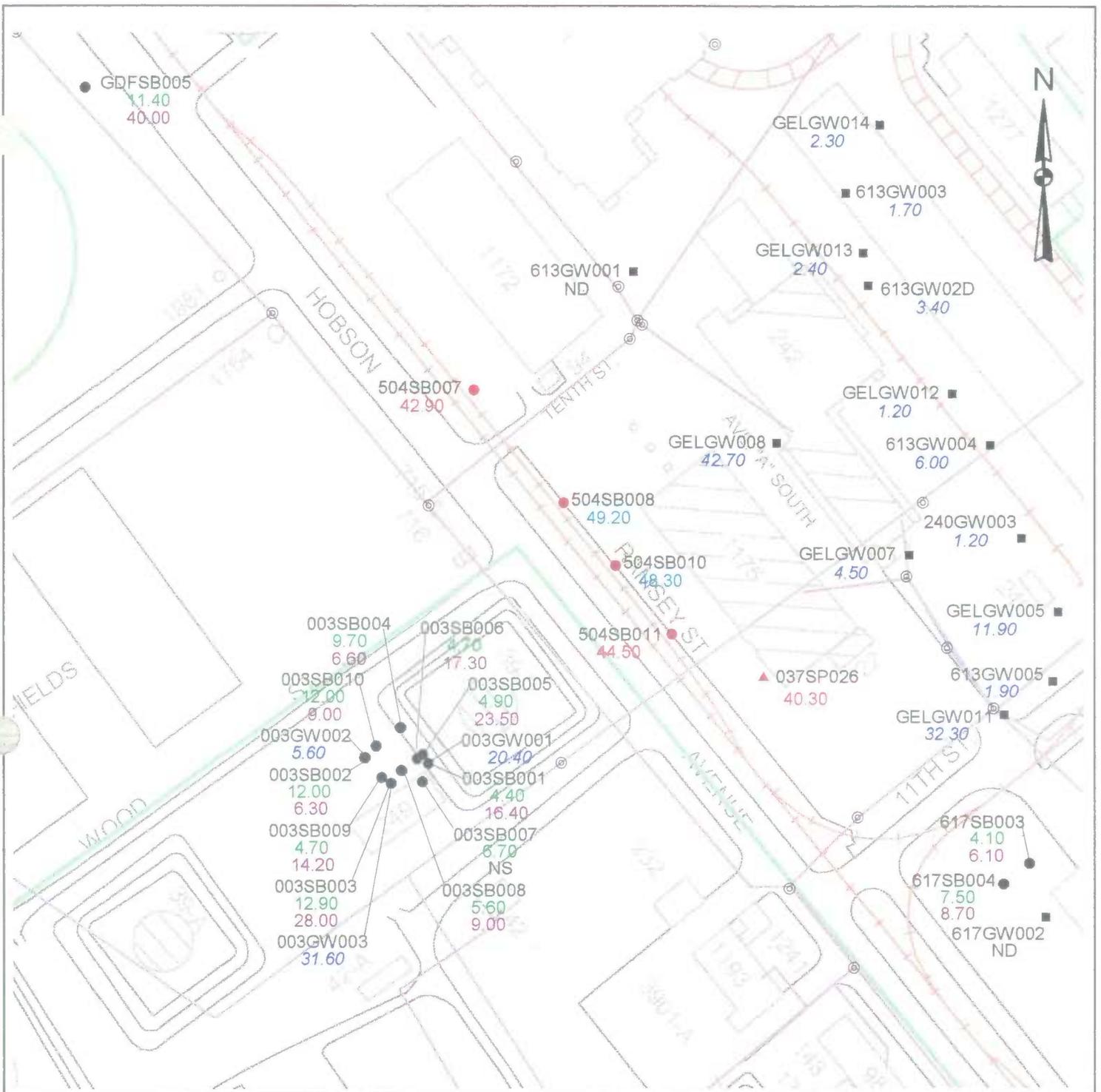
70 0 70 140 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.47
ZONE L - SUBZONE F
CHROMIUM
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=39.0 mg/kg SSL=38.0 mg/kg MCL=100 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- W SUBZONE BOUNDARY
- R RAILROAD
- © MANHOLE
- S SANITARY SEWER LINE
- ST STORM SEWER LINE

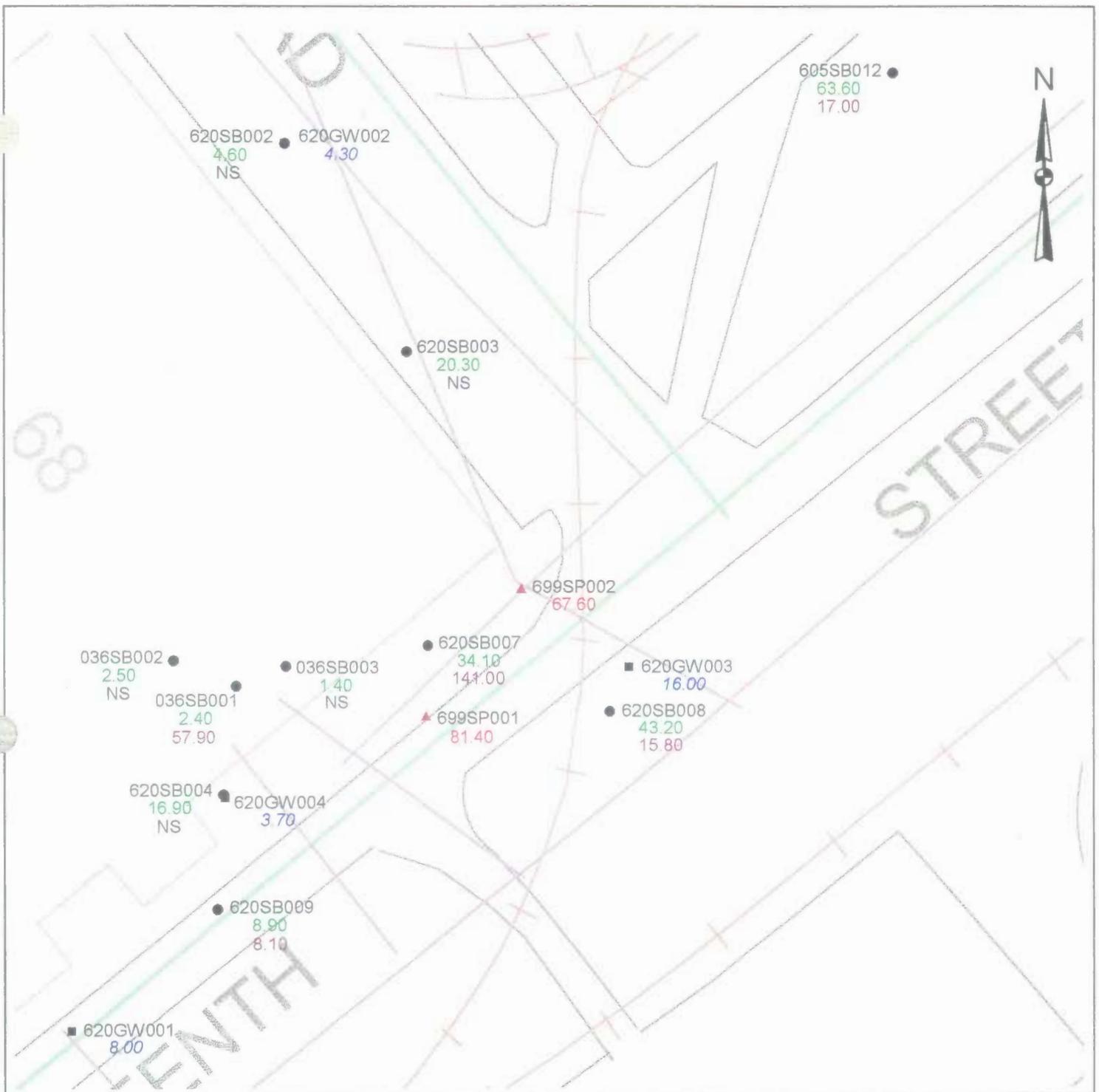
100 0 100 200 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.48
ZONE L - SUBZONE F
CHROMIUM
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=39.0 mg/kg SSL=38.0 mg/kg MCL=100 ug/L



LEGEND

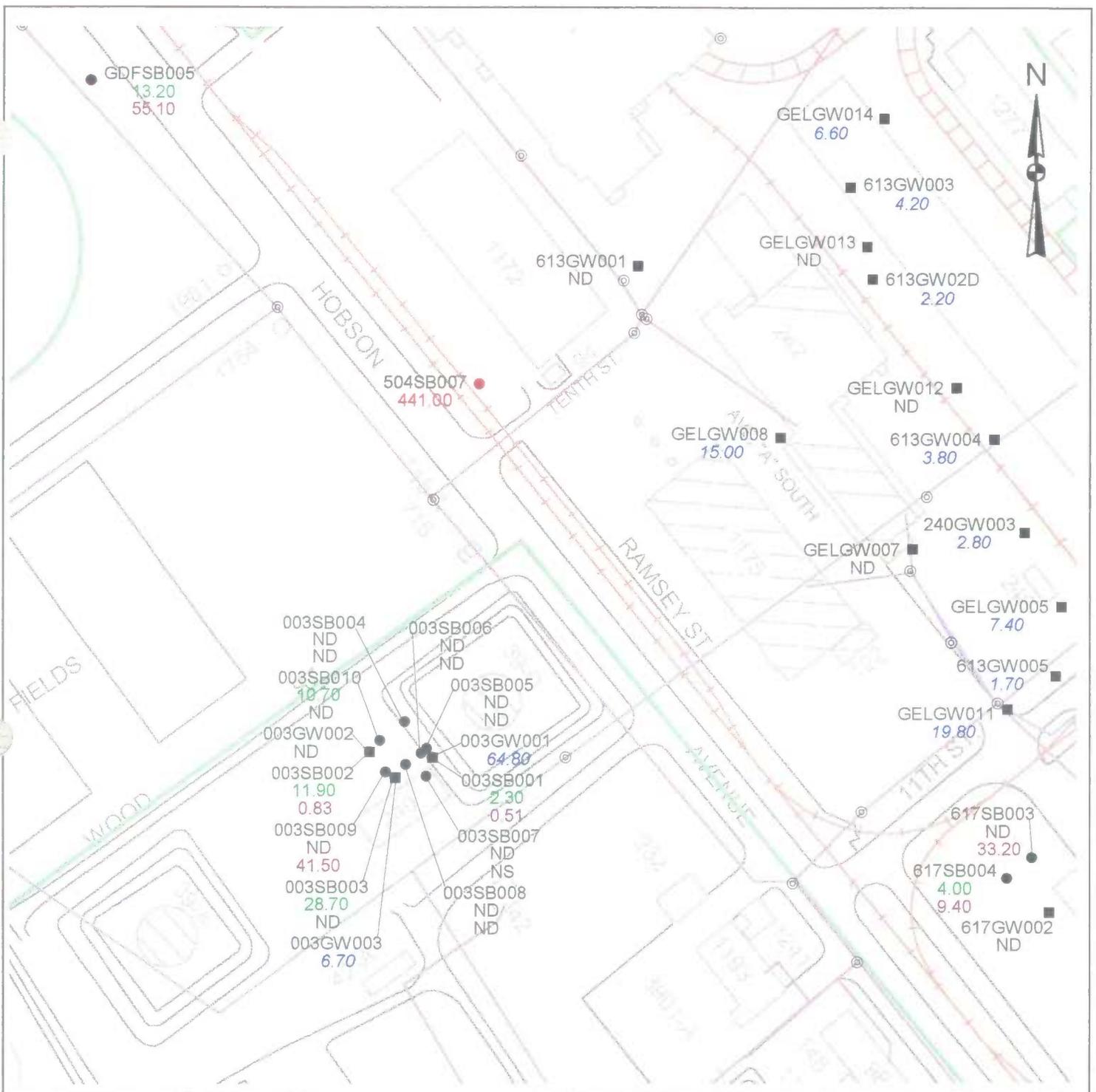
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- GROUNDWATER WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.49
ZONE L - SUBZONE F
CHROMIUM
ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=39.0 mg/kg SSL=38.0 mg/kg MCL=100 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

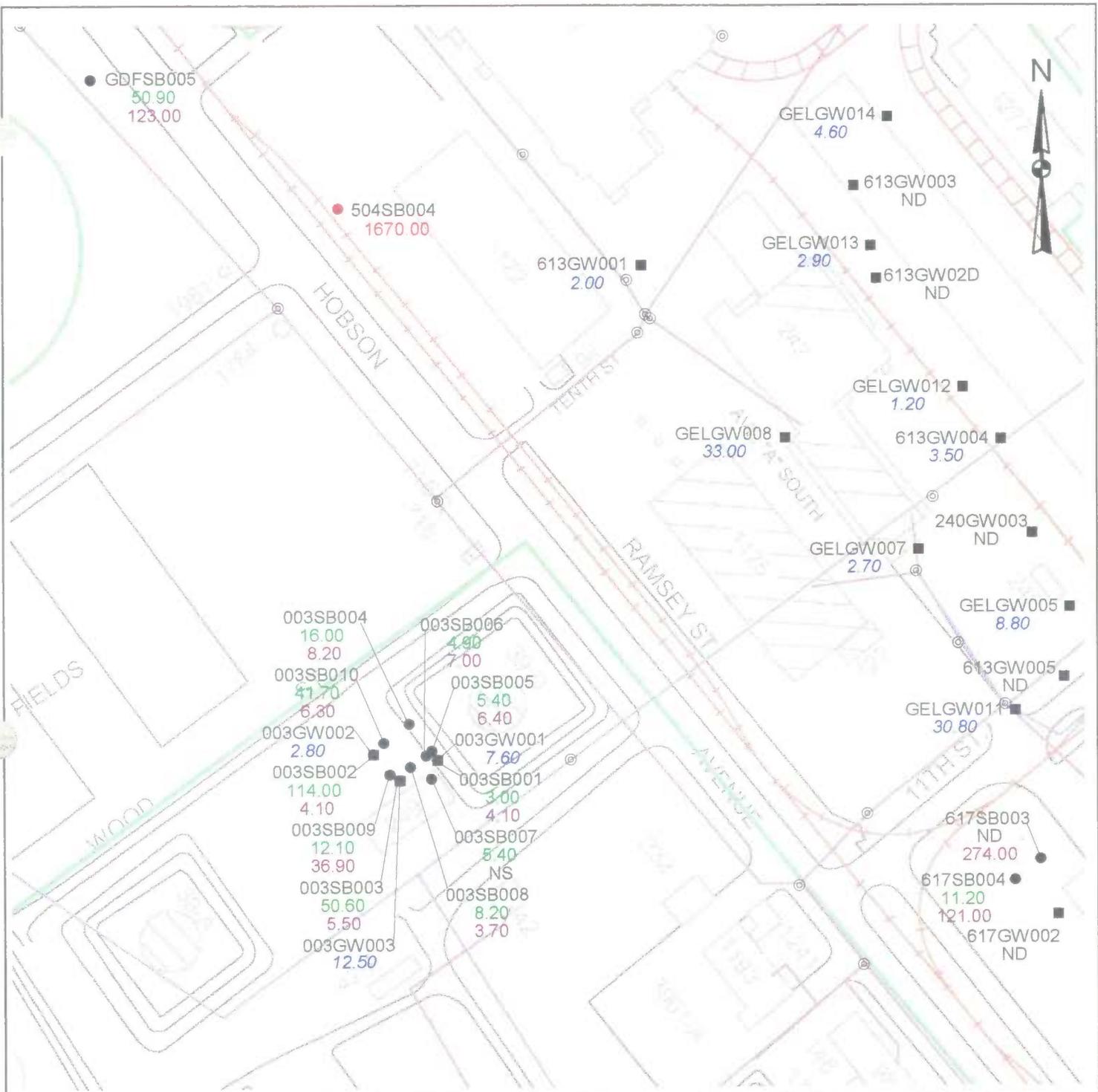
100 0 100 200 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.50
ZONE L - SUBZONE F
COPPER
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=310 mg/kg SSL=11200 mg/kg MCL=1300 ug/L



LEGEND

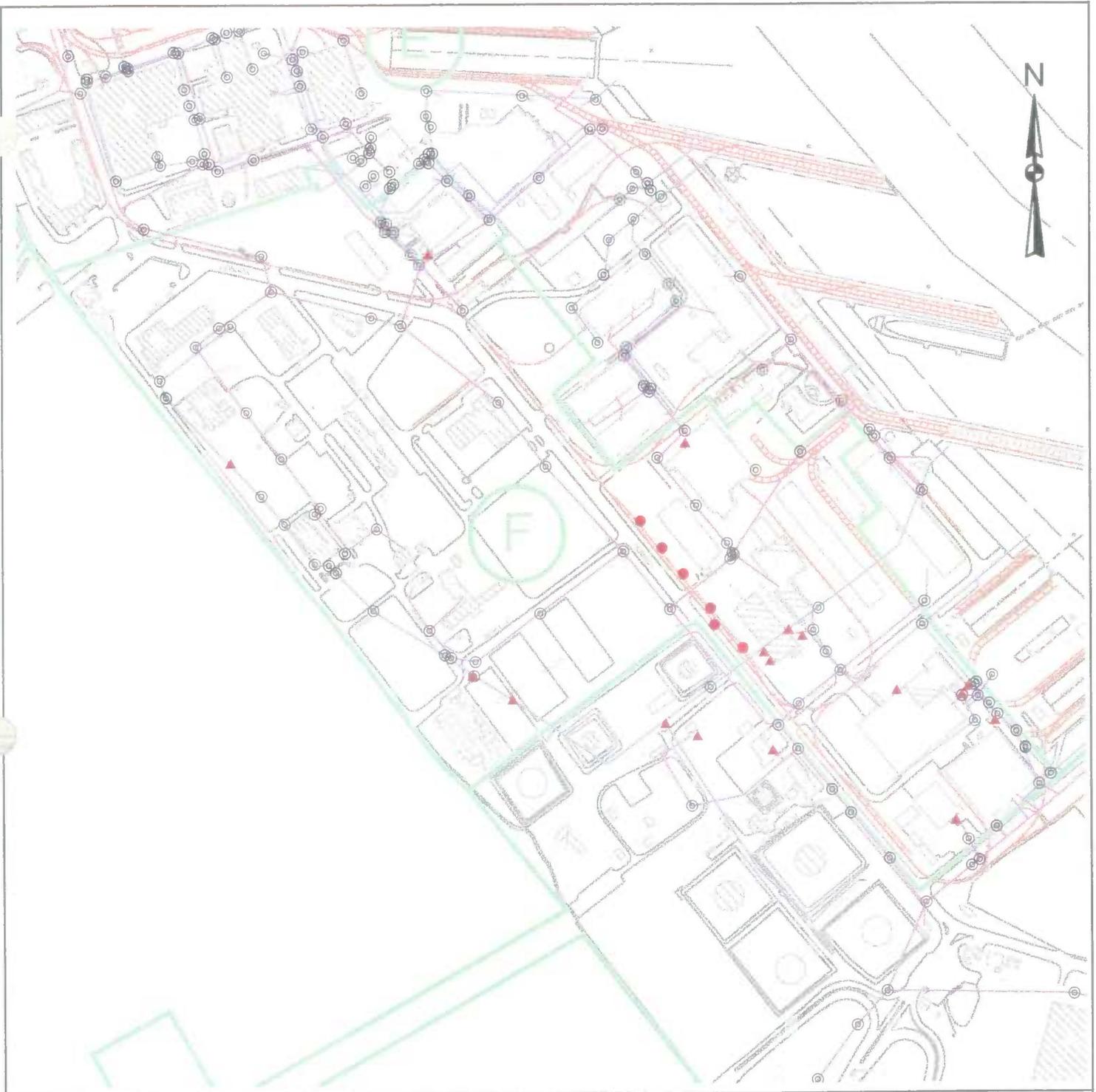
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.6.51
 ZONE L - SUBZONE F
 LEAD
 ZONE L EXCEEDANCES WITH ZONES F AND G
 SOIL AND GW CONCENTRATIONS

RBC=400 mg/kg SSL=400 mg/kg MCL=15.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION

- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

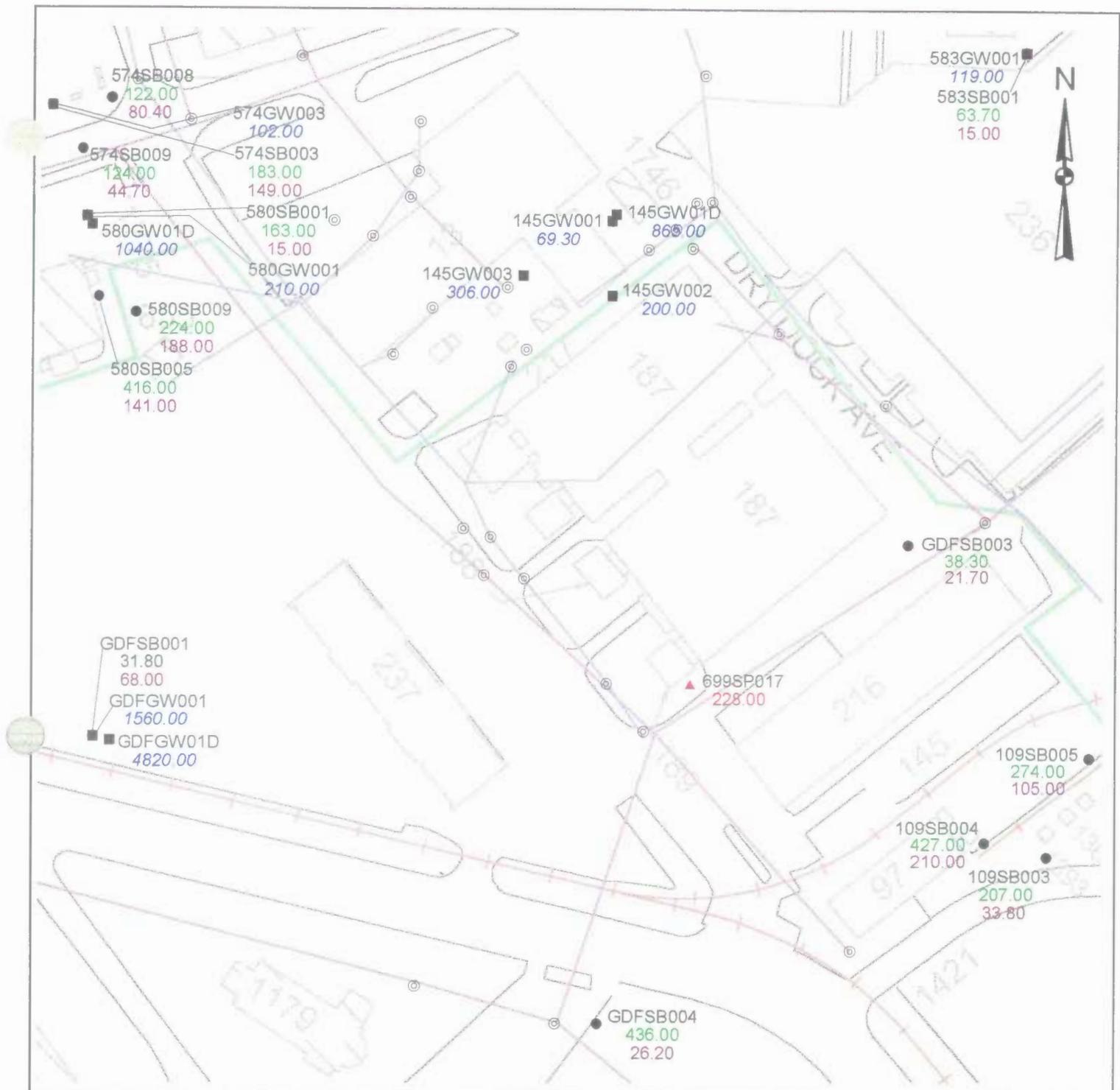
500 0 500 1000 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.52
ZONE L - SUBZONE F
MANGANESE
ZONE L EXCEEDANCES

RBC=160 mg/kg SSL=950 mg/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- SANITARY SEWER LINE
- STORM SEWER LINE
- ⊙ MANHOLE

80 0 80 160 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.53
ZONE L - SUBZONE F
MANGANESE
ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=160 mg/kg SSL=950 mg/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

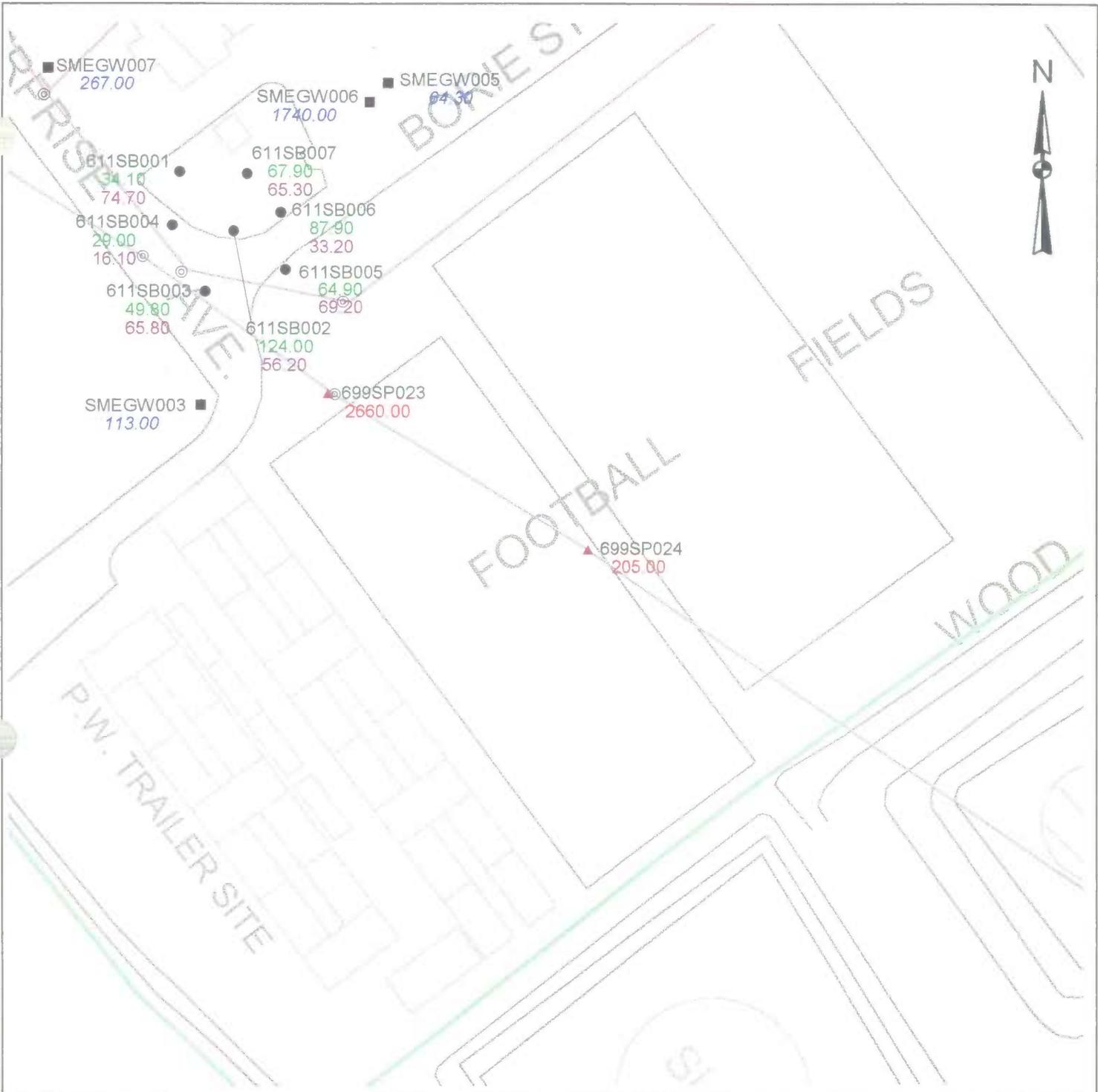
70 0 70 140 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.54
ZONE L - SUBZONE F
MANGANESE
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=160 mg/kg SSL=950 mg/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

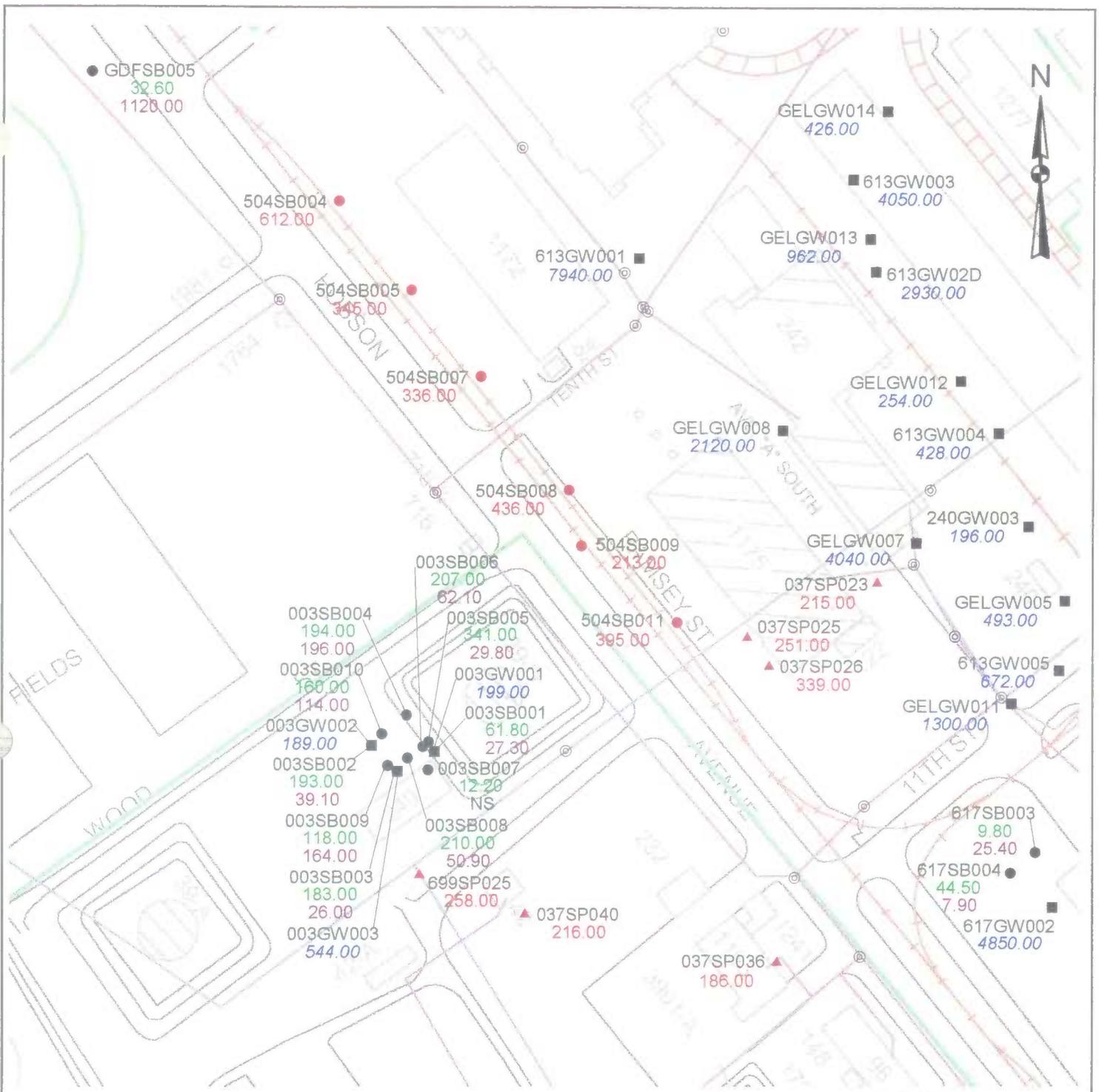
60 0 60 120 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.55
ZONE L - SUBZONE F
MANGANESE
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=160 mg/kg SSL=950 mg/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

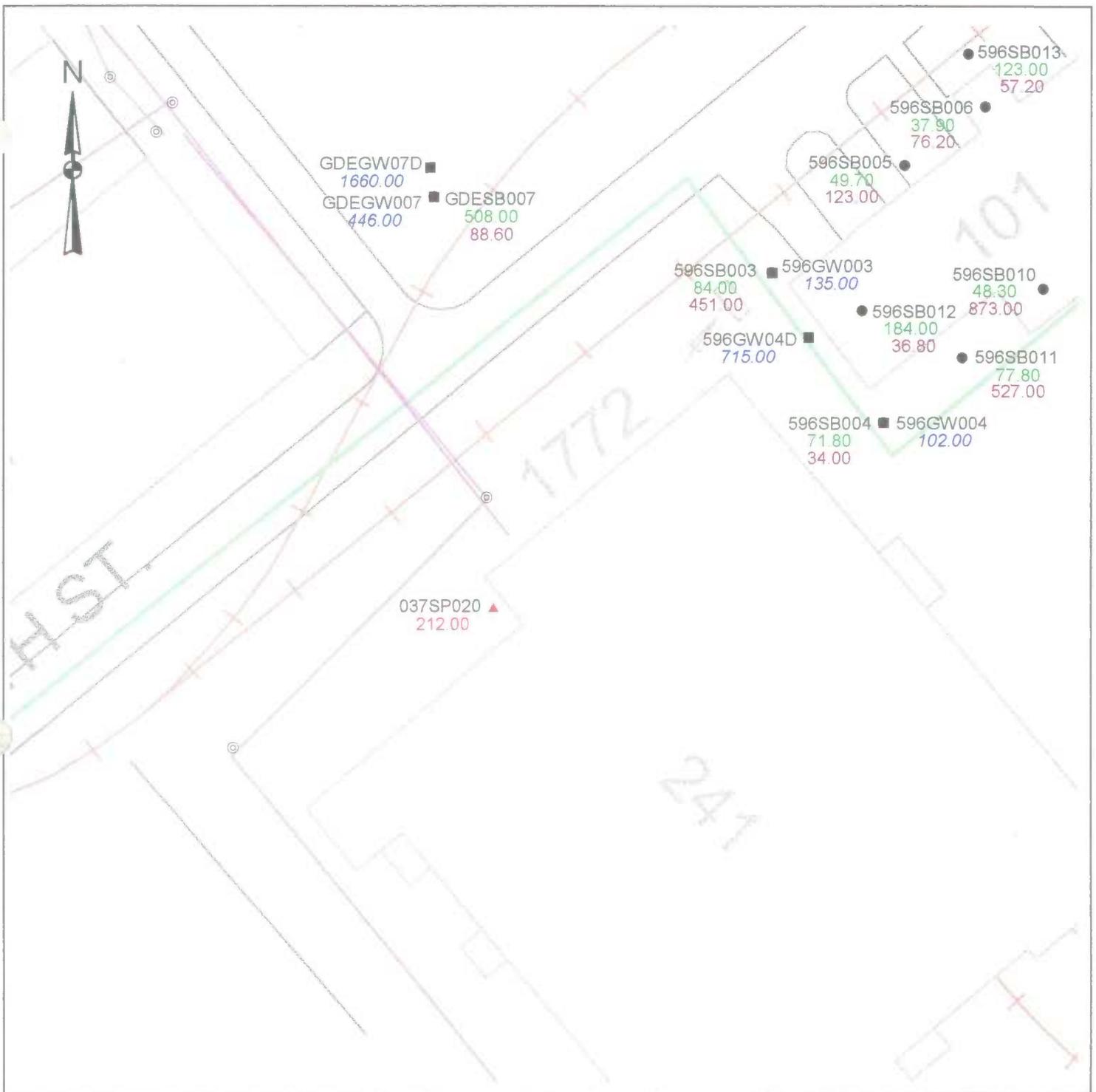
100 0 100 200 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.56
ZONE L - SUBZONE F
MANGANESE
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=160 mg/kg SSL=950 mg/kg MCL=NONE



LEGEND

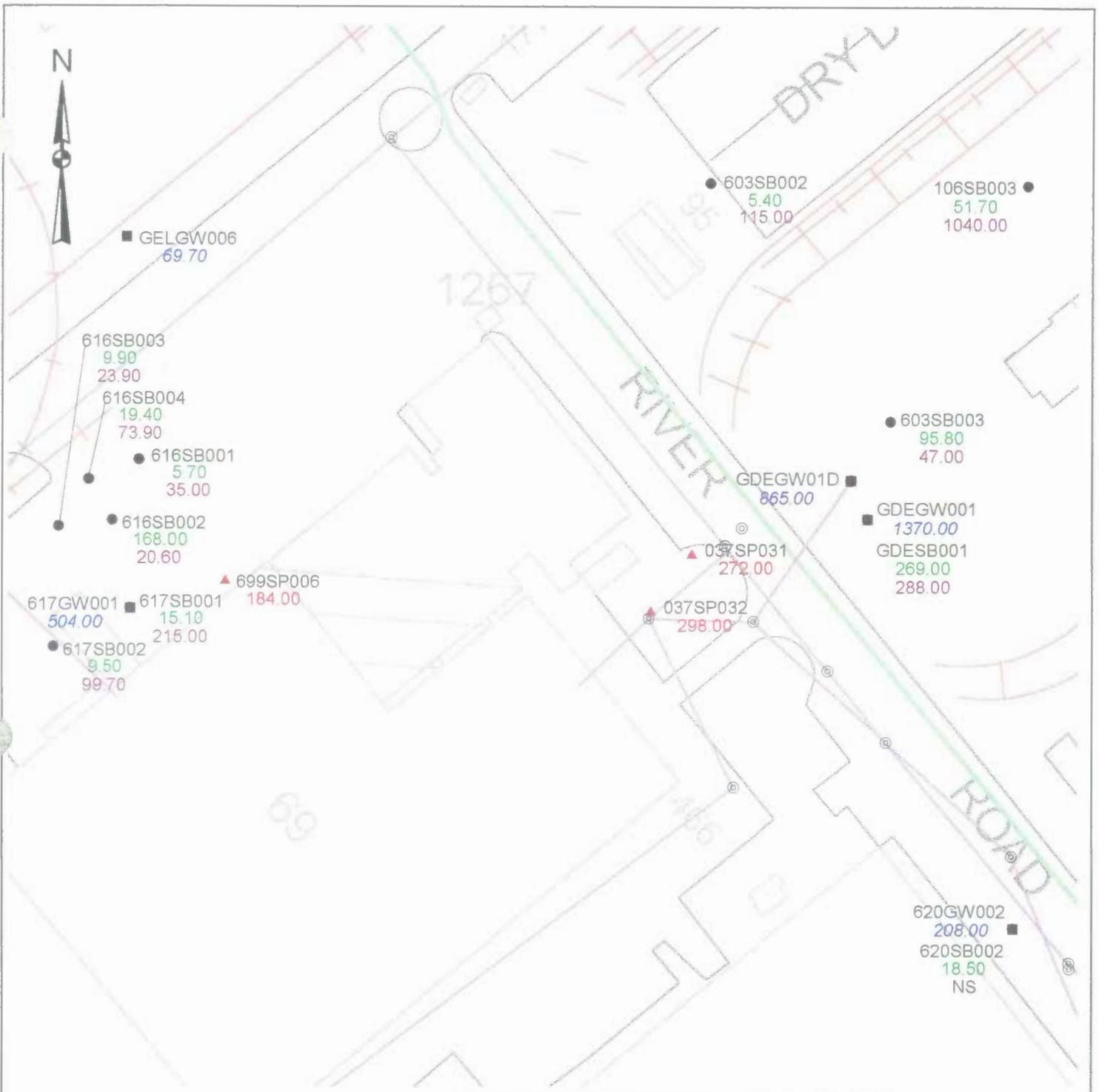
- ▲ ZONE L DPT SOIL LOCATION
 - ZONE L SOIL BORING LOCATION
 - 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
 - 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
 - MONITORING WELL LOCATION
 - 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
 - ZONE F SOIL BORING LOCATION
 - 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
 - 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
 - ND NOT DETECTED
 - NS NO SAMPLE TAKEN
 - SUBZONE BOUNDARY
 - RAILROAD
 - ⊙ MANHOLE
 - SANITARY SEWER LINE
 - STORM SEWER LINE
- 50 0 50 100 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.57
ZONE L - SUBZONE F
MANGANESE
ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=160 mg/kg SSL=950 mg/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

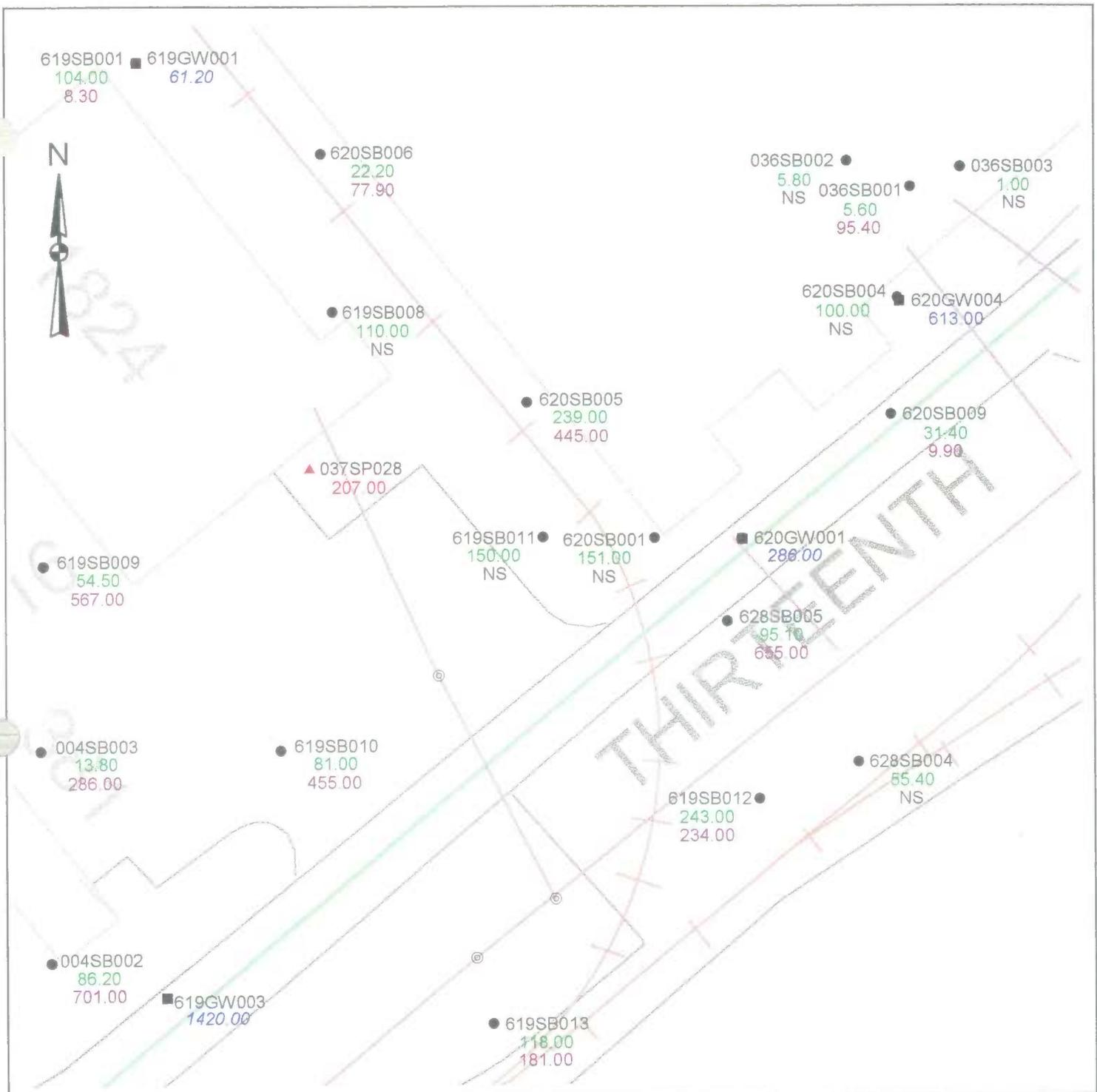
70 0 70 140 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.58
ZONE L - SUBZONE F
MANGANESE
ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=160 mg/kg SSL=950 mg/kg MCL=NONE



LEGEND

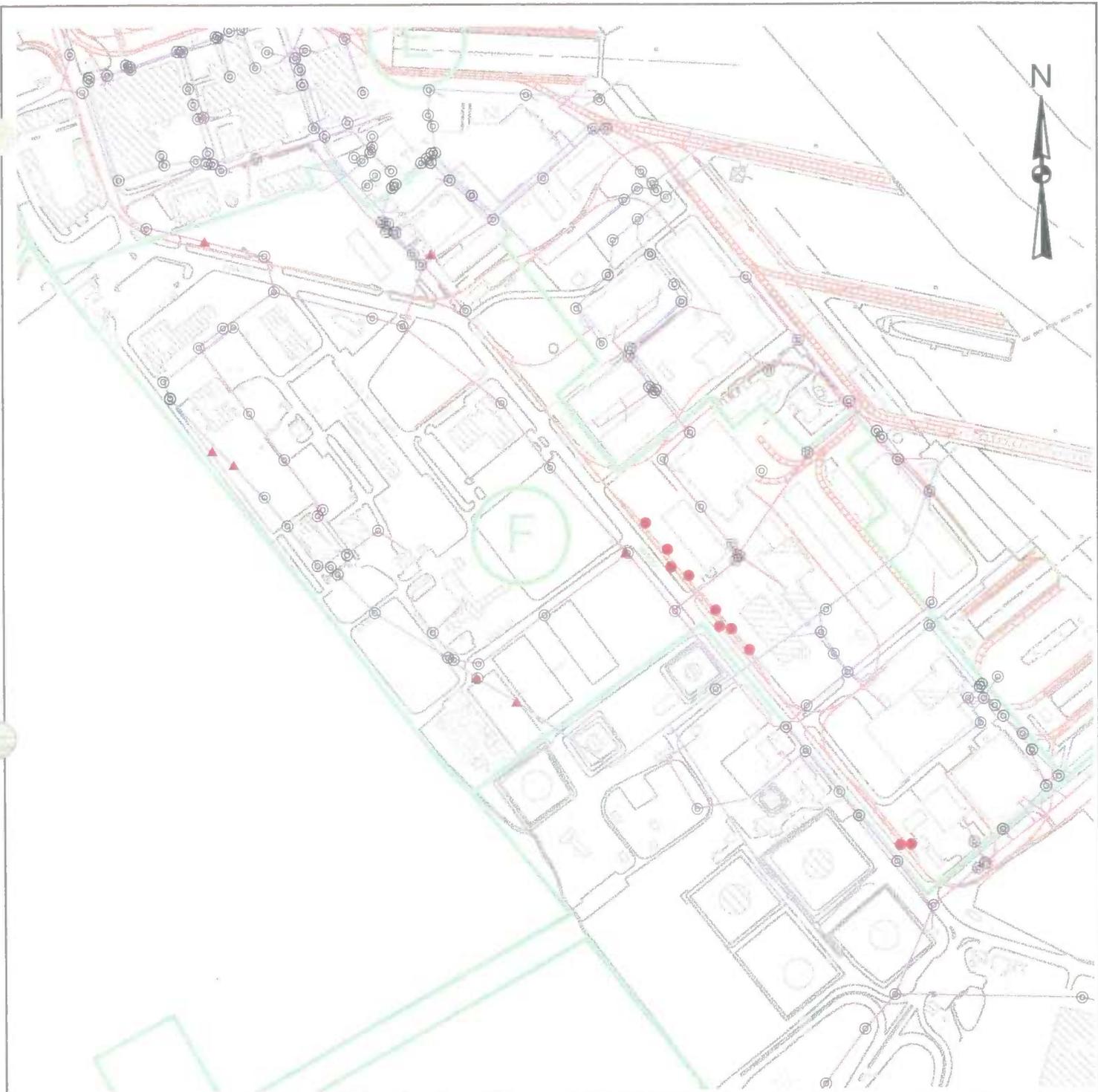
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.59
ZONE L - SUBZONE F
MANGANESE
ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=160 mg/kg SSL=950 mg/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION

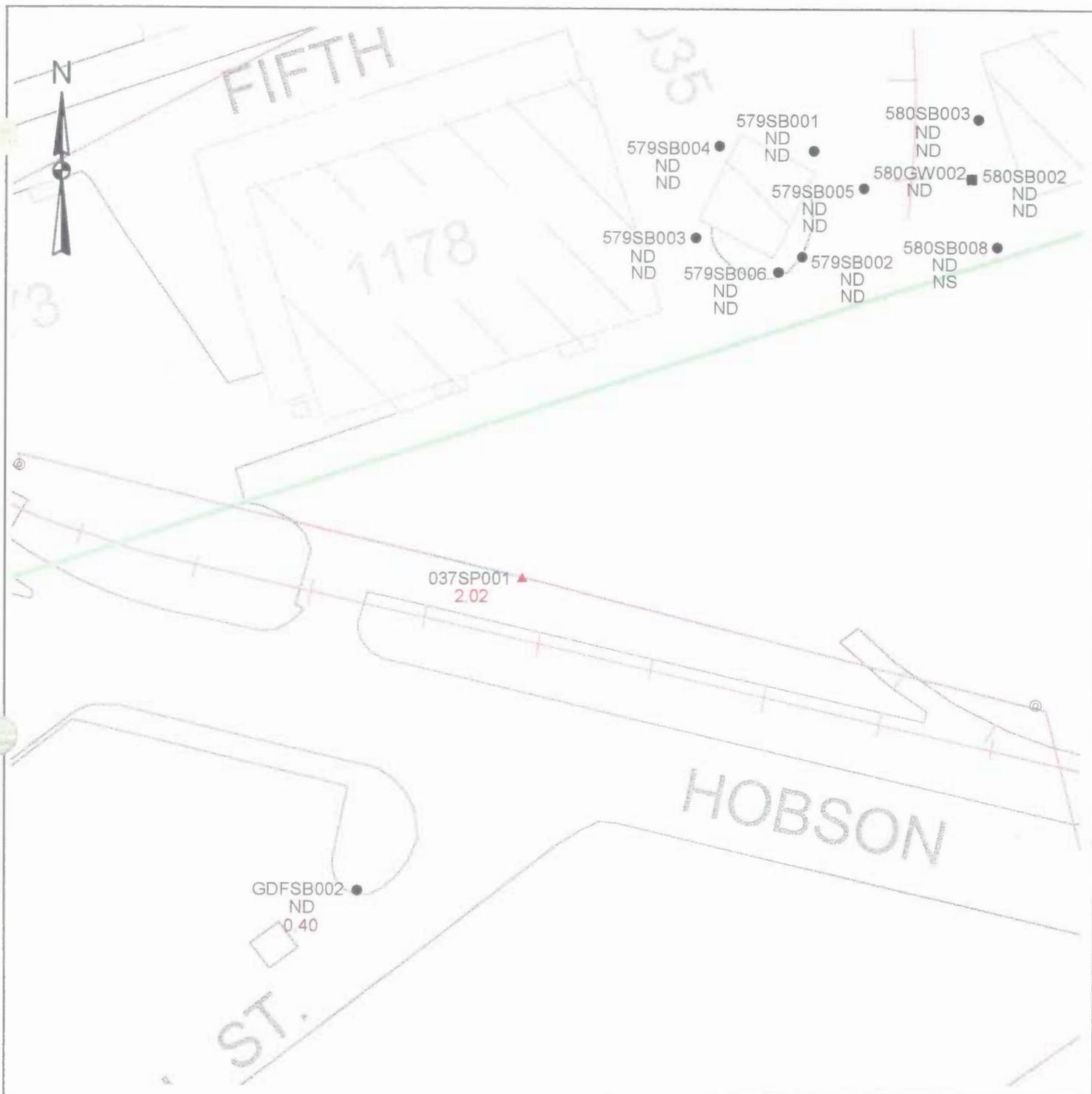
- | | | |
|---------------------|------------------|---------|
| SUBZONE BOUNDARY | RAILROAD | MANHOLE |
| SANITARY SEWER LINE | STORM SEWER LINE | |
- 500 0 500 1000 Feet



ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.6.60
 ZONE L - SUBZONE F
 THALLIUM
 ZONE L EXCEEDANCES

RBC=0.55 mg/kg SSL=0.70 mg/kg MCL=2.00 ug/L



LEGEND

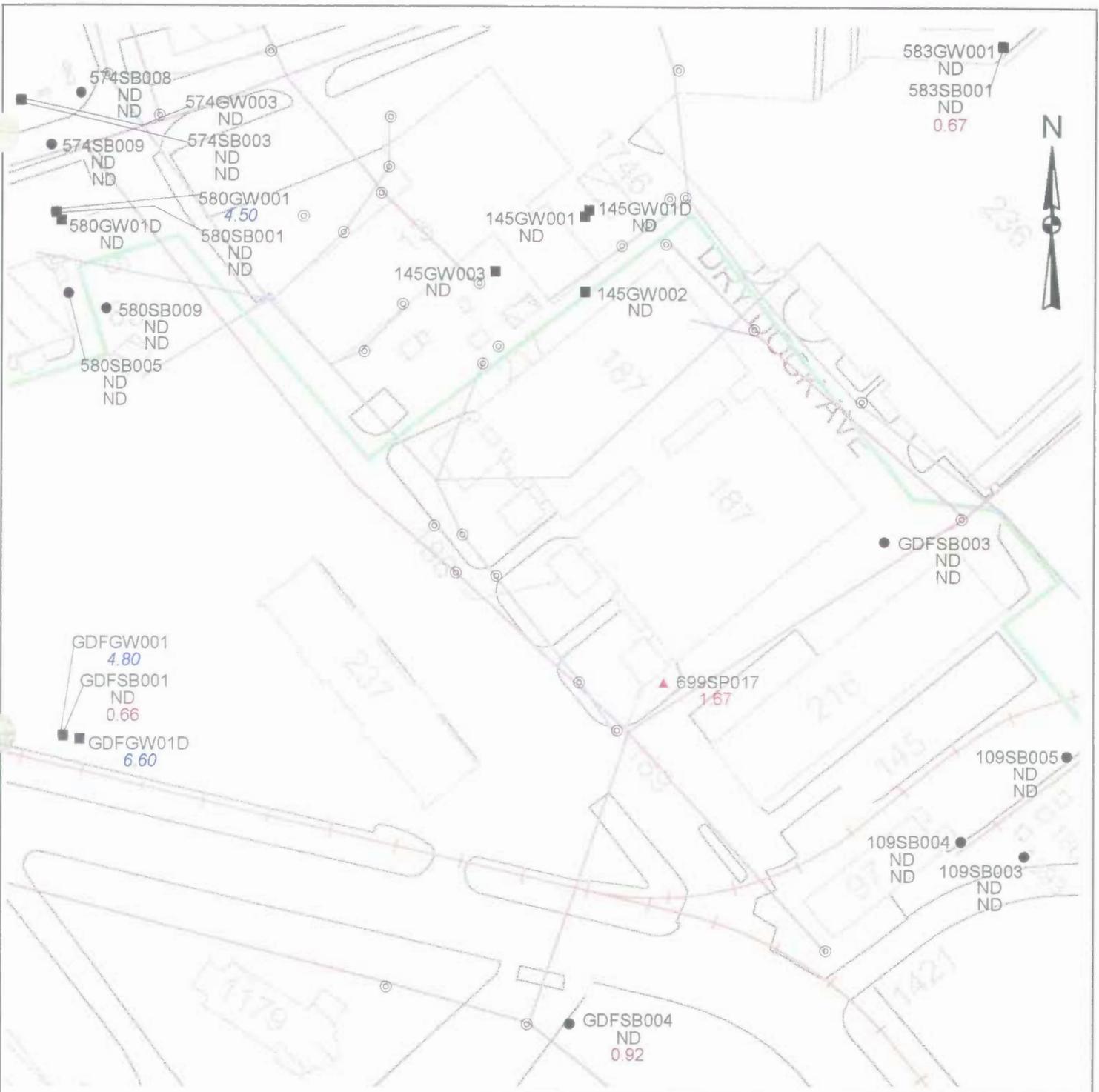
- ▲ ZONE L DPT SOIL LOCATION
 - ZONE L SOIL BORING LOCATION
 - 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
 - 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
 - MONITORING WELL LOCATION
 - 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
 - ZONE F SOIL BORING LOCATION
 - 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
 - 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
 - ND NOT DETECTED
 - NS NO SAMPLE TAKEN
 - SUBZONE BOUNDARY
 - RAILROAD
 - ⊙ MANHOLE
 - SANITARY SEWER LINE
 - STORM SEWER LINE
- 50 0 50 100 Feet



ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.6.61
 ZONE L - SUBZONE F
 THALLIUM
 ZONE L EXCEEDANCES WITH ZONES E AND F
 SOIL AND GW CONCENTRATIONS

RBC=0.55 mg/kg SSL=0.70 mg/kg MCL=2.00 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- W SUBZONE BOUNDARY
- R RAILROAD
- ◎ MANHOLE
- S SANITARY SEWER LINE
- ST STORM SEWER LINE

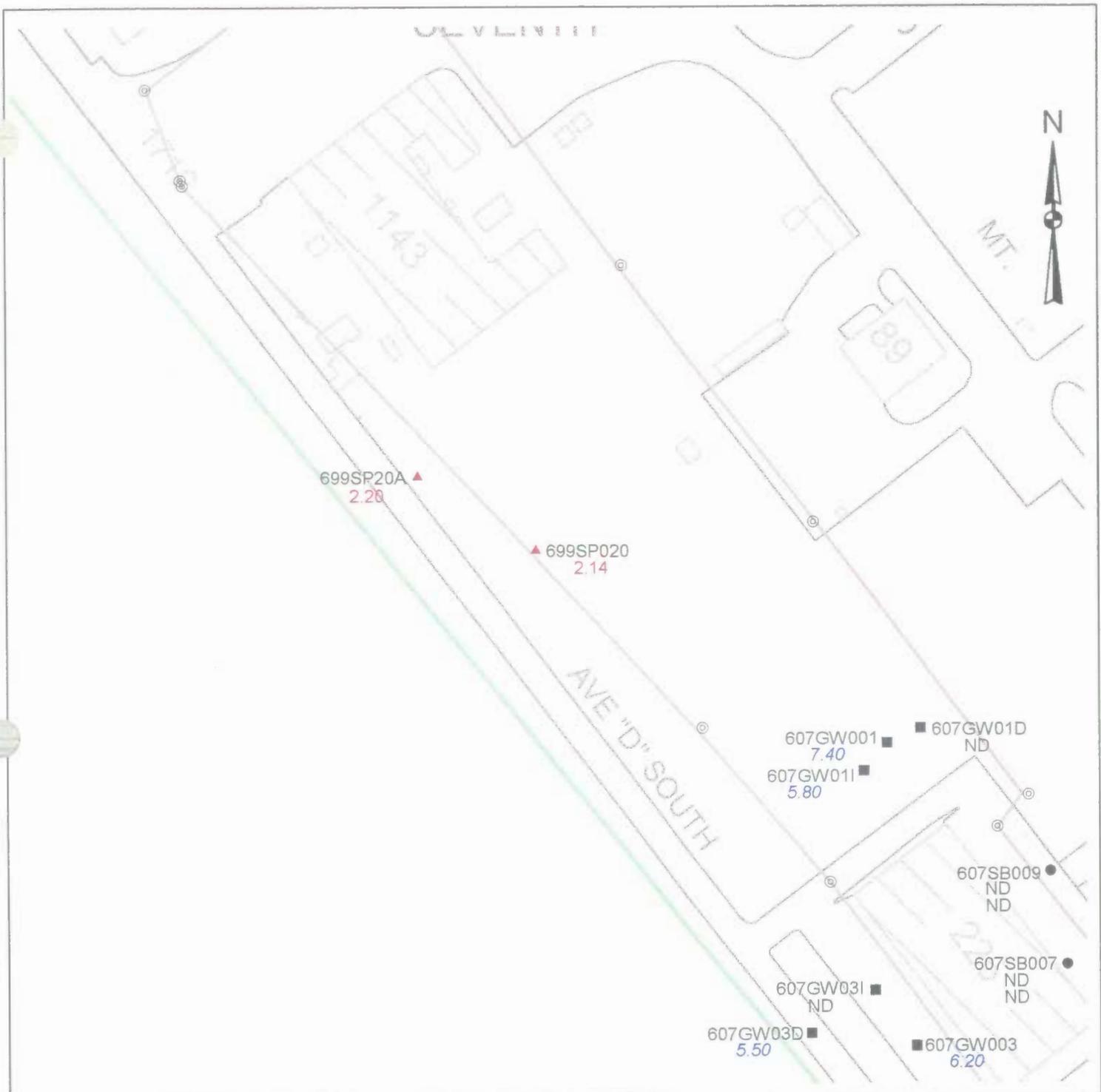


ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.62
ZONE L - SUBZONE F
THALLIUM
ZONE L EXCEEDANCES WITH ZONES E AND F
SOIL AND GW CONCENTRATIONS

RBC=0.55 mg/kg SSL=0.70 mg/kg MCL=2.00 ug/L

100 0 100 200 Feet



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

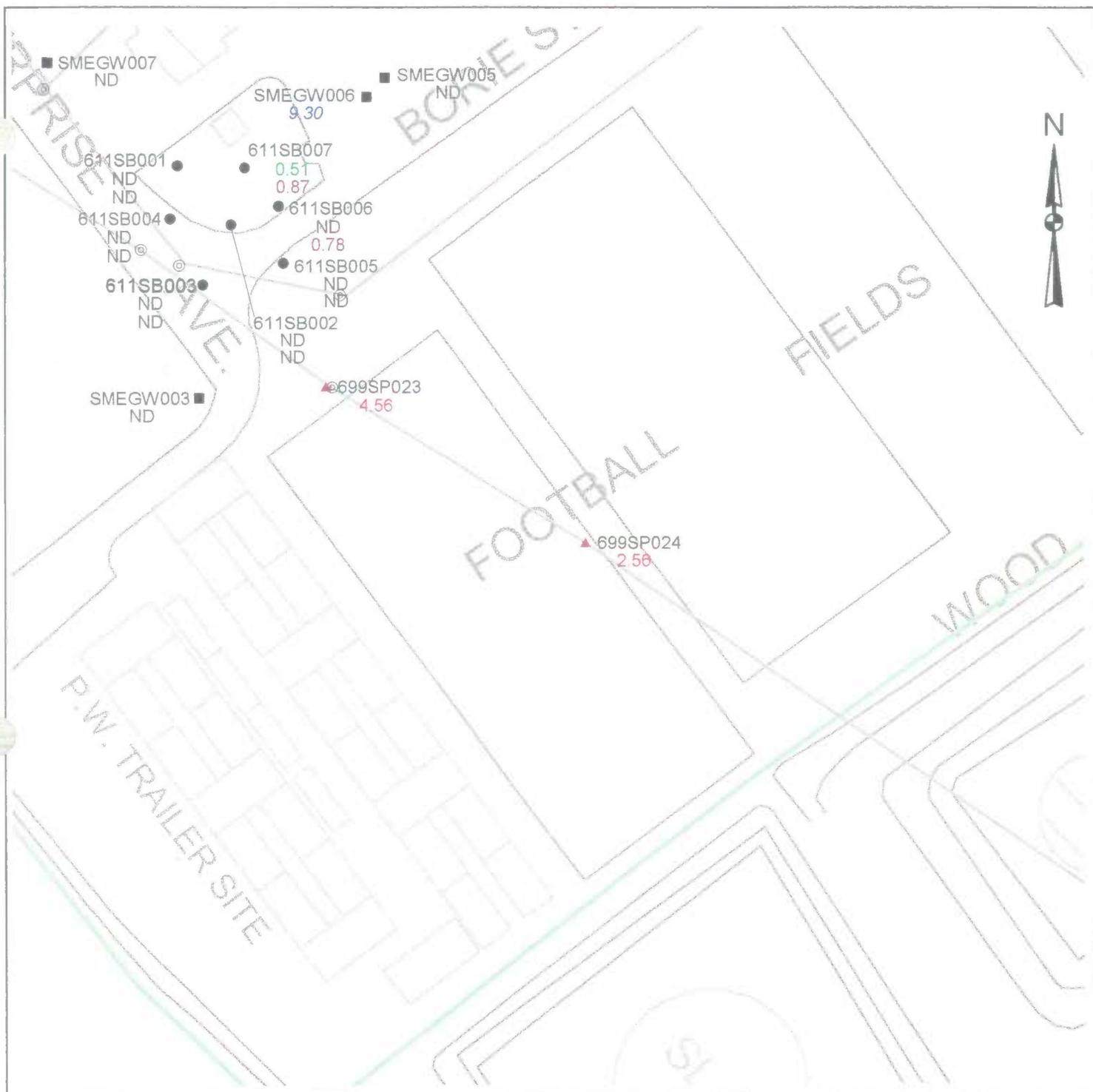


ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.63
ZONE L - SUBZONE F
THALLIUM
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=0.55 mg/kg SSL=0.70 mg/kg MCL=2.00 ug/L

90 0 90 180 Feet



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

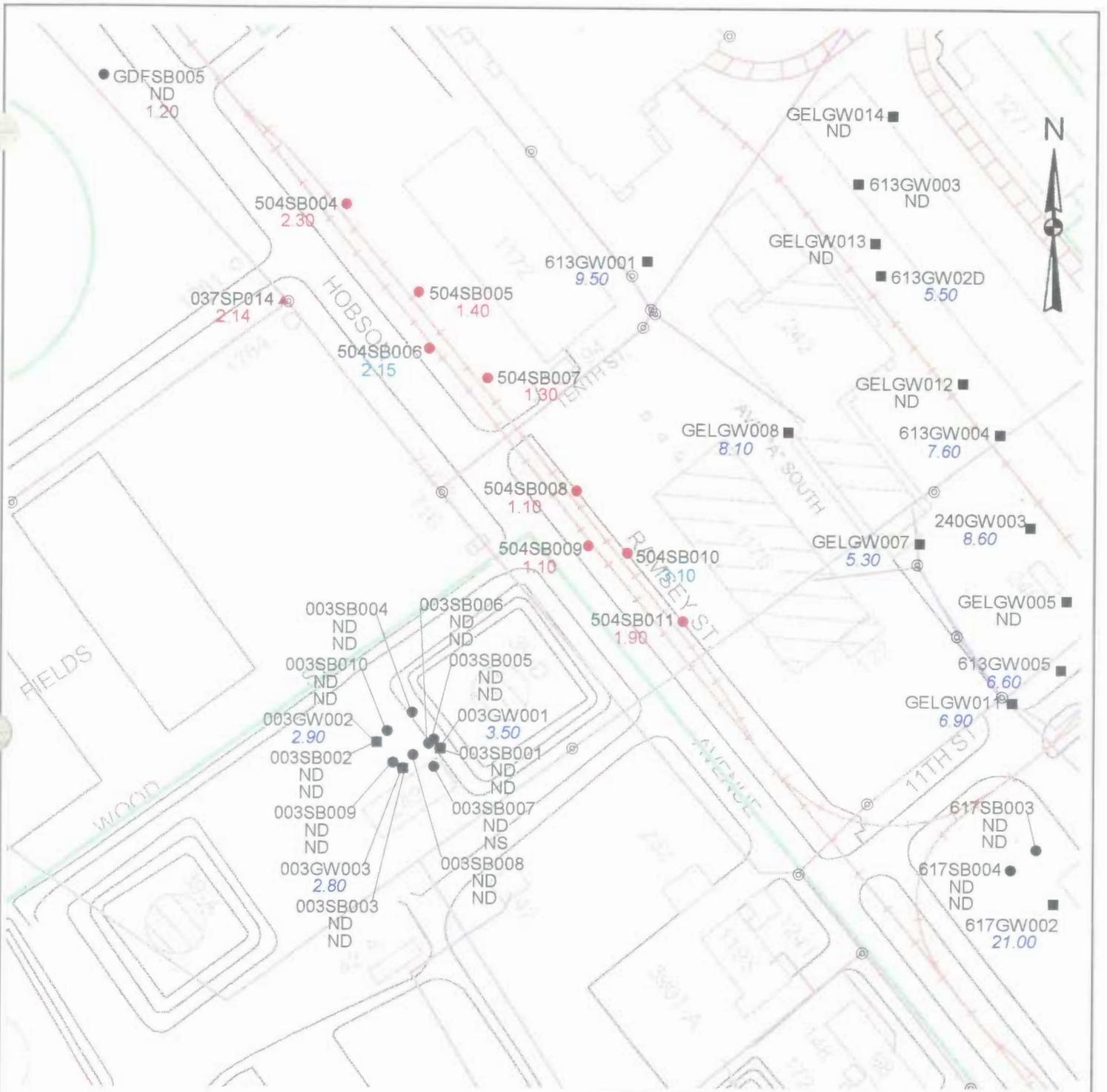


ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.64
ZONE L - SUBZONE F
THALLIUM
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=0.55 mg/kg SSL=0.70 mg/kg MCL=2.00 ug/L

80 0 80 160 Feet



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- W SUBZONE BOUNDARY
- RAILROAD
- ◎ MANHOLE
- SA N SANITARY SEWER LINE
- ST STORM SEWER LINE

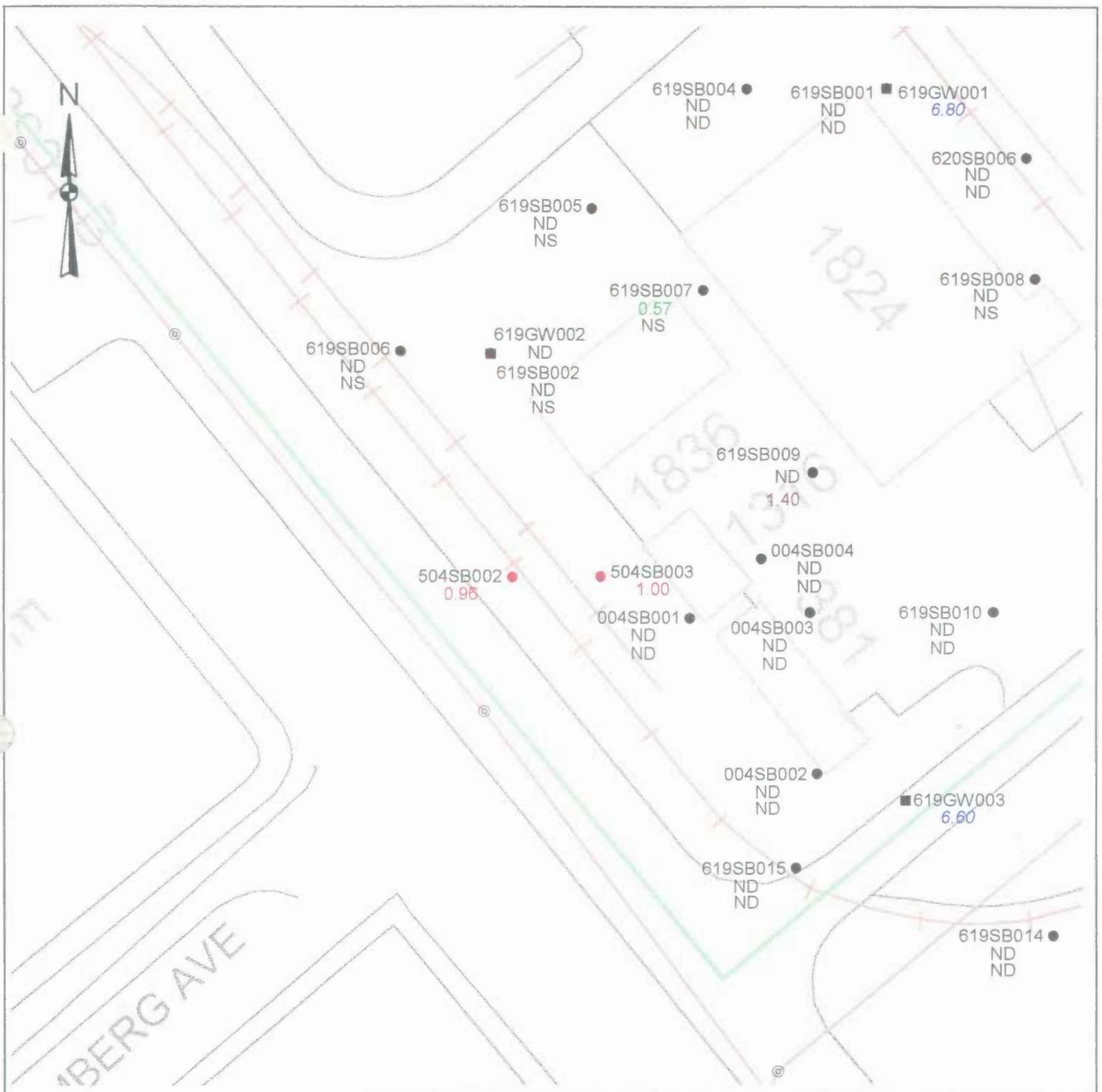
100 0 100 200 Feet



ZONE L - RCRA
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CHARLESTON, SC

FIGURE 10.6.65
ZONE L - SUBZONE F
THALLIUM
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=0.55 mg/kg SSL=0.70 mg/kg MCL=2.00 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
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NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.66
ZONE L - SUBZONE F
THALLIUM
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=0.55 mg/kg SSL=0.70 mg/kg MCL=2.00 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION

- SUBZONE BOUNDARY
- SANITARY SEWER LINE
- RAILROAD
- STORM SEWER LINE
- ⊙ MANHOLE

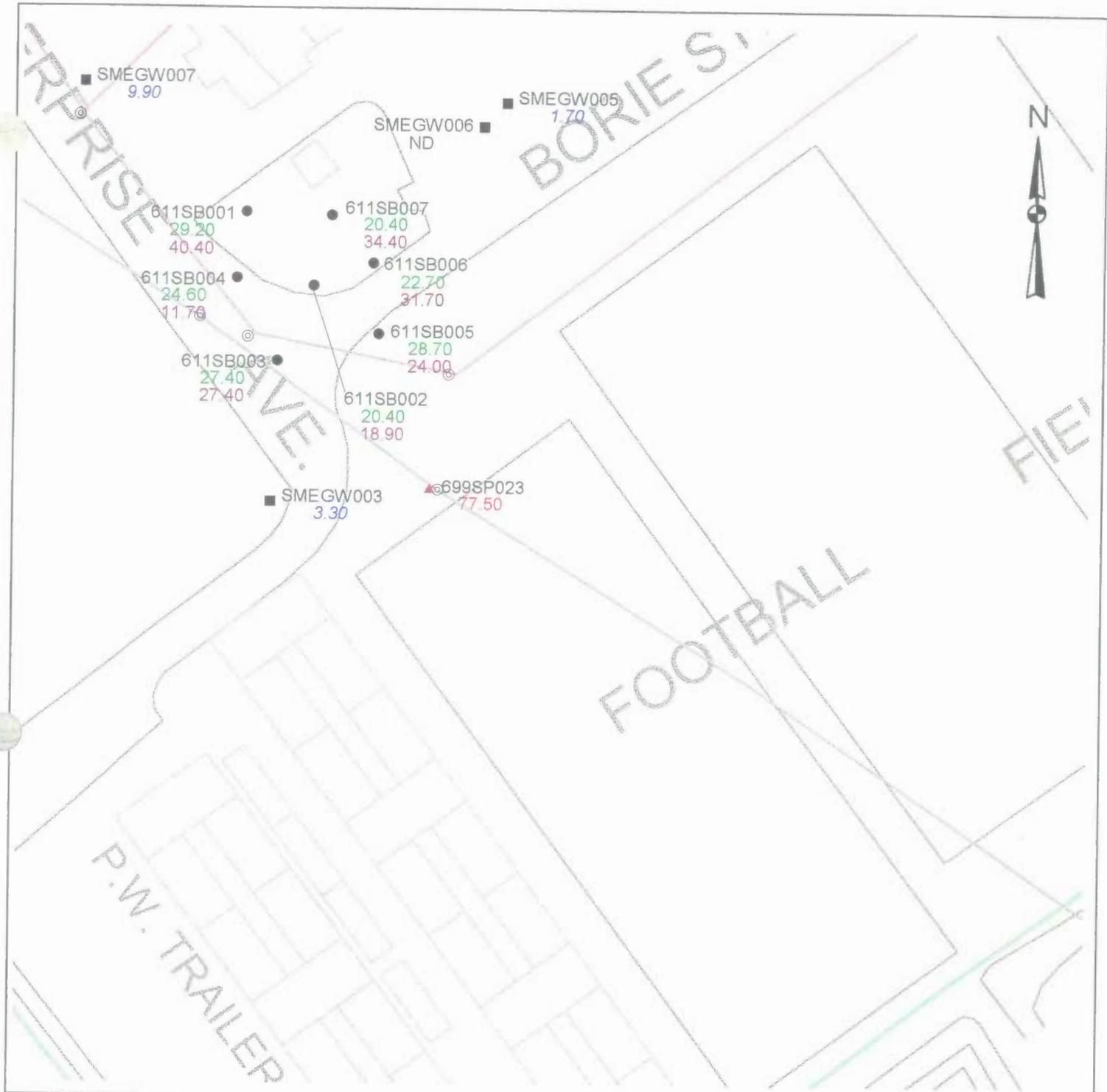
500 0 500 1000 Feet



ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.6.67
 ZONE L - SUBZONE F
 VANADIUM
 ZONE L EXCEEDANCES

RBC=55.0 mg/kg SSL=6000 mg/kg MCL=NONE



LEGEND

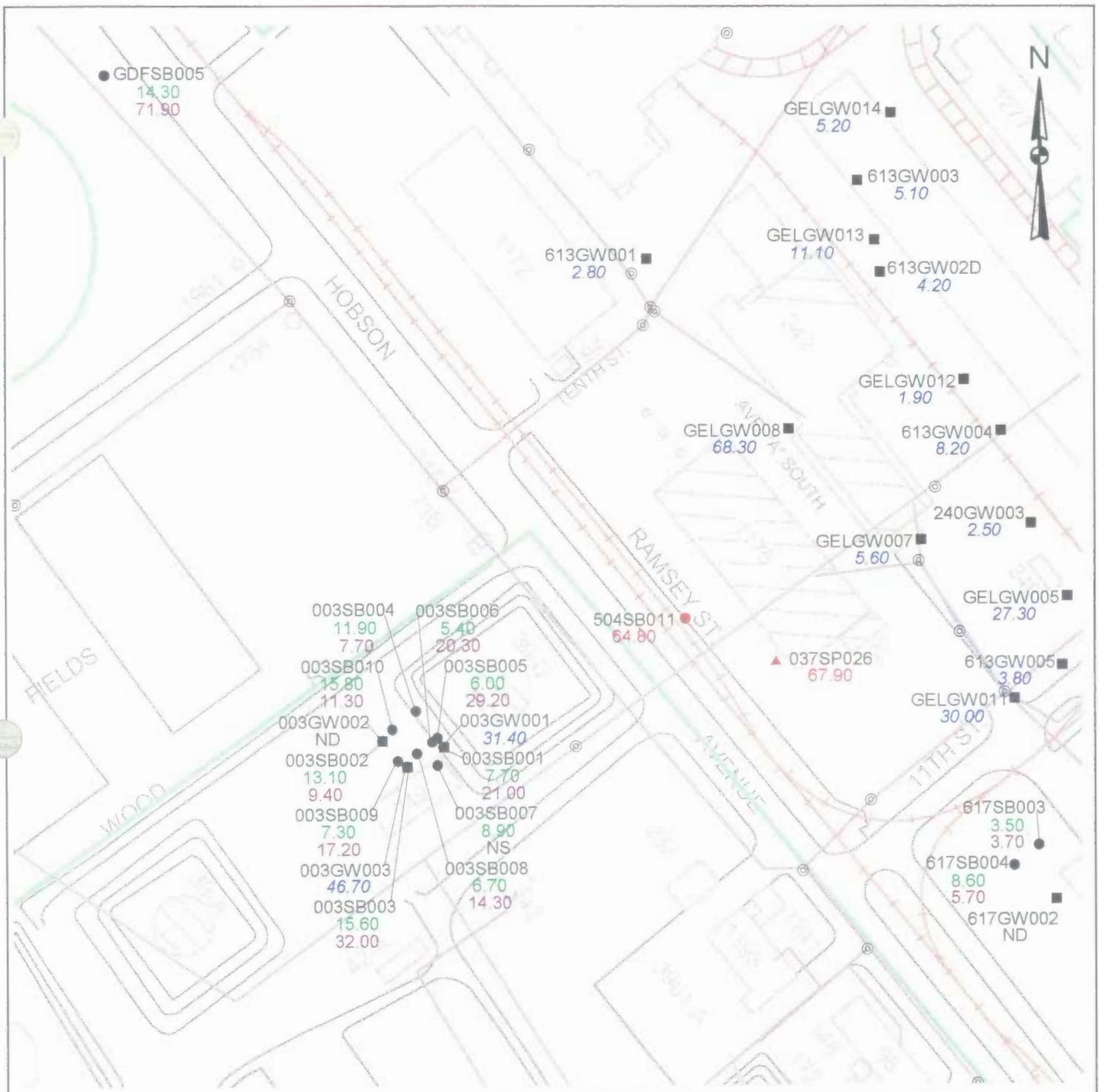
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



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CHARLESTON, SC

FIGURE 10.6.68
ZONE L - SUBZONE F
VANADIUM
ZONE L EXCEEDANCES WITH ZONE F
SOIL AND GW CONCENTRATIONS

RBC=55.0 mg/kg SSL=6000 mg/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE F SOIL BORING LOCATION
- 12.30 ZONE F SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE F SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

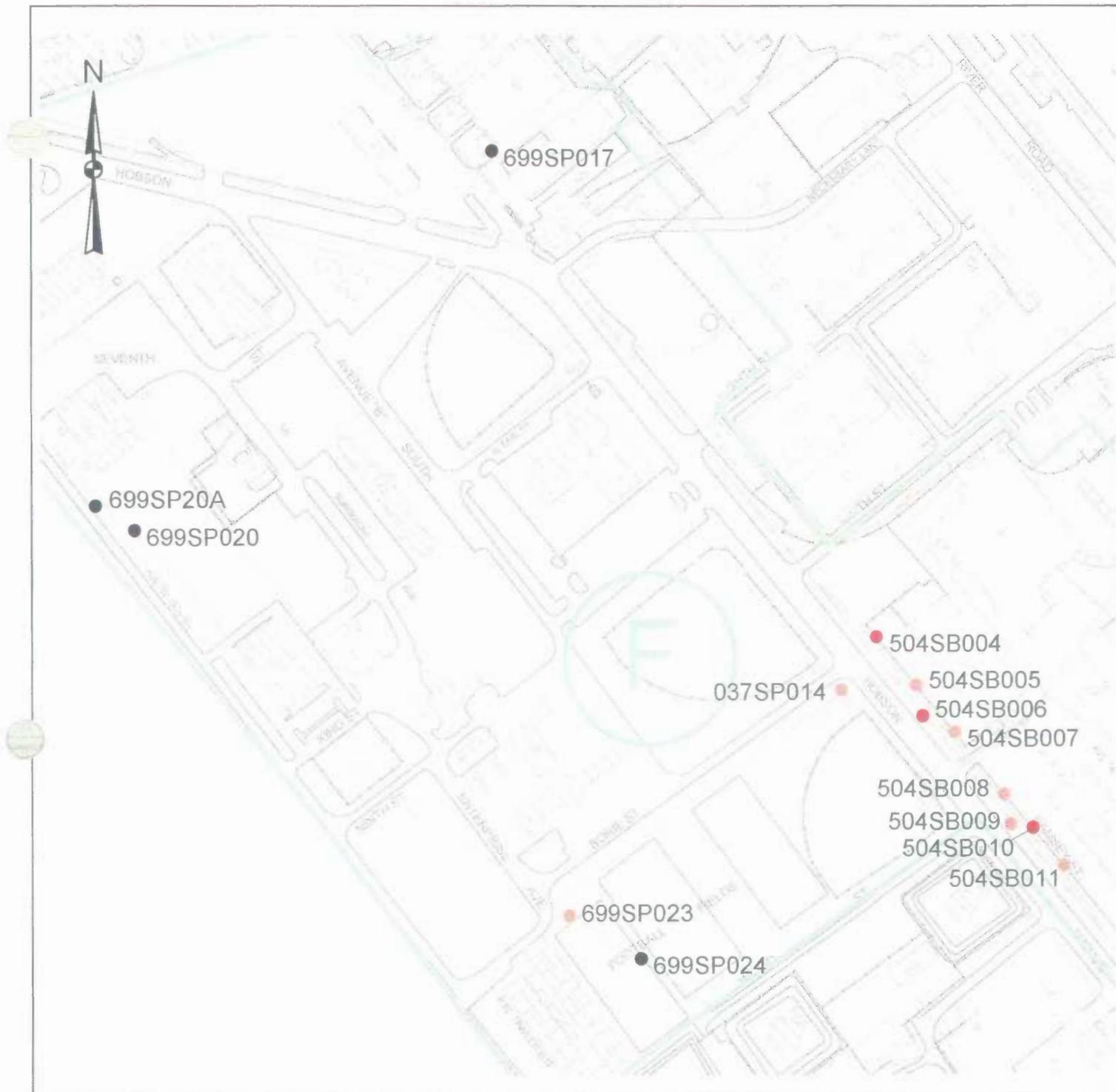
100 0 100 200 Feet



ZONE L - RCRA
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NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.69
ZONE L - SUBZONE F
VANADIUM
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=55.0 mg/kg SSL=6000 mg/kg MCL=NONE



LEGEND

- NO COPCs DETECTED
- < 1E-6
- 1E-6 to 5E-6
- 5E-6 to 1E-5
- 1E-5 to 1E-4
- > 1E-4

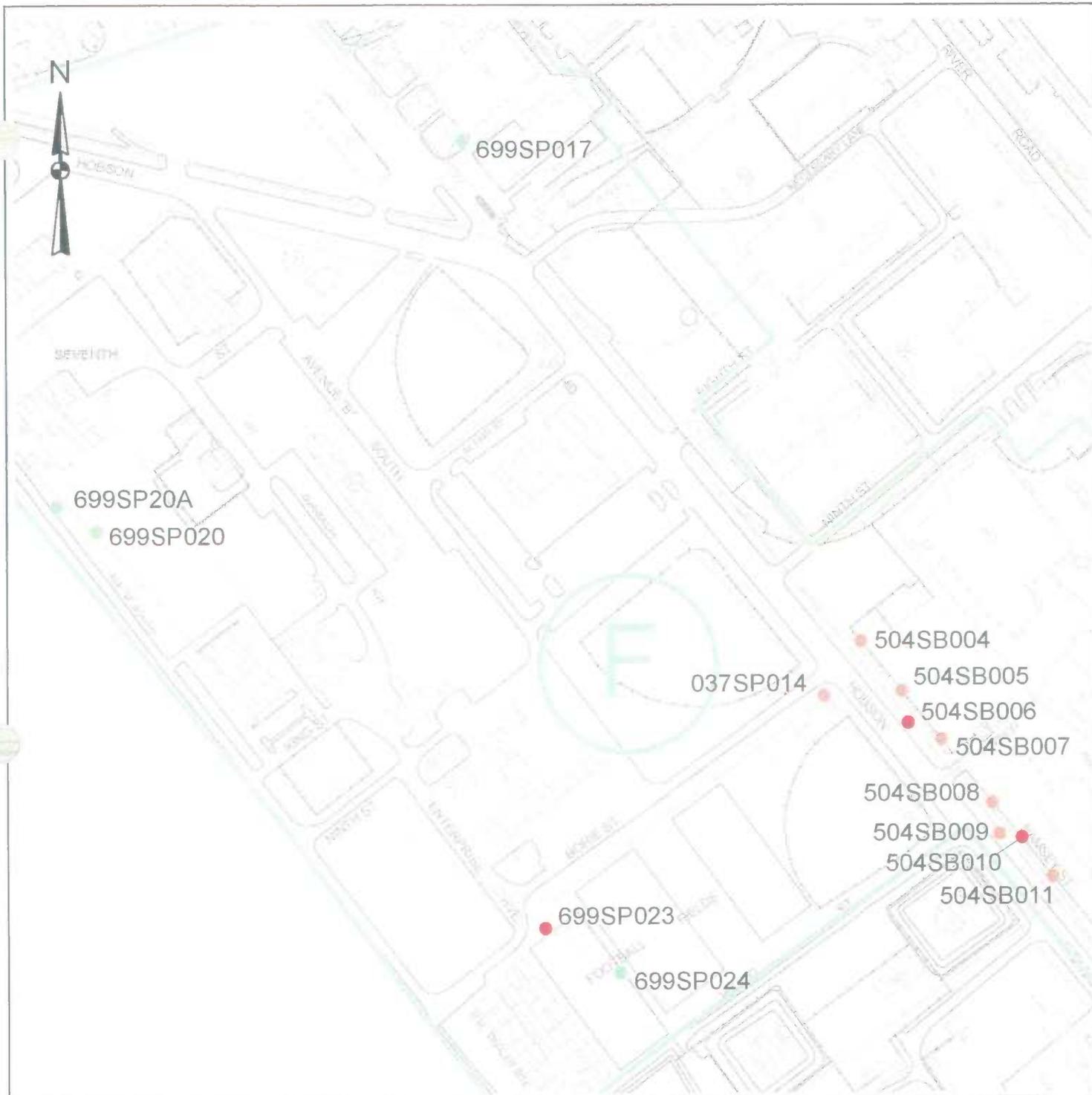


ZONE L - RCRA
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 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.6.70
 ZONE L - SUBZONE F
 SWMU 37, AOC 699, 504

SOIL POINT RISK
 RESIDENTIAL SCENARIO





LEGEND

- NO COPCs DETECTED
- 0 to 0.1
- 0.1 to 0.5
- 0.5 to 1.0
- 1.0 to 3.0
- > 3.0

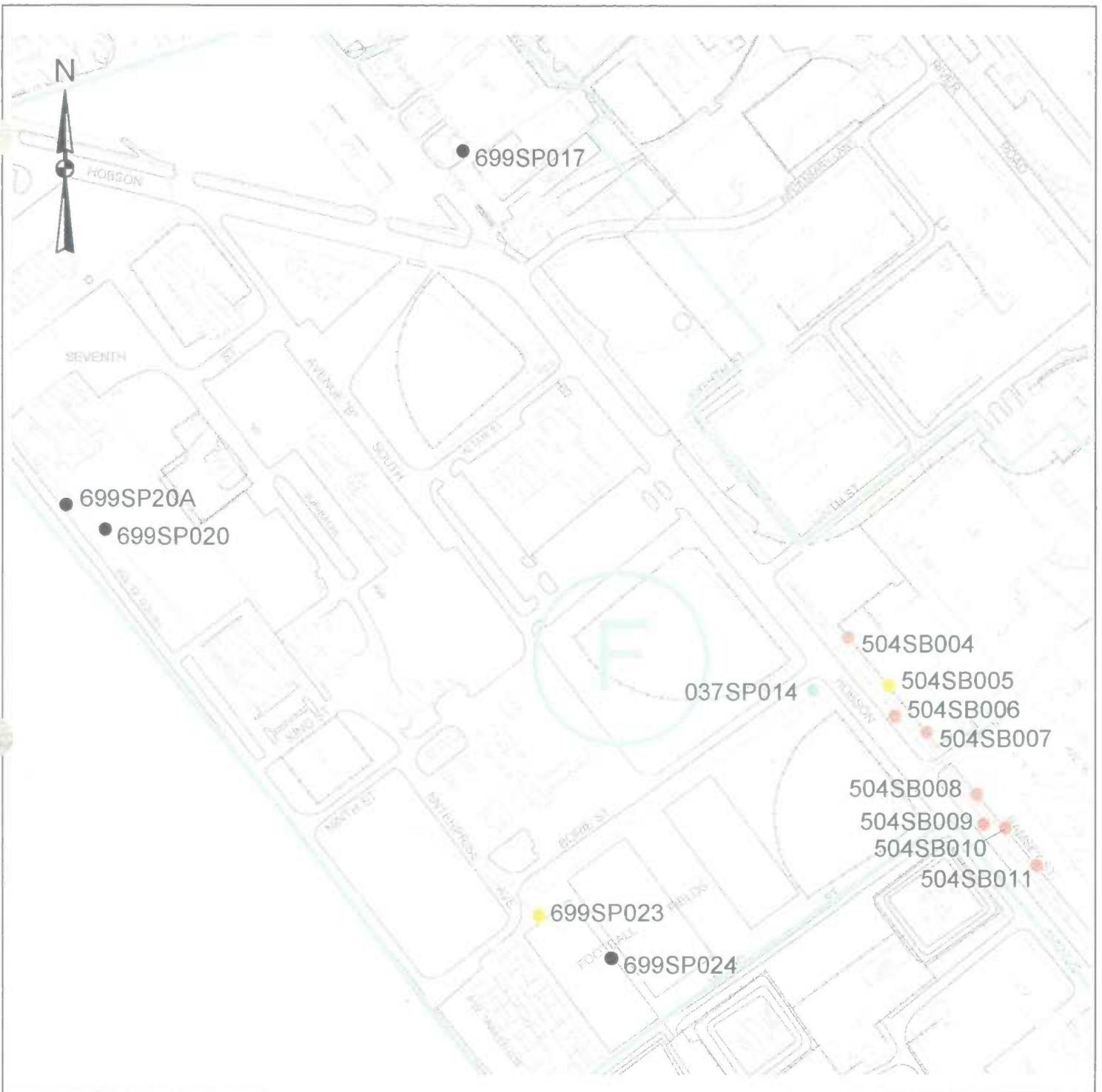


ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.6.71
ZONE L - SUBZONE F
SWMU 37, AOC 699, 504

SOIL HAZARD INDEX
RESIDENTIAL SCENARIO





LEGEND

- NO COPCs DETECTED
- < 1E-6
- 1E-6 to 5E-6
- 5E-6 to 1E-5
- 1E-5 to 1E-4
- > 1E-4

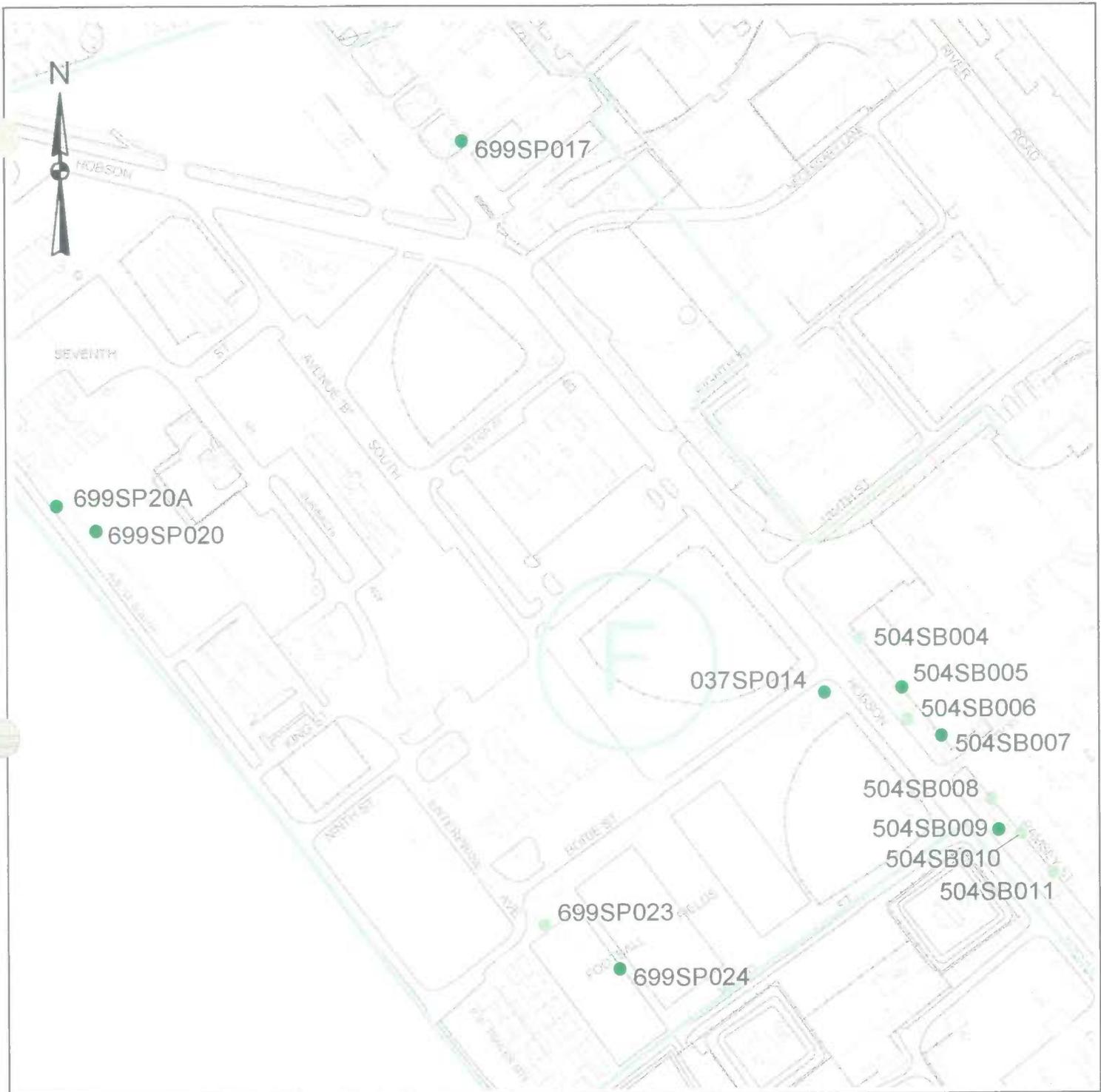


ZONE L - RCRA
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 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.6.72
 ZONE L - SUBZONE F
 SWMU 37, AOC 699, 504

SOIL POINT RISK
 INDUSTRIAL SCENARIO





LEGEND

- NO COPCs DETECTED
- 0 to 0.1
- 0.1 to 0.5
- 0.5 to 1.0
- 1.0 to 3.0
- > 3.0

300 0 300 600 Feet



ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.6.73
 ZONE L - SUBZONE F
 SWMU 37, AOC 699, 504

SOIL HAZARD INDEX
 INDUSTRIAL SCENARIO

10.7 Subzone G

The boundaries of Subzone G for the Zone L RFI are the areas investigated in the Zone G RFI. Data from the environmental samples collected during the Zone G investigation have been compared to data collected for the Zone L investigation. Sampling locations from Zone G are presented in Figures 10.7.1 and 10.7.2.

10.7.1 Subzone G, SWMU 37

Sampling in Subzone G, SWMU 37, consisted of two shallow monitoring wells, 14 upper-(0-1') and 9 lower-(3-5') interval soil boring samples collected using a hand auger, and 20 soil and 30 groundwater samples collected using DPT. The monitoring well groundwater and soil boring samples were analyzed for VOCs, SVOCs, metals, cyanide, chlorinated pesticides, and PCBs. The DPT samples were analyzed for VOCs, metals, and cyanide. Sampling locations are presented in Figures 10.7.3 through 10.7.8.

10.7.1.1 Nature of Contamination in Subzone G, SWMU 37, DPT Soil

Organic compound analytical results for soil obtained from DPT collection are summarized in Table 10.7.1. Inorganic analytical results are summarized in Table 10.7.2. Appendix C contains the complete data report for all samples collected in Zone L.

Volatile Organic Compounds Detected in DPT Soil

None of the seven VOCs found in the DPT soil samples exceeded the RBC values. PCE (52.8 $\mu\text{g/L}$) and TCE, (52.1 $\mu\text{g/L}$) both from 037SP012G1, exceeded the SSL values.

Metals/Cyanide Detected in DPT Soil

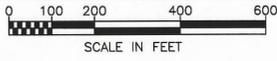
As summarized in Table 10.7.2, aluminum (9/20), antimony (1/20), arsenic (20/20), chromium (1/20), copper (1/20), iron (20/20), lead (1/20), manganese (5/20), thallium (1/20), and vanadium (3/20) exceeded RBC values in DPT soil samples. Chromium (1/20), lead (1/20), and thallium



LEGEND:

504SB002 ● SOIL BORING W/ ID NUMBER

 STUDY ZONE BOUNDARY WITH LETTER DESIGNATION



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Rev Number:	Rev Date:	Rev By:
Rev Number:	Rev Date:	Rev By:

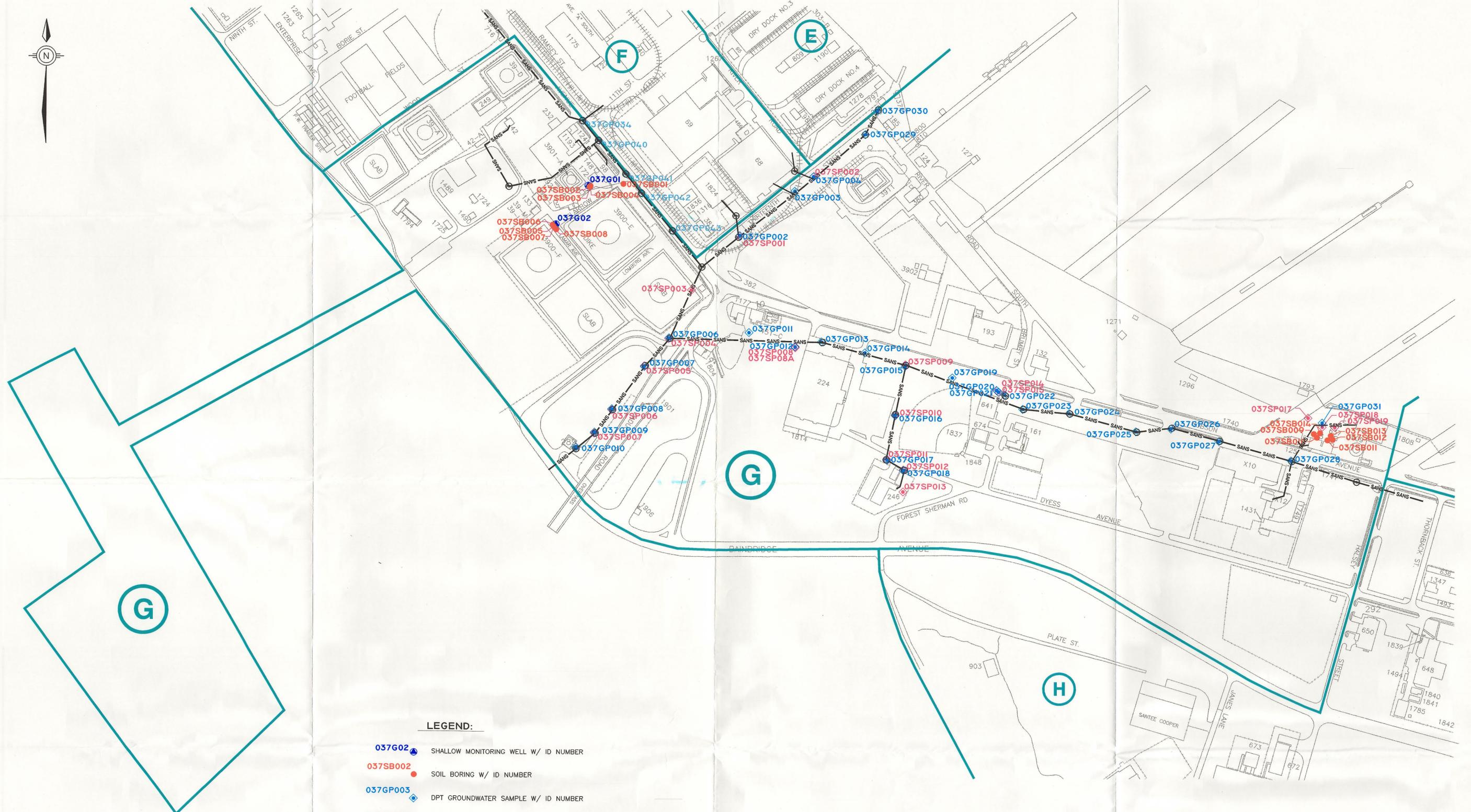


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FIGURE 10.7.1
ZONE G SOIL BORING LOCATIONS

Dr by: W. FAULK	Tr by: -
Ck by: C. VERNON	Appr by: T. HAVERKOST
Date: 11/25/98	DWG Name: 2912C086

Sheet 1
Of 1



LEGEND:

- 037G02 SHALLOW MONITORING WELL W/ ID NUMBER
- 037SB002 SOIL BORING W/ ID NUMBER
- ◆ 037GP003 DPT GROUNDWATER SAMPLE W/ ID NUMBER
- ◆ 037SP003 DPT SOIL SAMPLE W/ ID NUMBER
- ⊕ SANITARY SEWER MANHOLE
- SANS - SANITARY SEWER LINE
- G STUDY ZONE BOUNDARY WITH LETTER DESIGNATION

NOTE:
SAMPLES FROM ADJACENT ZONES SHOWN FOR REFERENCE
IN LIGHTER COLOR



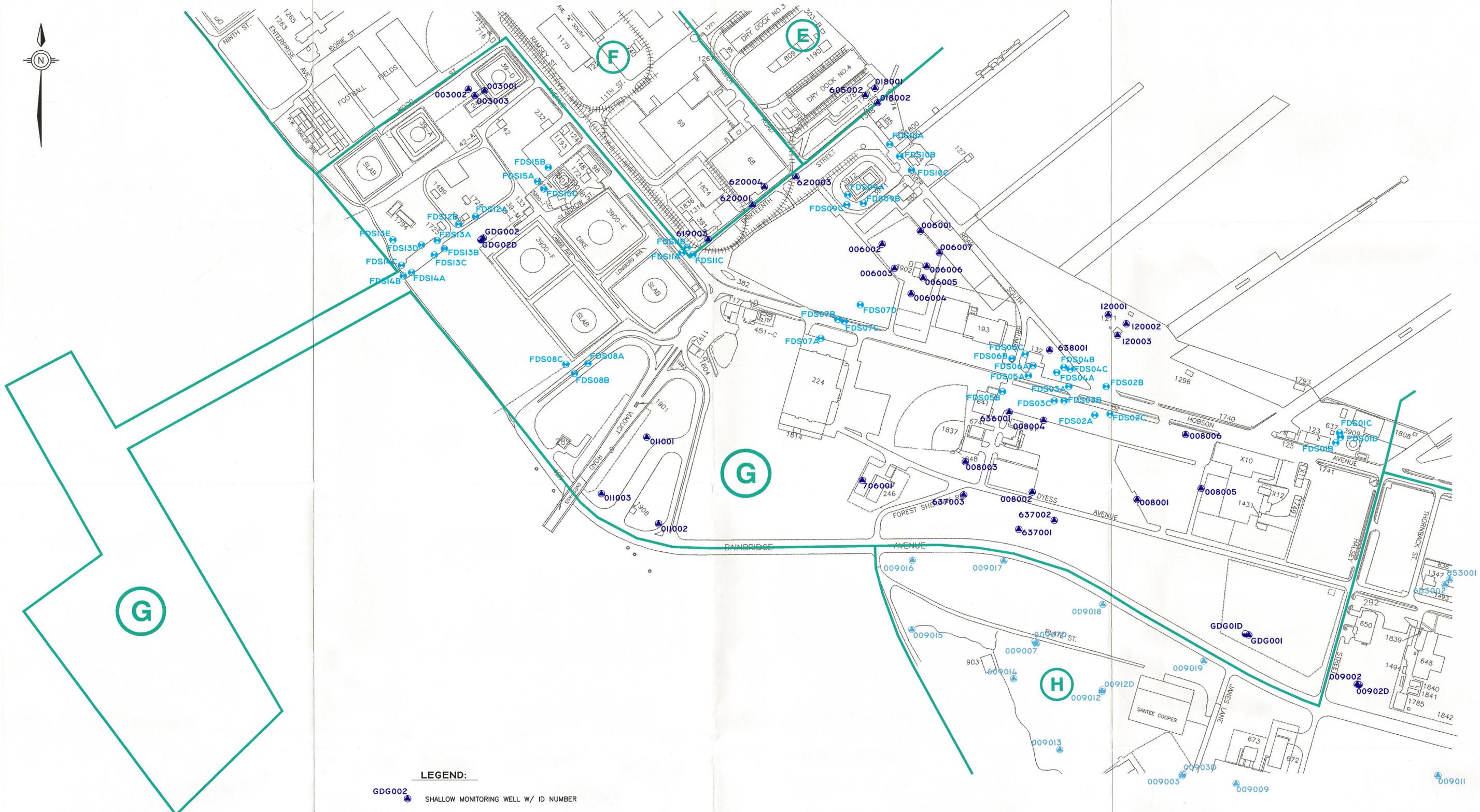
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Rev Number:	Rev Date:	Rev By:
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Rev Number:	Rev Date:	Rev By:

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FIGURE 10.7.3
SWMU 37 (SANITARY SEWER SYSTEM)
SAMPLING LOCATIONS
SUBZONE G

Dr by: W. FAULK	Tr by: -
Ck by: C. VERNON	Appr by: T. HAVERKOST
Date: 11/25/98	DWG Name: 2912C088

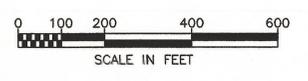
Sheet 1
of 1



LEGEND:

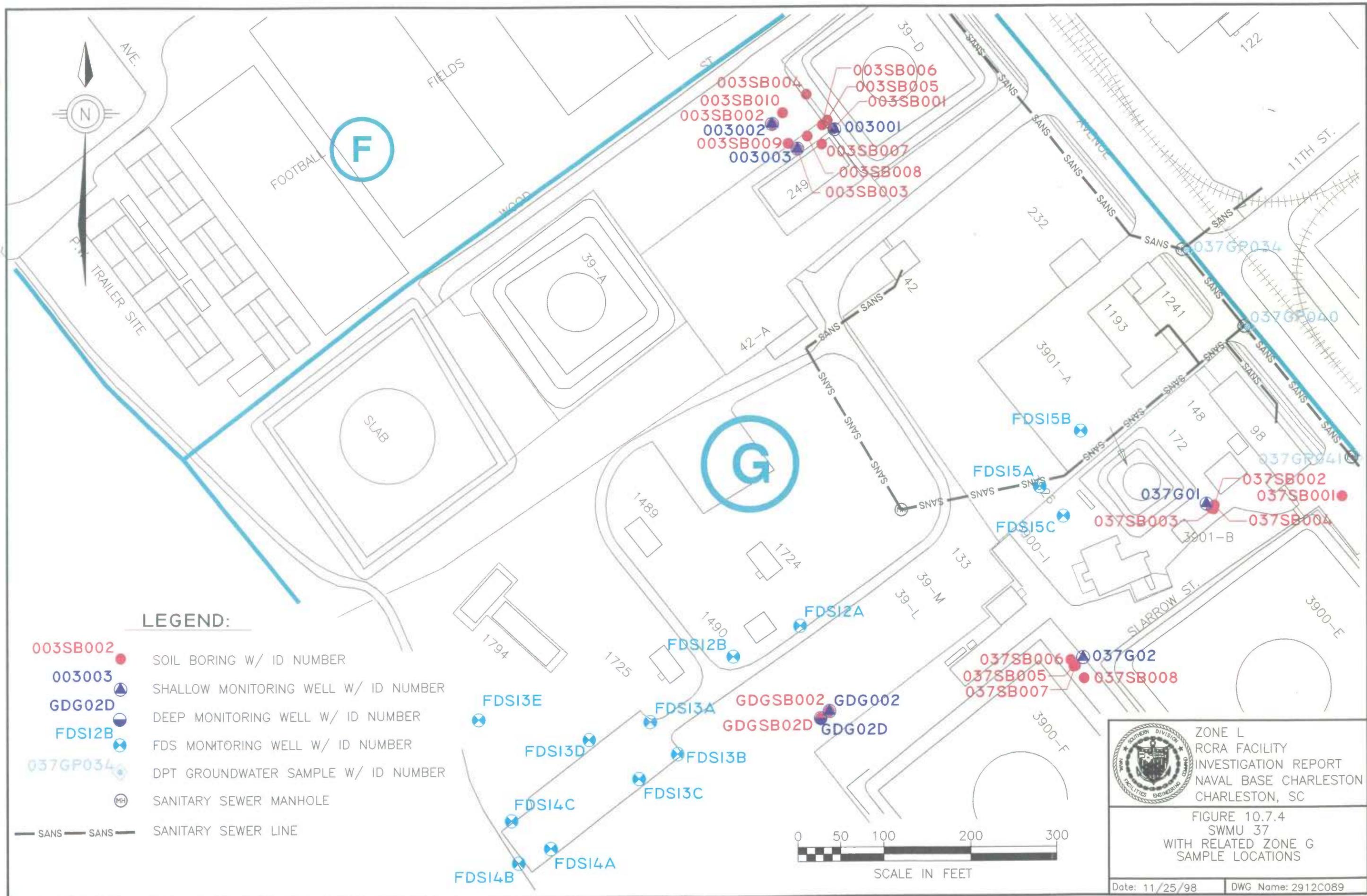
-  SHALLOW MONITORING WELL W/ ID NUMBER
-  INTERMEDIATE MONITORING WELL W/ ID NUMBER
-  DEEP MONITORING WELL W/ ID NUMBER
-  FUEL DISTRIBUTION SYSTEM MONITORING WELL W/ ID NUMBER
-  STUDY ZONE BOUNDARY WITH LETTER DESIGNATION

NOTE:
 SAMPLES FROM ADJACENT ZONES SHOWN FOR REFERENCE
 IN LIGHTER COLOR



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Rev Number:	Rev Date:	Rev By:

 ZONE L RCRA FACILITY INVESTIGATION REPORT NAVAL BASE CHARLESTON CHARLESTON, SC		FIGURE 10.7.2 ZONE G MONITORING WELL LOCATIONS	
		Dr by: W. FAULK	Tr by: -
Ck by: C. VERNY	Appr by: T. HAVERKOST		Sheet 1
Date: 11/25/98	DWG Name: 2912C087		of 1



LEGEND:

- 003SB002 ● SOIL BORING W/ ID NUMBER
- 003003 ● SHALLOW MONITORING WELL W/ ID NUMBER
- GDG02D ● DEEP MONITORING WELL W/ ID NUMBER
- FDSI2B ● FDS MONITORING WELL W/ ID NUMBER
- 037GP034 ● DPT GROUNDWATER SAMPLE W/ ID NUMBER
- MH ○ SANITARY SEWER MANHOLE
- SANS — SANITARY SEWER LINE

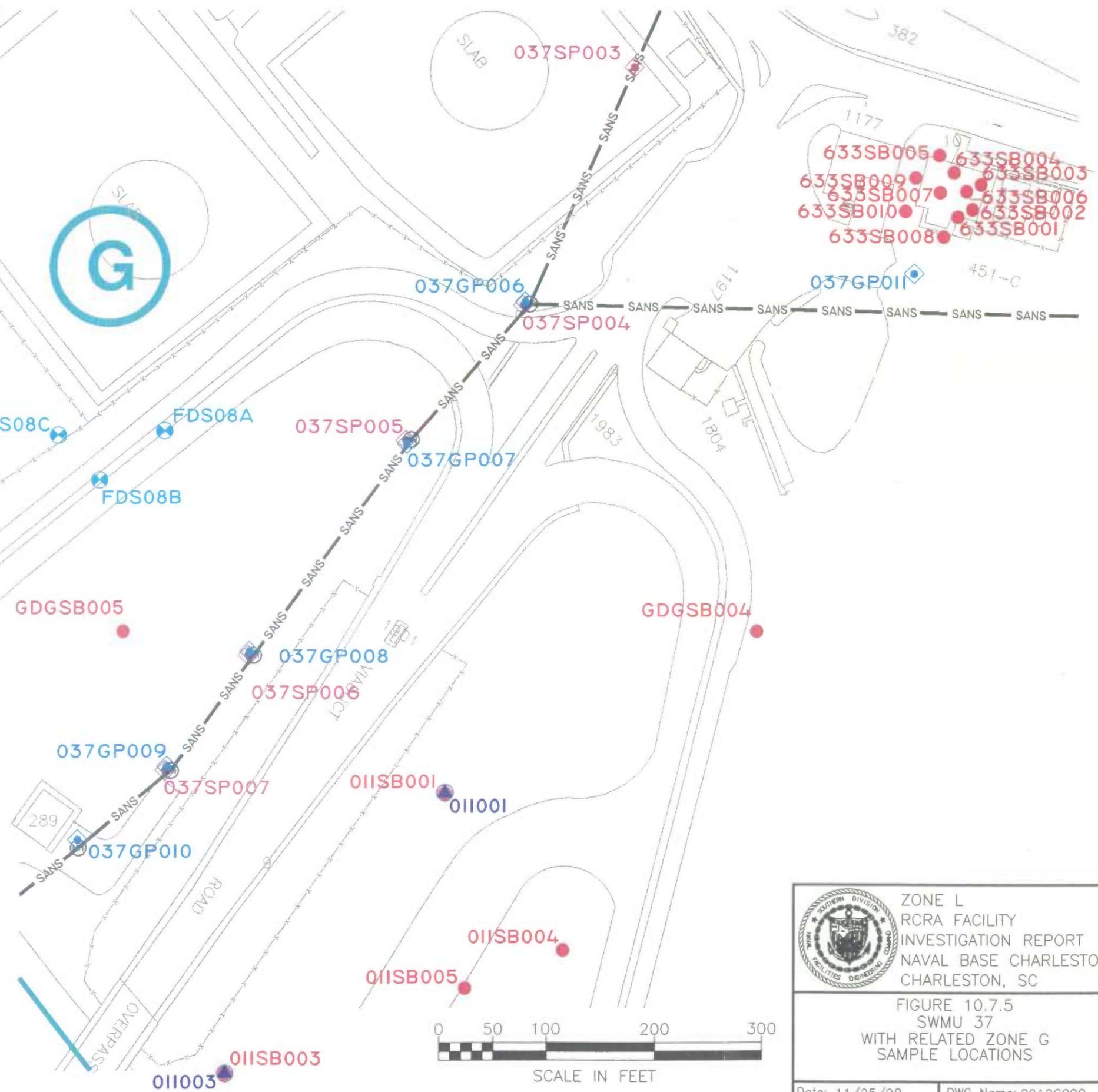


	ZONE L RCRA FACILITY INVESTIGATION REPORT NAVAL BASE CHARLESTON CHARLESTON, SC
	FIGURE 10.7.4 SWMU 37 WITH RELATED ZONE G SAMPLE LOCATIONS
Date: 11/25/98	DWG Name: 2912C089



LEGEND:

- **GDGSB005** SOIL BORING W/ ID NUMBER
- ▲ **011001** SHALLOW MONITORING WELL W/ ID NUMBER
- DEEP MONITORING WELL W/ ID NUMBER
- ▲ **FDS08C** FDS MONITORING WELL W/ ID NUMBER
- ◆ **037GP006** DPT GROUNDWATER SAMPLE W/ ID NUMBER
- ◆ **037SP003** DPT SOIL SAMPLE W/ ID NUMBER
- MH SANITARY SEWER MANHOLE
- SANITARY SEWER LINE

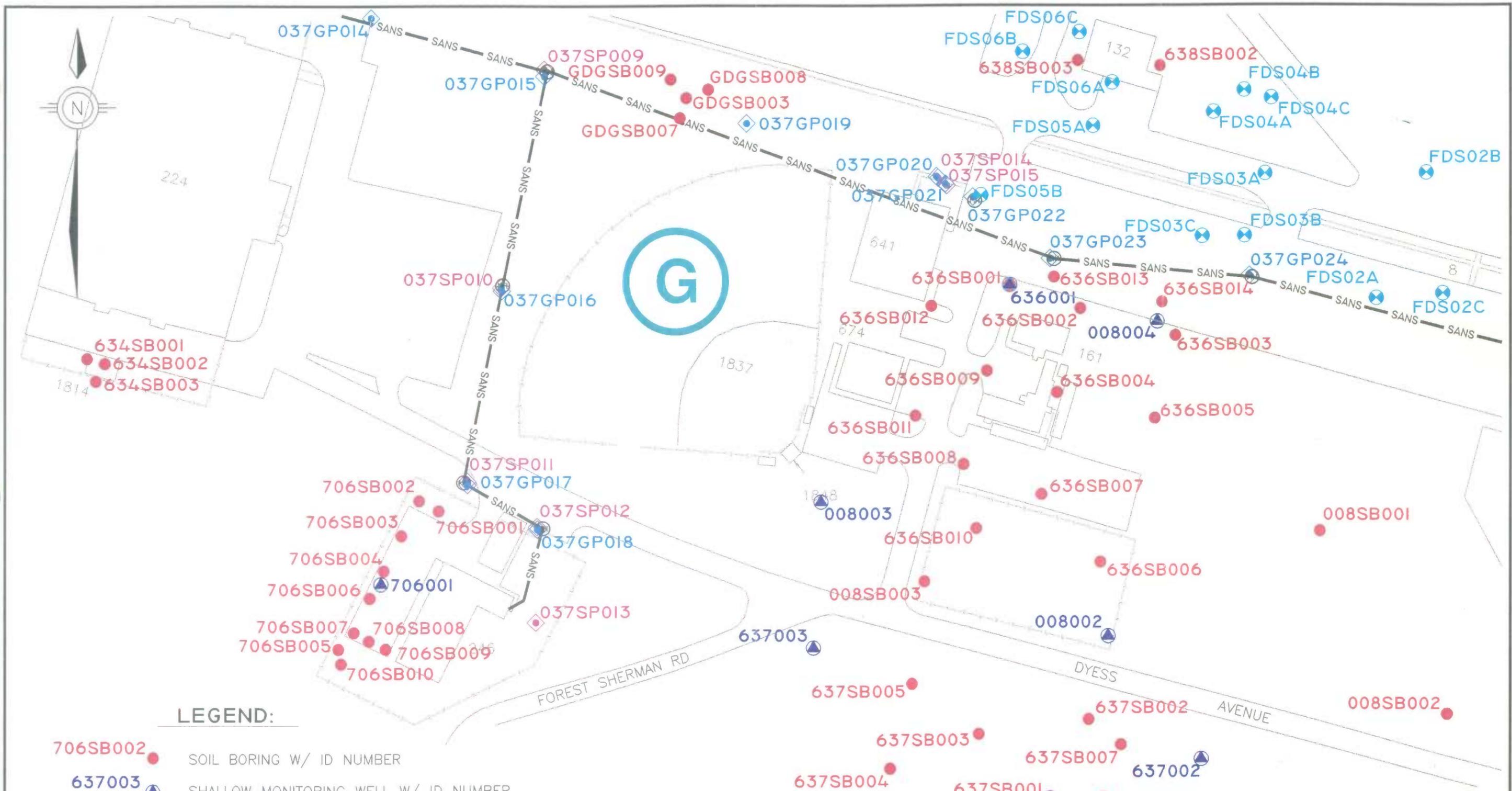




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FIGURE 10.7.5
 SWMU 37
 WITH RELATED ZONE G
 SAMPLE LOCATIONS

Date: 11/25/98 DWG Name: 2912C090



LEGEND:

- 706SB002 ● SOIL BORING W/ ID NUMBER
- 637003 ▲ SHALLOW MONITORING WELL W/ ID NUMBER
- FDS03C ● FDS MONITORING WELL W/ ID NUMBER
- 037GP017 ◆ DPT GROUNDWATER SAMPLE W/ ID NUMBER
- 037SP010 ◆ DPT SOIL SAMPLE W/ ID NUMBER
- MH ○ SANITARY SEWER MANHOLE
- SANS — SANITARY SEWER LINE





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NAVAL BASE CHARLESTON
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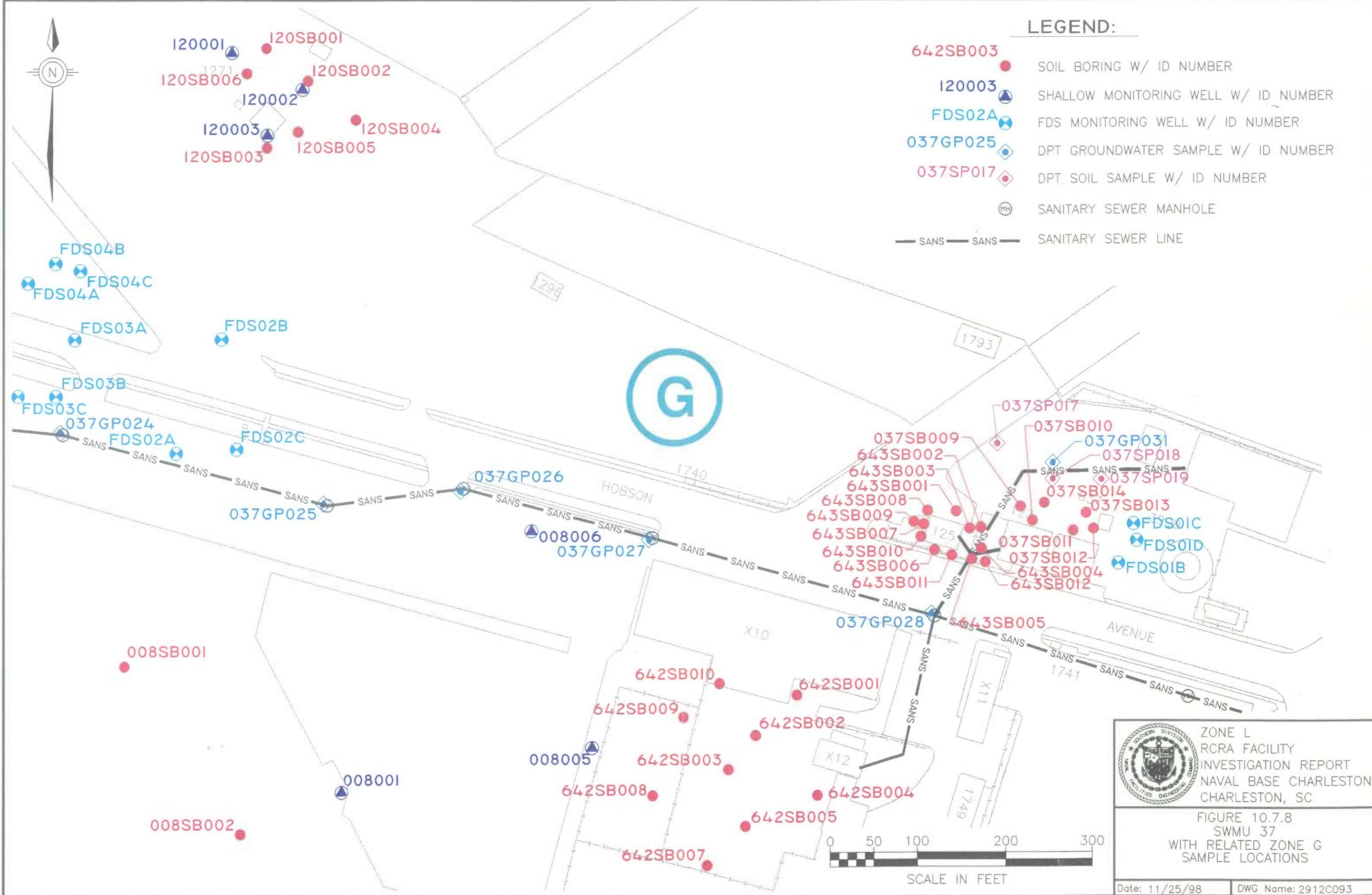
FIGURE 10.7.7
SWMU 37
WITH RELATED ZONE G
SAMPLE LOCATIONS

Date: 11/25/98 DWG Name: 2912C092



LEGEND:

- 642SB003 SOIL BORING W/ ID NUMBER
- ▲ 120003 SHALLOW MONITORING WELL W/ ID NUMBER
- ⊗ FDS02A FDS MONITORING WELL W/ ID NUMBER
- ◇ 037GP025 DPT GROUNDWATER SAMPLE W/ ID NUMBER
- ◆ 037SP017 DPT SOIL SAMPLE W/ ID NUMBER
- ⊙ (MH) SANITARY SEWER MANHOLE
- SANS — SANITARY SEWER LINE





ZONE L
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 INVESTIGATION REPORT
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.7.8
 SWMU 37
 WITH RELATED ZONE G
 SAMPLE LOCATIONS

Date: 11/25/98 DWG Name: 2912C093

(1/20) exceeded SSL values. Table 10.7.3 provides the specific sampling locations that exceeded the RBC or SSL values.

Table 10.7.1
SWMU 037, Zone L, Subzone G
Organic Compounds Detected in DPT Soil

Compound	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Volatile Organic Compounds ($\mu\text{g}/\text{kg}$)							
1,1,2,2-Tetrachloroethane	1/20	52.8	52.8	3.20	1	3	YES
1,1,2-Trichloroethane	1/20	52.1	52.1	11000	0	20	YES
2-Butanone (MEK)	2/20	14.5-152	83.3	4700000	0	7800 c	NO
2-Hexanone	1/20	13.7	13.7	310	0	7400 c	NO
Acetone	7/20	12.7-326	97.9	780000	0	16000	NO
Carbon disulfide	4/20	5.42-17.4	9.02	780000	0	32000	NO
Toluene	1/20	175	175	1600000	0	12000	NO

Notes:
 $\mu\text{g}/\text{kg}$ = Micrograms per kilogram
 RBC = Risk-based concentration
 GW = Groundwater
 SSL = Soil screening level
 c = Calculated SSL
 Soil to GW = Generic SSLs based on DAF = 20, adapted from USEPA Soil Screening Guidance: Technical Background Document, May 1996 (first preference), or calculated using values from Table 6.2 in Zone G RFI Report

Table 10.7.2
SWMU 037, Zone L, Subzone G
Inorganic Detections for DPT Soil

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Reference Conc.	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Inorganic Elements (mg/kg)								
Cyanide (CN)	1/20	0.310	0.310	160	0.38	0	40	NO
Aluminum (Al)	20/20	2780-13000	7613	7800	18700	9	1000000 c	NO
Antimony (Sb)	3/20	1.80-16.2	6.73	3.10	2.89	1	5	YES
Arsenic (As)	20/20	2.10-18.7	6.48	0.430	17.2	20	29	NO

Table 10.7.2
SWMU 037, Zone L, Subzone G
Inorganic Detections for DPT Soil

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Reference Conc.	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Barium (Ba)	20/20	9.50-354	44.2	550	109	0	1600	NO
Beryllium (Be)	19/20	0.240-0.830	0.526	16	1.20	0	63	NO
Cadmium (Cd)	6/20	0.490-4.50	1.26	7.80	1.07	0	8	NO
Calcium (Ca)	20/20	2260-167000	34565	NA	NA	NA	NA	NO
Chromium (Cr)	20/20	6.66-61.4	19.5	39.0	42.8	1	38	YES
Cobalt (Co)	20/20	0.720-7.88	2.64	470	6.60	0	2000 c	NO
Copper (Cu)	20/20	1.66-3570	213.6	310	260	1	11200 c	NO
Iron (Fe)	20/20	3680-57400	11071	2300	NA	20	NA	NO
Lead (Pb)	20/20	5.89-833	92.3	400	181	1	400	YES
Magnesium (Mg)	20/20	345-3550	1553	NA	NA	NA	NA	NO
Manganese (Mn)	20/20	16.9-768	130.7	160	325	5	950 c	NO
Mercury (Hg)	16/20	0.0400-2.25	0.284	NA	1.03	NA	2	YES
Nickel (Ni)	20/20	2.37-69.3	12.9	160	20.6	0	130	NO
Potassium (K)	20/20	210.0-2050	687.2	NA	NA	NA	NA	NO
Selenium (Se)	9/20	0.590-2.73	1.11	39.0	1.22	0	5	NO
Silver (Ag)	2/20	1.20-1.77	1.49	39.0	ND	0	34	NO
Sodium (Na)	20/20	221-2200	597	NA	NA	NA	NA	NO
Thallium (Tl)	1/20	3.38	3.38	0.55	0.85	1	0.7	YES
Tin (Sn)	4/20	4.17-79.1	23.8	4700	9.67	0	11000 c	NO
Vanadium (V)	20/20	7.13-399	50.0	55.0	60.9	3	6000	NO
Zinc (Zn)	20/20	10.8-1500	180.7	2300	519	0	12000	NO

Notes:

- mg/kg = Milligrams per kilogram
- RBC = Risk-based concentration
- NA = Not applicable
- ND = Not detected
- GW = Groundwater
- SSL = Soil screening level
- c = Calculated SSL
- Soil to GW = Generic SSLs based on DAF = 20, adapted from *USEPA Soil Screening Guidance: Technical Background Document*, May 1996 (first preference), or calculated using values from Table 6.2 in Zone G RFI Report

Table 10.7.3
SWMU 37, Zone L, Subzone G, DPT Soil Sample Locations with
Metals Detections Exceeding RBCs and/or SSLs

Metals	Sample ID	Concentrations Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Aluminum	037SP001G1	12100	Y	N	7800	1.0 E+06
	037SP002G1	8590	Y	N		
	037SP005G1	8340	Y	N		
	037SP008G1	13000	Y	N		
	037SP010G1	10000	Y	N		
	037SP011G1	8460	Y	N		
	037SP014G1	11700	Y	N		
	037SP015G1	9720	Y	N		
	037SP019G1	8510	Y	N		
Antimony	037SP010G1	16.2	Y	N	3.10	5.00
Arsenic	037SP001G1	11.7	Y	N	0.43	29.00
	037SP002G1	8.34	Y	N		
	037SP003G1	3.21	Y	N		
	037SP004G1	3.08	Y	N		
	037SP005G1	4.01	Y	N		
	037SP006G1	3.39	Y	N		
	037SP007G1	2.91	Y	N		
	037SP008G1	5.76	Y	N		
	037SP009G1	5.47	Y	N		
	037SP010G1	14.6	Y	N		
	037SP011G1	3.72	Y	N		
	037SP012G1	2.95	Y	N		
	037SP013G1	3.41	Y	N		
	037SP014G1	7.17	Y	N		
	037SP015G1	11.2	Y	N		
	037SP016G1	6.19	Y	N		
	037SP017G1	18.7	Y	N		
	037SP018G1	2.10	Y	N		

Table 10.7.3
SWMU 37, Zone L, Subzone G, DPT Soil Sample Locations with
Metals Detections Exceeding RBCs and/or SSLs

Metals	Sample ID	Concentrations Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
	037SP019G1	8.19	Y	N		
	037SP08AG1	3.42	Y	N		
Chromium	037SP010G1	61.4	Y	Y	39.00	38.00
Copper	037SP010G1	3570	Y	N	310	11200
Iron	037SP001G1	17100	Y	N	2300	NA
	037SP002G1	11000	Y	N		
	037SP003G1	3790	Y	N		
	037SP004G1	4950	Y	N		
	037SP005G1	7820	Y	N		
	037SP006G1	5010	Y	N		
	037SP007G1	4500	Y	N		
	037SP008G1	17600	Y	N		
	037SP009G1	9550	Y	N		
	037SP010G1	57400	Y	N		
	037SP011G1	5980	Y	N		
	037SP012G1	5790	Y	N		
	037SP013G1	7290	Y	N		
	037SP014G1	11900	Y	N		
	037SP015G1	13200	Y	N		
	037SP016G1	7830	Y	N		
	037SP017G1	10900	Y	N		
	037SP018G1	3680	Y	N		
	037SP019G1	8780	Y	N		
	037SP08AG1	7340	Y	N		
Lead	037SP010G1	833	Y	Y	400	400
Manganese	037SP001G1	176	Y	N	160	950
	037SP002G1	169	Y	N		
	037SP008G1	169	Y	N		

Table 10.7.3
SWMU 37, Zone L, Subzone G, DPT Soil Sample Locations with
Metals Detections Exceeding RBCs and/or SSLs

Metals	Sample ID	Concentrations Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
	037SP010G1	768	Y	N		
	037SP017G1	182	Y	N		
Thallium	037SP010G1	3.38	Y	Y	0.55	0.70
Vanadium	037SP010G1	399	Y	N	55.00	6000
	037SP017G1	125	Y	N		
	037SP019G1	152	Y	N		

Notes:
 mg/kg = Milligrams per kilogram
 RBC = Risk-based concentration
 SSL = Soil screening level
 GW = Groundwater
 Soil to GW = Generic SSLs based on DAF = 10, adapted from USEPA Soil Screening Guidance: Technical Background Document, May 1996 (first preference), or calculated using values from Table 6.2 in Zone G RFI Report.

10.7.1.2 Nature of Contamination in Subzone G, SWMU 37, DPT Groundwater

Thirty DPT groundwater samples were analyzed for VOCs, metals, and cyanide. Results for detected organic compounds are shown in Table 10.7.4, and results for detected inorganic chemicals are shown in 10.7.5. As stated in Section 10.0, DPT groundwater has not been compared to RBC or MCL values for inorganic parameters.

Volatile Organic Compounds Detected in DPT Groundwater

Carbon disulfide was detected in one DPT groundwater sample, but the result did not exceed the RBC or MCL values.

Table 10.7.4
 SWMU 37, Zone L, Subzone G
 Organic Compounds Detected in DPT Groundwater

Compound	Freq of Detection	Range of Detected Conc.	Mean of Detected Conc.	Tap Water RBC	MCL	Number of Samples Exceeding RBC	Salt Wtr. Surf. Wtr. Chronic	Ground-water Migration Concern	Surface Water Migration Concern
Volatile Compounds ($\mu\text{g/L}$)									
Carbon disulfide	1/30	7.04	7.04	100	NA	0	NA	NO	NO

Notes:

$\mu\text{g/L}$ = Micrograms per liter
 RBC = Risk-based concentration
 MCL = Maximum contaminant level
 NA = Not applicable

Table 10.7.5
 SWMU 37, Zone L, Subzone G
 Inorganic Detections for DPT Groundwater

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.
Inorganic Elements ($\mu\text{g/L}$)			
Cyanide (CN)	7/30	5.20-174	42.7
Aluminum (Al)	30/30	2210-559000	117402
Antimony (Sb)	4/30	8.00-16.5	11.9
Arsenic (As)	28/30	12.1-782	129.1
Barium (Ba)	30/30	31.2-1310	271.4
Beryllium (Be)	21/30	2.00-47.6	12.9
Cadmium (Cd)	8/30	3.00-33.1	9.88
Calcium (Ca)	30/30	64700-607000	281107
Chromium (Cr)	30/30	8.70-1360	255.6
Cobalt (Co)	26/30	5.00-188	42.8
Copper (Cu)	28/30	7.60-1670	126.4
Iron (Fe)	30/30	6060-875000	173335
Lead (Pb)	29/30	9.60-944	192.9

Table 10.7.5
SWMU 37, Zone L, Subzone G
Inorganic Detections for DPT Groundwater

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.
Magnesium (Mg)	30/30	21300-1010000	446077
Manganese (Mn)	30/30	127-8260	2054
Mercury (Hg)	13/30	0.210-3.20	0.678
Nickel (Ni)	30/30	4.40-373	75.1
Potassium (K)	30/30	10100-330000	150057
Selenium (Se)	8/30	5.90-14.4	9.61
Sodium (Na)	30/30	87600-8220000	3632087
Thallium (Tl)	9/30	10.8-58.6	24.3
Vanadium (V)	30/30	6.80-1560	254.7
Zinc (Zn)	30/30	21.7-5030	656.5

Notes:
 µg/L = Micrograms per liter

Inorganic Elements Detected in DPT Groundwater

Analytical results for inorganic compounds in DPT groundwater samples are shown in Table 10.7.5. As stated in Section 10.0, inorganic results from DPT groundwater samples were not compared to RBC or MCL values.

10.7.1.3 Nature of Contamination in Soil Borings

Fourteen upper-interval and nine lower-interval samples were collected using a hand auger and analyzed for VOCs, SVOCs, metals, cyanide, chlorinated pesticides and PCBs. Upper-interval sample results were compared to RBC values, and lower-interval samples were compared to SSL values. The results are summarized in Tables 10.7.6 (organic) and 10.7.7 (inorganic).

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Table 10.7.6
 SWMU 37, Zone L, Subzone G
 Organic Compounds Detected in Soil

Compound	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Volatile Organic Compounds ($\mu\text{g}/\text{kg}$)								
Benzene	Lower	1/9	2.00	2.00	22,000	0	30	NO
Chloroform	Lower	1/9	1.00	1.00	100,000	0	600	NO
Toluene	Upper	1/14	4.00	4.00	1,600,000	0	12,000	NO
	Lower	1/9	7.00	7.00	NA	NA		
Xylene (Total)	Upper	1/14	2.00	2.00	16,000,000	0	140,000 c	NO
	Lower	1/9	7.00	7.00	NA	NA		
Semivolatile Compounds ($\mu\text{g}/\text{kg}$)								
2-Methylnaphthalene	Upper	1/14	100	100	3,100,000	0	460,000 c	NO
Acenaphthene	Upper	1/14	3,700	3,700	470,000	0	570,000	NO
Acenaphthylene	Upper	1/14	1,600	1,600	310,000	0	190,000 c	NO
Anthracene	Upper	3/14	73.0-16,000	5,401	2,300,000	0	12,000,000	NO
	Lower	3/9	70.0-95.0	80.0	NA	NA		
B(a)P Equiv.	Upper	8/14	0.042-39698	5341	88	6	3200 c	YES
	Lower	5/9	174-367	296	NA	NA		
Benzo(a)anthracene	Upper	7/14	40.0-43,000	6,442	880	2	2,000	YES
	Lower	5/9	130-290	211	NA	NA		
Benzo(a)pyrene	Upper	7/14	44.0-32,000	4,884	88	5	8,000	YES
	Lower	5/9	140-250	202	NA	NA		
Benzo(b)fluoranthene	Upper	6/14	71.0-1,500	372	880	1	5,000	NO
	Lower	5/9	130-270	215	NA	NA		
Benzo(g,h,i)perylene	Upper	6/14	60.0-4,300	852	310,000	0	230,000,000 c	NO
	Lower	5/9	71.0-170	112	NA	NA		
Benzo(k)fluoranthene	Upper	6/14	74.0-35,000	6,165	8,800	1	49,000	NO
	Lower	4/9	130-250	201	NA	NA		

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Table 10.7.6
SWMU 37, Zone L, Subzone G
Organic Compounds Detected in Soil

Compound	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Butylbenzylphalate	Upper	8/14	40.0-110	68.0	1,600,000	0	930,000	NO
	Lower	5/9	50.0-590	262	NA	NA		
Chrysene	Upper	8/14	42.0-48,000	6,343	88,000	0	160,000	NO
	Lower	5/9	150-330	238	NA	NA		
Di-n-butylphthalate	Lower	1/9	67.0	67.0	780,000	NA	2,300,000	NO
Dibenz(a,h)anthracene	Upper	3/14	66.0-2,500	935	88	2	2,000	YES
	Lower	3/9	48.0-83.0	65.0	NA	NA		
Dibenzofuran	Upper	1/14	1,200	1,200	310,000	0	14,000 c	NO
Fluoranthene	Upper	9/14	44.0-74,000	8,573	310,000	0	4,300,000	NO
	Lower	5/9	220-640	425	NA	NA		
Fluorene	Upper	1/14	3,800	3,800	310,000	0	560,000	NO
Indeno(1,2,3-cd)pyrene	Upper	6/14	52.0-5,000	966	880	1	14,000	NO
	Lower	5/9	64.0-150	103	NA	NA		
Naphthalene	Upper	1/14	72.0	72.0	310,000	0	84,000	NO
Phenanthrene	Upper	8/14	46.0-50,000	6,350	310,000	0	1,300,000 c	NO
	Lower	5/9	84.0-330	224	NA	NA		
Pyrene	Upper	11/14	46-170,000	15,794	230,000	0	4,200,000	NO
	Lower	5/9	250-550	399	NA	NA		
bis(2-Ethylhexyl)phthalate(BEHP)	Upper	1/14	40.0	40.0	46,000	0	3,600,000	NO
	Lower	3/9	49.0-140	96.0	NA	NA		
Chlorinated Pesticides (µg/kg)								
4,4'-DDD	Upper	3/14	10.0-41.0	23.0	2,700	0	16,000	NO
	Lower	1/9	3.70	3.70	NA	NA		
4,4'-DDE	Upper	11/14	3.50-390	75.5	1,900	0	54,000	NO
	Lower	4/9	3.60-9.30	5.60	NA	NA		

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Table 10.7.6
SWMU 37, Zone L, Subzone G
Organic Compounds Detected in Soil

Compound	Sampling Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
4,4'-DDT	Upper	8/14	3.30-210	61.8	1,900	0	16,000	NO
	Lower	1/9	3.80	3.80	NA	NA		
Heptachlor epoxide	Upper	5/14	2.40-11.9	7.02	70	0	700	NO
	Lower	2/9	2.40-5.20	3.80	NA	NA		
alpha-Chlordane	Upper	4/14	2.20-9.50	4.60	490	0	10,000	NO
	Lower	1/9	2.00	2.00	NA	NA		
gamma-Chlordane	Upper	8/14	2.40-10.0	5.80	490	0	10,000	NO
	Lower	1/9	3.50	3.50	NA	NA		
Polychlorinated Biphenyls (µg/kg)								
Aroclor-1260	Upper	1/14	140	140	320	0	1,000	NO

Notes:

- µg/kg = Micrograms per kilogram
- RBC = Risk-based concentration
- NA = Not applicable
- GW = Groundwater
- SSL = Soil screening level
- c = Calculated SSL
- Soil to GW = Generic SSLs based on DAF = 20, adapted from *USEPA Soil Screening Guidance: Technical Background Document*, May 1996 (first preference), or calculated using values from Table 6.2 in Zone G RFI Report

Table 10.7.7
SWMU 37, Zone L, Subzone G
Inorganic Detections for Soil

Element	Sample Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Reference Conc.	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Inorganic Elements (mg/kg)									
Cyanide (CN)	Upper	4/14	0.100-2.00	0.590	160	0.38	0	40	NO
	Lower	2/9	0.130	0.130	NA	0.22	NA		
Aluminum (Al)	Upper	14/14	1270-9060	5806	7800	18700	2	1000000 ^c	NO
	Lower	9/9	4520-12400	8743	NA	23600	NA		

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**Table 10.7.7
SWMU 37, Zone L, Subzone G
Inorganic Detections for Soil**

Element	Sample Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Reference Conc.	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Antimony (Sb)	Upper	6/14	0.370-4.60	1.41	3.10	2.89	1	5	NO
	Lower	3/9	0.500-2.20	1.10	NA	ND	NA		
Arsenic (As)	Upper	14/14	2.90-13.4	6.25	0.430	17.2	14	29	NO
	Lower	9/9	1.80-9.90	5.34	NA	15.5	NA		
Barium (Ba)	Upper	14/14	7.90-69.2	27.1	550	109	0	1600	NO
	Lower	9/9	23.2-43.8	34.2	NA	64.5	NA		
Beryllium (Be)	Upper	14/14	0.090-0.630	0.430	16.0	1.20	0	63	NO
	Lower	9/9	0.260-0.800	0.550	NA	1.63	NA		
Cadmium (Cd)	Upper	13/14	0.200-1.30	0.480	7.80	1.07	0	8	NO
	Lower	9/9	0.110-2.00	0.440	NA	0.48	NA		
Calcium (Ca)	Upper	14/14	104.2-309000	35209.6	NA	NA	NA	NA	NO
	Lower	9/9	2880-70800	13957	NA	NA	NA		
Chromium (Cr)	Upper	14/14	4.10-37.0	15.8	39	42.8	0	38	NO
	Lower	9/9	7.90-30.9	18.2	NA	43.4	NA		
Cobalt (Co)	Upper	14/14	0.210-5.50	2.34	470	6.60	0	2000 c	NO
	Lower	9/9	1.30-3.70	2.30	NA	8.14	NA		
Copper (Cu)	Upper	13/14	4.70-548	76.4	310	260	1	11200 c	NO
	Lower	6/9	0.410-565	110.2	NA	32.6	NA		
Iron (Fe)	Upper	14/14	1910-11700	7561	2300	NA	13	NA	NO
	Lower	9/9	6670-21200	12032	NA	NA	NA		
Lead (Pb)	Upper	14/14	2.20-162	46.8	400	181	0	400	NO
	Lower	9/9	6.40-187	33.8	NA	66.3	NA		
Magnesium (Mg)	Upper	14/14	187.5-3240	1083.7	NA	NA	NA	NA	NO
	Lower	9/9	471-1720	1109	NA	NA	NA		
Manganese (Mn)	Upper	14/14	5.55-336	91.9	160	325	1	950 c	NO
	Lower	9/9	17.2-194	108.5	NA	291	NA		
Mercury (Hg)	Upper	10/14	0.040-0.320	0.110	NA	1.03	NA	2	NO
	Lower	7/9	0.070-0.180	0.110	NA	0.31	NA		

Table 10.7.7
SWMU 37, Zone L, Subzone G
Inorganic Detections for Soil

Element	Sample Interval	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Residential RBC	Reference Conc.	Number of Samples Exceeding RBC	Soil to GW SSL	Leaching Potential
Nickel (Ni)	Upper	14/14	0.660-123	22.6	160	20.6	0	130	YES
	Lower	9/9	2.20-234	30.4	NA	18.3	NA		
Potassium (K)	Upper	14/14	189.50-632	413.8	NA	NA	NA	NA	NO
	Lower	9/9	231-822	500	NA	NA	NA		
Selenium (Se)	Upper	9/14	0.320-0.760	0.480	39	1.22	0	5	NO
	Lower	5/9	0.330-0.930	0.660	NA	1.26	NA		
Silver (Ag)	Upper	1/14	0.480	0.480	39	ND	0	34	NO
Sodium (Na)	Upper	14/14	141.5-302	229.5	NA	NA	NA	NA	NO
	Lower	9/9	157-593	244	NA	NA	NA		
Thallium (Tl)	Lower	1/9	1.30	1.30	NA	0.85	0	0.7	YES
Tin (Sn)	Upper	3/14	1.60-30.6	11.3	4700	9.67	0	11000 ^c	NO
	Lower	2/9	1.90-2.60	2.25	NA	2.96	NA		
Vanadium (V)	Upper	14/14	5.40-295	66.3	55	60.9	4	6000	NO
	Lower	9/9	10.9-96.4	31.9	NA	72.5	NA		
Zinc (Zn)	Upper	13/14	20.9-573	129.9	2300	519	0	12000	NO
	Lower	6/9	12.5-787	165.9	NA	145	NA		

Notes:
 mg/kg = Milligrams per kilogram
 RBC = Risk-based concentration
 NA = Not applicable
 ND = Not detected
 GW = Groundwater
 SSL = Soil screening level
 c = Calculated SSL
 Soil to GW = Generic SSLs based on DAF = 20, adapted from *USEPA Soil Screening Guidance: Technical Background Document*, May 1996 (first preference), or calculated using values from Table 6.2 in Zone G RFI Report

Volatile Organic Compounds Detected in Soil Borings

Benzene, chloroform, toluene, and xylene (total) were detected, but none exceeded the RBC or SSL values.

1
2
3
4
5

Semivolatile Organic Compounds Detected in Soil Borings

Benzo(a)anthracene at locations 037SB003G1 and 037SB004G1, benzo(a)pyrene at locations 037SB001G1, 037SB002G1, 037SB003G1, 037SB004G1, and 037SB013G1, benzo(b)fluoranthene at location 037SB003G1, benzo(k)fluoranthene at location 037SB004G1, dibenz(a,h)anthracene at locations 037SB003G1 and 037SB004G1, and indeno(1,2,3-cd)pyrene at location 037SB004G1 exceeded the RBC values.

Chlorinated Pesticides and PCBs Detected in Soil Borings

4,4'-DDD, 4,4'-DDE, 4,4'-DDT, heptachlor epoxide, alpha-chlordane, and gamma-chlordane were detected in soil boring samples, but none exceeded the RBC or SSL values. Aroclor-1260 was detected in one surface sample at a concentration below its RBC.

Metals/Cyanide Detected in Soil Borings

Aluminum (3/14), antimony (1/14), arsenic (14/14), copper (1/14), iron (13/14), manganese (2/14), and vanadium (4/14) exceeded the RBC values. Nickel (1/9) and thallium (1/9) exceeded the SSL values. Cyanide was detected in 4 of 14 samples but did not exceed the RBC or SSL value. The locations of the sample exceedances are summarized in Table 10.7.8.

Table 10.7.8
 SWMU 37, Zone L Subzone G, Soil Borings Sample Locations with
 Metals Detections Exceeding RBCs or SSLs

Metal	Sample ID	Concentration Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Aluminum	037SB001G1	9060	Y	N	7800.00	40.00
	037SB002G1	8120	Y	N		
	037SB008G1	8810	Y	N		
Antimony	037SB004G1	4.60	Y	N	3.10	5.00

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Table 10.7.8
SWMU 37, Zone L Subzone G, Soil Borings Sample Locations with
Metals Detections Exceeding RBCs or SSLs

Metal	Sample ID	Concentration Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Arsenic	037SB001G1	6.70	Y	N	0.43	29.00
	037SB002G2	12.30	Y	N		
	037SB003G1	6.40	Y	N		
	037SB004G1	11.00	Y	N		
	037SB005G1	3.00	Y	N		
	037SB006G1	3.50	Y	N		
	037SB007G1	13.40	Y	N		
	037SB008G1	3.00	Y	N		
	037SB009G1	5.90	Y	N		
	037SB010G1	2.90	Y	N		
	037SB011G1	4.30	Y	N		
	037SB012G1	3.10	Y	N		
	037SB013G1	4.50	Y	N		
	037SB014G1	7.50	Y	N		
Copper	037SB009G1	548	Y	N	310.00	11200.00
Iron	037SB001G1	6990	Y	N	2300.00	NA
	037SB002G1	11700	Y	N		
	037SB003G1	8240	Y	N		
	037SB004G1	6830	Y	N		
	037SB005G1	60000	Y	N		
	037SB006G1	6860	Y	N		
	037SB007G1	8900	Y	N		
	037SB008G1	9810	Y	N		
	037SB009G1	9650	Y	N		
	037SB010G1	3640	Y	N		
	037SB011G1	11300	Y	N		
	037SB013G1	6890	Y	N		
	037SB014G1	7140	Y	N		
	Manganese	037SB002g1	163	Y		
037SB010G1		336	Y	N		
Nickel	037SB011G1	234	N	Y	160.00	130.00
Thallium	037SB005G1	1.30	N	Y	0.55	0.70
Vanadium	037SB009G1	110	Y	N	55.00	6000.00
	037SB010G1	55.80	Y	N		
	037SB011G1	295	Y	N		
	037SB013G1	170	Y	N		
	037SB014G1	138	Y	N		

Notes:
 mg/kg = Milligrams per kilograms
 RBC = Risk-based concentration
 SSL = Soil screening level

10.7.1.4 Nature of Contamination in Subzone G, SWMU 37, Groundwater

Two shallow monitoring wells were installed and samples were analyzed for VOCs, SVOCs, chlorinated pesticides, PCBs, metals, and cyanide. The results for the detected compounds are summarized in Table 10.7.9 (inorganics). No organic compounds were detected in the monitoring well samples.

Metals/Cyanide Detected in Groundwater

Results for aluminum, arsenic, chromium, iron, manganese, thallium, and vanadium exceeded the RBC values in both wells. Both thallium detections also exceeded the MCL value. Results for antimony and lead exceeded the RBC value at location 037001G1.

Sample locations with detected concentrations of analytes that exceed either RBC, SSL, or MCL values are shown in Figures 10.7.9 through 10.7.44.

Table 10.7.9
 SWMU 37, Zone L, Subzone G
 Inorganic Detections for First Quarter Groundwater
 Shallow Monitoring Wells

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Tap Water RBC	Reference Conc.	MCL	Number of Samples Exceeding RBC	Salt Wtr. Surf. Wtr. Chronic	Ground-water Migration Concern	Surface Water Migration Concern
Inorganic Elements (µg/L)										
Cyanide (CN)	2/2	2.70-3.00	2.90	73	3.8	200	0	1	NO	YES
Aluminum (Al)	2/2	10300-10800	10550	3700	692	NA	2	NA	YES	NO
Antimony (Sb)	1/2	1.90	1.90	1.5	4.85	6	1	NA	YES	NO
Arsenic (As)	2/2	10.5-15.2	12.9	0.045	17.8	50	2	36	YES	NO
Barium (Ba)	2/2	82.2-118.0	100.1	260	31	2000	0	NA	NO	NO
Beryllium (Be)	1/2	1.30	1.30	7.30	ND	4	1	NA	YES	NO
Calcium (Ca)	2/2	108000-331000	219500	NA	NA	NA	NA	NA	NO	NO
Chromium (Cr)	2/2	18.3-20.2	19.3	18	3.88	100	2	50	YES	NO

Table 10.7.9
SWMU 37, Zone L, Subzone G
Inorganic Detections for First Quarter Groundwater
Shallow Monitoring Wells

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.	Tap Water RBC	Reference Conc.	MCL	Number of Samples Exceeding RBC	Salt Wtr. Surf. Wtr. Chronic	Ground-water Migration Concern	Surface Water Migration Concern
Cobalt (Co)	2/2	4.20-31.9	18.1	220	1.45	NA	0	NA	NO	NO
Copper (Cu)	2/2	6.10-7.60	6.90	150	8.33	1300	0	2.9	NO	YES
Iron (Fe)	2/2	11900-16100	14000	1100	NA	NA	2	NA	YES	NO
Lead (Pb)	1/2	8.40	8.40	1.5	4.6	15	1	8.5	YES	NO
Magnesium (Mg)	2/2	9390-39600	24495	NA	NA	NA	NA	NA	NO	NO
Manganese (Mn)	2/2	242-3730	1986	73	2906	NA	2	NA	YES	NO
Nickel (Ni)	2/2	7.20-14.0	10.6	73	4.08	100	0	8.3	NO	YES
Potassium (K)	2/2	3760-3910	3835	NA	NA	NA	NA	NA	NO	NO
Sodium (Na)	2/2	13800-356000	184900	NA	NA	NA	NA	NA	NO	NO
Thallium (Tl)	2/2	7.00-7.80	7.40	0.26	ND	2	2	21.3	YES	NO
Vanadium (V)	2/2	26.1-30.2	28.2	26	15.4	NA	2	NA	YES	NO
Zinc (Zn)	2/2	25.3-30.8	28.1	1100	15.6	NA	0	86	NO	NO

Notes:
 µg/L = Micrograms per liter
 RBC = Risk-based concentration
 MCL = Maximum contaminant level
 NA = Not applicable
 ND = Not detected

10.7.2 Fate and Transport Assessment for SWMU 37 in Subzone G

Section 10.7 contains short descriptions of the portions of SWMU 37 within Subzone G. Environmental media sampled as part of the RFI for these sites include surface soil borings, subsurface soil borings, and shallow groundwater (monitoring wells and DPT samples). Potential constituent migration pathways investigated for SWMU 37 include soil to groundwater and groundwater to surface water. Soil to air and soil to sediment cross-media fate and transport were determined not to be a concern.

The fate and transport screening comparison for SWMU 37 soil and groundwater samples included referencing of previous Zone RFI Reports when applicable. Contaminants of potential concern were identified for each sample media and sampling method (i.e., soil boring versus DPT soil sampling) in Section 10.7. The Zone G RFI Report was consulted to identify any sites within the subzone G that are associated geographically with the Zone L sample points. Analytical results from samples with overlapping sites were compared to data generated during the Zone G RFI. If concentrations at Zone L sample points associated with overlapping sites were higher than those of the referenced Zone G RFI Report or if new fate and transport COPCs were identified, further evaluation will be deferred to the Zone G RFI and included as an addendum. If Zone L sample concentrations were less than or equal to those in the Zone G RFI Report, it was assumed that the Zone L fate and transport conclusions would be similar to those of the Zone G RFI and no further evaluation is needed. Zone L sampling locations that are not associated with any overlapping sites are summarized in the fate and transport COPC tables and fate and transport evaluations provided in the following sections.

10.7.2.1 Soil to Groundwater Cross-Media Transport

In Section 10.7, Tables 10.7.1, 10.7.2, 10.7.6, and 10.7.7 compare maximum detected organic and inorganic constituent concentrations in soil boring and DPT soil samples from SWMU 37 to risk-based soil screening levels considered protective of groundwater. To provide a conservative screen, generic soil screening levels were used; leachate entering the aquifer was assumed to be diluted by a ratio of 20:1, with no attenuation of constituents in soil (DAF=20). Background reference values for inorganics were noted but did not enter into the screening process.

The screening comparisons in four tables mentioned above identify the constituents with the potential to impact groundwater quality. Table 10.7.10 provides a summary of SWMU 37 soil samples reporting SSL exceedances, along with the names of associated Zone G sites overlapping

the areas where some of these soil samples were collected. For Subzone G, all Zone L sample points are associated with overlapping Zone G or Fuel Distribution (FDS) sites.

Table 10.7.10
SWMU 37, Zone L, Subzone G
Fate and Transport COPCs

Exceedance Location	Overlapping Site	Fate and Transport COPCs	COPCs to be further Evaluated?	Reference Document
Soil Borings				
037SB004	FDS	BEQs	Yes	None
037SB005	FDS	Thallium	Yes	None
037SB011	AOC 643	Nickel	Yes	Table 10.10.10*
DPT Soil				
037SP010	AOC 634; AOC 706	Antimony	Yes; No ^a	Table 10.3.5;10.14.9*
		Chromium	Yes; No ^a	Table 10.3.5;10.14.9*
		Lead	Yes; No ^a	Table 10.3.5;10.14.9*
		Mercury	Yes; No ^a	Table 10.3.5;10.14.9*
		Thallium	Yes; Yes	Table 10.3.5;10.14.9*
037SP012	AOC 634; AOC 706	1,1,2,2-Tetrachloroethane	Yes; Yes	Table 10.3.5;10.14.9*
		1,1,2-Trichloroethane	Yes; Yes	Table 10.3.5;10.14.9*
Groundwater				
037GW001	FDS	Thallium	Yes	None
037GW002	FDS	Manganese	Yes	None
		Nickel	Yes	None
		Thallium	Yes	None

Notes:

*Zone G RFI Report (EnSafe, 1998)

^a Zone L concentrations are within the range of those in reference document.

10.7.2.2 Groundwater to Surface Water Cross-Media Transport

In Section 10.7, Table 10.7.4, 10.7.5 and 10.7.9 compare maximum detected inorganic constituent concentrations in monitoring well and DPT groundwater samples from SWMU 37 to RBCs, and to chronic ambient saltwater quality criteria values for the protection of aquatic life (saltwater

surface water chronic screening values). For inorganics, maximum concentrations in groundwater are compared to the greater of (a) RBCs, or (b) background reference concentrations for groundwater, as well as to the saltwater surface water chronic values. To provide a conservative screen, no attenuation or dilution of constituents in groundwater is assumed before comparison to the relevant standards.

Table 10.7.10 provides a summary of SWMU 37 groundwater samples reporting exceedance of RBCs or surface water screening levels, along with the names of overlapping Zone G sites. For Subzone G, all Zone L sample points are associated with overlapping Zone G or Fuel Distribution (FDS) sites.

10.7.2.3 Fate and Transport Summary

Because all of the Zone L sites in Subzone G are associated with either a Zone G site or FDS site, the fate and transport conclusions will be deferred to the Zone G RFI as an addendum.

10.7.3 Human Health Risk Assessment for SWMU 37, Subzone G

10.7.3.1 Site Background and Investigative Approach

Section 10.7 provides a description for SWMU 37 as well as a discussion of the sampling activities that took place during the Zone L RFI activities.

10.7.3.2 COPC Identification

SWMU 37 Soil

Based on the screening comparisons described in Section 7 of this RFI and presented in Tables 10.7.1, 10.7.2, and 10.7.6, antimony, BEQs, chromium, copper, lead, manganese, mercury, 1,1,2,2-tetrachloroethane, and vanadium, were identified as COPCs for soil. Table 10.7.11 provides a summary of SWMU 37 soil samples that reported exceedances along with any associated sites that overlapped the area where these soil samples were taken. All of the

soil samples that reported exceedances were collected in the vicinity of an existing Zone G site. 1
 For soil COPCs identified for SWMU 37 subzone G, data generated during the Zone L RFI were 2
 compared to data generated during the Zone G RFI and the results of these comparisons are 3
 provided on Table 10.7.11. A reference to the Zone G RFI report is also provided so that these 4
 comparisons can be easily verified. It was assumed that if the data generated during the Zone L 5
 RFI were less than or within the range of the data generated during the Zone G RFI, then the 6
 conclusions for Zone L would be the similar and therefore no further evaluation would be 7
 necessary. Conversely, if for any reason the data generated during the Zone L RFI revealed 8
 something that was not evaluated during the Zone G RFI (data reported higher than that presented 9
 in the Zone G RFI, or new COPCs), then further evaluation should be deferred to the Zone G RFI 10
 and included as an addendum. Recommendations are provided in Section 11. 11

Table 10.7.11
 SWMU 37, Zone L, Subzone G
 Risk Assessment COPCs

Exceedance Location	Overlapping Site	Risk Assessment COPCs	COPCs to be further Evaluated?	Reference Document
Soil Borings				
037SB001	FDS	BEQs	Yes	None
037SB002	FDS	BEQs	Yes	None
037SB003	FDS	BEQs	Yes	None
037SB004	FDS	Antimony	Yes	None
		BEQs	Yes	None
037SB009	AOC 643	Copper	Yes	Table 10.10.10*
		Vanadium	Yes	Table 10.10.10*
037SB010	AOC 643	Manganese	Yes	Table 10.10.10*
037SB011	AOC 643	Copper	Yes	Table 10.10.10*
		Vanadium	Yes	Table 10.10.10*
037SB013	AOC 643	BEQs	Yes	Table 10.10.10*
		Vanadium	Yes	Table 10.10.10*
037SB014	AOC 643	Vanadium	Yes	Table 10.10.10*

Table 10.7.11
SWMU 37, Zone L, Subzone G
Risk Assessment COPCs

Exceedance Location	Overlapping Site	Risk Assessment COPCs	COPCs to be further Evaluated?	Reference Document
DPT Soil				
037SP010	AOC 634; AOC 706	Antimony	Yes; Yes	Table 10.3.6; 10.14.11*
		Chromium	Yes; Yes	Table 10.3.6; 10.14.11*
		Copper	Yes; Yes	Table 10.3.6; 10.14.11*
		Lead	Yes; Yes	Table 10.3.6; 10.14.11*
		Manganese	Yes; Yes	Table 10.3.6; 10.14.11*
		Mercury	Yes; Yes	Table 10.3.6; 10.14.11*
		Vanadium	Yes; Yes	Table 10.3.6; 10.14.11*
037SP012	AOC 634; AOC 706	1,1,2,2-Tetrachloroethane	Yes; Yes	Table 10.3.6; 10.14.11*
037SP017	AOC 643	Arsenic	No ^a	Table 10.10.10*
		Vanadium	Yes	Table 10.10.10*
037SP019	AOC 643	Vanadium	Yes	Table 10.10.10*
Groundwater				
037GW001	FDS	Aluminum	Yes	None
		Chromium	Yes	None
		Thallium	Yes	None
		Vanadium	Yes	None
037GW002	FDS	Aluminum	Yes	None
		Chromium	Yes	None
		Manganese	Yes	None
		Thallium	Yes	None
		Vanadium	Yes	None

Notes:

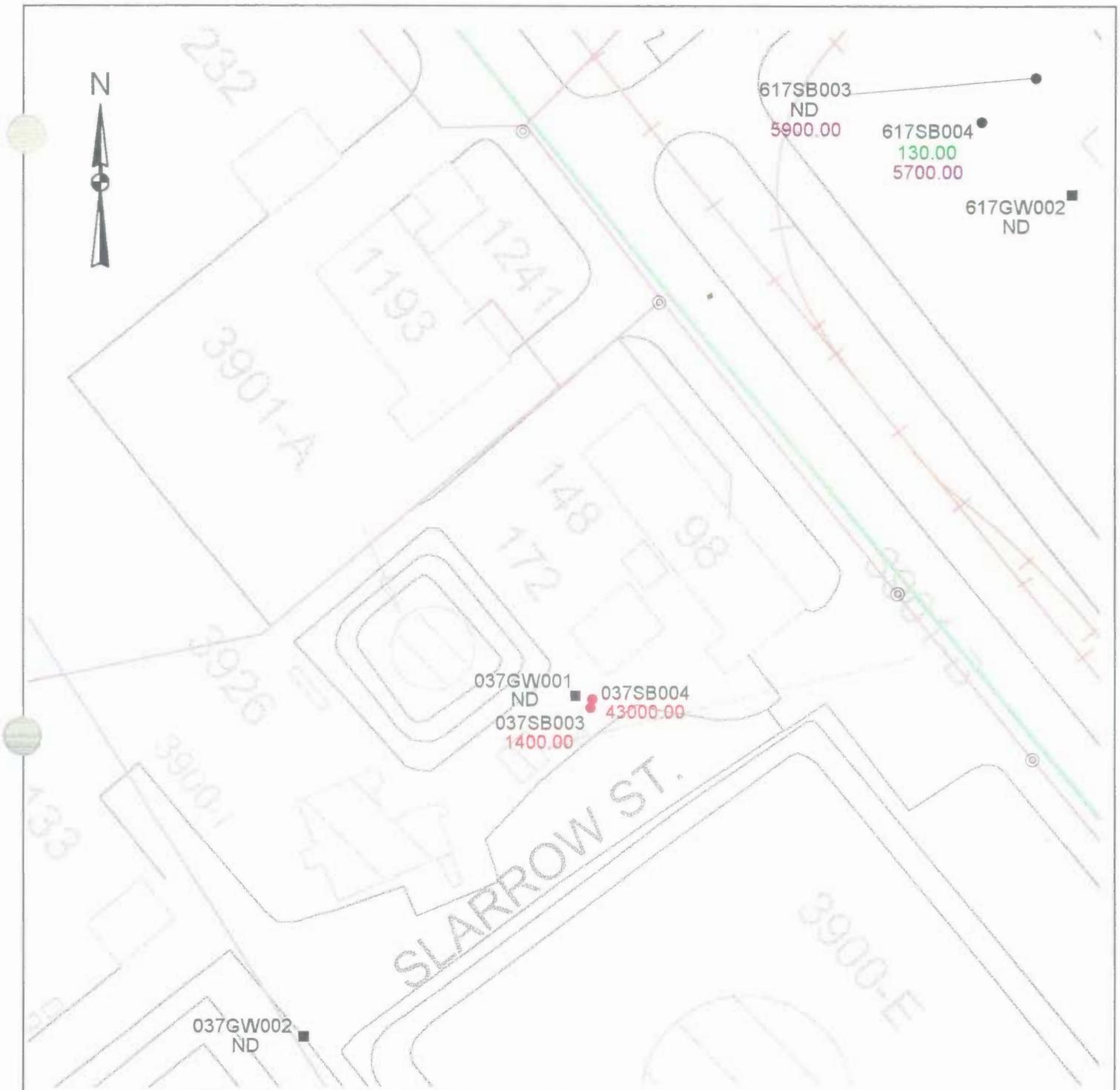
*Zone G RFI Report (EnSafe, 1998)

^a Zone L concentrations are within the range of those in reference document.

SWMU 37 Groundwater

Based on the screening comparisons described in Section 7 of this RFI and presented in Table 10.7.3, aluminum, chromium, manganese, thallium, and vanadium were identified as COPCs for groundwater. Table 10.7.11 provides a summary of SWMU 37 groundwater samples that reported exceedances along with any associated sites that overlapped the area where these

samples were taken. As shown, all groundwater sample were collected in the vicinity of an existing Zone G site. Groundwater data generated during the Zone L RFI were compared to data generated during the Zone G RFI and the results of these comparisons are provided on Table 10.7.11. A reference to the Zone G RFI report is also provided so that these comparisons can be easily verified. It was assumed that if the data generated during the Zone L RFI were less than or within the range of the data generated during the Zone G RFI, then the conclusions for Zone L would be the similar and therefore no further evaluation would be necessary. Conversely, if for any reason the data generated during the Zone L RFI reveals something that was not evaluated during the Zone G RFI (data reported higher than that presented in the Zone G RFI, or new COPCs), then further evaluation should be deferred to the Zone G RFI and included as an addendum. Recommendations are provided in Section 11.



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (ug/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

70 0 70 140 Feet



ZONE L - RCRA
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CHARLESTON, SC

FIGURE 10.7.9
ZONE L - SUBZONE G
BENZO(A)ANTHRACENE
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=880 ug/kg SSL=2000 ug/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION

SUBZONE BOUNDARY	RAILROAD	MANHOLE
SANITARY SEWER LINE	STORM SEWER LINE	

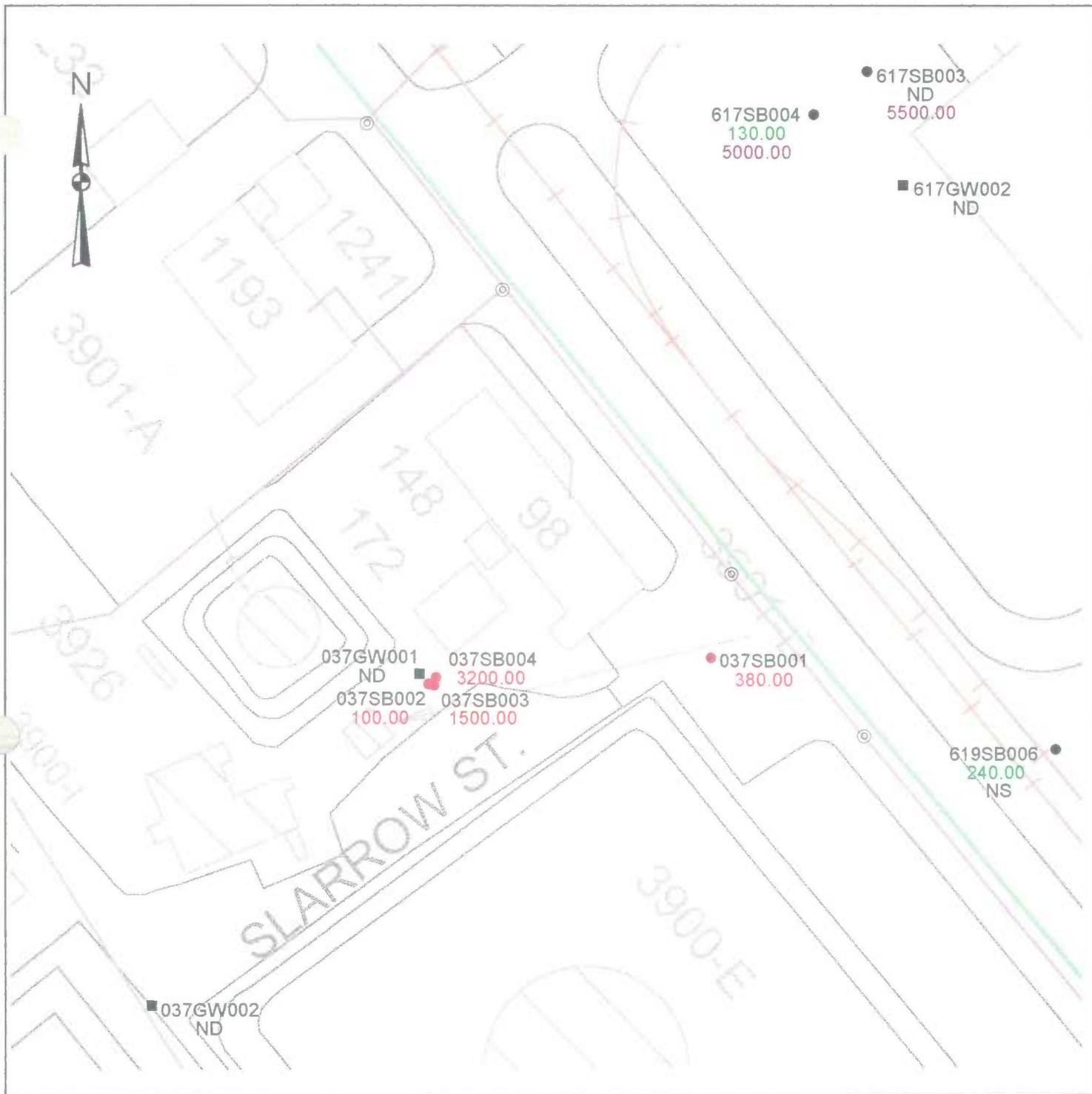
600 0 600 1200 Feet



ZONE L - RCRA
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 CHARLESTON, SC

FIGURE 10.7.10
 ZONE L - SUBZONE G
 BENZO(A)PYRENE
 ZONE L EXCEEDANCES

RBC=88.0 ug/kg SSL=8000 ug/kg MCL=0.20 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (ug/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

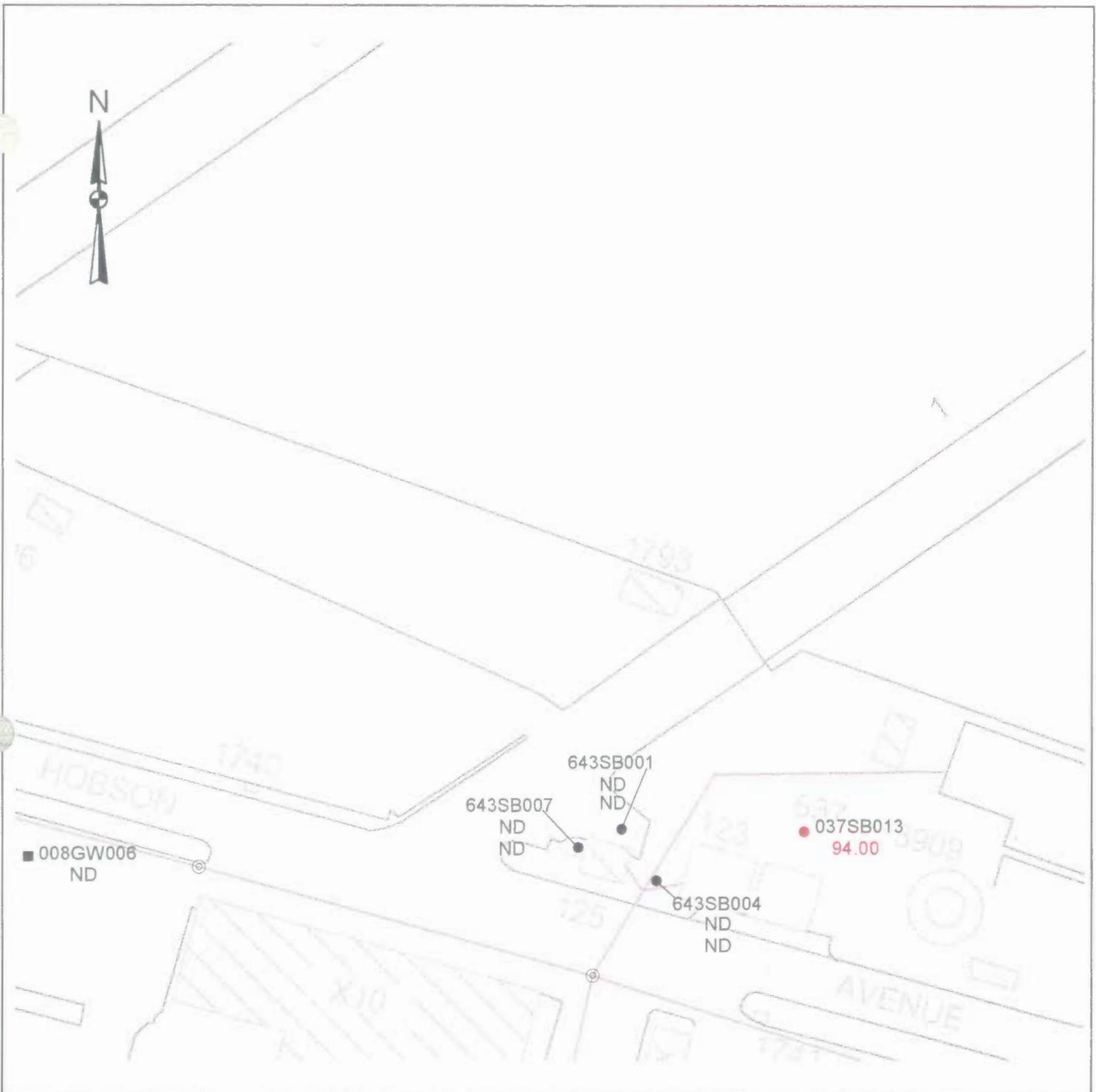
- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
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CHARLESTON, SC

FIGURE 10.7.11
ZONE L - SUBZONE G
BENZO(A)PYRENE
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=88.0 ug/kg SSL=8000 ug/kg MCL=0.20 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (ug/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

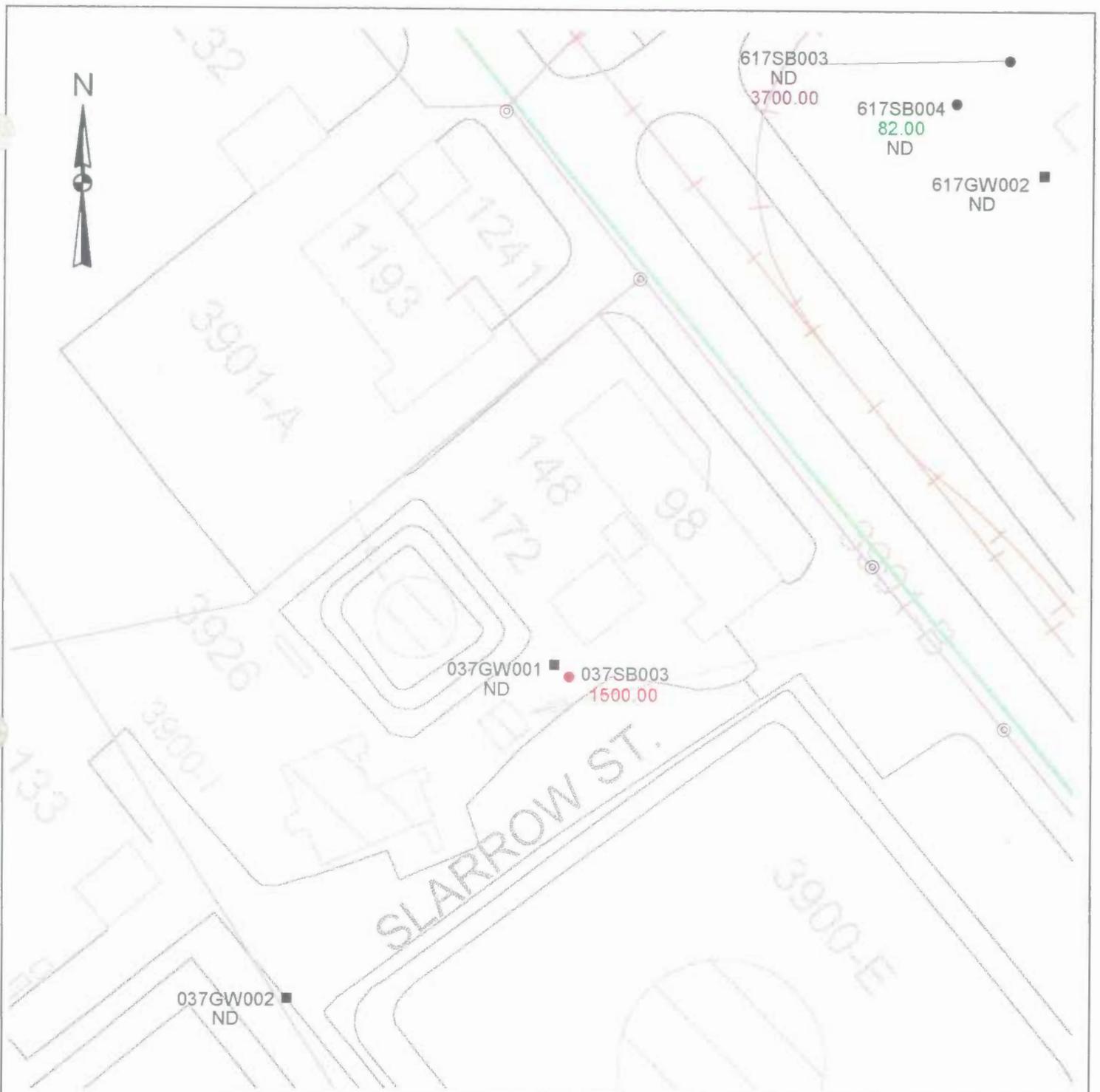
100 0 100 200 Feet



ZONE L - RCRA
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NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.12
ZONE L - SUBZONE G
BENZO(A)PYRENE
ZONE L EXCEEDANCES WITH ZONE G
SOIL AND GW CONCENTRATIONS

RBC=88.0 ug/kg SSL=8000 ug/kg MCL=0.20 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (ug/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

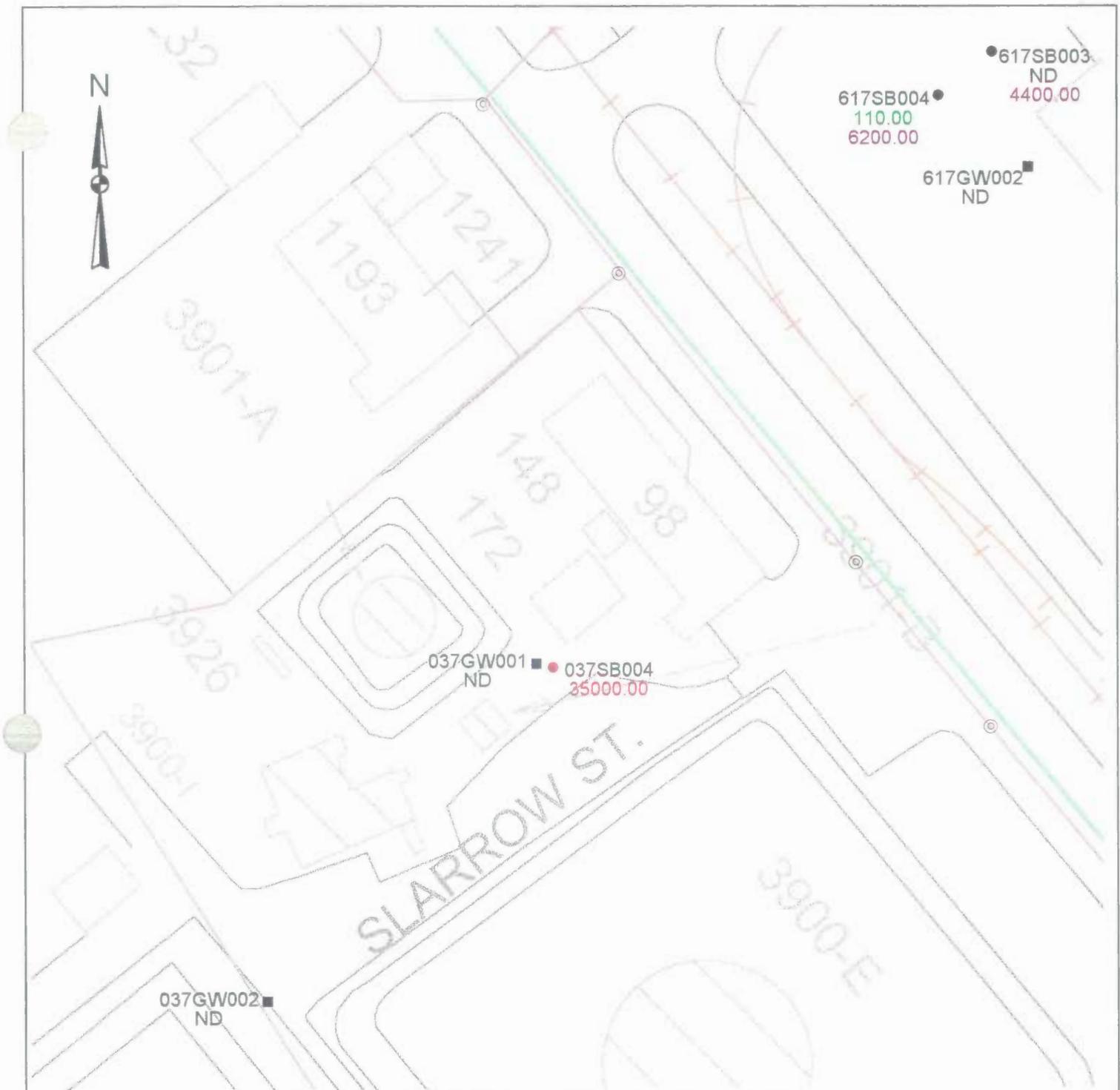
70 0 70 140 Feet



ZONE L - RCRA
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CHARLESTON, SC

FIGURE 10.7.13
ZONE L - SUBZONE G
BENZO(B)FLUORANTHENE
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=880 ug/kg SSL=5000 ug/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (ug/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

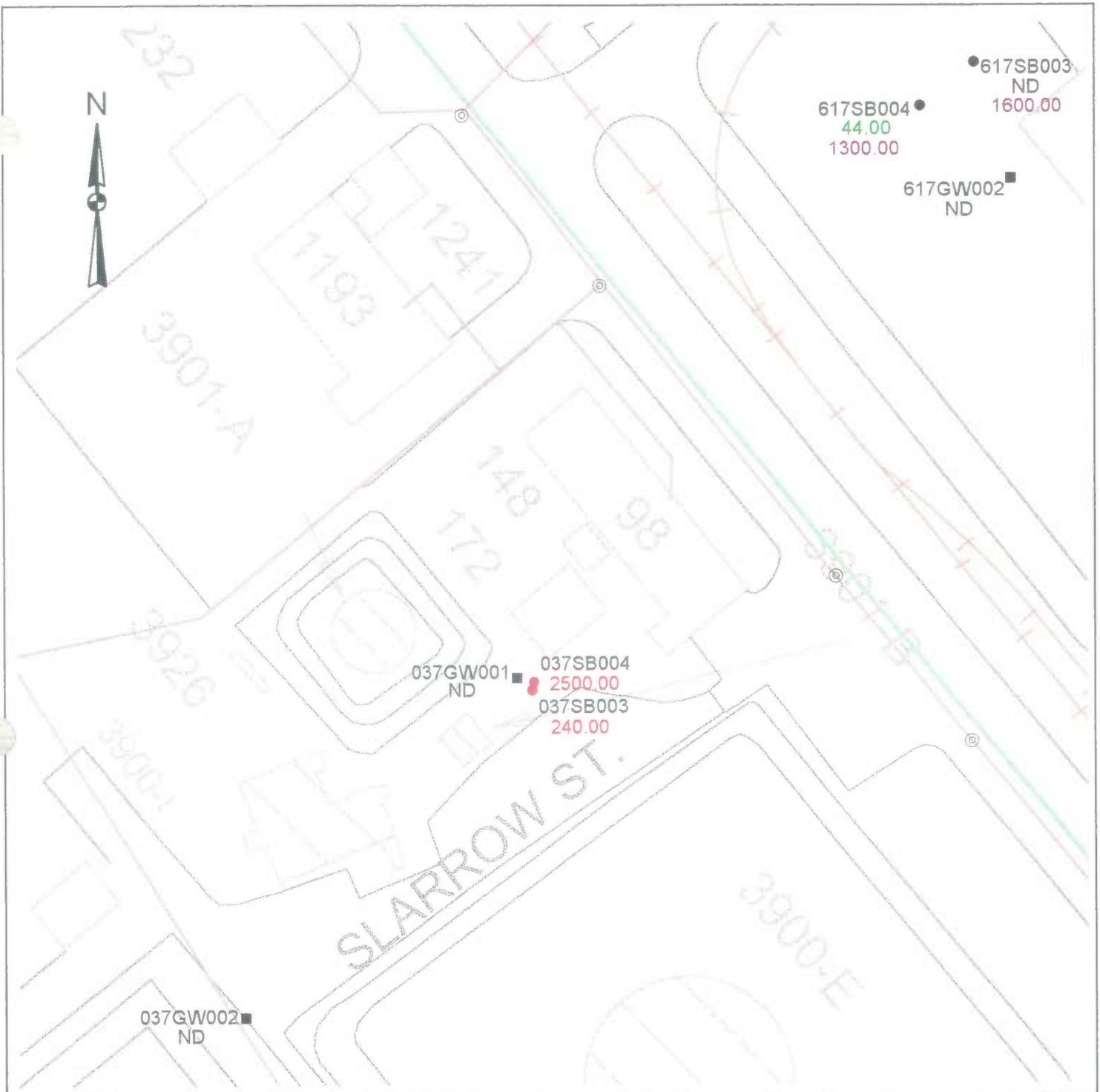
70 0 70 140 Feet



ZONE L - RCRA
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CHARLESTON, SC

FIGURE 10.7.14
ZONE L - SUBZONE G
BENZO(K)FLUORANTHENE
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=8800 ug/kg SSL=49000 ug/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (ug/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

70 0 70 140 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.15
ZONE L - SUBZONE G
DIBENZ(A,H)ANTHRACENE
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=88.0 ug/kg SSL=2000 ug/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION

- | | | |
|---------------------|------------------|---------|
| SUBZONE BOUNDARY | RAILROAD | MANHOLE |
| SANITARY SEWER LINE | STORM SEWER LINE | |

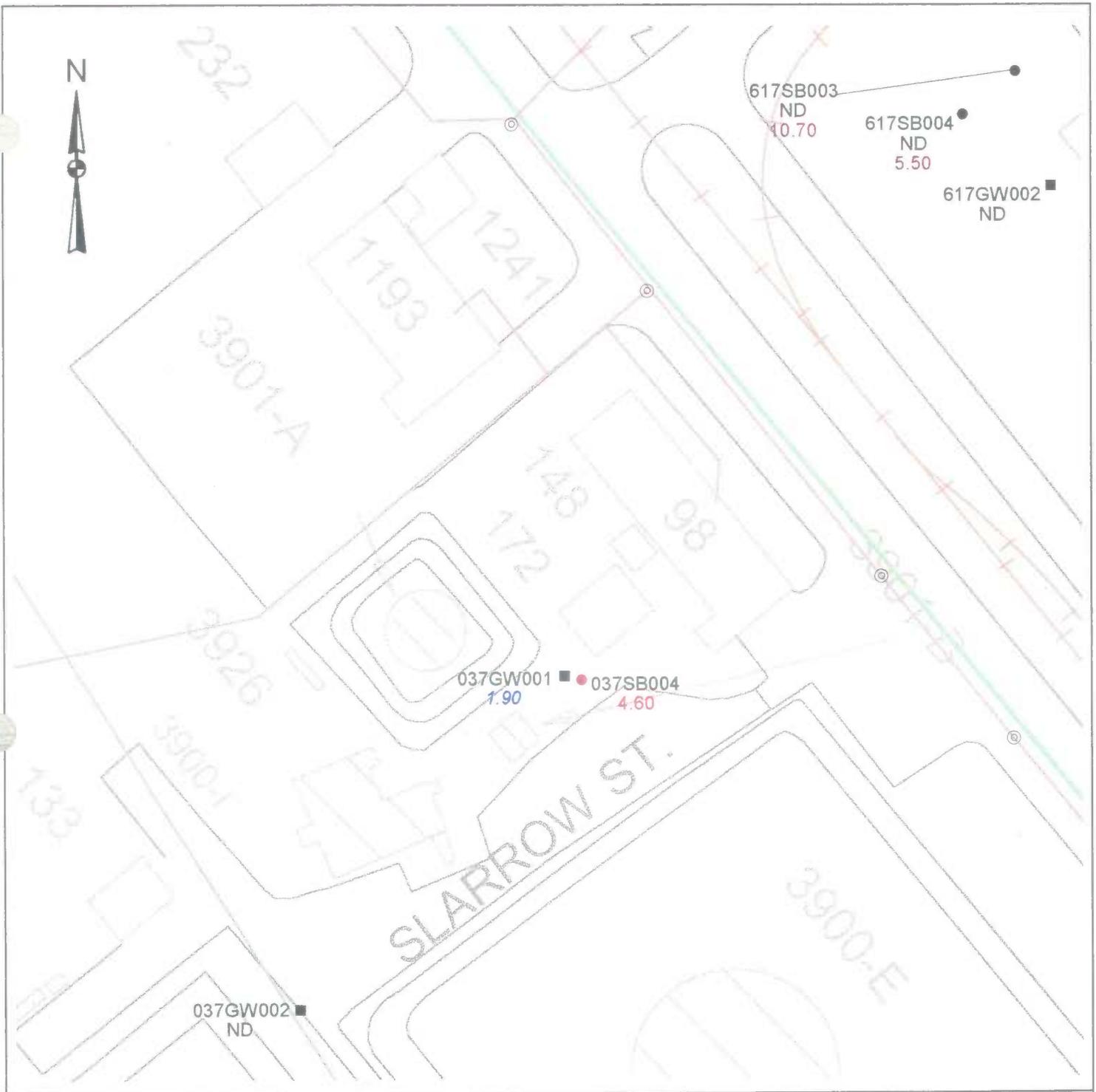
600 0 600 1200 Feet



ZONE L - RCRA
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CHARLESTON, SC

FIGURE 10.7.16
ZONE L - SUBZONE G
ANTIMONY
ZONE L EXCEEDANCES

RBC=3.10 mg/kg SSL=5.00 mg/kg MCL=6.00 ug/L



LEGEND

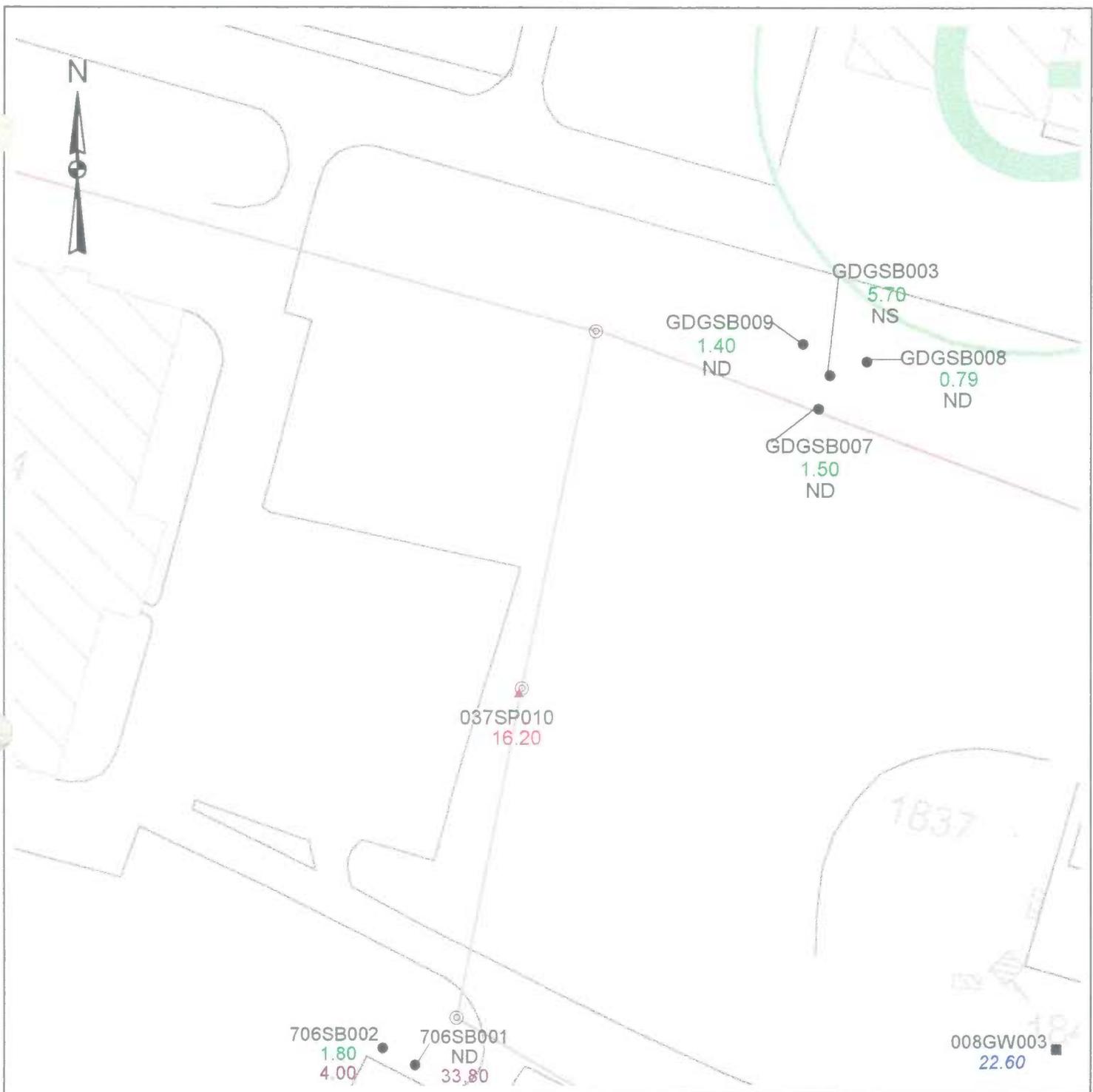
- ▲ ZONE L DPT SOIL LOCATION
 - ZONE L SOIL BORING LOCATION
 - 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
 - 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
 - MONITORING WELL LOCATION
 - 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
 - ZONE G SOIL BORING LOCATION
 - 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
 - 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
 - ND NOT DETECTED
 - NS NO SAMPLE TAKEN
 - SUBZONE BOUNDARY
 - RAILROAD
 - ⊙ MANHOLE
 - SANITARY SEWER LINE
 - STORM SEWER LINE
- 70 0 70 140 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
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CHARLESTON, SC

FIGURE 10.7.17
ZONE L - SUBZONE G
ANTIMONY
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=3.10 mg/kg SSL=5.00 mg/kg MCL=6.00 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

80 0 80 160 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.18
ZONE L - SUBZONE G
ANTIMONY
ZONE L EXCEEDANCES WITH ZONE G
SOIL AND GW CONCENTRATIONS

RBC=3.10 mg/kg SSL=5.00 mg/kg MCL=6.00 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION

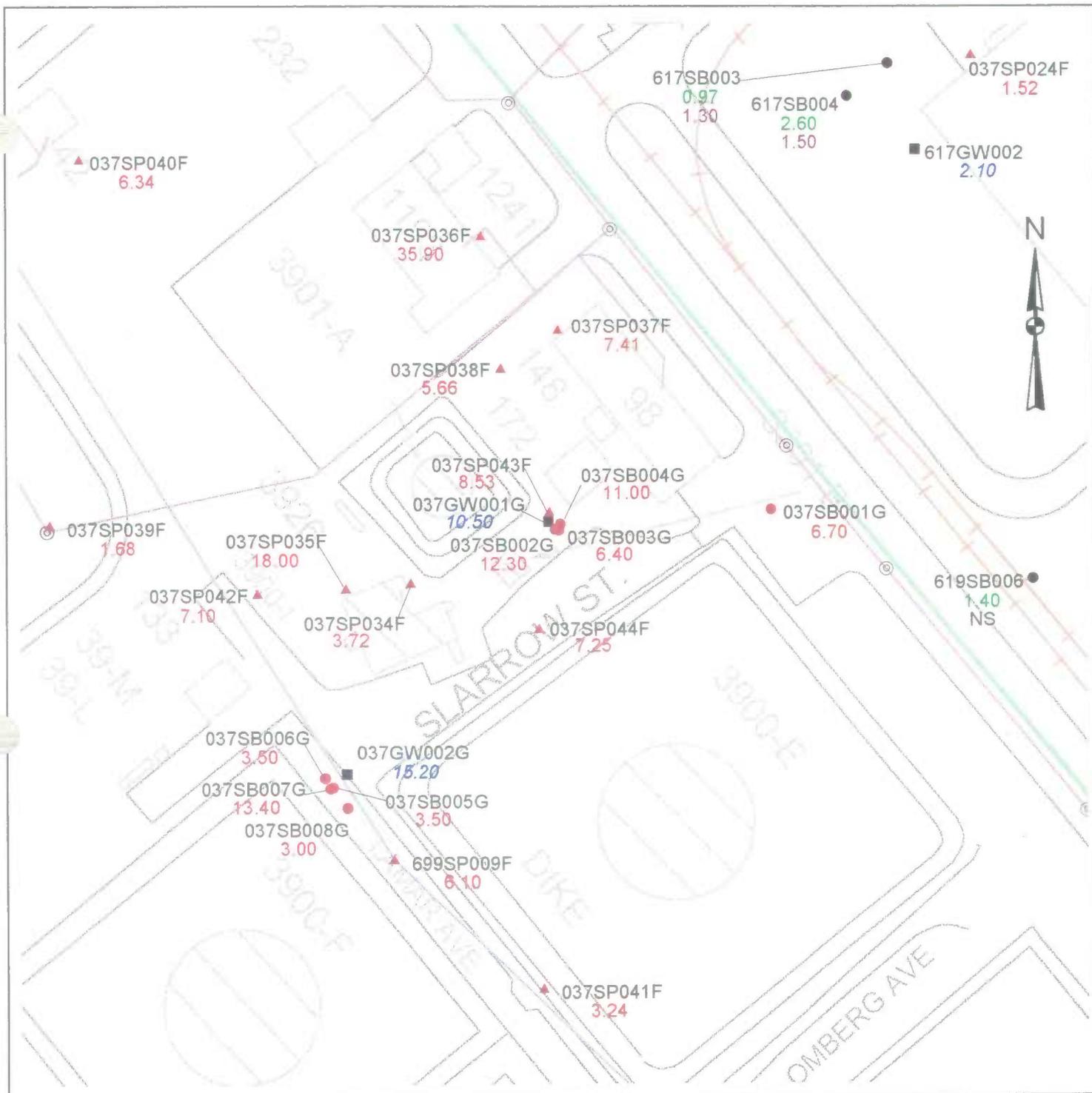
- SUBZONE BOUNDARY
 - SANITARY SEWER LINE
 - RAILROAD
 - STORM SEWER LINE
 - MANHOLE
- 600 0 600 1200 Feet



ZONE L - RCRA
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 CHARLESTON, SC

FIGURE 10.7.19
 ZONE L - SUBZONE G
 ARSENIC
 ZONE L EXCEEDANCES

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

100 0 100 200 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.20
ZONE L - SUBZONE G
ARSENIC
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L

STREETS



▲ 037SP002
8.34

■ 620GW003
11.10

● 620SB008
22.60
17.40

LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

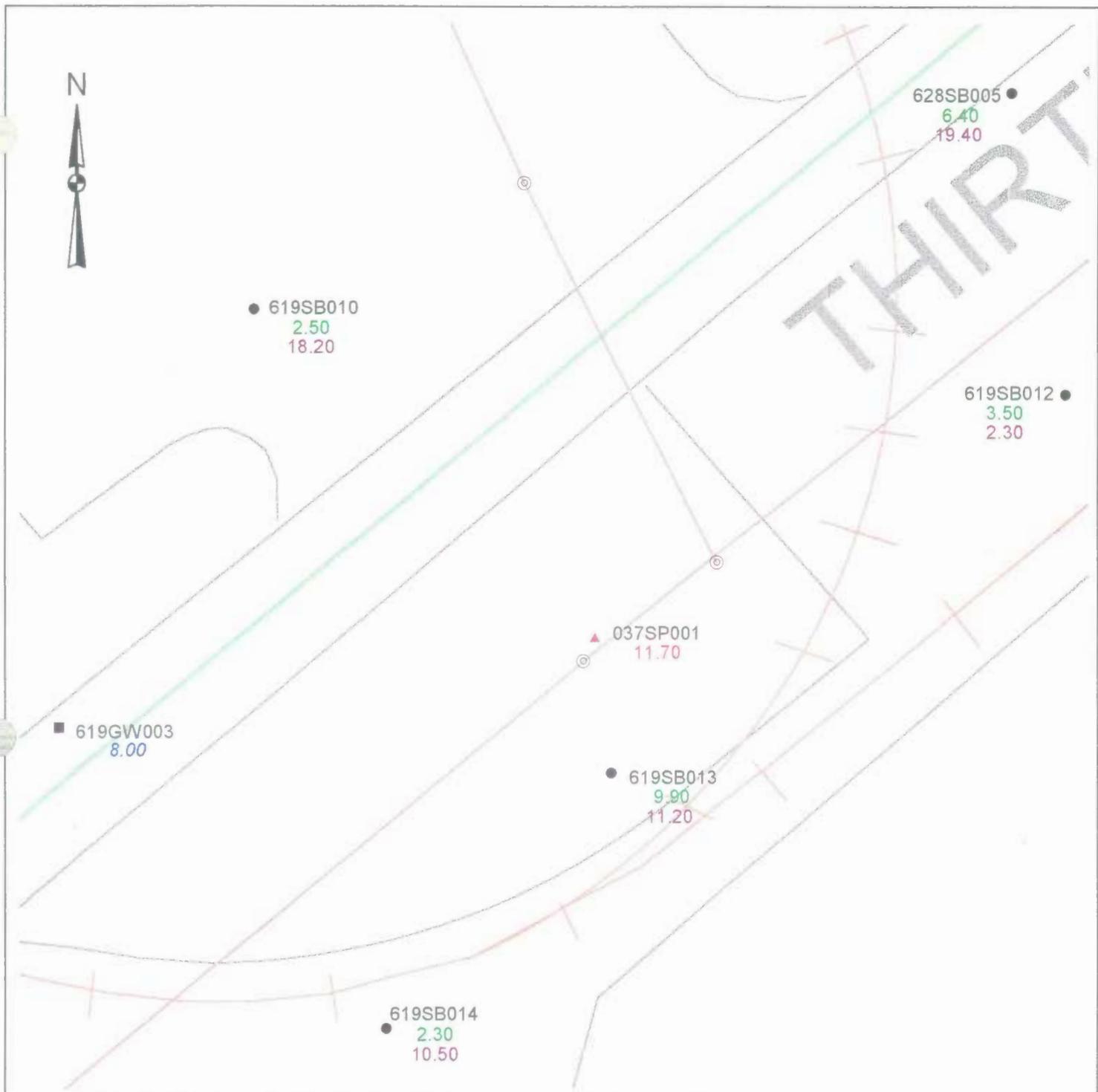
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ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.21
ZONE L - SUBZONE G
ARSENIC
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

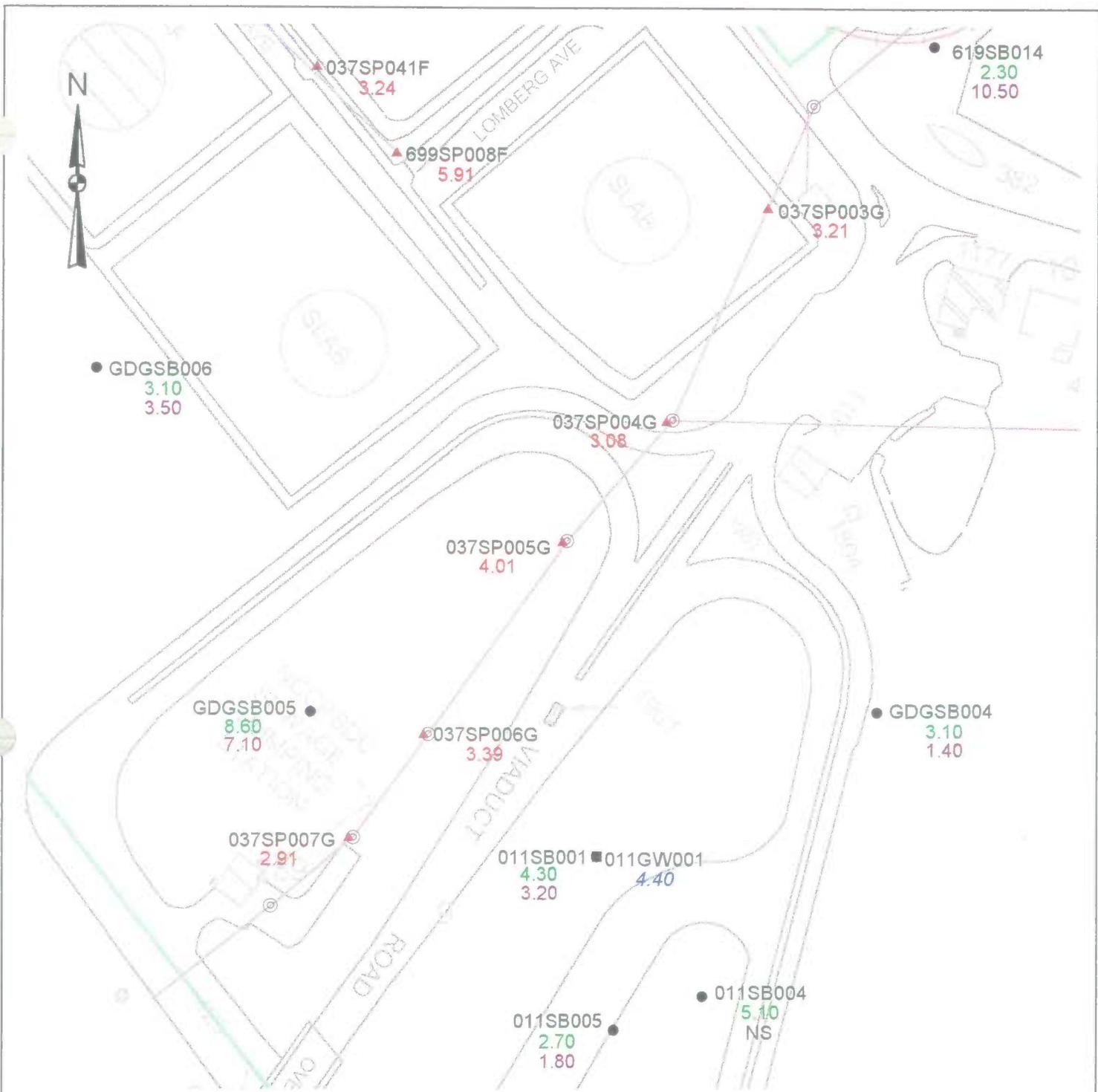
SUBZONE BOUNDARY
 RAILROAD
 ⊙ MANHOLE
 SANITARY SEWER LINE
 STORM SEWER LINE



ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.7.22
 ZONE L - SUBZONE G
 ARSENIC
 ZONE L EXCEEDANCES WITH ZONES F AND G
 SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- W SUBZONE BOUNDARY
- R RAILROAD
- ⊙ MANHOLE
- S SANITARY SEWER LINE
- ST STORM SEWER LINE

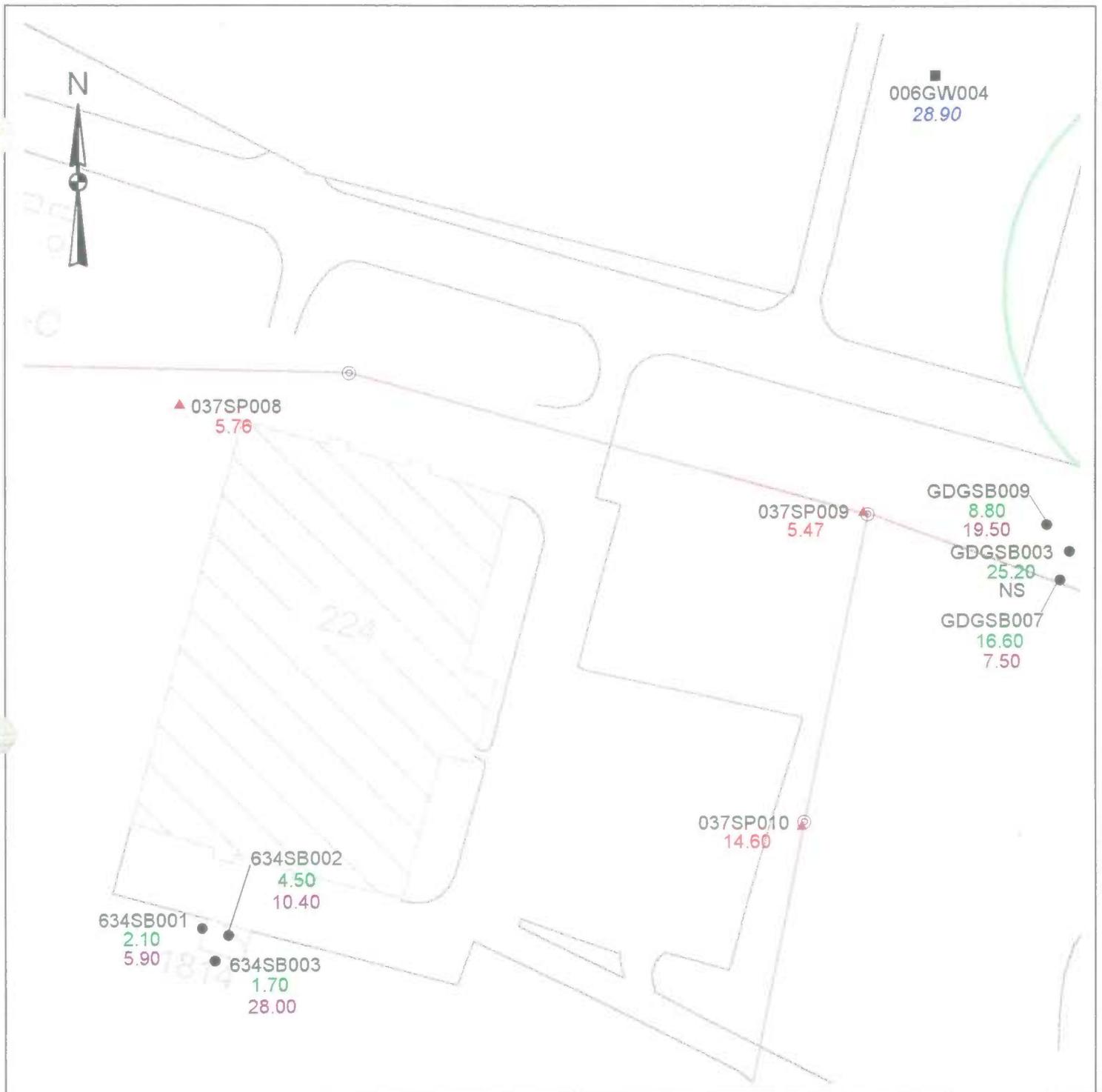
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ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.23
ZONE L - SUBZONE G
ARSENIC
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- SANITARY SEWER LINE
- RAILROAD
- STORM SEWER LINE
- MANHOLE

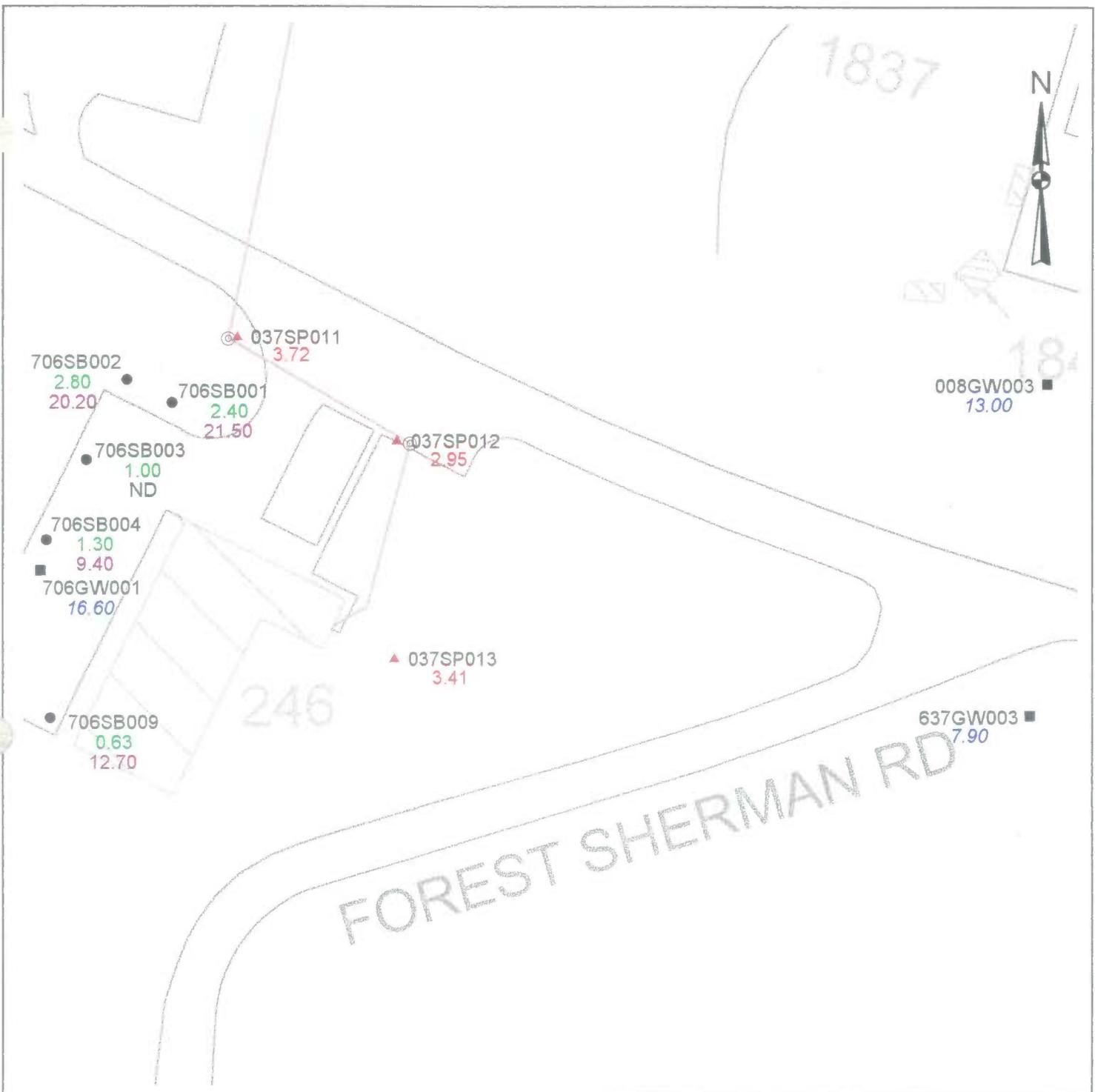
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ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.24
ZONE L - SUBZONE G
ARSENIC
ZONE L EXCEEDANCES WITH ZONE G
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

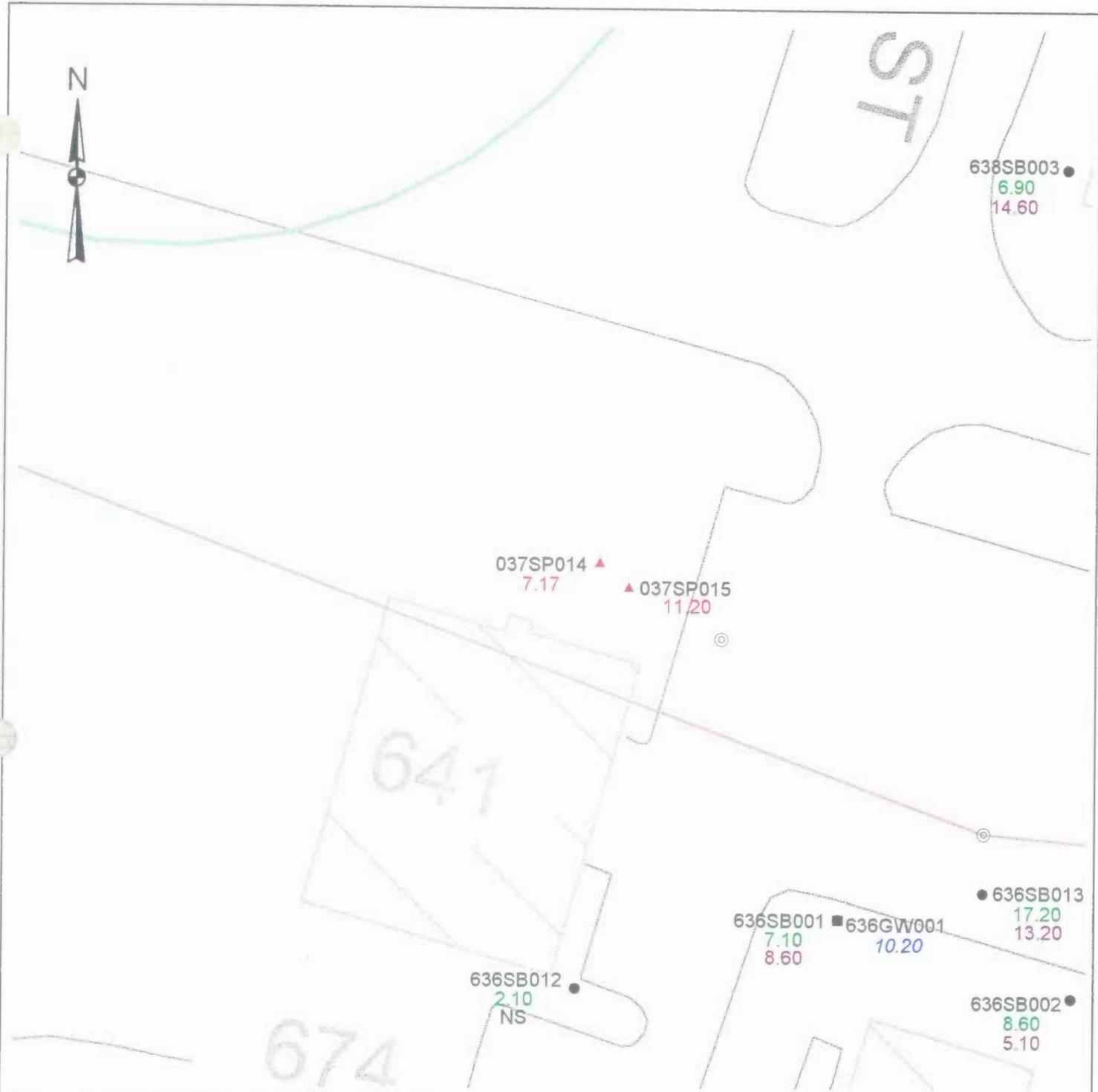
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ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.25
ZONE L - SUBZONE G
ARSENIC
ZONE L EXCEEDANCES WITH ZONE G
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- W SUBZONE BOUNDARY
- R RAILROAD
- ⊙ MANHOLE
- S SANITARY SEWER LINE
- ST STORM SEWER LINE

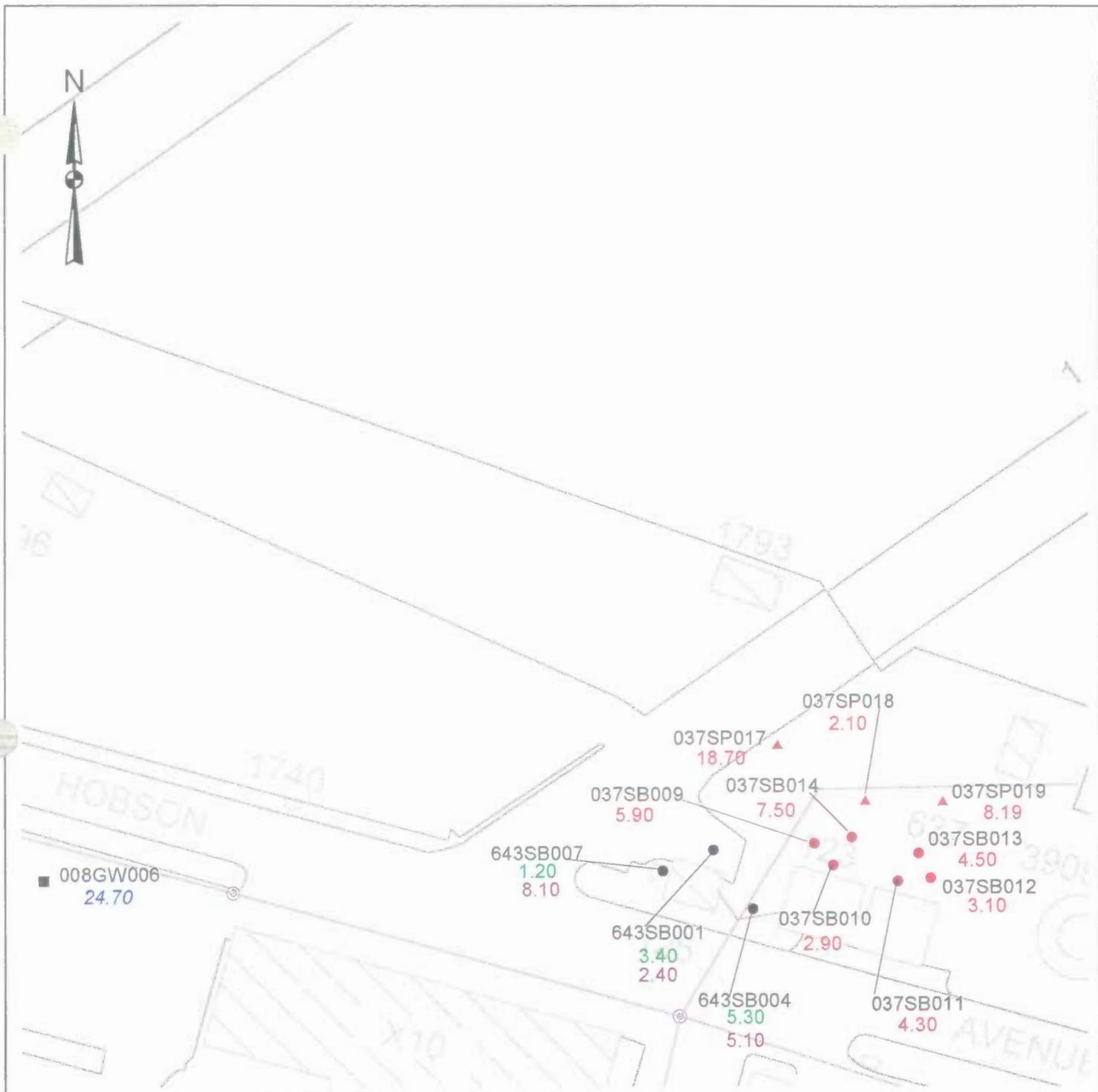
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ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.26
ZONE L - SUBZONE G
ARSENIC
ZONE L EXCEEDANCES WITH ZONE G
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.27
ZONE L - SUBZONE G
ARSENIC
ZONE L EXCEEDANCES WITH ZONE G
SOIL AND GW CONCENTRATIONS

RBC=0.43 mg/kg SSL=29.0 mg/kg MCL=50.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

SUBZONE BOUNDARY
 RAILROAD
 MANHOLE
 SANITARY SEWER LINE
 STORM SEWER LINE



ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.7.28
 ZONE L - SUBZONE G
 CHROMIUM
 ZONE L EXCEEDANCES WITH ZONE G
 SOIL AND GW CONCENTRATIONS

RBC=39.0 mg/kg SSL=38.0 mg/kg MCL=100 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION

- | | | | | |
|------------------|---------------------|----------|------------------|---------|
| SUBZONE BOUNDARY | SANITARY SEWER LINE | RAILROAD | STORM SEWER LINE | MANHOLE |
|------------------|---------------------|----------|------------------|---------|

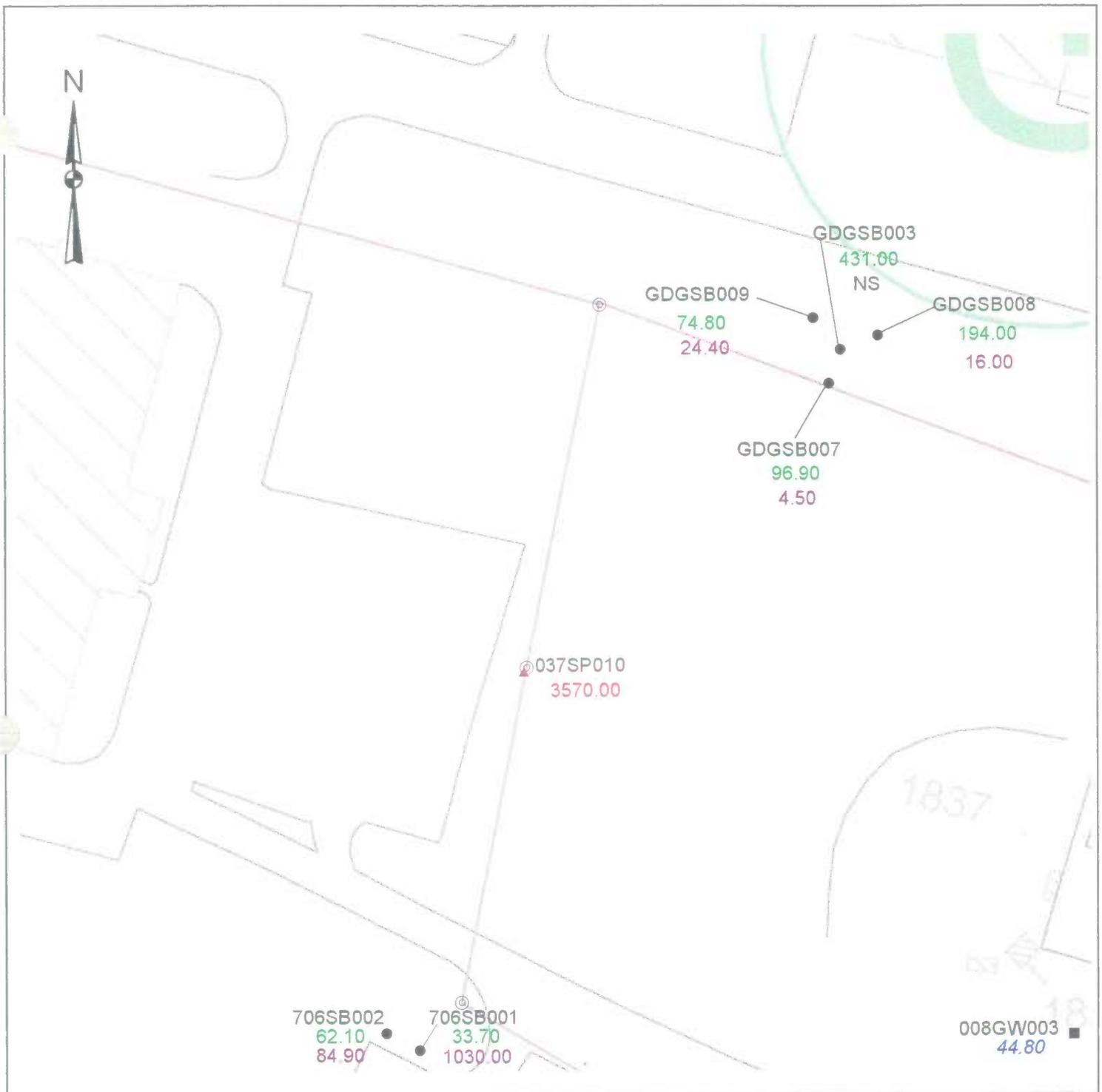
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ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.29
ZONE L - SUBZONE G
COPPER
ZONE L EXCEEDANCES

RBC=310 mg/kg SSL=11200 mg/kg MCL=1300 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- SANITARY SEWER LINE
- RAILROAD
- STORM SEWER LINE
- MANHOLE

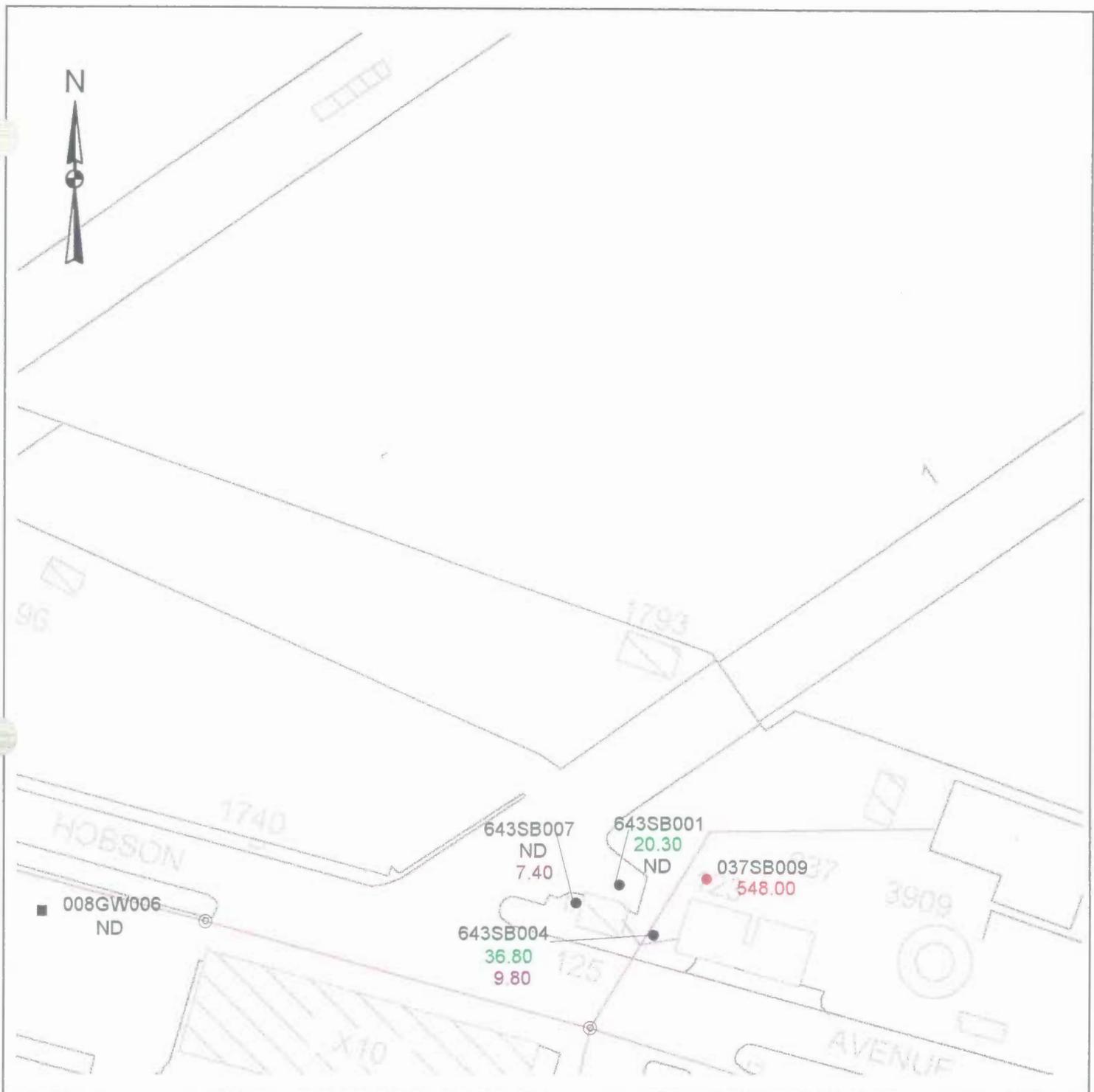
80 0 80 160 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.30
ZONE L - SUBZONE G
COPPER
ZONE L EXCEEDANCES WITH ZONE G
SOIL AND GW CONCENTRATIONS

RBC=310 mg/kg SSL=11200 mg/kg MCL=1300 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- ▬ SUBZONE BOUNDARY
- ▬ RAILROAD
- ⊙ MANHOLE
- ▬ SANITARY SEWER LINE
- ▬ STORM SEWER LINE

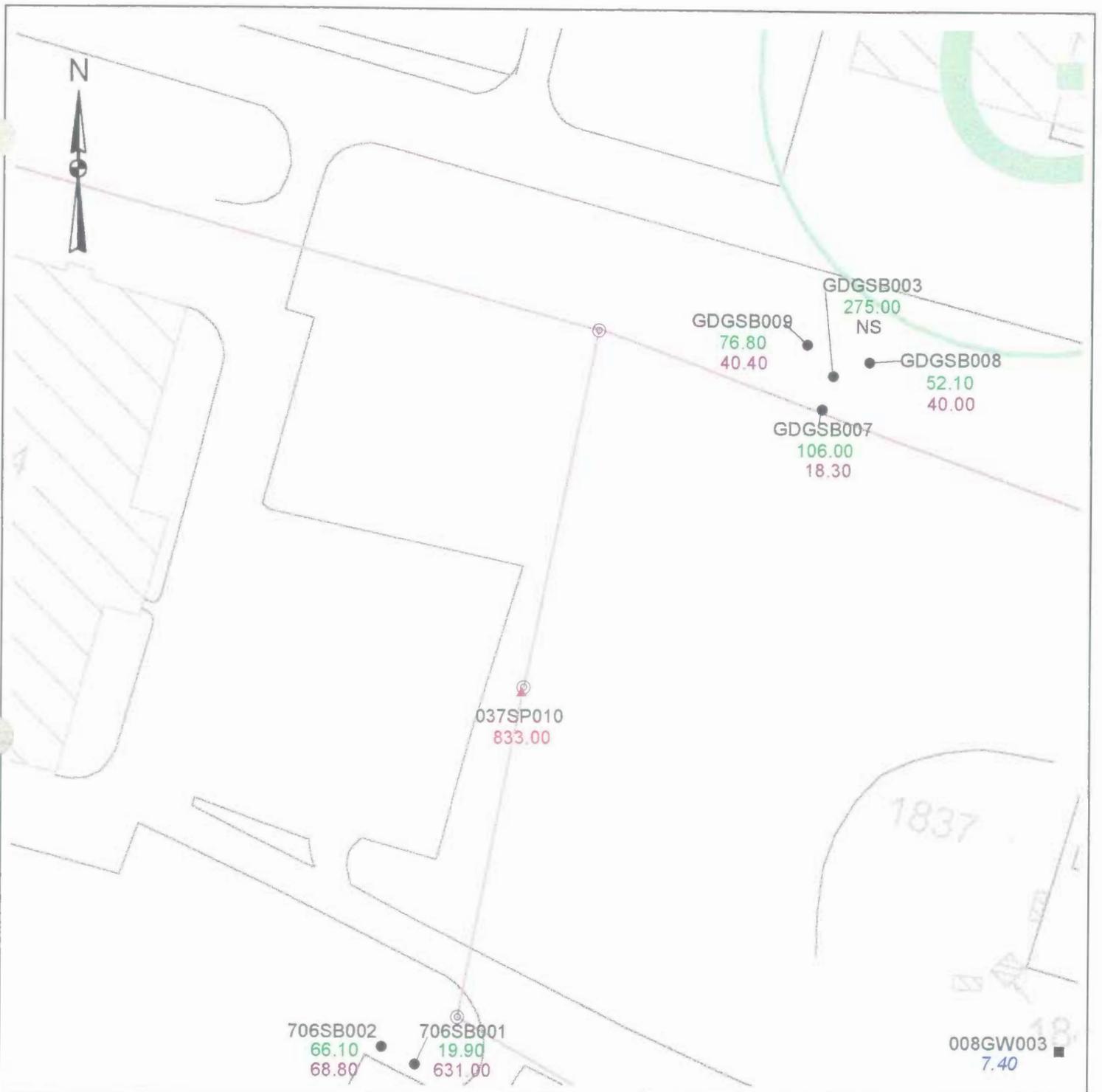
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ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.31
ZONE L - SUBZONE G
COPPER
ZONE L EXCEEDANCES WITH ZONE G
SOIL AND GW CONCENTRATIONS

RBC=310 mg/kg SSL=11200 mg/kg MCL=1300 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.32
ZONE L - SUBZONE G
LEAD
ZONE L EXCEEDANCES WITH ZONE G
SOIL AND GW CONCENTRATIONS

RBC=400 mg/kg SSL=400 mg/kg MCL=15.0 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION

- SUBZONE BOUNDARY
- SANITARY SEWER LINE
- RAILROAD
- STORM SEWER LINE
- MANHOLE

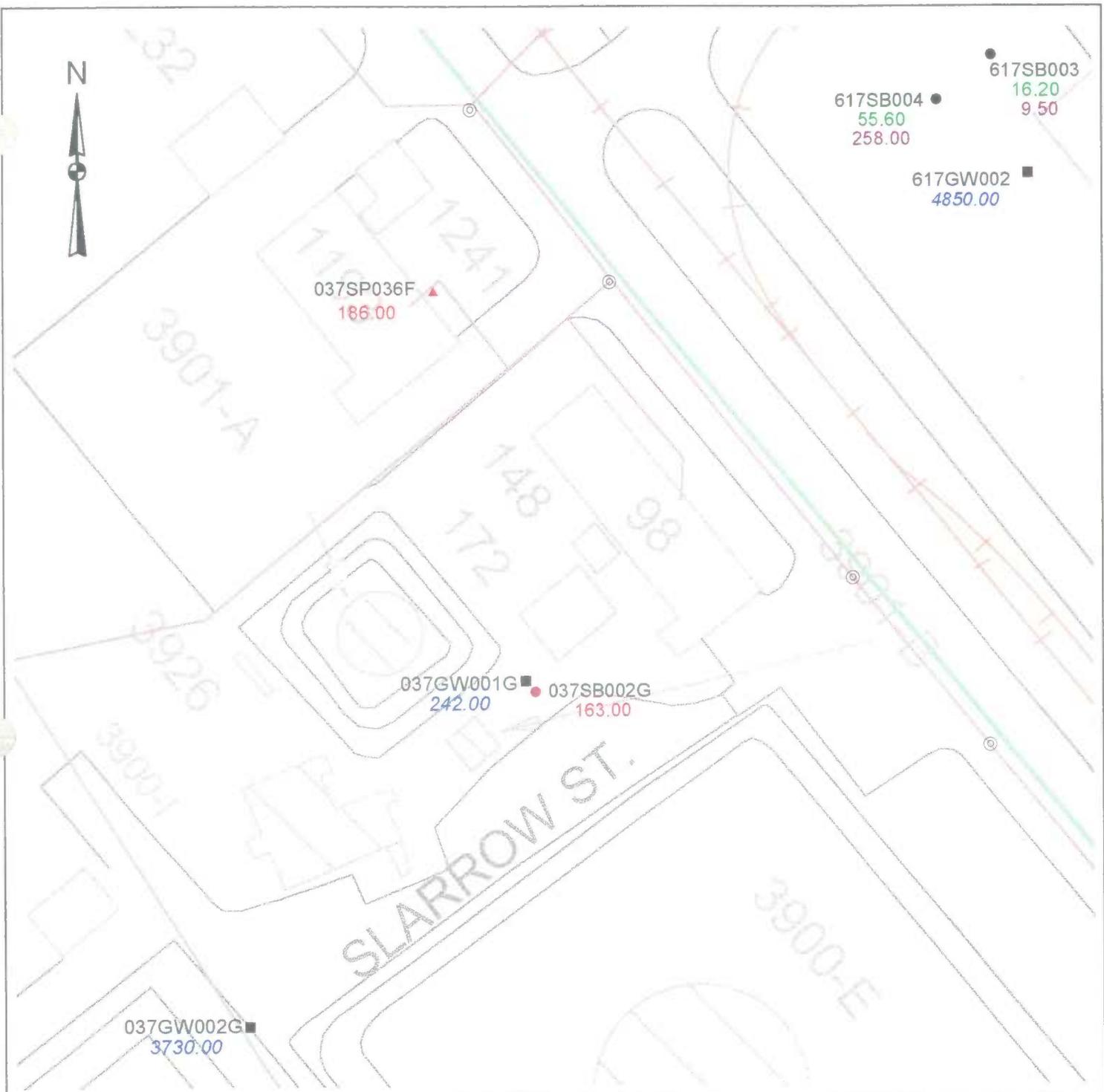
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ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.33
ZONE L - SUBZONE G
MANGANESE
ZONE L EXCEEDANCES

RBC=160 mg/kg SSL=950 mg/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- SANITARY SEWER LINE
- STORM SEWER LINE
- ⊙ MANHOLE

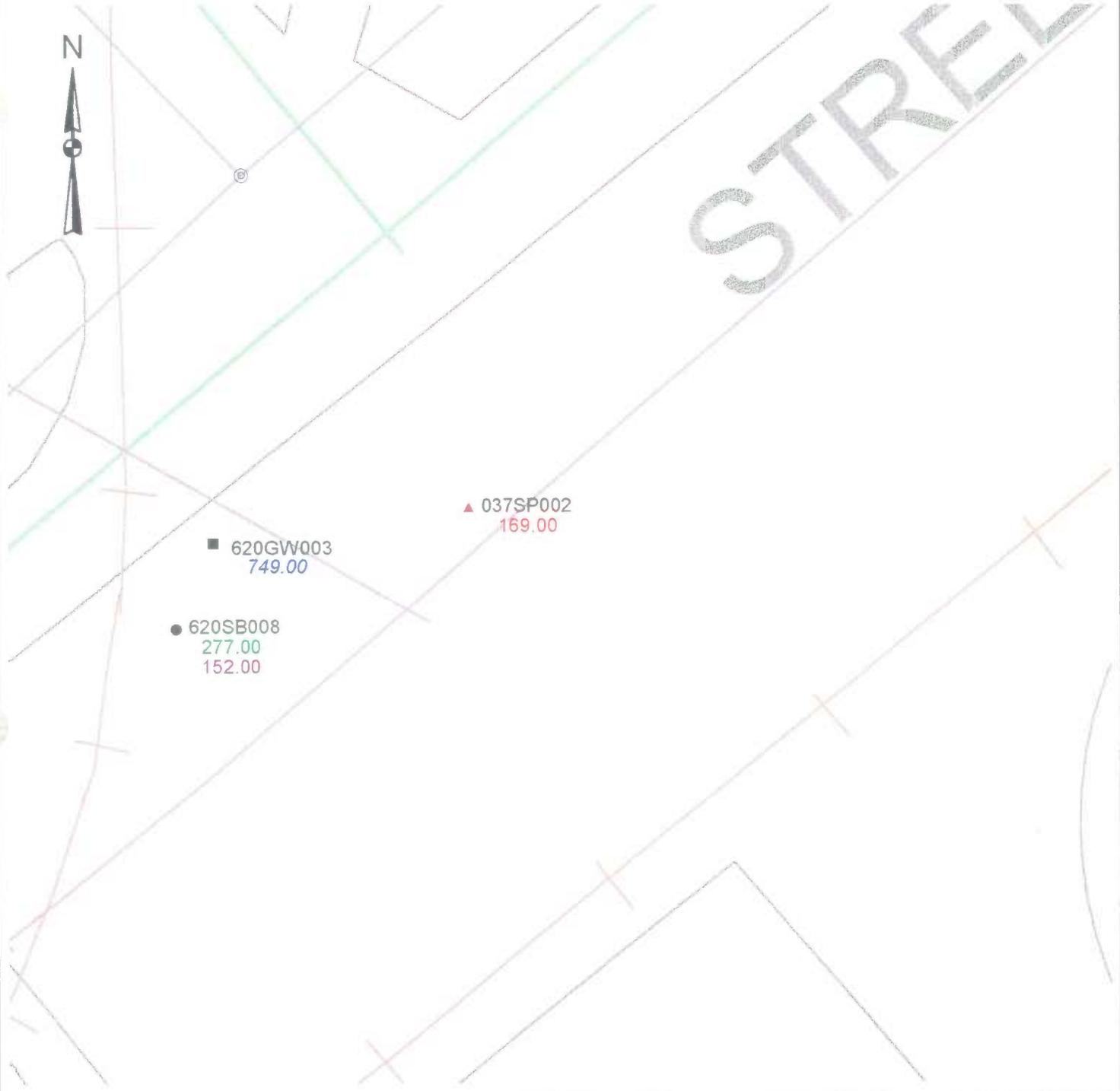


ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.7.34
 ZONE L - SUBZONE G
 MANGANESE
 ZONE L EXCEEDANCES WITH ZONES F AND G
 SOIL AND GW CONCENTRATIONS

RBC=160 mg/kg SSL=950 mg/kg MCL=NONE

STREEL



LEGEND

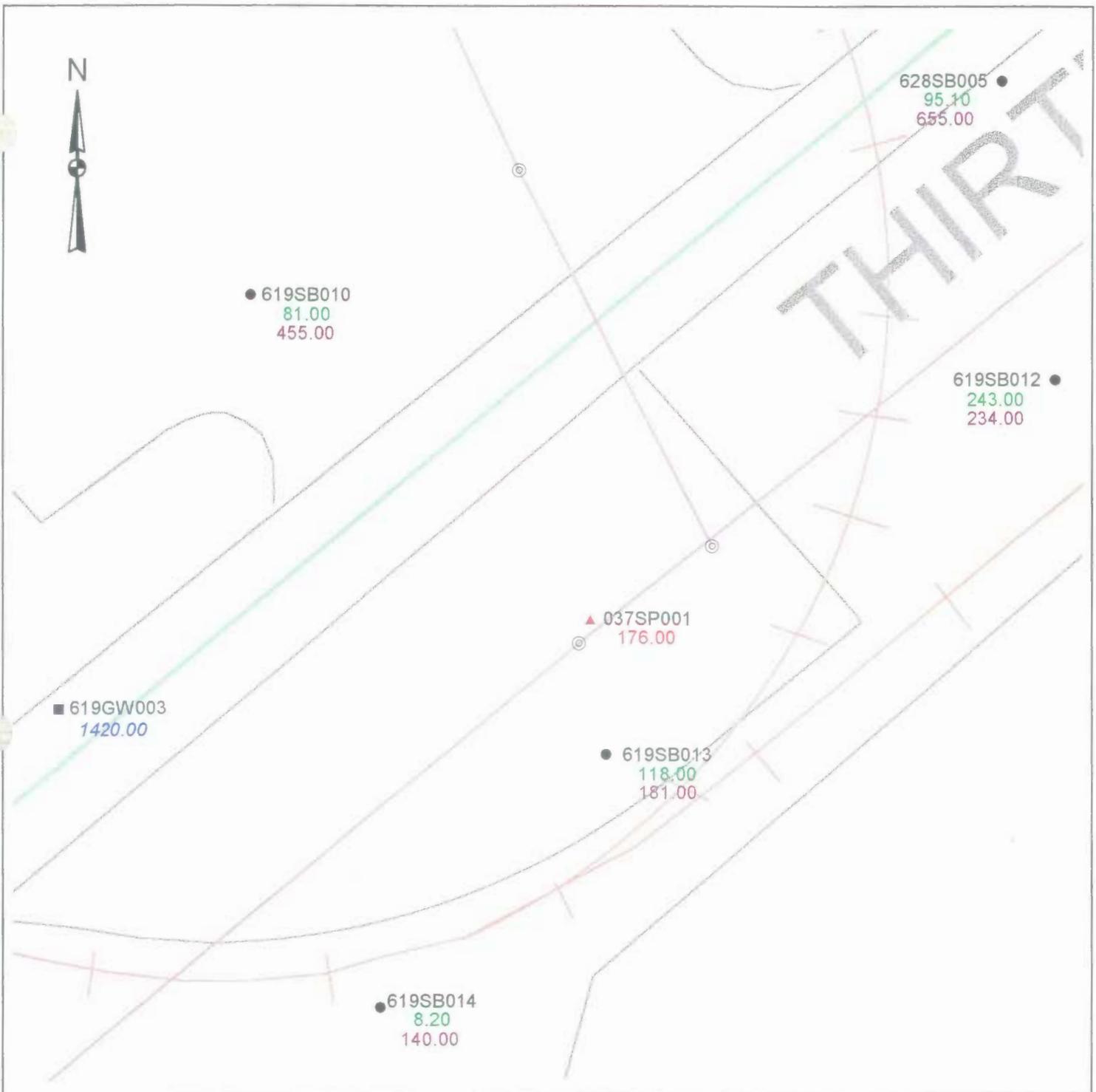
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.35
ZONE L - SUBZONE G
MANGANESE
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=160 mg/kg SSL=950 mg/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.36
ZONE L - SUBZONE G
MANGANESE
ZONE L EXCEEDANCES WITH ZONES F AND G
SOIL AND GW CONCENTRATIONS

RBC=160 mg/kg SSL=950 mg/kg MCL=NONE



LEGEND

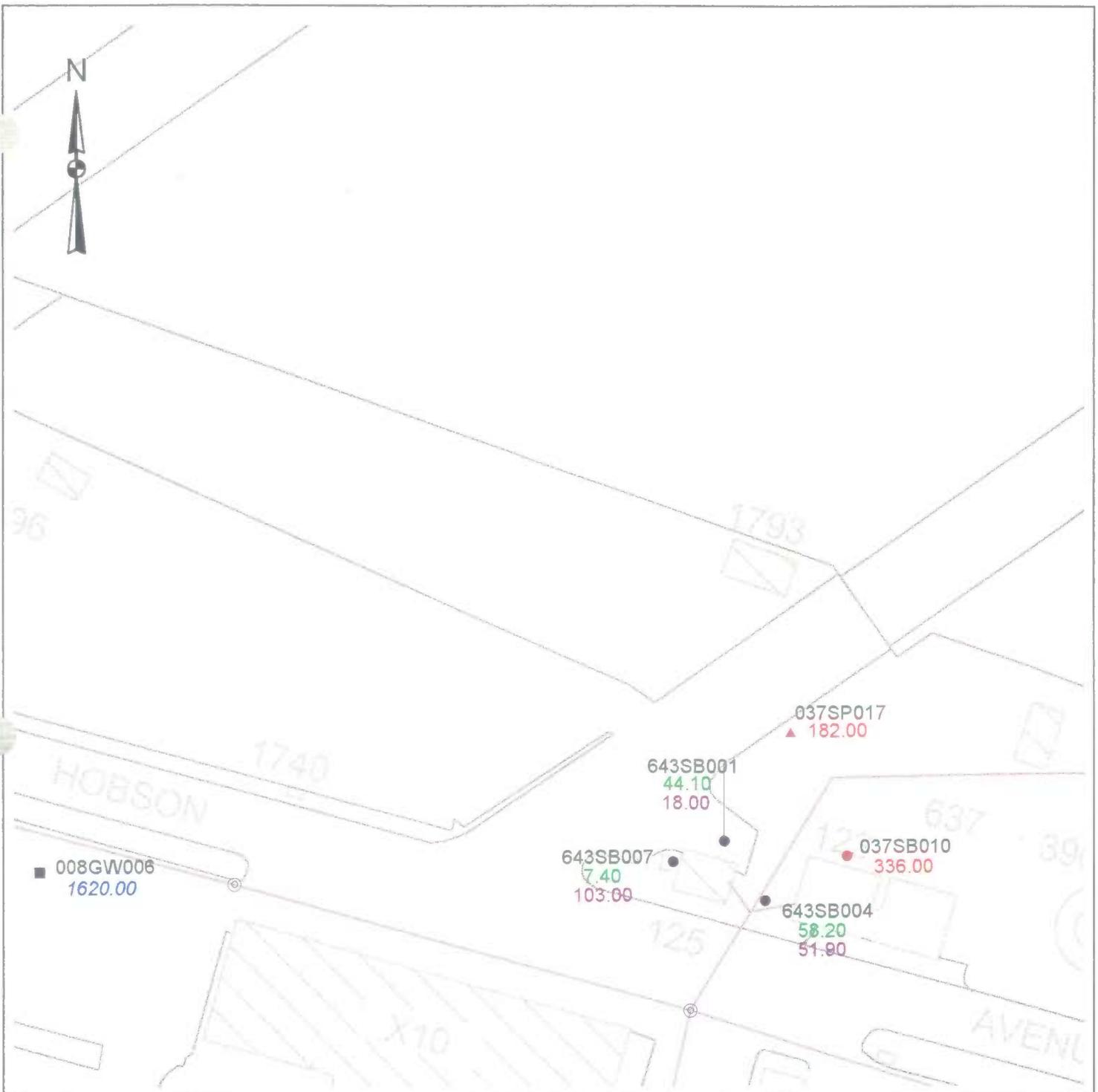
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.7.37
 ZONE L - SUBZONE G
 MANGANESE
 ZONE L EXCEEDANCES WITH ZONE G
 SOIL AND GW CONCENTRATIONS

RBC=160 mg/kg SSL=950 mg/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
 - ZONE L SOIL BORING LOCATION
 - 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
 - 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
 - MONITORING WELL LOCATION
 - 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
 - ZONE G SOIL BORING LOCATION
 - 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
 - 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
 - ND NOT DETECTED
 - NS NO SAMPLE TAKEN
 - N SUBZONE BOUNDARY
 - N RAILROAD
 - © MANHOLE
 - N SANITARY SEWER LINE
 - N STORM SEWER LINE
- 90 0 90 180 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.38
ZONE L - SUBZONE G
MANGANESE
ZONE L EXCEEDANCES WITH ZONE G
SOIL AND GW CONCENTRATIONS

RBC=160 mg/kg SSL=950 mg/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION

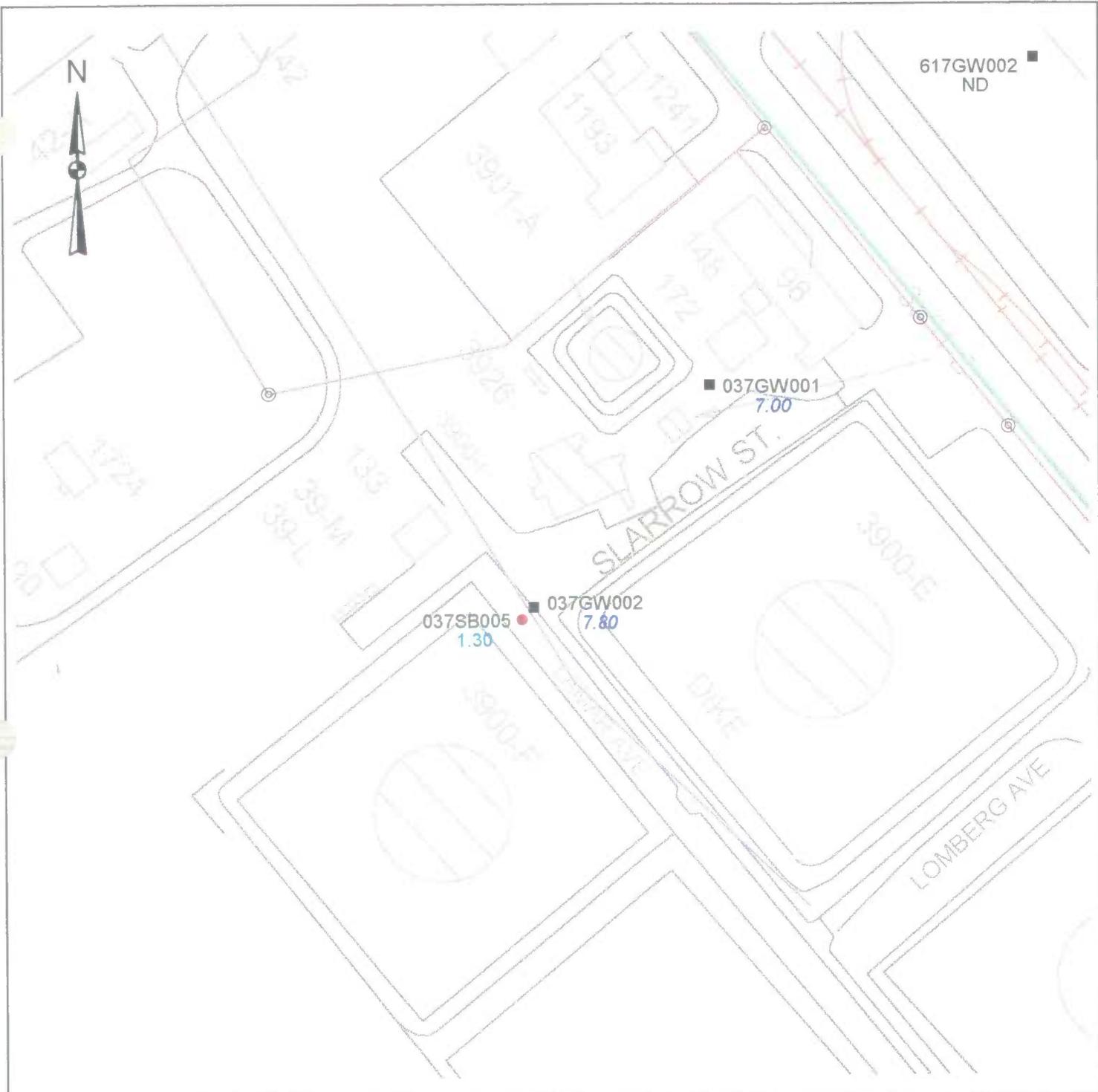
- SUBZONE BOUNDARY
 - SANITARY SEWER LINE
 - RAILROAD
 - STORM SEWER LINE
 - ⊙ MANHOLE
- 600 0 600 1200 Feet



ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.7.39
 ZONE L - SUBZONE G
 THALLIUM
 ZONE L EXCEEDANCES

RBC=0.55 mg/kg SSL=0.70 mg/kg MCL=2.00 ug/L



LEGEND

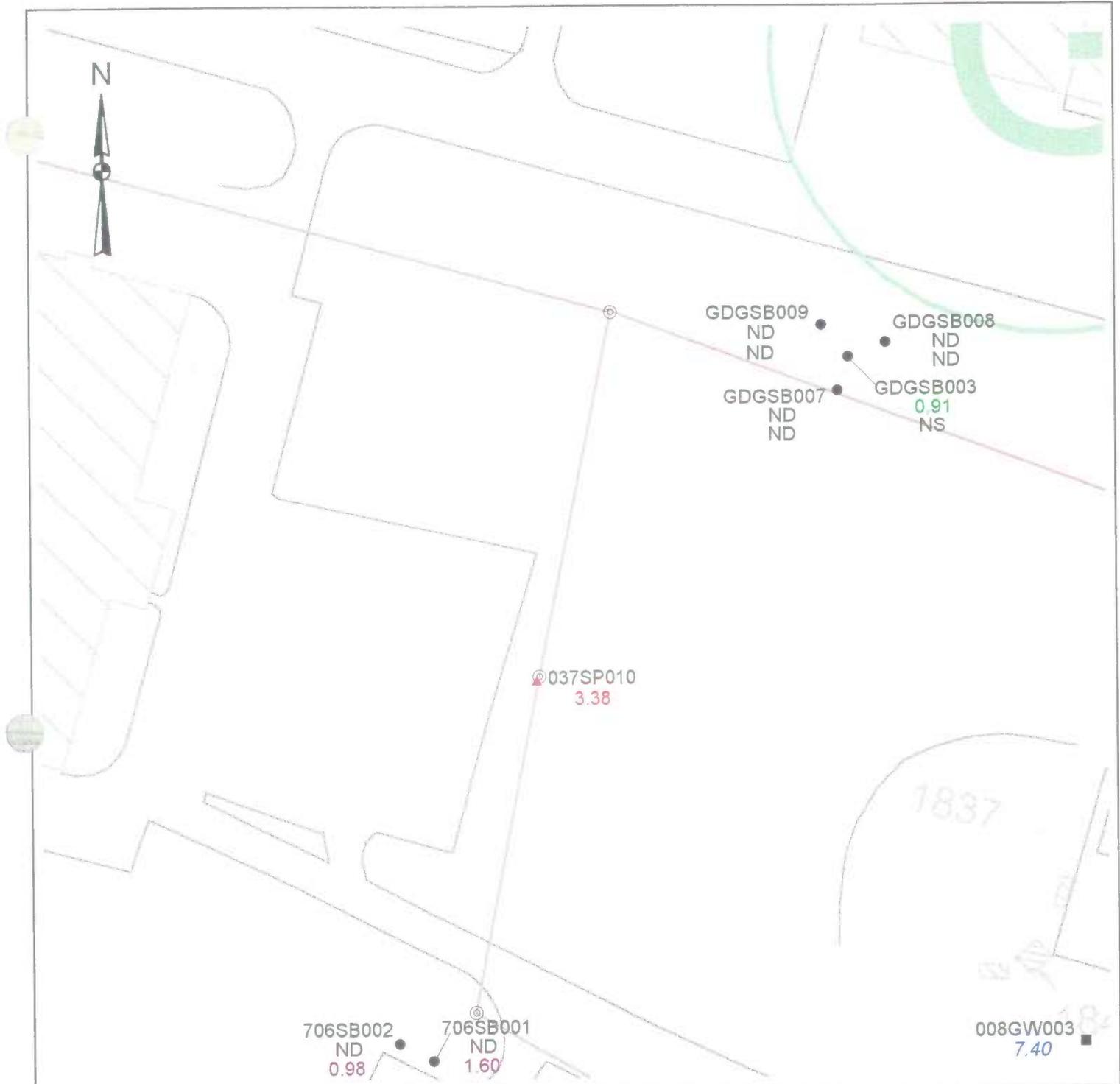
- ▲ ZONE L DPT SOIL LOCATION
 - ZONE L SOIL BORING LOCATION
 - 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
 - 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
 - MONITORING WELL LOCATION
 - 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
 - ZONE G SOIL BORING LOCATION
 - 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
 - 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
 - ND NOT DETECTED
 - NS NO SAMPLE TAKEN
 - SUBZONE BOUNDARY
 - RAILROAD
 - ⊙ MANHOLE
 - SANITARY SEWER LINE
 - STORM SEWER LINE
- 100 0 100 200 Feet



ZONE L - RCRA
 FACILITY INVESTIGATION
 NAVAL BASE CHARLESTON
 CHARLESTON, SC

FIGURE 10.7.40
 ZONE L - SUBZONE G
 THALLIUM
 ZONE L EXCEEDANCES WITH ZONES F AND G
 SOIL AND GW CONCENTRATIONS

RBC=0.55 mg/kg SSL=0.70 mg/kg MCL=2.00 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

80 0 80 160 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.41
ZONE L - SUBZONE G
THALLIUM
ZONE L EXCEEDANCES WITH ZONE G
SOIL AND GW CONCENTRATIONS

RBC=0.55 mg/kg SSL=0.70 mg/kg MCL=2.00 ug/L



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION

- ▭ SUBZONE BOUNDARY
 - ▭ SANITARY SEWER LINE
 - ▭ RAILROAD
 - ▭ STORM SEWER LINE
 - ⊙ MANHOLE
- 600 0 600 1200 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.42
ZONE L - SUBZONE G
VANADIUM
ZONE L EXCEEDANCES

RBC=55.0 mg/kg SSL=6000 mg/kg MCL=NONE



LEGEND

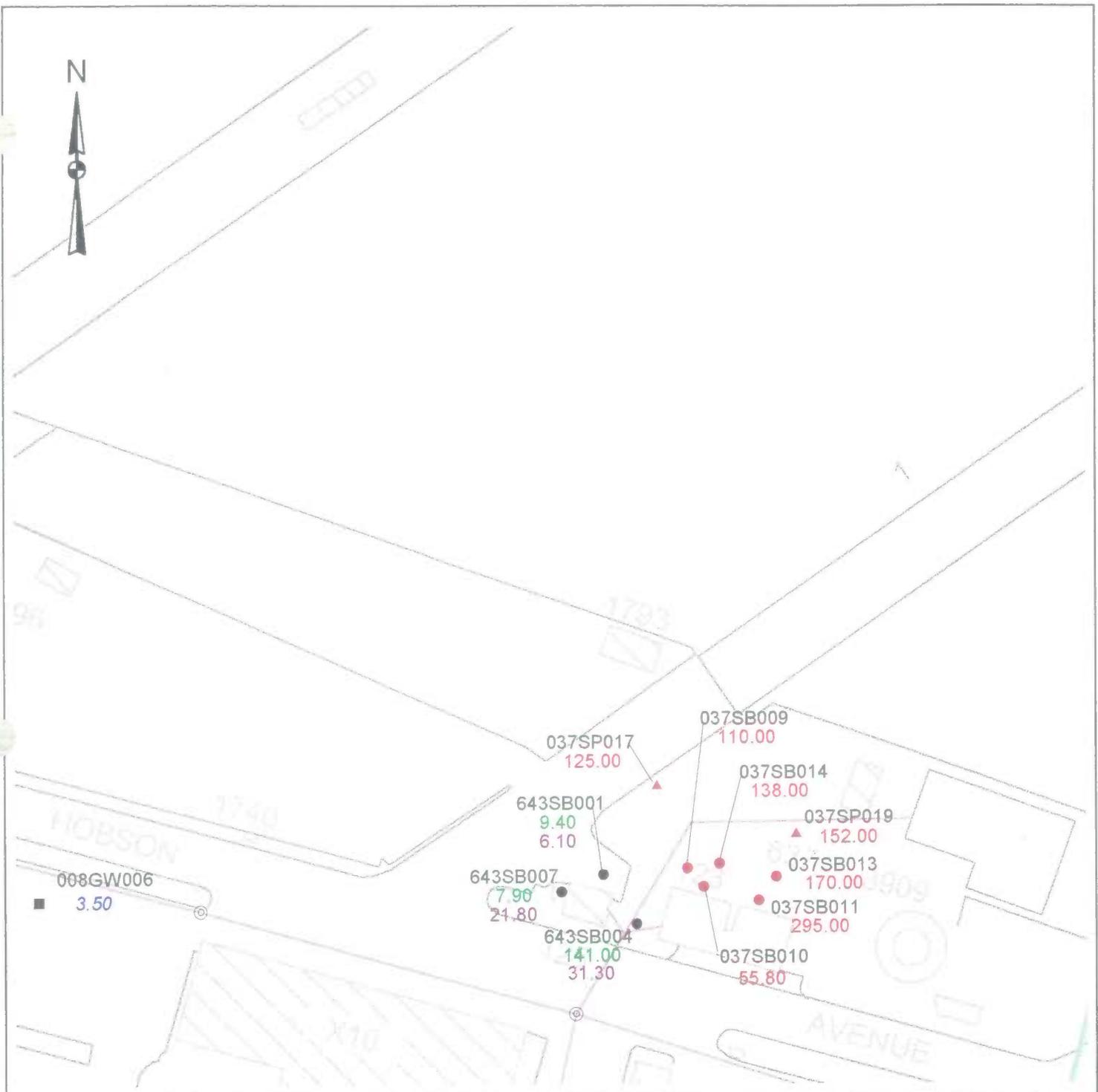
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.43
ZONE L - SUBZONE G
VANADIUM
ZONE L EXCEEDANCES WITH ZONE G
SOIL AND GW CONCENTRATIONS

RBC=55.0 mg/kg SSL=6000 mg/kg MCL=NONE



LEGEND

- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE G SOIL BORING LOCATION
- 12.30 ZONE G SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE G SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

100 0 100 200 Feet



ZONE L - RCRA
FACILITY INVESTIGATION
NAVAL BASE CHARLESTON
CHARLESTON, SC

FIGURE 10.7.44
ZONE L - SUBZONE G
VANADIUM
ZONE L EXCEEDANCES WITH ZONE G
SOIL AND GW CONCENTRATIONS

RBC=55.0 mg/kg SSL=6000 mg/kg MCL=NONE