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DRAFT RESOURCE CONSERVATION AND RECOVERY ACT FACILITY INVESTIGATION  
REPORT VOLUME 2 OF 12 SECTIONS 10.0 TO 10.2 ZONE L CNC CHARLESTON SC  
12/18/1998  
ENSAFE INC.

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

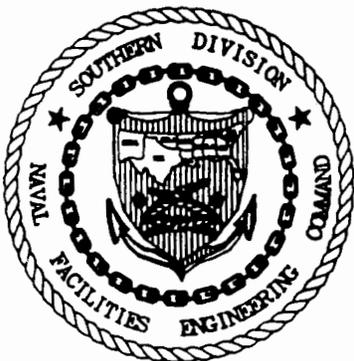


**VOLUME 2 OF 12  
SECTIONS 10.0 TO 10.2**

**CTO-029  
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**Prepared for:**

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**10.0 SITE-SPECIFIC EVALUATIONS**

This section evaluates the nature and extent of the contamination found at each site delimited by subzone including identification of COPCs, fate and transport of the COPCs, human health and ecological excess risk, and corrective measures considerations.

Soil and groundwater sampling were performed per the Final Zone L RFI Work Plan at locations along the storm sewer system, sanitary sewer system, and railroad system using hand auger and Direct Push Technology (DPT) sampling methods. The hand auger and monitoring well samples were analyzed at DQO Level 3 while the DPT soil and groundwater samples were collected at DQO Level 2. Organic compound analytical results were compared to the USEPA Region 3 Risk-Based Concentration (RBCs) and, in the case of subsurface soil, Soil Screening Level (SSLs) values were referenced from the May 1996 tables or are calculated for specific compounds. Inorganic soil analytical results were compared to RBCs and reference concentrations (RCs), as outlined in Section 5 of this report, or to RBCs where no RCs were available. Subzone-specific AUTOCAD figures are provided to show the location of Zone L samples collected and existing zone sample locations. Analyte-specific Arcview figures are provided for each site showing the concentration of specific COPCs detected in surface soil compared to its corresponding RBCs, the concentrations of analytes detected in lower interval soil samples and their corresponding SSLs, and groundwater (both DPT and monitoring well) concentrations detected to Maximum Concentration Limits (MCLs) and appropriate RBCs. Hand auger soil samples were collected at two intervals: 0 -1' (upper-interval), and 3 - 5' (lower- interval). DPT soil samples were collected just above the water table at approximately 4 feet. DPT groundwater samples were collected at a depth of approximately 15 feet. For comparison purposes only, the highest detected result in a existing monitoring well was used in the Arcview figures.

Metals detections from DPT groundwater have not been compared to MCLs or RBCs due to the sampling method used to obtain the DPT samples. These samples were not filtered when they

were collected and contain a higher amount of particulate metals, thereby not being a direct comparison to values promulgated for dissolved metals in groundwater. Section 10.0.1 illustrates comparisons of DPT groundwater metals concentrations and their associated turbidity readings with metals detections and turbidity readings of nearby groundwater monitoring wells.

Due to the unique nature of the Zone L RFI investigation (i.e. basewide examination of utilities), the analytical results from other zone's investigations will be compared to Zone L data where applicable. Figures have been provided with each subzone for each site showing the location of these additional sampling locations. Data collected from the Fuel Distribution System and catch basins in zones, E, F, & G were compared to data collected in Zone L for possible impacted areas.

### **Data Evaluation**

The following screening tools and data evaluation methods were used to determine COPCs at each site:

- Soil analytical results for surface interval samples were compared to residential or industrial soil ingestion screening values (depending on the future use scenario) as stated in the USEPA Region 3 RBC table. Analytical results for lower-interval soil samples were compared to soil screening levels (SSLs) for soil-to-groundwater transfer in the Region 3 RBC table. Lead was specifically compared to the OSWER soil screening value of 1,300 mg/kg for an industrial scenario and 400 mg/kg for a residential scenario. Analytical results for sediment samples collected from storm and floor drain catch basins from individual RFIs were treated as soil and compared to relevant RBCs and were reported in the specific RFI reports.
  
- Groundwater analytical results were compared to tap water RBCs or to the USEPA Drinking Water Regulations and Health Advisories (May, 1995).

- Sediment results for samples collected from the Cooper River were compared to sediment screening values (SSVs) in USEPA Region 4's *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (USEPA, 1997) and reported in Section 8.0. 1  
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- Zone-wide sample location figures created in AutoCAD, isocontour maps, and ArcView figures were utilized to better define the extent of contamination and help evaluate human health and ecological risk. 6  
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- Duplicate samples were incorporated with their corresponding primary samples. When either the duplicate or primary sample had a detection, the detected value was used. When both the duplicate and primary samples had detections, the higher of the two concentrations was used to compensate for matrix heterogeneity. 10  
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Each site has been addressed separately in Section 10 and contains section headings for each subzone. 14  
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**10.0.1 SWMU 37, Sanitary Sewer System**

SWMU 37 is the sanitary sewer system at CNC and includes gravity pipes, manholes, lift and pumping stations, force mains, and latrines. Contaminants associated with this system include acids, organotins, surfactants, heavy metals, caustics, chlorinated solvents, petroleum hydrocarbons, metals, cyanide, and PCBs. The primary pathway for these contaminants is exfiltration into soil and groundwater due to voids, cracks, and collapses of the pipes. Prior to the 1970s, CNC had a combined wastewater collection system which collected domestic wastewater, industrial wastes, and storm water runoff, which were discharged directly into the receiving watercourse without treatment. During the 1970s, a separate sanitary sewer system was developed consisting of approximately 90,000 linear feet (LF) of gravity sewer and 29 pumping stations with associated force mains. Wastewater has entered the system from five major sources: residential areas, commercial facilities, industrial facilities, medical facilities, and naval vessels.

**10.0.2 AOC 699, Storm Sewer System**

AOC 699 is the storm sewer system at CNC and includes both gravity pipelines and manholes. The sources of contamination are nonpoint source runoff from contaminated sites with major pathways identified as direct discharge into waterways and compromised sewer line integrity resulting in release to the soil and groundwater. Several cross-connects have also been identified through dye tracing. These may also provide a route of entry for contaminants into the storm sewer system and these may exfiltrate to soil and groundwater as stated above.

**10.0.3 AOC 504, Railroad System**

AOC 504, the railroad system, was constructed as early as 1909 and consists of all existing and abandoned railyards, rail lines, and hazardous material loading/unloading areas. Contaminants associated with this site include acids, metals, petroleum hydrocarbons, coal, coal derivatives, solvents, wood preservatives (Creosote), herbicides, and pesticides. Currently, there are approximately 13 miles of railroad lines associated with CNC .

#### **10.0.4 Turbidity Comparisons**

This section compares the turbidity levels and corresponding concentrations of selected metals for monitoring wells at CNC and the DPT groundwater locations in Zone L. The purpose of the study was to determine if the analyte concentrations in the DPT locations differ statistically from those in the monitoring wells. Arsenic, beryllium and thallium were selected as the analytes to be compared. To assist in the data comparisons, each zone was subdivided into subzones so the analyte concentrations of the DPT sample locations could be compared with the monitoring wells in their general vicinity. The data are compared as an overall aggregate and also compared in individual subzones. The data were analyzed for difference using a two-tailed t-Test assuming unequal variances and a 95% confidence interval. The two-tailed t-Test was used to determine if the data from the DPT sample locations and the monitoring wells are statistically different. When the analyte of interest was not detected, one-half of the reported detection limit was used for statistical analysis.

##### **10.0.4.1 Aggregate Comparison**

###### **Turbidity**

Statistical analysis of the aggregate turbidity means in each of the subzones indicates that the turbidity means differ significantly. The aggregate mean of the DPT sample locations was 474.0 nephelometric turbidity units (ntu) while the mean of the monitoring wells was 10.7 ntu. Turbidity data were not available for Subzones A through D. Table 10.0.4.1 details the data.

**Table 10.0.4.1  
 Aggregate Turbidity Means  
 Comparisons**

Subzone	DPT Sample Location (ntu)	Monitoring Wells (ntu)
E1	417.5	18.1
E2	477.6	3.4
E3	624.5	16.4
E4	434.0	13.8
E5	301.3	18.5
E6	249.4	29.9
E7	605.3	8.4
F1	576.8	5.5
F2	359.6	None
F3	308.2	52.9
F4	532.6	3.5
F5	631.0	5.7
F6	619.5	9.3
G1	775.5	4.5
G2	582.0	1.4
H1	419.0	3.0
H2	627.0	0.5
H3	137.5	0.8
H4	702.2	1.5
H5	465.7	3.8
I1	123.0	2.4
I2	458.4	31.4
<b>Average</b>	<b>474.0</b>	<b>10.7</b>
<b>t-Statistic</b>	<b>12.4</b>	
<b>t Critical (95%)</b>	<b>2.1</b>	

**Arsenic**

Statistical analysis of the aggregate arsenic means in each of the subzones indicates that the arsenic means differ significantly. The aggregate mean of the DPT sample locations was 93.3 micrograms per liter ( $\mu\text{g/L}$ ) while the mean of the monitoring wells was 11.6  $\mu\text{g/L}$ . Table 10.0.4.2 details the data.

**Table 10.0.4.2  
 Aggregate Arsenic Concentration Means Comparisons**

Subzone	DPT Sample Location ( $\mu\text{g/L}$ )	Monitoring Wells ( $\mu\text{g/L}$ )
A1	191.1	13.1
A2	50.1	21.6
B	115.9	5.2
C1	49.4	11.5
C2	80.9	3.4
C3	277.3	19.1
C4	173.0	10.2
E1	21.1	6.5
E2	21.6	6.3
E3	116.4	10.3
E4	44.5	15.8
E5	49.5	12.8
E6	42.2	18.2
E7	43.9	36.8
F1	67.4	5.2
F2	61.0	None
F3	93.6	12.5
F4	53.0	3.5
F5	86.3	7.1
F6	71.2	8.6
G1	292.3	54.9
G2	161.1	13.6
H1	37.5	11.6

**Table 10.0.4.2**  
**Aggregate Arsenic Concentration Means Comparisons**

Subzone	DPT Sample Location ( $\mu\text{g/L}$ )	Monitoring Wells ( $\mu\text{g/L}$ )
H2	70.1	3.1
H3	82.4	3.5
H4	80.0	1.7
H5	68.7	3.5
I1	191.0	13.3
I2	12.9	4.2
<b>Average</b>	<b>93.3</b>	<b>11.6</b>
<b>t Statistic</b>	<b>6.1</b>	
<b>t Critical (95%)</b>	<b>2.0</b>	

## Beryllium

Statistical analysis of the aggregate beryllium means in each of the subzones indicates that the beryllium means differ significantly. The aggregate mean of the DPT sample locations was 5.4  $\mu\text{g/L}$  while the mean of the monitoring wells was 0.7  $\mu\text{g/L}$ . Table 10.0.4.3 details the data.

**Table 10.0.4.3**  
**Aggregate Beryllium Concentration Means Comparisons**

Subzone	DPT Sample Location ( $\mu\text{g/L}$ )	Monitoring wells ( $\mu\text{g/L}$ )
A1	7.1	0.4
A2	3.0	0.1
B	4.5	1.7
C1	2.1	9.2
C2	2.8	0.2
C3	4.3	0.2
C4	12.7	0.2
E1	1.5	0.3
E2	1.3	0.3
E3	14.6	0.3

**Table 10.0.4.3**  
**Aggregate Beryllium Concentration Means Comparisons**

Subzone	DPT Sample Location ( $\mu\text{g/L}$ )	Monitoring wells ( $\mu\text{g/L}$ )
E4	2.8	0.5
E5	4.2	0.5
E6	2.9	0.4
E7	3.9	0.4
F1	4.8	0.2
F2	2.6	None
F3	6.4	0.2
F4	2.6	0.8
F5	7.8	0.2
F6	5.6	0.2
G1	23.0	0.5
G2	6.0	0.4
H1	2.6	0.2
H2	5.4	0.2
H3	5.3	0.2
H4	4.5	0.2
H5	4.0	0.2
I1	6.7	0.4
I2	1.0	0.4
<b>Average</b>	<b>5.4</b>	<b>0.7</b>
<b>t Statistic</b>	<b>5.2</b>	
<b>t Critical (95%)</b>	<b>2.0</b>	

**Thallium**

Statistical analysis of the aggregate thallium means in each of the subzones indicates that the thallium means differ significantly. The aggregate mean of the DPT sample locations was 7.3  $\mu\text{g/L}$  while the mean of the monitoring wells was 3.0  $\mu\text{g/L}$ . Table 10.0.4.3a details the data.

**Table 10.0.4.3a**  
**Aggregate Thallium Concentration Means Comparisons**

Subzone	DPT Sample Location ( $\mu\text{g/L}$ )	Monitoring Wells ( $\mu\text{g/L}$ )
A1	9.0	2.0
A2	5.0	2.6
B	5.0	12.6
C1	5.0	6.6
C2	5.0	1.9
C3	7.7	1.9
C4	13.7	1.9
E1	5.3	2.3
E2	5.4	2.4
E3	12.6	2.0
E4	6.4	2.3
E5	7.9	2.4
E6	8.3	2.5
E7	6.5	2.3
F1	5.0	3.4
F2	5.7	None
F3	7.8	2.6
F4	5.4	3.4
F5	7.2	3.9
F6	5.5	3.6
G1	18.8	3.5
G2	15.3	2.7
H1	5.7	2.6
H2	5.0	1.7
H3	6.1	1.9
H4	5.0	2.0
H5	6.5	3.1
I1	5.0	3.4
I2	5.0	2.3
<b>Average</b>	<b>7.3</b>	<b>3.0</b>
<b>t Statistic</b>	<b>5.7</b>	
<b>t Critical (95%)</b>	<b>2.0</b>	

**10.0.4.2 Subzone Comparison**

**Subzone A-1**

Statistical analysis of the arsenic values in Subzone A-1 indicates that the arsenic values may not differ significantly between the DPT locations and the monitoring wells. The uncertainty with the analysis can be attributed to the small number of monitoring wells in the subzone. The mean of the DPT sample locations was 191.1  $\mu\text{g/L}$  and the mean of the monitoring wells was 13.1  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone A-1 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. This analysis may be misleading because of the small number of monitoring wells in the subzone. The mean of the DPT sample locations was 7.1  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.4  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone A-1 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. This analysis may be misleading because of the small number of monitoring wells in the subzone. The mean of the DPT sample locations was 9.0  $\mu\text{g/L}$  and the mean of the monitoring wells was 2.0  $\mu\text{g/L}$ .

The DPT sample locations were not analyzed for turbidity. Table 10.0.4.4 details the results of the data in Subzone A-1. Figure 10.0.4.1 identifies the sample locations.

**Table 10.0.4.4  
 Subzone A-1 Data Comparisons**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>DPT Sample Location</b>				
037GP001	Not Taken	140.00	7.40	10.00 U
037GP002	Not Taken	10.00 U	2.00 U	10.00 U
037GP003	Not Taken	10.00 U	2.00 U	10.00 U
037GP004	Not Taken	1120.00	16.10	16.30
037GP005	Not Taken	153.00	12.70	12.90

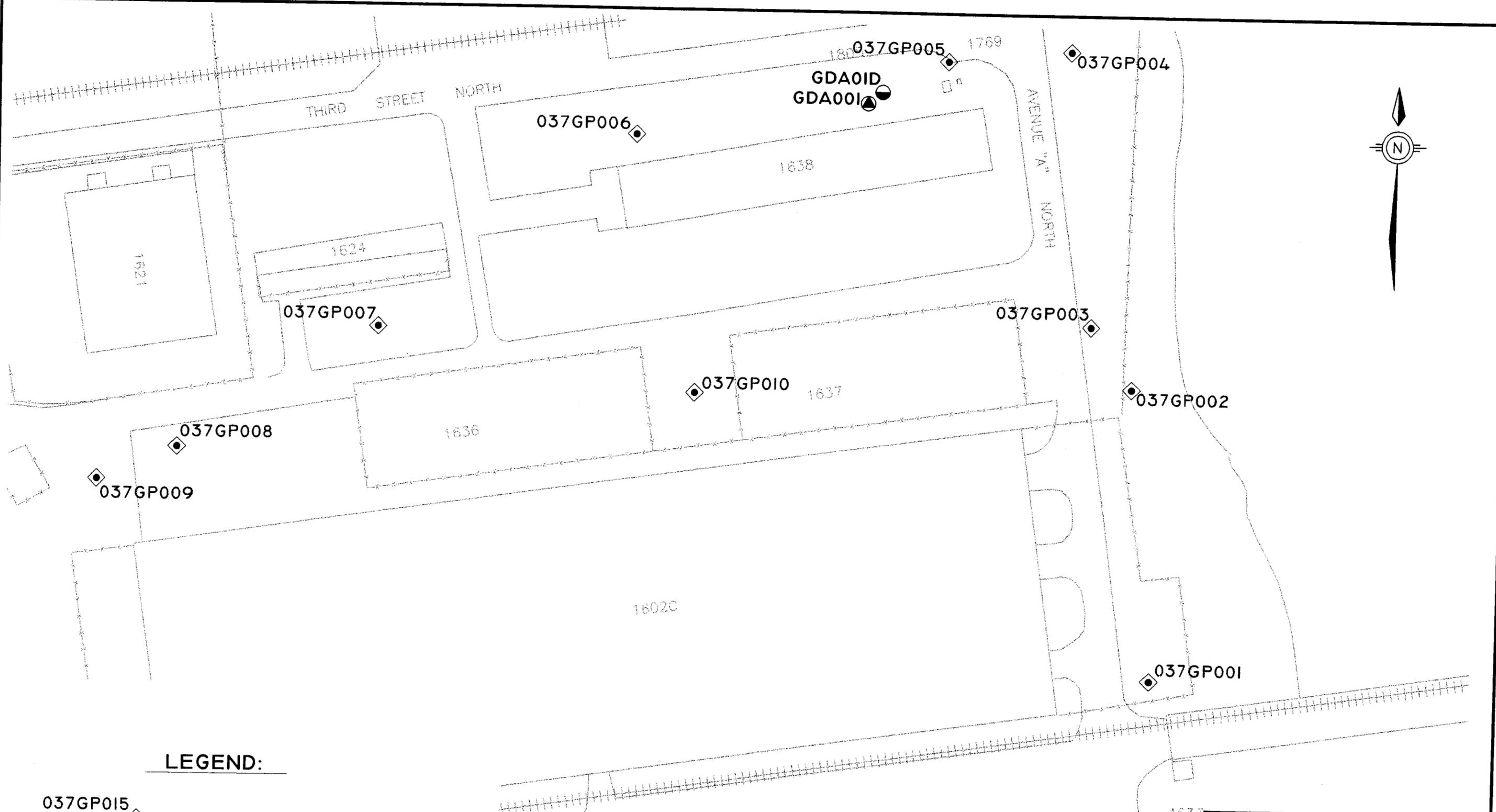
**Table 10.0.4.4**  
**Subzone A-1 Data Comparisons**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
037GP006	Not Taken	68.60	5.30	10.00 U
037GP007	Not Taken	12.10	2.00 U	10.00 U
037GP008	Not Taken	10.00 U	2.00 U	10.00 U
037GP009	Not Taken	10.00 U	2.00 U	10.00 U
037GP010	Not Taken	397.00	24.80	25.90
<b>Monitoring Wells</b>				
GDAGW00101	1	68.30	1.00 U	4.00 UJ
GDAGW00102	11	7.90 UJ	1.00 U	3.00 U
GDAGW00103	2	3.00 U	1.00 U	3.00 U
GDAGW00104	7	2.60 J	0.98 UJ	3.10 UR
GDAGW01D01	0	4.00 J	1.00 U	4.00 UJ
GDAGW01D02	3	10.50 UJ	1.00 U	3.00 U
GDAGW01D03	9	8.00 J	1.00 U	3.00 U
GDAGW01D04	0	11.10 J	0.11 UJ	3.10 UR

**Subzone A-2**

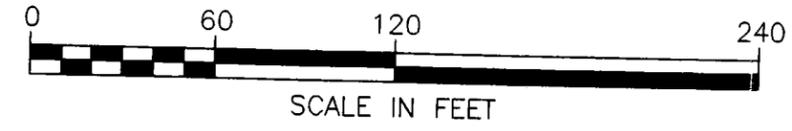
Statistical analysis of the arsenic values in Subzone A-2 indicates that the arsenic values may not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 50.1  $\mu\text{g/L}$  and the mean of the monitoring wells was 21.6  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone A-2 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. This analysis may be misleading because beryllium was detected in only five of the DPT sample locations and none of the monitoring wells. The mean of the DPT sample locations was 3.0  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.1  $\mu\text{g/L}$ .



**LEGEND:**

- 037GP015 DPT WATER SAMPLE W/ ID NUMBER
- 037A01 SHALLOW MONITORING WELL W/ ID NUMBER
- GDA03D DEEP MONITORING WELL W/ ID NUMBER



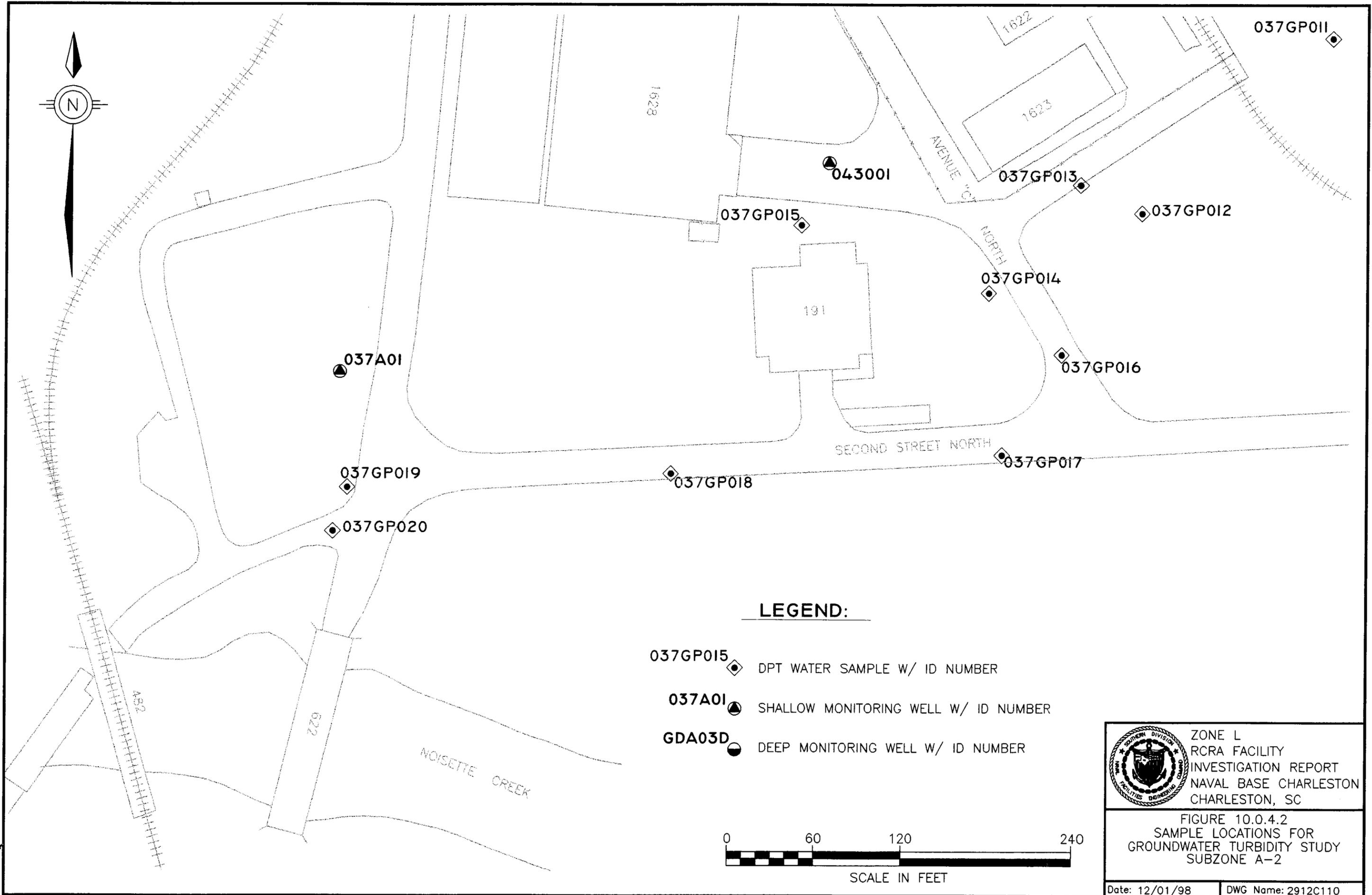
	<p>ZONE L RCRA FACILITY INVESTIGATION REPORT NAVAL BASE CHARLESTON CHARLESTON, SC</p>
	<p>FIGURE 10.0.4.1 SAMPLE LOCATIONS FOR GROUNDWATER TURBIDITY STUDY SUBZONE A-1</p>
<p>Date: 12/01/98   DWG Name: 2912C109</p>	

Statistical analysis of the thallium values in Subzone A-2 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. This analysis may be misleading because thallium was not detected in any of the DPT or monitoring wells. The mean of the DPT sample locations was 5.0  $\mu\text{g/L}$  and the mean of the monitoring wells was 2.6  $\mu\text{g/L}$ .

The DPT sample locations were not analyzed for turbidity. Table 10.0.4.5 details the results of the data in Subzone A-2. Figure 10.0.4.2 identifies the sample locations.

**Table 10.0.4.5  
 Subzone A-2 Data Comparisons**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>DPT Sample Location</b>				
037GP011	Not Taken	40.10	2.80	10.00 U
037GP012	Not Taken	40.60	2.50	10.00 U
037GP013	Not Taken	199.00	4.20	10.00 U
037GP014	Not Taken	10.00 U	2.00 U	10.00 U
037GP015	Not Taken	10.00 U	2.00 U	10.00 U
037GP016	Not Taken	64.60	2.20	10.00 U
037GP017	Not Taken	10.60	2.00 U	10.00 U
037GP018	Not Taken	10.00 U	2.00 U	10.00 U
037GP019	Not Taken	14.70	2.00 U	10.00 U
037GP020	Not Taken	116.00	13.10	10.00 U
<b>Monitoring Wells</b>				
043GW00101	0.00	18.30	0.30 U	4.80 U
043GW00106	0.00	25.20 J	0.20 U	5.00 U
043GW001A2	0.00	21.20	0.34 U	6.00 U



**LEGEND:**

- 037GP015 ◊ DPT WATER SAMPLE W/ ID NUMBER
- 037A01 ▲ SHALLOW MONITORING WELL W/ ID NUMBER
- GDA03D ● DEEP MONITORING WELL W/ ID NUMBER


 ZONE L  
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 NAVAL BASE CHARLESTON  
 CHARLESTON, SC

FIGURE 10.0.4.2  
 SAMPLE LOCATIONS FOR  
 GROUNDWATER TURBIDITY STUDY  
 SUBZONE A-2

**Subzone B**

Statistical analysis of the arsenic values in Subzone B indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 115.9  $\mu\text{g/L}$  and the mean of the monitoring wells was 5.2  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone B indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 4.5  $\mu\text{g/L}$  and the mean of the monitoring wells was 1.7  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone B indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. This analysis may be misleading because thallium was not detected in any of the DPT or monitoring wells. The mean of the DPT sample locations was 5.0  $\mu\text{g/L}$  and the mean of the monitoring wells was 12.6  $\mu\text{g/L}$ .

The DPT sample locations were not analyzed for turbidity. Table 10.0.4.6 details the results of the data in Subzone B. Figures 10.0.4.3 and 10.0.4.4 identifies the sample locations.

**Table 10.0.4.6  
 Subzone B Data Comparisons**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>DPT Sample Location</b>				
037GP001	Not Taken	52.80	2.90	10.00 U
037GP002	Not Taken	61.90	2.20	10.00 U
037GP003	Not Taken	43.70	2.00 U	10.00 U
037GP004	Not Taken	520.00	3.90	10.00 U
037GP005	Not Taken	108.00	4.80	10.00 U
037GP006	Not Taken	40.70	2.00 U	10.00 U
037GP007	Not Taken	127.00	5.10	10.00 U

**Table 10.0.4.6**  
**Subzone B Data Comparisons**

Sample ID	Turbidity (ntu)	Arsenic (µg/L)	Beryllium (µg/L)	Thallium (µg/L)
037GP008	Not Taken	44.20	11.20	10.00 U
037GP009	Not Taken	29.90	4.20	10.00 U
037GP010	Not Taken	131.00	8.60	10.00 U
<b>Monitoring Wells</b>				
GDBGW00101	0	7.60 J	1.00 U	40.00 UJ
GDBGW00102	0	2.00 U	1.00 U	15.00 U
GDBGW00103	0	15.00 U	1.00 U	15.00 U
GDBGW00104	0	21.10 U	4.80 J	31.10 U
GDBGW01D01	0	4.00 U	1.00 U	40.00 UJ
GDBGW01D02	0	2.00 U	1.00 U	15.00 U
GDBGW01D03	0	3.00 U	1.00 U	15.00 U
GDBGW01D04	0	21.10 U	5.40 J	31.10 U

**Subzone C-1**

Subzone C-1 had only one DPT groundwater location and results for arsenic, beryllium, and thallium were used as a single point comparison.

The DPT sample location was not analyzed for turbidity. Table 10.0.4.7 details the results of the data in Subzone C-1. Figure 10.0.4.5 identifies the sample locations.

**Table 10.0.4.7**  
**Subzone C-1 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic (µg/L)	Beryllium (µg/L)	Thallium (µg/L)
<b>DPT Sample Location</b>				
037GP002	Not Taken	49.40	2.10	10.00 U
<b>Monitoring Wells</b>				
037GW00101	0	49.20	0.42 U	5.00 U
037GW00102	0	41.60	5.00 U	10.00 U
037GW00201	0	2.30 J	0.34 U	5.00 U

**Table 10.0.4.7**  
**Subzone C-1 Data Comparison**

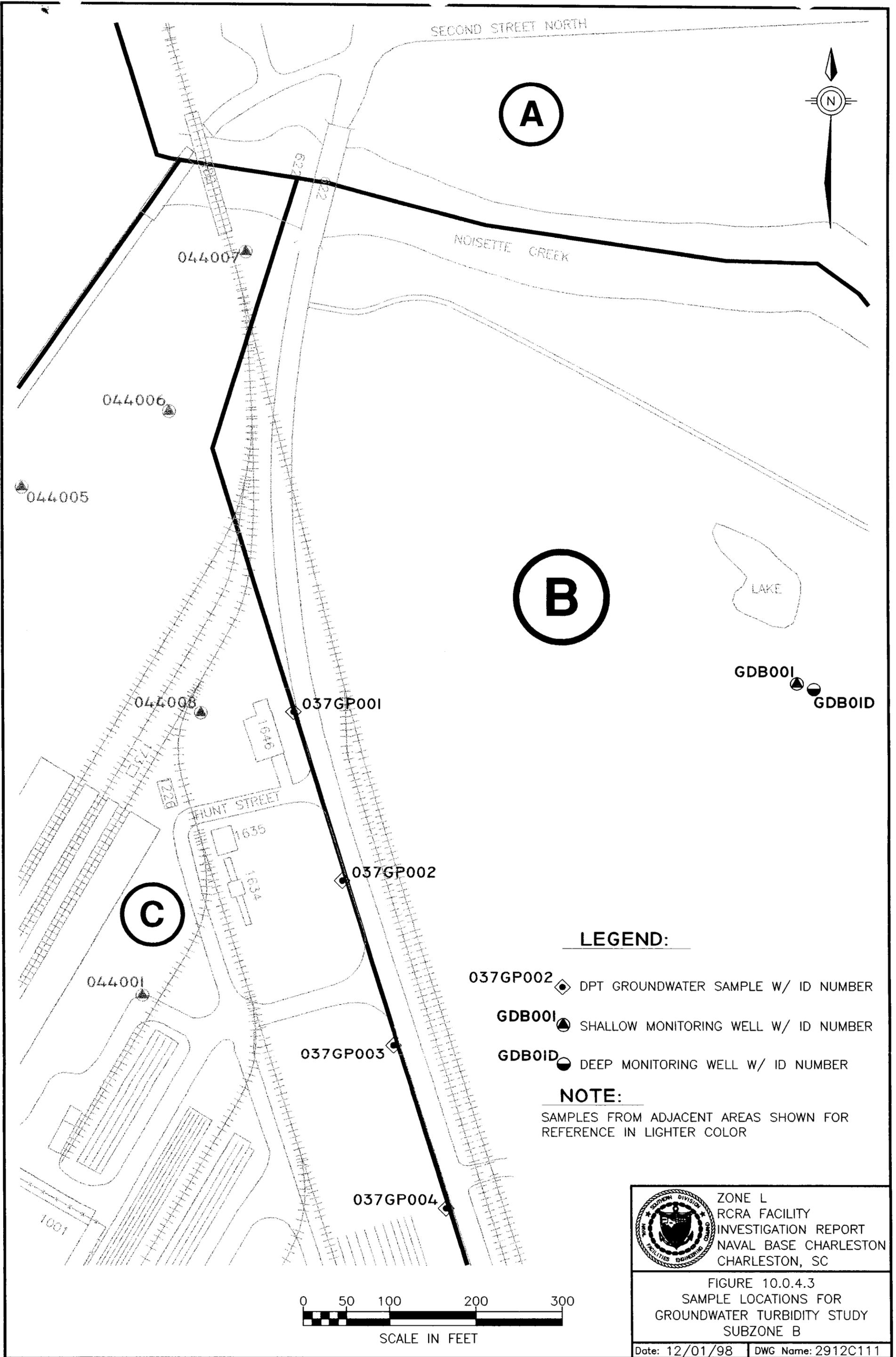
<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
037GW00202	0	10.00 U	5.00 U	10.00 U
044GW00101	0	3.90 J	21.90	4.50 U
044GW00102	4	2.50 UJ	20.80	2.70 UJ
044GW00103	8	2.50 UJ	19.80	13.60 UJ
044GW00104	2	2.50 UJ	32.90	34.50 J
044GW00105	2	6.60 J	17.50	19.90
044GW00802	10	11.50 J	0.53 J	2.70 U
044GW00803	8	7.60 J	0.30 U	2.70 UJ
044GW00804	8	22.00 U	0.36 J	2.70 UJ
044GW00805	4	7.20 J	1.70 UJ	5.00 U

**Subzone C-2**

Statistical analysis of the arsenic values in Subzone C-2 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 80.9  $\mu\text{g/L}$  and the mean of the monitoring wells was 3.4  $\mu\text{g/L}$ .

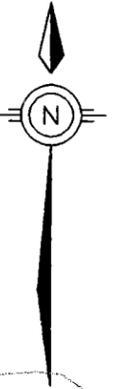
Statistical analysis of the beryllium values in Subzone C-2 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 2.8  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.2  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone C-2 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. This analysis may be misleading because thallium was not detected in any of the DPT locations and only two of the monitoring wells. The mean of the DPT locations was 5.0  $\mu\text{g/L}$  and the mean of the monitoring wells was 1.9  $\mu\text{g/L}$ .



SECOND STREET NORTH

**A**



NOISETTE CREEK

044007

044006

044005

**B**



LAKE

GDB001

GDB01D

044008

037GP001

1646

HUNT STREET

1635

1634

037GP002

**C**

044001

037GP003

037GP004

**LEGEND:**

037GP002 DPT GROUNDWATER SAMPLE W/ ID NUMBER

GDB001 SHALLOW MONITORING WELL W/ ID NUMBER

GDB01D DEEP MONITORING WELL W/ ID NUMBER

**NOTE:**

SAMPLES FROM ADJACENT AREAS SHOWN FOR REFERENCE IN LIGHTER COLOR

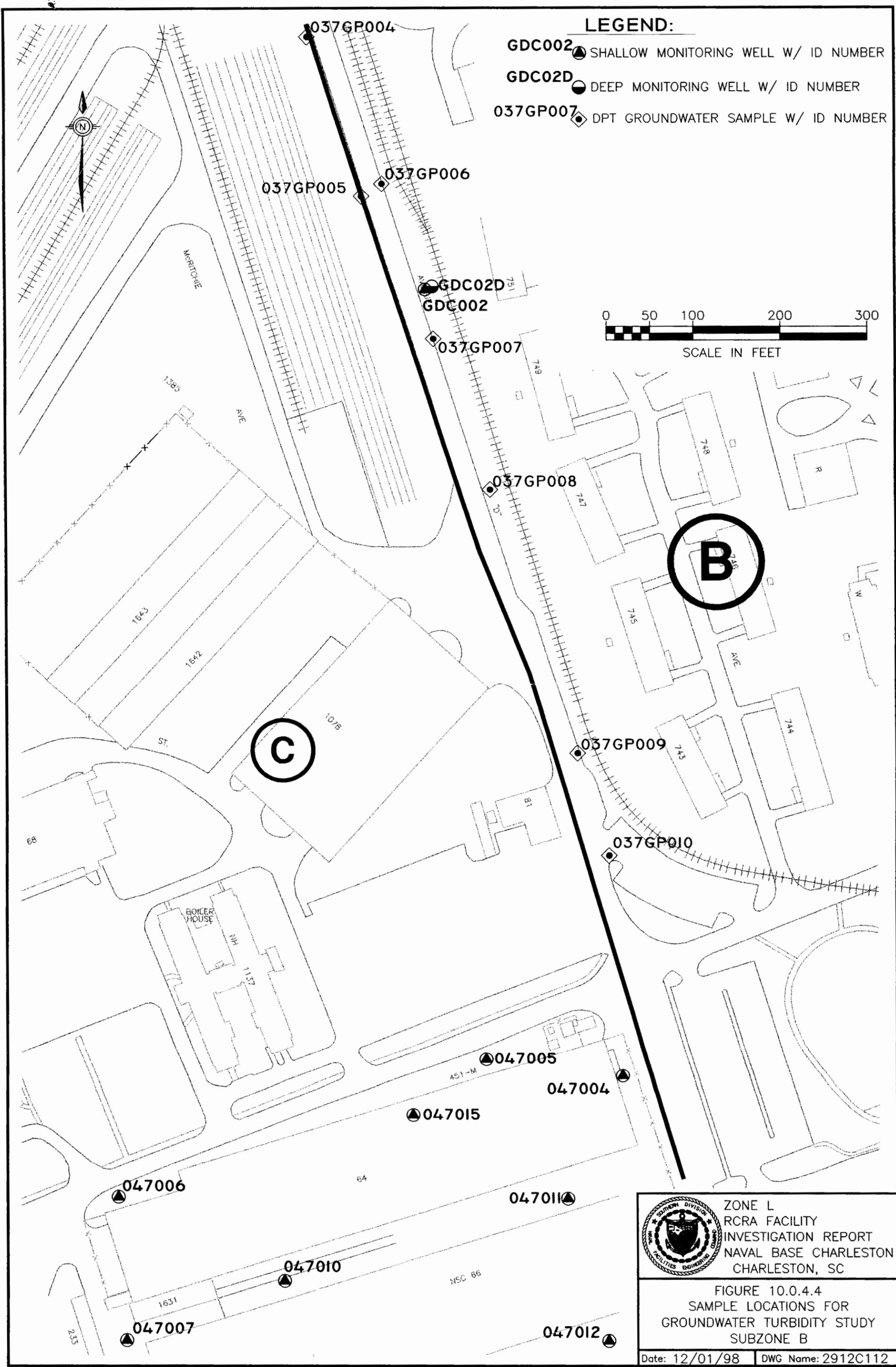


SCALE IN FEET



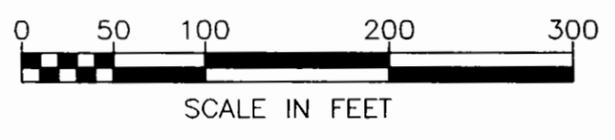
ZONE L  
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INVESTIGATION REPORT  
NAVAL BASE CHARLESTON  
CHARLESTON, SC

FIGURE 10.0.4.3  
SAMPLE LOCATIONS FOR  
GROUNDWATER TURBIDITY STUDY  
SUBZONE B



**LEGEND:**

- GDC002  SHALLOW MONITORING WELL W/ ID NUMBER
- GDC02D  DEEP MONITORING WELL W/ ID NUMBER
- 037GP007  DPT GROUNDWATER SAMPLE W/ ID NUMBER



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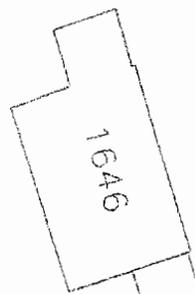
FIGURE 10.0.4.4  
SAMPLE LOCATIONS FOR  
GROUNDWATER TURBIDITY STUDY  
SUBZONE B



**B**

**C**

044008



037C01



037C02



HUNT ST.



037GP002



**LEGEND:**

037C02



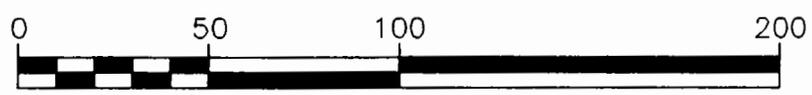
SHALLOW MONITORING WELL W/ ID NUMBER

037GP002



DPT SOIL SAMPLE W/ ID NUMBER

044001



SCALE IN FEET



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FIGURE 10.0.4.5  
SAMPLE LOCATIONS FOR  
GROUNDWATER TURBIDITY STUDY  
SUBZONE C-1

The DPT locations were not analyzed for turbidity. Table 10.0.4.8 details the results of the data in Subzone C-2. Figure 10.0.4.6 identifies the sample locations.

**Table 10.0.4.8**  
**Subzone C-2 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
<b>DPT Locations</b>				
037GP001	Not Taken	37.30	2.50	10.00 U
037GP002	Not Taken	49.40	2.10	10.00 U
037GP003	Not Taken	55.60	6.60	10.00 U
037GP004	Not Taken	80.10	2.90	10.00 U
037GP005	Not Taken	88.60	3.20	10.00 U
037GP006	Not Taken	166.00	2.60	10.00 U
037GP007	Not Taken	10.00 U	2.00 U	10.00 U
037GP008	Not Taken	169.00	8.60	10.00 U
037GP009	Not Taken	51.30	3.20	10.00 U
037GP010	Not Taken	103.00	2.00 U	10.00 U
037GP011	Not Taken	361.00	3.40	10.00 U
037GP012	Not Taken	65.60	2.20	10.00 U
037GP013	Not Taken	116.00	5.90	10.00 U
037GP13A	Not Taken	81.40	2.00 U	10.00 U
037GP014	Not Taken	10.00 U	2.00 U	10.00 U
037GP015	Not Taken	10.00 U	2.00 U	10.00 U
037GP017	Not Taken	12.10	2.00 U	10.00 U
037GP018	Not Taken	10.00 U	2.00 U	10.00 U
<b>Monitoring Wells</b>				
047GW00401	0	3.20 U	0.20 U	4.50 U
047GW00402	8	4.60 J	0.30 U	2.70 U
047GW00403	0	2.50 UJ	0.50 U	3.40 U
047GW00404	8	6.60 J	0.30 U	2.70 UJ
047GW00501	45	3.20 U	0.20 U	4.50 U
047GW00502	121	9.20 J	0.35 U	3.90 U
047GW00503	0	2.50 UJ	0.50 U	4.30 J
047GW00504	13	2.50 UJ	0.33 J	2.70 UJ

**Table 10.0.4.8**  
**Subzone C-2 Data Comparison**

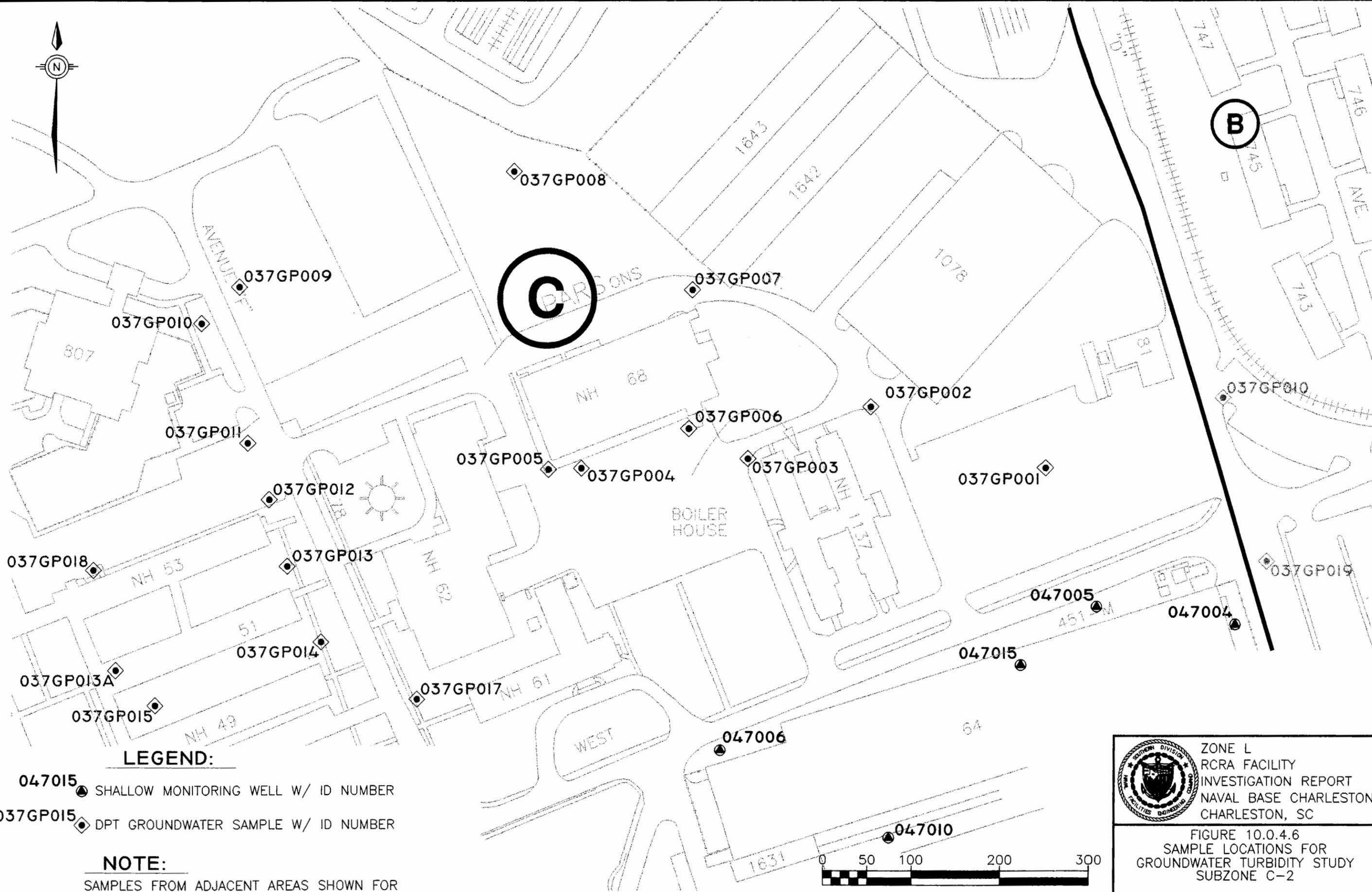
Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
047GW00601	1	7.10 J	0.20 U	4.50 U
047GW00602	2	3.80 J	0.30 U	5.10 U
047GW00603	0	2.50 UJ	0.50 U	3.40 U
047GW00604	0	4.30 J	0.30 U	2.70 UJ
047GW01001	9	3.20 U	0.20 U	4.50 U
047GW01002	5	2.50 U	0.33 U	2.70 U
047GW01003	7	2.50 UJ	0.50 U	3.40 U
047GW01004	82	2.50 UJ	0.30 U	2.70 UJ
047GW01501	2	3.90 J	0.20 U	4.50 U
047GW01502	4	6.50 J	0.34 U	2.70 U
047GW01503	1	4.50 J	0.30 U	2.80 J
047GW01504	0	6.10 UJ	0.30 U	2.70 UJ

### Subzone C-3

Statistical analysis of the arsenic values in Subzone C-3 indicates that the arsenic values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 277.3  $\mu\text{g/L}$  and the mean of the monitoring wells was 19.1  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone C-3 indicates that the beryllium values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 4.3  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.2  $\mu\text{g/L}$ . This analysis may be misleading because beryllium was not detected in any of the monitoring wells.

Statistical analysis of the thallium values in Subzone C-3 indicates that the thallium values do not differ significantly between the DPT locations and the monitoring wells. This analysis may be misleading because thallium was detected in only one of the DPT locations and only two of the



**LEGEND:**

- 047015  SHALLOW MONITORING WELL W/ ID NUMBER
- 037GP015  DPT GROUNDWATER SAMPLE W/ ID NUMBER

**NOTE:**

SAMPLES FROM ADJACENT AREAS SHOWN FOR REFERENCE IN LIGHTER COLOR



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 CHARLESTON, SC

FIGURE 10.0.4.6  
 SAMPLE LOCATIONS FOR  
 GROUNDWATER TURBIDITY STUDY  
 SUBZONE C-2

Date: 12/02/98

DWG Name: 2912C114



monitoring wells. The mean of the DPT sample locations was 7.7  $\mu\text{g/L}$  and the mean of the monitoring wells was 1.9  $\mu\text{g/L}$ .

The DPT sample locations were not analyzed for turbidity. Table 10.0.4.9 details the results of the data in Subzone C-3. Figure 10.0.4.7 identifies the sample locations.

**Table 10.0.4.9**  
**Subzone C-3 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>DPT Locations</b>				
037GP021	Not Taken	60.80	3.70	10.00 U
037GP023	Not Taken	1220.00	12.20	18.30
037GP024	Not Taken	10.00 U	2.00 U	10.00 U
037GP022	Not Taken	10.00 U	2.00 U	10.00 U
037GP22A	Not Taken	95.70	3.80	10.00 U
<b>Monitoring Wells</b>				
047GW00201	0	9.20 J	0.20 U	4.50 U
047GW00202	3	10.50	0.30 U	2.70 U
047GW00203	3	9.00 J	0.30 U	2.70 UJ
047GW00204	0	12.00 J	0.30 U	3.90 J
047GW00301	2	3.20 U	0.20 U	4.50 U
047GW00302	4	2.50 U	0.30 U	2.70 U
047GW00303	0	2.50 UJ	0.30 U	2.70 UJ
047GW00701	5	3.20 U	0.20 U	4.50 U
047GW00702	5	2.50 U	0.30 U	2.70 U
047GW00703	0	2.50 UJ	0.50 U	3.90 J
047GW00704	0	2.50 UJ	0.30 U	2.70 UJ
047GW00801	0	3.20 U	0.20 U	4.50 U
047GW00802	2	2.50 U	0.32 U	2.70 U
047GW00803	4	2.50 UJ	0.50 U	3.40 U
047GW00804	8	2.50 UJ	0.30 U	2.70 UJ
047GW00901	0	3.20 U	0.20 U	4.50 U
047GW00902	4	2.50 U	0.30 U	4.60 U

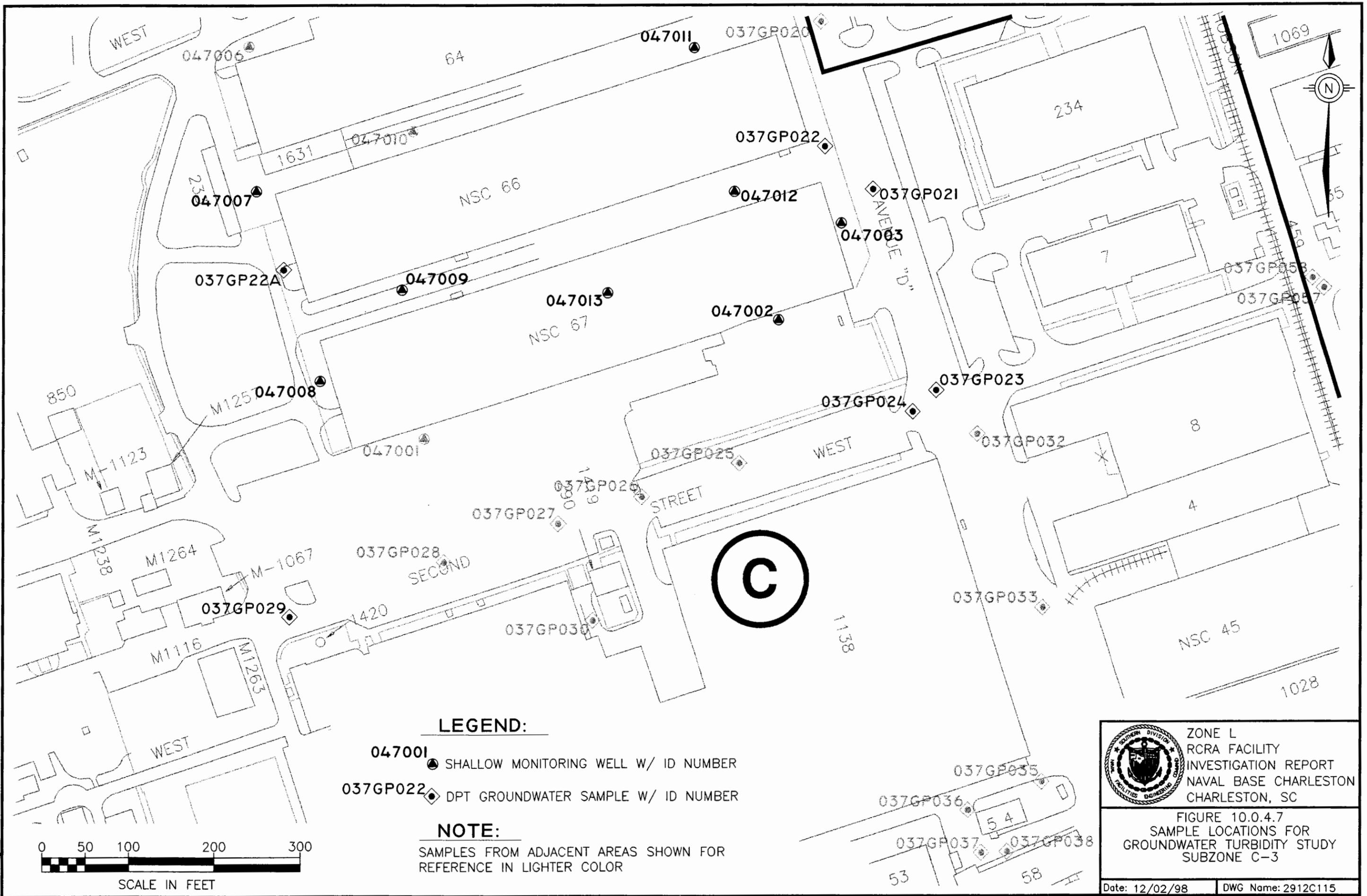
**Table 10.0.4.9**  
**Subzone C-3 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
047GW00903	4	2.50 UJ	0.50 U	3.40 U
047GW00904	10	2.50 UJ	0.30 U	2.70 UJ
047GW01101	12	46.30	0.20 U	4.50 U
047GW01102	6	164.00	0.30 U	2.70 U
047GW01103	6	159.00	0.50 U	3.40 U
047GW01104	0	120.00	0.30 U	2.70 UJ
047GW01201	9	3.20 U	0.20 U	4.50 U
047GW01202	9	15.00	0.30 U	5.80 U
047GW01203	8	5.60 J	0.30 U	2.70 UJ
047GW01204	0	21.10 U	0.30 U	2.70 UJ
047GW01301	3	3.20 U	0.20 U	4.50 U
047GW01302	6	2.50 U	0.30 U	3.40 U
047GW01303	0	3.60 J	0.30 U	2.70 U
047GW01304	0	5.80 UJ	0.30 U	2.70 UJ

**Subzone C-4**

Statistical analysis of the arsenic values in Subzone C-4 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 173.0  $\mu\text{g/L}$  and the mean of the monitoring wells was 10.2  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone C-4 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 12.7  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.2  $\mu\text{g/L}$ . This analysis may be misleading because beryllium was detected in only one of the monitoring wells.



**LEGEND:**

- 047001 ● SHALLOW MONITORING WELL W/ ID NUMBER
- 037GP022 ◆ DPT GROUNDWATER SAMPLE W/ ID NUMBER

**NOTE:**

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FIGURE 10.0.4.7  
SAMPLE LOCATIONS FOR  
GROUNDWATER TURBIDITY STUDY  
SUBZONE C-3

Statistical analysis of the thallium values in Subzone C-4 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 13.7  $\mu\text{g/L}$  and the mean of the monitoring wells was 1.9  $\mu\text{g/L}$ . This analysis may be misleading because thallium was detected in only one of the monitoring wells.

The DPT sample locations were not analyzed for turbidity. Table 10.0.4.10 details the results of the data in Subzone C-4. Figure 10.0.4.8 identifies the sample locations.

**Table 10.0.4.10**  
**Subzone C-4 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>DPT Locations</b>				
037GP025	Not Taken	32.20	3.70	10.00
037GP026	Not Taken	1080.00	47.40	14.40
037GP027	Not Taken	53.50	5.00 U	11.20
037GP028	Not Taken	58.50	2.70	10.00
037GP029	Not Taken	59.20	2.90	10.00
037GP030	Not Taken	250.00	8.00	10.00
037GP031	Not Taken	406.00	63.40	10.50
037GP032	Not Taken	68.00	5.00 U	10.00
037GP033	Not Taken	108.00	15.90	16.00
037GP034	Not Taken	31.60	5.00 U	10.00
037GP035	Not Taken	67.80	9.40	17.60
037GP036	Not Taken	54.90	8.50	14.80
037GP037	Not Taken	104.00	7.50	21.20
037GP038	Not Taken	35.80	5.00 U	10.60
037GP039	Not Taken	186.00	11.80	29.90
<b>Monitoring Wells</b>				
047GW00101	0	6.10 J	0.20 U	4.50 U
047GW00102	1	10.90	0.30 U	2.70 U
047GW00103	5	7.50 J	0.30 U	2.70 UJ
047GW00104	0	8.60 J	0.30 U	2.70 UJ

**Table 10.0.4.10**  
**Subzone C-4 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
523GW00101	10	16.60	0.46 U	4.50 U
523GW00102	6	6.00 J	0.32 J	2.70 U
523GW00103	6	2.50 UJ	0.50 U	4.30 J
523GW00104	0	2.50 UJ	0.30 U	2.70 UJ
523GW00201	29	26.60	0.20 U	4.50 U
523GW00202	5	21.10	0.30 U	3.70 U
523GW00203	0	10.50 J	0.50 U	3.40 U
523GW00204	0	10.80 UJ	0.30 U	2.70 UJ

**Subzone E-1**

Statistical analysis of the turbidity values in Subzone E-1 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 417.5 ntu and the mean of the monitoring wells was 18.1 ntu.

Statistical analysis of the arsenic values in Subzone E-1 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 21.1  $\mu\text{g/L}$  and the mean of the monitoring wells was 6.5  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone E-1 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 1.5  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.3  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone E-1 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 5.3  $\mu\text{g/L}$  and the mean of the monitoring wells was 2.3  $\mu\text{g/L}$ .

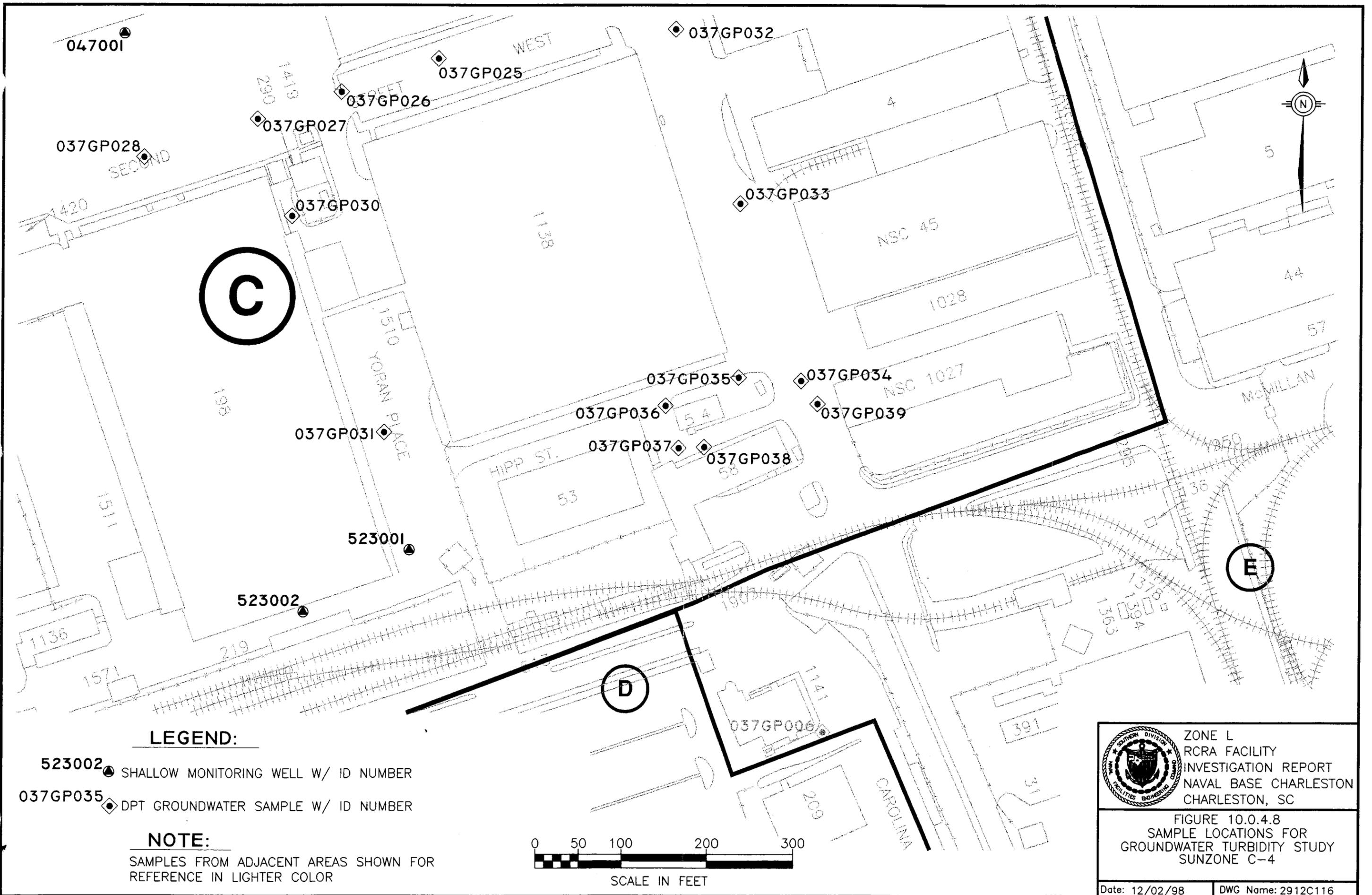


Table 10.0.4.11 details the results of the data in Subzone E-1. Figure 10.0.4.9 identifies the sample locations.

**Table 10.0.4.11**  
**Subzone E-1 Data Comparisons**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>DPT Locations</b>				
037GP059	242	10.00 U	2.00 U	10.00 U
037GP061	102	14.60	2.00 U	10.00 U
037GP062	70	20.40	2.00 U	10.00 U
037GP063	89	41.30	2.20	10.00 U
037GP064	39	10.00 U	2.00 U	10.00 U
037GP066	999	25.20	2.00 U	10.00 U
037GP067	777	18.60	2.00 U	10.00 U
037GP068	999	17.00	2.00 U	10.00 U
037GP069	Not Taken	10.00 U	2.00 U	10.00 U
037GP070	380	15.70	2.00 U	10.00 U
037GP071	117	10.00 U	2.00 U	10.00 U
037GP072	999	14.30	2.40	10.00 U
037GP073	458	13.60	2.00 U	10.00 U
037GP074	616	216.00	6.60	12.80
037GP075	101	10.00 U	2.00 U	10.00 U
037GP076	261	10.00 U	2.20	10.00 U
037GP077	55	10.00 U	2.00 U	10.00 U
037GP078	826	37.70	3.20	10.00 U
037GP079	515	29.50	2.90	10.00 U
699GP075	176	10.00 U	2.00 U	10.00 U
699GP077	558	11.60	2.00 U	10.00 U
699GP078	227	18.00	2.00 U	10.00 U
699GP079	417	17.20	2.00	10.00 U
699GP080	731	11.10	2.00 U	10.00 U
699GP081	424	20.60	2.00 U	10.00 U

**Table 10.0.4.11**  
**Subzone E-1 Data Comparisons**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
699GP082	14	10.00 U	2.00 U	10.00 U
699GP083	821	10.00 U	2.00 U	10.00 U
699GP084	236	10.00 U	2.00 U	10.00 U
699GP085	442	13.40	2.00 U	10.00 U
<b>Monitoring Wells</b>				
021GW00101	2	5.00 U	1.00 U	5.00 U
021GW00102	0	2.50 U	0.38 J	4.60 U
021GW00201	0	19.50	1.00 U	5.00 U
021GW00202	81	26.10	0.87 U	2.70 U
021GW00301	1	5.00 U	1.00 U	5.00 U
021GW00302	0	2.60 J	0.43 U	2.70 U
021GW00303	2	2.50 U	0.30 U	3.20 J
021GW00304	1	2.10 UJ	0.20 U	5.00 U
023GW00101	8	5.00 U	1.00 U	5.00 U
023GW00102	88	4.90 U	0.61 U	2.70 U
023GW00103	9	2.50 U	0.30 U	2.70 UJ
023GW00104	25	2.10 U	0.21 J	5.00 U
023GW01D01	0	5.00 U	1.00 U	5.00 U
023GW01D02	0	2.50 U	0.30 U	2.70 U
023GW01D03	0	2.50 U	0.30 U	2.70 UJ
023GW01D04	0	3.20 J	0.20 U	5.00 U
053GW00101	5	9.40 J	1.00 U	5.00 U
053GW00102	4	8.80 U	0.30 U	2.70 U
053GW00103	147	14.30	0.85 U	4.80 J
053GW00104	5	5.90 J	0.23 J	6.00 U
054GW00101	5	5.00 U	1.00 U	5.00 U
054GW00102	6	2.50 U	0.30 U	2.70 U
054GW00201	9	5.00 U	1.00 U	5.00 J
054GW00202	4	3.30 U	0.53 J	4.80 U
054GW00203	7	3.70 J	0.30 U	3.60 J

**Table 10.0.4.11**  
**Subzone E-1 Data Comparisons**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
054GW00204	7	2.10 UJ	0.33 J	5.00 U
054GW00301	3	6.00 J	1.00 U	5.00 U
054GW00302	2	4.20 U	0.30 U	2.70 U
063GW00101	3	5.00 U	1.00 U	5.00 U
063GW00102	0	6.90 J	0.39 U	2.70 U
063GW00103	3	5.60 J	0.47 U	5.30 J
063GW00104	2	2.10 UJ	0.20 U	5.00 U
063GW00201	7	7.40 J	1.00 U	5.00 U
063GW00202	5	13.70	0.50 U	2.70 U
063GW00203	216	5.60 J	0.50 U	5.70 J
063GW00204	9	2.20 J	0.20 U	5.00 U
065GW00101	0	5.00 U	1.00 U	5.00 U
065GW00102	2	4.60 U	0.36 U	4.60 U
065GW00103	3	6.40 J	0.39 U	2.70 U
065GW00104	0	5.70 J	0.20 U	5.00 U
065GW00301	205	22.60	1.20 J	5.00 U
065GW00302	8	10.70 U	0.44 U	2.70 U
065GW00303	6	3.50 J	0.30 U	2.70 UJ
065GW00304	0	7.30 J	0.20 U	5.00 U
065GW00401	4	58.80	2.00 J	5.00 U
065GW00402	0	6.40 J	0.40 J	2.70 U
065GW00403	1	2.50 U	0.30 U	2.70 UJ
065GW00404	0	2.10 U	0.20 U	5.00 U
065GW00501	9	12.70	1.00 U	5.00 U
065GW00502	141	23.30 J	0.37 J	3.70 U
065GW00503	5	18.50	0.30 U	2.70 UJ
065GW00504	2	12.80	0.27 J	5.00 U
065GW00601	34	5.00 U	1.00 U	5.00 U
065GW00602	2	2.60 U	0.34 U	3.10 U
065GW00603	6	2.80 J	0.44 U	2.70 U

**Table 10.0.4.11**  
**Subzone E-1 Data Comparisons**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
065GW00604	78	2.20 J	0.20 U	5.00 U
065GW00701	1	7.80 J	0.39 U	3.50 U
065GW00704	1	4.00 J	0.20 U	5.00 U
065GW007A2	1	2.10 U	0.20 UJ	5.00 U
065GW007A3	3	6.80 J	0.20 UJ	5.00 U
065GW00801	4	16.20	0.39 U	2.90 U
065GW00804	2	25.50	0.20 U	5.00 U
065GW008A2	4	15.10	0.20 UJ	5.00 U
065GW008A3	12	30.70	0.23 UJ	5.00 U
065GW04D01	3	22.80	1.00 U	5.00 U
065GW04D02	0	19.00 J	0.35 J	2.70 U
065GW04D03	0	17.70	0.30 U	2.70 UJ
065GW04D04	1	44.00	0.20 U	5.00 U
067GW00203	10	2.50 U	0.30 U	4.00 J
067GW00204	10	2.10 UJ	0.20 U	5.00 U
525GW00101	2	5.00 U	1.00 U	5.00 U
525GW00102	3	2.50 U	0.30 U	2.70 U
525GW00103	2	2.50 U	0.30 U	2.70 UJ
525GW00104	2	11.70	0.20 U	5.00 U
526GW00101	1	5.00 U	1.00 U	5.00 U
526GW00102	1	3.40 U	0.30 U	2.70 U
526GW00103	1	5.20 U	0.34 U	4.70 U
526GW00104	0	2.10 J	0.20 U	5.00 U
526GW00201	10	5.00 U	1.00 U	5.00 U
526GW00202	34	9.60 U	0.39 U	2.70 U
526GW00203	17	4.90 U	0.41 U	2.70 U
526GW00204	23	5.20 J	0.20 U	5.00 U
526GW01D01	0	5.00 U	1.00 U	5.00 U
526GW01D02	0	2.50 U	0.36 U	2.90 U
526GW01D03	0	3.30 U	0.39 U	2.70 U

**Table 10.0.4.11**  
**Subzone E-1 Data Comparisons**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
526GW01D04	0	2.10 UJ	0.21 J	5.00 U
528GW00101	7	9.60 J	1.00 U	5.00 U
528GW00102	0	2.50 U	0.30 U	2.70 U
528GW00103	2	2.50 U	0.39 U	2.70 U
528GW00104	2	2.50 U	0.30 U	2.70 U
542GW00101	48	5.00 U	1.00 U	5.00 U
542GW00102	14	2.50 UJ	0.50 U	2.70 U
542GW00103	7	2.50 U	0.30 U	3.30 J
542GW00104	7	2.10 UJ	0.20 U	5.00 U
542GW00201	6	5.00 U	1.00 U	5.00 U
542GW00202	0	3.90 J	0.50 U	2.70 U
542GW00203	0	4.60 J	0.30 U	2.70 UJ
542GW00204	0	2.10 UJ	0.20 U	6.70 U
542GW00301	110	5.00 U	1.00 U	5.00 U
542GW00302	6	5.00 J	0.50 U	4.20 J
542GW00303	9	3.60 J	0.30 U	2.70 UJ
542GW00304	9	2.10 UJ	0.20 U	5.00 U
542GW00401	707	17.40	1.00 U	5.00 U
542GW00402	10	21.90	0.50 U	2.70 U
542GW00403	75	22.30	0.30 U	3.30 J
542GW00404	75	16.80 J	0.20 U	5.00 U
543GW00101	7	5.00 U	1.00 U	5.00 U
543GW00102	5	2.50 UJ	0.45 U	2.70 U
543GW00103	8	5.60 J	0.32 J	2.70 UJ
543GW00104	9	2.10 UJ	0.20 U	5.00 U
550GW00101	3	18.50	1.00 U	5.00 U
550GW00102	6	19.90	0.32 U	2.70 U
550GW00103	1	93.20	0.30 U	4.00 J
550GW00104	1	55.90	0.20 U	5.00 U
GDEGW01901	338	5.00 U	1.00 U	5.00 U

**Table 10.0.4.11**  
**Subzone E-1 Data Comparisons**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
GDEGW01902	18	3.70 J	0.30 U	2.70 U
GDEGW01903	12	4.60 J	0.34 J	4.10 U
GDEGW01904	56	2.60 J	0.35 J	5.60 U
GDEGW02001	9	5.00 U	1.00 U	5.00 U
GDEGW02002	8	2.50 U	0.30 U	2.70 U
GDEGW02003	10	2.50 UJ	0.30 U	2.70 UJ
GDEGW02004	7	2.50 U	0.30 U	2.70 UJ
GDEGW02101	41	5.00 U	1.00 U	5.00 U
GDEGW02102	6	2.50 U	0.30 U	2.70 U
GDEGW02103	3	8.70 J	0.30 U	5.90 UJ
GDEGW02104	6	2.50 U	0.30 J	2.70 UJ
GDEGW02201	0	6.70 J	1.00 U	5.00 U
GDEGW02202	1	3.70 J	0.50 U	3.20 J
GDEGW02203	1	3.10 J	0.30 U	3.00 UJ
GDEGW02204	2	2.50 U	0.31 J	2.70 UJ
GDEGW02301	4	5.00 U	1.00 U	5.00 U
GDEGW02302	0	2.50 UJ	0.50 U	4.10 J
GDEGW02303	0	2.50 U	0.30 U	2.80 U
GDEGW02304	0	2.80 J	0.30 U	4.20 U
GDEGW02401	8	5.00 U	1.00 U	5.00 U
GDEGW02402	62	2.70 J	0.50 U	2.70 U
GDEGW02403	15	5.80 U	0.68 U	2.70 U
GDEGW02404	3	2.50 U	0.30 U	3.10 U
GDEGW02501	0	5.00 U	1.00 U	5.00 U
GDEGW02502	0	2.50 UJ	0.50 U	2.70 U
GDEGW02503	0	3.60 J	0.33 J	2.70 UJ
GDEGW02504	0	2.50 U	0.30 U	2.70 U
GDEGW19D01	1	5.00 U	1.00 U	5.00 U
GDEGW19D02	0	2.50 U	0.30 U	2.70 U
GDEGW19D03	1	2.50 U	0.30 U	6.80 U

**Table 10.0.4.11**  
**Subzone E-1 Data Comparisons**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
GDEGW19D04	2	2.50 U	0.30 U	4.80 U
GDEGW20D01	0	5.00 U	1.00 U	5.00 U
GDEGW20D02	1	2.50 U	0.30 U	2.70 U
GDEGW20D03	1	2.50 UJ	0.30 U	2.70 UJ
GDEGW20D04	0	2.50 U	0.30 U	2.70 UJ
GDEGW21D01	2	5.00 U	1.00 U	5.00 U
GDEGW21D02	0	2.50 U	0.30 U	2.70 U
GDEGW21D03	1	2.50 UJ	0.30 U	4.20 UJ
GDEGW21D04	0	2.50 U	0.38 J	2.70 UJ
GDEGW22D01	1	5.00 U	1.00 U	5.00 U
GDEGW22D02	0	2.50 UJ	0.50 U	3.60 J
GDEGW22D03	0	3.20 J	0.39 J	3.60 UJ
GDEGW22D04	0	2.50 U	0.46 J	2.90 UJ
GDEGW23D01	0	5.00 U	1.00 U	5.00 U
GDEGW23D02	0	3.20 J	0.50 U	6.00 J
GDEGW23D03	0	2.50 U	0.61 J	3.80 U
GDEGW23D04	5	2.90 J	0.38 U	4.00 U
GDEGW24D01	1	5.00 U	1.00 U	5.00 U
GDEGW24D02	0	12.50 J	0.50 U	4.50 J
GDEGW24D03	0	15.50	0.93 U	4.70 U
GDEGW24D04	0	11.40	0.30 U	5.20 U
GDEGW25D01	0	5.00 U	1.00 U	5.00 U
GDEGW25D02	0	2.50 UJ	0.46 U	2.70 U
GDEGW25D03	0	4.20 J	0.31 J	7.40 J
GDEGW25D04	0	2.50 U	0.30 U	2.70 U



**Subzone E-2**

Statistical analysis of the turbidity values in Subzone E-2 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 477.6 ntu and the mean of the monitoring wells was 3.4 ntu.

Statistical analysis of the arsenic values in Subzone E-2 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 21.6  $\mu\text{g/L}$  and the mean of the monitoring wells was 6.3  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone E-2 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 1.3  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.3  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone E-2 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 5.4  $\mu\text{g/L}$  and the mean of the monitoring wells was 2.4  $\mu\text{g/L}$ .

Table 10.0.4.12 details the results of the data in Subzone E-2. Figure 10.0.4.10 identifies the sample locations.

**Table 10.0.4.12  
 Subzone E-2 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>DPT Locations</b>				
037GP055	630	10.00 U	2.00 U	10.00 U
037GP056	667	20.60	2.00 U	10.00 U
037GP057	630	26.70	3.40	10.00 U
037GP058	81	19.80	2.00 U	10.00 U
037GP065	659	10.00 U	2.00 U	10.00 U

**Table 10.0.4.12**  
**Subzone E-2 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
037GP080	312	11.60	2.00 U	10.00 U
037GP081	999	10.00 U	2.00 U	10.00 U
037GP082	736	21.30	2.00 U	10.00 U
037GP083	112	24.00	2.00 U	10.00 U
037GP084	48	10.00 U	2.00 U	10.00 U
037GP085	499	26.50	2.00 U	10.00 U
037GP086	999	49.00	4.80	10.00 U
037GP087	520	10.00 U	2.00 U	10.00 U
037GP088	543	32.10	2.00 U	10.00 U
037GP089	26	10.00 U	2.00 U	10.00 U
037GP090	137	13.20	2.00 U	10.00 U
037GP091	999	10.00 U	2.00 U	10.00 U
037GP091	Not Taken	15.90	2.00 U	10.00 U
037GP093	999	20.50	2.00 U	10.00 U
037GP094	903	129.00	4.40	10.00 U
037GP095	355	43.90	3.90	14.00
037GP096	897	27.60	2.00 U	10.00 U
699GP034	999	27.00	2.00 U	10.00 U
699GP067	182	10.00 U	2.00 U	10.00 U
699GP068	43	10.00 U	2.00 U	10.00 U
699GP069	Not Taken	10.00 U	2.00 U	10.00 U
699GP070	999	10.00 U	2.00 U	10.00 U
699GP071	327	19.80	2.00 U	10.00 U
699GP072	330	10.20	2.00 U	10.00 U
699GP073	830	20.80	2.00 U	10.00 U
699GP074	324	10.00 U	2.00 U	10.00 U
699GP076	369	10.00 U	2.00 U	10.00 U
699GP086	11	10.00 U	2.00 U	10.00 U
699GP087	160	47.90	2.00 U	10.00 U
699GP088	168	60.30	2.00 U	10.00 U

**Table 10.0.4.12**  
**Subzone E-2 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
699GP089	204	10.00 U	2.00 U	10.00 U
699GP090	Not Taken	19.10	2.00 U	10.00 U
699GP091	87	12.40	2.00 U	10.00 U
699GP092	417	61.50	2.00 U	13.70
699GP093	508	10.00 U	2.00 U	10.00 U
699GP094	440	46.00	2.40	22.10
<b>Monitoring Wells</b>				
025GW00101	6	5.00 U	1.00 U	5.00 U
025GW00102	8	2.50 U	0.40 U	2.80 U
025GW00103	5	2.50 U	0.69 U	2.70 U
025GW00104	8	2.50 U	0.30 U	3.30 J
025GW00301	5	5.00 U	1.00 U	5.00 U
025GW00302	0	3.00 J	0.30 U	2.70 UJ
025GW00303	7	4.10 U	0.56 U	6.00 U
025GW00304	10	3.00 J	0.30 U	3.10 J
025GW00401	7	5.00 U	1.00 U	5.00 U
025GW00402	0	2.50 U	0.30 U	2.70 UJ
025GW00403	9	2.70 U	0.59 U	2.70 U
025GW00404	10	2.80 J	0.30 U	4.50 J
067GW00103	9	14.10	0.30 U	2.70 UJ
067GW00104	8	7.20 J	0.20 U	5.00 U
067GW00203	10	2.50 U	0.30 U	4.00 J
067GW00204	10	2.10 UJ	0.20 U	5.00 U
070GW00101	33	5.00 U	1.00 U	5.00 U
070GW00102	0	4.30 J	0.33 J	3.70 UJ
070GW00103	3	2.50 U	0.30 U	3.20 J
070GW00104	9	2.10 UJ	0.20 U	5.00 U
070GW00201	5	5.70 J	1.00 U	5.00 U
070GW00202	0	3.10 J	0.32 J	2.70 UJ
070GW00203	8	2.50 U	0.32 J	2.70 UJ

**Table 10.0.4.12**  
**Subzone E-2 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
070GW00204	9	2.10 UJ	0.20 U	5.00 U
070GW01D01	6	12.50	1.00 U	9.50 J
070GW01D02	0	12.80	0.30 U	10.00 UJ
070GW01D03	2	5.00 J	0.30 U	10.60 J
070GW01D04	1	6.40 J	0.20 U	10.30 U
530GW00101	1	24.20	0.32 J	2.70 U
530GW00102	6	9.70 U	0.31 J	2.70 U
530GW00103	4	7.10 J	0.32 J	4.40 J
530GW00104	10	8.40 J	0.20 U	5.00 U
530GW00201	0	2.70 U	0.30 U	3.10 U
530GW00202	9	5.90 U	0.32 J	2.70 U
530GW00203	10	2.70 J	0.33 U	2.90 J
530GW00204	10	2.90 J	0.20 U	5.00 U
530GW01D01	1	2.50 U	0.43 J	2.70 U
530GW01D02	6	2.50 U	0.36 J	3.30 U
530GW01D03	5	2.50 U	0.30 U	3.50 J
530GW01D04	6	2.10 U	0.26 J	5.00 U
530GW02D01	0	2.90 U	0.30 U	3.40 U
530GW02D02	10	2.50 U	0.30 U	2.70 U
530GW02D03	1	2.50 U	0.35 U	3.80 J
530GW02D04	0	2.10 UJ	0.20 U	5.00 U
538GW00101	0	60.10	1.00 U	5.00 U
538GW00102	0	67.00	0.50 U	3.80 J
538GW00103	0	53.10	0.30 U	2.70 UJ
538GW00104	1	56.70	0.20 U	5.00 U
538GW01D01	1	6.80 U	1.00 U	5.00 U
538GW01D02	0	3.80 J	0.50 U	2.70 U
538GW01D03	1	3.20 J	0.30 U	3.90 J
538GW01D04	1	4.20 J	0.20 U	5.00 U
539GW00101	6	5.00 U	1.00 U	5.00 U

**Table 10.0.4.12**  
**Subzone E-2 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
539GW00102	0	2.50 U	0.36 J	3.90 UJ
539GW00103	9	2.50 U	0.50 U	3.50 J
539GW00104	13	2.10 UJ	0.20 U	5.00 U
539GW01D01	1	5.00 U	1.00 U	5.00 U
539GW01D02	0	2.50 U	0.33 J	2.90 UJ
539GW01D03	0	2.50 U	0.36 U	2.80 J
539GW01D04	0	2.10 UJ	0.20 U	5.00 U
549GW00101	3	7.90 J	1.00 U	5.00 U
549GW00102	0	17.10	0.30 U	2.70 U
549GW00103	1	11.00	0.30 U	2.70 U
549GW00104	0	13.40	0.30 U	3.40 J
549GW00201	0	5.00 U	1.00 U	5.00 U
549GW00202	0	5.30 J	0.30 U	2.70 U
549GW00203	3	4.70 J	0.30 U	5.10 U
549GW00204	8	5.40 J	0.30 U	2.70 U
549GW00301	6	5.00 U	1.00 U	5.00 U
549GW00302	0	2.50 U	0.32 J	3.00 UJ
549GW00303	9	2.50 U	0.30 U	2.70 U
549GW00304	7	2.50 U	0.30 U	4.10 J
551GW00101	0	5.00 U	1.00 U	5.00 U
551GW00102	0	2.50 U	0.63 U	5.90 U
551GW00103	1	2.50 U	0.53 U	3.30 U
551GW00104	0	2.50 U	0.30 U	3.10 J
551GW00201	0	5.00 U	1.00 U	5.00 U
551GW00202	2	2.50 U	0.34 U	2.70 U
551GW00203	2	2.80 U	0.51 U	3.50 U
551GW00204	1	2.50 U	0.30 U	4.40 J
551GW02D01	0	21.20	1.00 U	5.00 U
551GW02D02	0	22.30	0.38 U	2.70 U
551GW02D03	0	15.40	0.30 U	2.70 UJ

**Table 10.0.4.12**  
**Subzone E-2 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
551GW02D04	2	25.40	0.30 U	2.70 U
GDEGW01701	1	5.00 U	1.00 U	5.00 U
GDEGW01702	0	4.30 J	0.31 J	2.70 UJ
GDEGW01703	2	4.20 J	0.30 U	2.70 U
GDEGW01704	2	2.90 J	0.30 U	4.60 U
GDEGW01801	3	6.60 U	0.30 U	2.70 U
GDEGW01802	4	9.30 J	0.30 U	3.80 U
GDEGW01803	2	7.50 J	0.30 U	2.70 UJ
GDEGW01804	6	7.40 J	0.35 U	2.70 U
GDEGW02601	3	6.80 J	0.85 J	2.70 U
GDEGW02604	3	2.10 U	0.20 U	5.00 U
GDEGW026A2	0	2.10 U	0.26 J	5.00 U
GDEGW026A3	3	2.10 U	0.55 UJ	5.00 U
GDEGW02701	4	23.30	0.35 J	3.10 U
GDEGW02704	4	4.10 J	0.20 U	5.00 U
GDEGW027A2	4	7.50 J	0.20 UJ	5.00 U
GDEGW027A3	0	2.10 U	0.38 UJ	5.00 U
GDEGW17D01	1	9.90 J	1.00 U	5.00 U
GDEGW17D02	0	7.70 J	0.30 U	2.70 UJ
GDEGW17D03	0	6.60 J	0.33 J	2.70 U
GDEGW17D04	0	4.00 J	0.30 U	3.60 U
GDEGW18D01	0	2.50 U	0.31 J	2.70 U
GDEGW18D02	1	2.50 U	0.37 J	2.70 U
GDEGW18D03	0	2.50 UJ	0.39 J	2.70 UJ
GDEGW18D04	1	2.50 U	0.35 U	2.70 U
GDEGW26D01	2	2.80 J	0.30 U	2.70 U
GDEGW26D04	2	2.10 U	0.20 U	5.00 U
GDEGW26DA2	2	2.10 U	0.23 J	5.00 U
GDEGW26DA3	0	2.10 U	0.42 UJ	7.20 U
GDEGW27D01	1	2.50 U	0.36 J	3.60 U

**Table 10.0.4.12**  
**Subzone E-2 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
GDEGW27D04	1	2.10 U	0.20 U	5.00 U
GDEGW27DA2	1	2.10 U	0.20 UJ	5.00 U
GDEGW27DA3	0	2.10 U	0.41 UJ	5.70 U

**Subzone E-3**

Statistical analysis of the turbidity values in Subzone E-3 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 624.5 ntu and the mean of the monitoring wells was 16.4 ntu.

Statistical analysis of the arsenic values in Subzone E-3 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 116.4  $\mu\text{g/L}$  and the mean of the monitoring wells was 10.3  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone E-3 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 14.6  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.3  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone E-3 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 12.6  $\mu\text{g/L}$  and the mean of the monitoring wells was 2.0  $\mu\text{g/L}$ .



Table 10.0.4.13 details the results of the data in Subzone E-3. Figure 10.0.4.11 identifies the sample locations.

**Table 10.0.4.13  
 Subzone E-3 Data Comparisons**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (µg/L)</b>	<b>Beryllium (µg/L)</b>	<b>Thallium (µg/L)</b>
<b>DPT Locations</b>				
037GP045	84	10.00 U	5.00 U	10.00 U
037GP049	905	31.10	2.00 U	10.00 U
037GP050	273	256.00	12.60	21.80
037GP051	106	10.00 U	2.00 U	10.00 U
037GP052	394	268.00	5.20	12.20
037GP053	999	29.50	2.00 U	10.00 U
037GP054	999	194.00	15.30	26.00
037GP097	940	47.80	3.00	10.10
699GP022	320	19.70	5.00 U	10.00 U
699GP023	339	39.70	5.00 U	10.00 U
699GP031	975	86.50	5.70	10.00 U
699GP032	999	19.30	5.00 U	10.00 U
699GP033	999	17.30	2.00 U	10.00 U
699GP095	999	115.00	8.40	37.90
699GP30A	37	10.00 U	2.00 U	10.00 U
037GP001	Not Taken	231.00	12.70	13.00
037GP002	Not Taken	89.80	5.90	10.00 U
037GP003	Not Taken	153.00	19.20	31.20
037GP004	Not Taken	54.20	4.10	10.00 U
037GP005	Not Taken	75.90	5.00 U	10.00 U
037GP006	Not Taken	242.00	23.80	43.60
037GP007	Not Taken	452.00	100.00 U	13.80
037GP008	Not Taken	80.50	20.00	10.00 U
037GP009	Not Taken	37.00	6.80	10.00 U
037GP010	Not Taken	581.00	188.00	52.20
037GP011	Not Taken	28.80	3.50	10.00 U

**Table 10.0.4.13**  
**Subzone E-3 Data Comparisons**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
037GP012	Not Taken	82.00	5.20	10.00 U
037GP013	Not Taken	14.30	2.00 U	10.00 U
<b>Monitoring Wells</b>				
559GW00101	10	5.00 UJ	1.00 U	5.00 U
559GW00102	0	2.50 U	0.32 J	2.70 UJ
559GW00103	5	2.50 U	0.35 J	2.70 U
559GW00104	0	2.50 U	0.33 J	2.70 UJ
559GW00201	0	2.50 U	0.32 J	4.30 U
559GW00202	0	2.70 J	0.30 J	2.70 UJ
559GW00203	1	4.20 J	0.30 U	3.70 UJ
559GW00204	1	3.10 J	0.34 J	2.70 UJ
559GW00301	4	8.60 J	1.00 U	5.00 U
559GW00302	5	5.50 J	0.30 U	2.70 UJ
559GW00303	3	2.80 J	0.30 U	4.10 U
559GW00304	32	4.80 J	0.30 U	4.40 U
559GW00401	7	11.90 J	1.00 U	5.00 U
559GW00402	1	17.20	0.30 U	2.70 U
559GW00403	1	14.90	0.30 U	4.70 U
559GW00404	4	18.60	0.30 U	6.30 U
559GW00501	59	5.00 UJ	1.00 U	5.00 U
559GW00502	11	2.50 U	0.30 J	3.10 UJ
559GW00503	21	4.10 J	0.30 U	3.10 U
559GW00504	10	4.00 J	0.30 U	4.70 U
559GW02D01	0	2.50 UJ	0.30 U	2.70 UJ
559GW02D02	0	4.00 J	0.34 J	2.70 UJ
559GW02D03	0	2.50 U	0.30 U	2.70 UJ
559GW02D04	1	3.70 J	0.30 U	3.40 U
559GW03D01	0	3.50 J	0.30 U	3.90 J
559GW03D02	3	3.80 J	0.30 U	2.70 UJ
559GW03D03	2	3.70 J	0.30 U	3.30 U

**Table 10.0.4.13**  
**Subzone E-3 Data Comparisons**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
559GW03D04	3	4.80 J	0.30 U	3.60 U
559GW04D01	4	11.40 J	0.30 U	2.70 UJ
559GW04D02	4	18.00	0.30 U	2.70 U
559GW04D03	0	20.20	0.30 U	5.30 U
559GW04D04	1	16.50	0.30 U	4.20 U
563GW00301	0	5.80 J	1.00 U	5.00 U
563GW00302	0	2.50 U	0.30 U	2.70 U
563GW00303	0	2.50 U	0.44 J	4.20 U
563GW00304	0	2.50 U	0.35 J	2.70 UJ
569GW00101	0	5.00 UJ	1.00 U	5.00 U
569GW00102	0	2.50 U	0.99 U	3.70 U
569GW00103	5	2.50 UJ	0.95 J	2.70 UJ
569GW00104	4	2.50 U	0.76 J	2.70 UJ
569GW00201	6	5.00 UJ	1.00 U	5.00 U
569GW00202	0	2.50 U	0.31 U	2.70 U
569GW00203	2	2.50 UJ	0.30 U	3.40 UJ
569GW00204	0	2.50 U	0.31 J	2.70 UJ
569GW01D01	0	5.30 J	0.30 U	5.50 J
569GW01D02	0	3.20 U	0.35 U	2.70 U
569GW01D03	0	4.40 J	0.30 U	2.70 UJ
569GW01D04	0	2.70 J	0.32 J	2.70 UJ
570GW00101	1	2.50 U	0.71 J	2.70 U
570GW00102	9	2.50 U	1.30 U	2.70 U
570GW00103	0	2.50 UJ	0.79 J	2.70 UJ
570GW00104	0	2.50 U	0.69 J	4.70 U
570GW00201	78	40.20	2.00 U	5.00 U
570GW00202	61	8.50 U	1.00 U	2.70 U
570GW00203	517	13.50	0.80 J	2.70 U
570GW00204	236	8.90 J	0.67 J	5.90 U
570GW00301	1	5.00 UJ	1.00 U	5.00 U

**Table 10.0.4.13  
Subzone E-3 Data Comparisons**

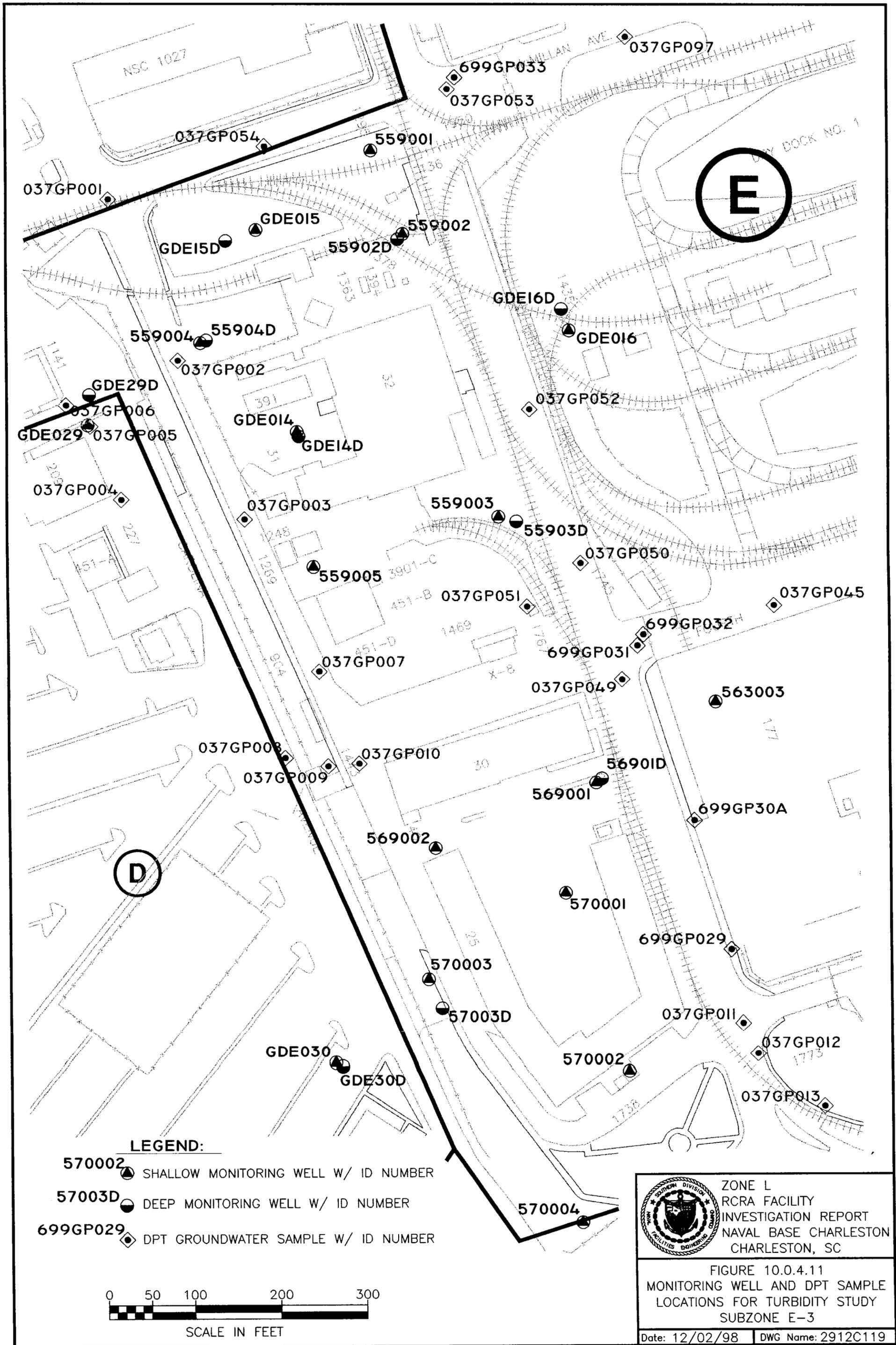
<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
570GW00302	0	2.50 U	0.45 U	2.70 U
570GW00303	0	2.50 UJ	0.30 U	2.70 UJ
570GW00304	0	2.50 U	0.31 J	2.70 UJ
570GW00401	14	5.70 J	0.59 J	2.70 UJ
570GW00404	14	2.10 U	0.20 U	5.00 U
570GW004A2	14	2.10 U	0.38 J	5.00 U
570GW004A3	6	2.10 U	0.27 UJ	5.00 U
570GW03D01	0	2.50 UJ	0.30 U	2.70 UJ
570GW03D02	0	2.50 U	0.38 U	2.70 U
570GW03D03	1	2.50 U	0.30 U	2.70 U
570GW03D04	2	2.50 U	0.30 U	2.70 UJ
GDEGW01401	156	16.40 J	1.00 U	5.00 U
GDEGW01402	7	33.80	0.36 J	2.70 UJ
GDEGW01403	60	20.00	0.35 J	2.70 UJ
GDEGW01404	304	14.40	0.32 U	3.40 U
GDEGW01501	1	5.00 UJ	1.00 U	5.00 U
GDEGW01502	1	14.90 U	0.37 U	4.70 U
GDEGW01503	0	11.10	0.78 U	2.70 UJ
GDEGW01504	1	7.50 J	0.37 U	3.00 U
GDEGW01601	1	55.80	1.00 U	5.00 U
GDEGW01602	1	85.30	0.30 U	2.70 UJ
GDEGW01603	0	70.30	0.31 J	2.70 U
GDEGW01604	3	33.80	0.30 U	9.10 U
GDEGW02901	5	20.50	0.30 UJ	2.70 UJ
GDEGW02904	5	9.20 J	0.20 U	5.00 U
GDEGW029A2	5	6.70 J	0.20 UJ	5.00 U
GDEGW029A3	0	13.00	0.20 UJ	5.00 U
GDEGW03001	10	3.80 U	0.39 J	3.50 U
GDEGW03004	10	2.10 U	0.20 U	5.00 U
GDEGW030A2	10	2.10 U	0.20 UJ	5.00 U

**Table 10.0.4.13**  
**Subzone E-3 Data Comparisons**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
GDEGW030A3	0	2.10 U	0.20 UJ	5.00 U
GDEGW14D01	1	7.90 J	1.00 U	5.00 U
GDEGW14D02	0	11.70 U	0.31 U	5.10 U
GDEGW14D03	0	9.20 J	0.30 U	3.60 J
GDEGW14D04	0	5.40 J	0.32 U	3.90 U
GDEGW15D01	1	29.10	0.30 U	4.70 J
GDEGW15D02	1	34.50	0.30 U	2.70 UJ
GDEGW15D03	0	37.30	0.30 U	4.40 J
GDEGW15D04	2	38.80	0.30 U	3.90 U
GDEGW16D01	1	10.60	1.00 U	5.00 U
GDEGW16D02	1	13.90	0.30 U	3.20 U
GDEGW16D03	0	10.70	0.30 U	2.70 U
GDEGW16D04	5	6.20 J	0.30 U	4.20 U
GDEGW29D01	2	32.00	0.30 UJ	2.70 UJ
GDEGW29D04	2	39.90	0.20 U	5.00 U
GDEGW29DA2	2	33.70	0.20 UJ	5.00 U
GDEGW29DA3	0	37.30	0.20 UJ	7.00 U
GDEGW30D01	1	5.00 U	0.37 J	2.70 U
GDEGW30D04	1	4.50 J	0.20 U	5.00 U
GDEGW30DA2	1	4.10 J	0.20 UJ	5.00 U
GDEGW30DA3	1	3.60 J	0.20 UJ	5.00 U

**Subzone E-4**

Statistical analysis of the turbidity values in Subzone E-4 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 434.0 ntu and the mean of the monitoring wells was 13.8 ntu.



**LEGEND:**

- 570002  SHALLOW MONITORING WELL W/ ID NUMBER
- 57003D  DEEP MONITORING WELL W/ ID NUMBER
- 699GP029  DPT GROUNDWATER SAMPLE W/ ID NUMBER



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

FIGURE 10.0.4.11  
MONITORING WELL AND DPT SAMPLE  
LOCATIONS FOR TURBIDITY STUDY  
SUBZONE E-3

Statistical analysis of the arsenic values in Subzone E-4 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 44.5  $\mu\text{g/L}$  and the mean of the monitoring wells was 15.8  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone E-4 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 2.8  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.5  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone E-4 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 6.4  $\mu\text{g/L}$  and the mean of the monitoring wells was 2.3  $\mu\text{g/L}$ .

Table 10.0.4.2.14 details the results of the data in Subzone E-4. Figure 10.0.4.12 identifies the sample locations.

**Table 10.0.4.14**  
**Subzone E-4 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>DPT Locations</b>				
037GP022	105	60.60	4.50	12.80
037GP036	437	21.60	2.20	10.00 U
037GP039	351	29.90	2.00 U	10.00 U
037GP040	453	10.00 U	2.00 U	10.00 U
037GP041	321	10.00 U	2.00 U	10.00 U
037GP042	365	10.00 U	2.00 U	10.00 U
037GP043	999	42.10	2.00 U	10.00 U
037GP044	506	10.00 U	2.00 U	10.00 U
037GP046	999	51.20	5.00 U	10.00 U
037GP047	999	29.30	5.00 U	10.00 U

**Table 10.0.4.14**  
**Subzone E-4 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
037GP048	271	32.20	4.30	10.00 U
037GP098	106	34.40	2.00 U	10.00 U
037GP103	950	10.00 U	2.00 U	10.00 U
037GP16A	303	58.20	9.80	10.00 U
037GP17A	118	31.40	3.80	10.00 U
037GP18A	119	10.00 U	2.00 U	10.00 U
037GP22A	282	49.70	5.40	10.00 U
037GP23A	100	150.00	3.80	10.00 U
037GP24A	121	10.00 U	2.00 U	10.00 U
699GP016	761	10.00 U	2.00 U	10.00 U
699GP017	168	10.50	2.00 U	10.00 U
699GP018	445	10.00 U	2.00 U	10.00 U
699GP019	117	10.00 U	2.00 U	10.00 U
699GP020	36	10.00 U	2.00 U	10.00 U
699GP021	527	10.00 U	5.00 U	10.00 U
699GP024	282	31.40	5.00 U	10.00 U
699GP025	999	60.90	5.00 U	10.00 U
699GP026	815	13.70	5.00 U	10.00 U
699GP027	359	350.00	14.30	46.80
699GP028	356	14.30	5.00 U	10.00 U
699GP029	140	19.80	2.00 U	10.00 U
699GP035	72	86.00	4.00	10.00 U
699GP036	178	33.00	2.00 U	10.00 U
699GP037	510	10.00 U	2.00 U	10.00 U
699GP039	568	36.70	4.40	10.00 U
699GP042	23	10.00	2.00 U	10.00 U
699GP043	2	88.20	4.00	10.00 U
699GP044	998	23.20	2.70	10.00 U
699GP045	728	20.60	3.00	10.00 U

**Table 10.0.4.14**  
**Subzone E-4 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
699GP046	999	14.20	2.00 U	10.00 U
699GP047	508	19.50	2.20	10.00 U
699GP048	630	31.40	2.90	10.00 U
699GP049	283	75.90	2.00 U	10.00 U
699GP053	347	10.00 U	2.60	10.00 U
699GP054	294	10.00 U	2.00 U	10.00 U
699GP055	242	16.00	3.00	10.00 U
699GP056	320	10.00 U	3.00	10.00 U
699GP057	212	10.00 U	2.00 U	10.00 U
699GP058	474	17.70	2.70	10.00 U
699GP059	133	13.90	2.00 U	10.00 U
699GP060	399	15.00	2.00 U	10.00 U
699GP061	999	180.00	5.90	10.00 U
699GP062	316	10.00 U	2.00 U	10.00 U
699GP063	909	49.40	3.00	10.00 U
699GP064	999	75.90	3.50	10.00 U
699GP066	250	572.00	19.60	36.00
037GP017	Not Taken	10.00 U	2.00 U	10.00 U
699GP038	Not Taken	17.70	2.00 U	10.00 U
<b>Monitoring Wells</b>				
083GW00201	10	7.70 J	1.00 U	5.00 U
083GW00202	0	10.50 J	0.47 U	2.70 U
083GW00203	6	12.90 J	0.30 U	2.70 UJ
083GW00204	6	2.90 J	0.30 U	2.70 U
084GW00101	3	5.00 U	1.00 U	5.00 U
084GW00102	3	2.50 U	0.47 U	2.70 U
084GW00103	3	2.50 UJ	0.30 U	2.70 UJ
084GW00104	2	2.50 U	0.34 U	2.70 U
084GW00201	3	35.50	1.00 U	5.00 U
084GW00202	1	44.70	0.32 U	2.70 U

**Table 10.0.4.14**  
**Subzone E-4 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
084GW00203	2	46.30	0.30 U	8.20 J
084GW00204	1	38.40	0.30 U	2.70 U
097GW00101	0	31.50	1.00 U	5.00 U
097GW00102	5	38.70	0.30 U	2.70 UJ
097GW00103	7	4.00 J	0.30 UJ	2.70 UJ
097GW00104	0	2.50 UJ	0.30 U	3.90 U
145GW00103	0	2.50 U	1.10 U	2.70 U
145GW00104	3	2.50 U	0.79 U	2.70 UJ
145GW00203	0	3.90 J	1.20 U	2.70 U
145GW00204	4	8.80 U	0.77 U	2.70 UJ
145GW00303	4	2.90 J	0.79 U	5.50 U
145GW00304	4	2.50 U	1.10 U	2.70 UJ
145GW01D03	0	45.50	1.20 U	9.00 U
145GW01D04	0	98.60	0.85 U	7.00 UJ
172GW00101	0	5.00 U	1.00 U	5.00 U
172GW00102	0	4.90 J	0.53 U	2.70 U
172GW00103	1	5.30 J	0.30 U	2.70 UJ
172GW00104	0	6.90 J	0.32 U	3.10 U
172GW00201	10	5.10 J	1.00 U	5.00 U
172GW00202	13	10.10 U	0.96 U	2.70 U
172GW00203	15	15.80	0.32 J	2.70 UJ
172GW00204	13	6.50 J	0.47 U	2.70 U
172GW02D01	0	18.50	1.00 U	5.00 U
172GW02D02	0	24.20	0.70 U	2.70 U
172GW02D03	0	33.00	0.31 J	4.00 J
172GW02D04	0	28.90	0.43 U	3.40 U
563GW00101	367	34.40	1.00 U	5.00 U
563GW00102	770	31.80	0.75 U	2.70 U
563GW00103	393	37.90	0.30 J	2.70 UJ
563GW00104	56	25.20	0.31 J	2.70 UJ
563GW00201	8	26.70	1.00 U	5.00 U

**Table 10.0.4.14**  
**Subzone E-4 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
563GW00202	0	32.90	0.60 U	2.70 U
563GW00203	22	36.50	0.30 U	3.80 U
563GW00204	10	25.20	0.35 J	2.70 UJ
563GW01D01	1	5.00 U	1.00 U	5.00 U
563GW01D02	0	3.40 U	0.55 U	2.70 U
563GW01D03	0	6.40 J	0.30 U	2.70 UJ
563GW01D04	0	2.90 J	0.30 U	2.70 UJ
566GW00101	0	5.00 U	1.00 J	5.00 U
566GW00102	0	6.30 U	1.20 J	2.70 UJ
566GW00103	10	2.50 U	1.70 U	2.70 UJ
566GW00104	0	2.50 U	2.10 J	5.80 J
566GW01D01	0	62.70	1.00 U	5.00 U
566GW01D02	3	67.80	0.42 J	2.70 UJ
566GW01D03	9	74.60	0.64 U	2.70 UJ
566GW01D04	0	73.70	0.38 J	5.30 J
572GW00101	37	5.40 J	1.00 U	5.00 U
572GW00102	7	8.60 U	0.72 U	2.70 U
572GW00103	7	11.90	0.30 U	3.10 J
572GW00104	6	12.50	0.30 U	10.80 U
572GW00201	0	5.00 U	1.00 U	5.00 U
572GW00202	6	3.50 U	0.83 U	4.90 J
572GW00203	7	2.50 U	0.30 U	2.70 U
572GW00204	0	2.50 U	0.30 U	5.40 U
572GW00301	6	5.00 U	1.00 U	5.00 U
572GW00302	0	7.50 U	0.67 U	5.70 U
572GW00303	7	2.50 U	0.30 U	2.70 U
572GW00304	1	2.50 U	0.30 U	4.90 U
573GW00101	3	5.00 U	1.00 U	5.00 U
573GW00102	1	2.50 U	0.38 U	3.20 J
573GW00103	2	2.50 U	0.30 U	4.80 U
573GW00104	1	2.50 U	0.36 U	3.80 U

**Table 10.0.4.14**  
**Subzone E-4 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
573GW01D01	2	5.00 U	1.00 U	5.00 U
573GW01D02	3	4.40 U	0.79 U	2.70 U
573GW01D03	2	2.50 U	0.30 U	4.00 U
573GW01D04	2	2.50 U	0.33 U	2.70 U
574GW00101	2	5.00 U	1.00 U	5.00 U
574GW00102	0	6.40 U	0.50 J	3.40 J
574GW00103	1	2.50 U	0.81 U	2.70 UJ
574GW00104	2	3.40 U	0.30 U	2.70 U
574GW00201	0	5.00 U	1.00 U	5.00 U
574GW00202	0	4.70 U	0.50 J	2.70 UJ
574GW00203	0	3.00 J	0.66 U	2.70 UJ
574GW00204	1	2.50 U	0.30 U	2.70 U
574GW00301	3	5.00 U	1.00 U	5.00 U
574GW00302	0	2.50 UJ	1.10 U	2.70 U
574GW00303	23	22.40	0.69 U	2.70 UJ
574GW00304	7	19.20	0.30 U	2.70 U
574GW01D01	3	67.50	1.00 U	5.00 U
574GW01D02	0	70.70	0.80 J	8.30 J
574GW01D03	0	74.10	0.84 U	2.70 UJ
574GW01D04	2	79.40	0.30 U	4.10 J
576GW00101	1	5.00 U	3.00 J	5.00 U
576GW00102	0	2.50 U	2.50 J	2.70 UJ
576GW00103	5	3.60 J	3.20 J	2.70 UJ
576GW00104	7	2.50 U	2.30 J	4.60 J
576GW00201	5	5.00 U	1.00 U	5.00 U
576GW00202	6	4.00 U	0.80 J	2.70 UJ
576GW00203	8	2.50 U	1.30 U	2.70 UJ
576GW00204	0	2.50 U	0.79 J	5.30 J
576GW02D01	0	35.10	1.00 U	5.00 U
576GW02D02	0	51.70	0.34 J	2.70 UJ
576GW02D03	1	58.00	0.85 U	4.00 UJ

**Table 10.0.4.14**  
**Subzone E-4 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
576GW02D04	0	22.80	0.30 U	2.70 U
580GW00101	0	5.00 U	1.00 U	5.00 U
580GW00102	0	2.50 U	0.38 J	4.50 J
580GW00103	10	2.50 U	0.73 U	2.70 UJ
580GW00104	0	2.50 U	0.48 U	2.70 UJ
580GW00201	2	8.30 J	1.00 U	5.00 U
580GW00202	0	9.70 J	0.30 U	2.70 UJ
580GW00203	0	15.60	1.20 U	6.90 U
580GW00204	0	8.60 U	0.30 U	2.90 UJ
580GW01D01	0	84.40	1.00 U	5.00 U
580GW01D02	0	96.60	0.30 U	2.70 UJ
580GW01D03	10	110.00	0.64 U	4.10 UJ
580GW01D04	0	98.70	0.31 U	5.60 UJ
583GW00101	0	5.00 U	1.00 U	5.00 U
583GW00102	0	4.10 U	0.36 J	2.70 UJ
583GW00103	7	2.50 U	0.30 UJ	2.70 UJ
583GW00104	3	2.50 UJ	0.82 J	2.70 U
583GW00201	0	5.00 U	1.00 U	5.00 U
583GW00202	0	2.80 U	0.32 J	2.70 UJ
583GW00203	1	2.50 U	0.32 U	7.00 U
583GW00204	0	2.90 J	0.77 J	2.70 U
583GW00301	1	5.00 U	1.00 U	5.00 U
583GW00302	0	2.50 U	0.53 J	5.40 J
583GW00303	0	2.50 U	0.49 U	2.70 U
583GW00304	2	2.50 UJ	0.63 J	2.70 U
583GW02D01	1	15.60	1.00 U	5.00 U
583GW02D02	0	15.30 U	0.55 J	5.50 J
583GW02D03	0	16.50	0.46 U	5.60 U
583GW02D04	1	13.30 J	0.76 J	2.70 U
GDEGW01201	8	5.00 U	1.00 U	5.30 J
GDEGW01202	9	3.20 U	0.96 U	2.70 U

**Table 10.0.4.14**  
**Subzone E-4 Data Comparison**

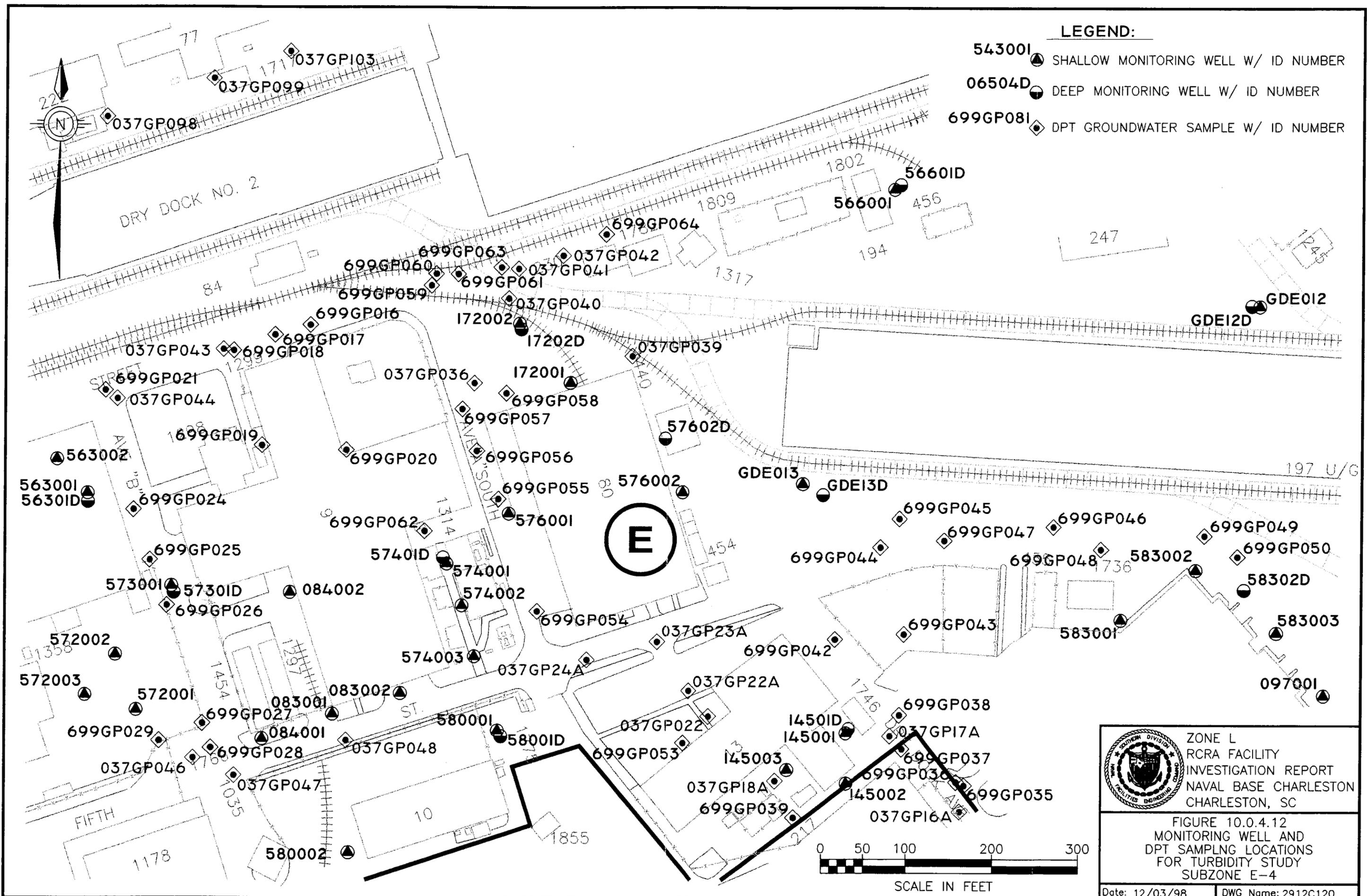
<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
GDEGW01203	9	2.50 U	0.79 U	4.30 UJ
GDEGW01204	10	2.50 U	0.51 J	2.70 U
GDEGW01301	2	5.00 U	1.00 U	5.00 U
GDEGW01302	1	3.10 U	0.82 U	3.40 J
GDEGW01303	1	2.50 U	0.83 U	2.70 UJ
GDEGW01304	2	2.50 U	0.30 U	3.90 J
GDEGW12D01	0	10.40	1.00 U	5.00 U
GDEGW12D02	0	13.30 U	0.68 U	2.70 U
GDEGW12D03	0	16.40	0.82 U	3.50 UJ
GDEGW12D04	6	13.80 U	0.30 U	2.70 U
GDEGW13D01	0	5.50 J	1.00 U	5.00 U
GDEGW13D02	9	2.50 U	0.80 U	3.40 J
GDEGW13D03	0	10.10	0.90 U	3.90 UJ
GDEGW13D04	3	9.20 U	0.34 J	2.70 J

**Subzone E-5**

Statistical analysis of the turbidity values in Subzone E-5 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 3.13 ntu and the mean of the monitoring wells was 18.5 ntu.

Statistical analysis of the arsenic values in Subzone E-5 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 49.5  $\mu\text{g/L}$  and the mean of the monitoring wells was 12.8  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone E-5 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 4.2  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.5  $\mu\text{g/L}$ .



**LEGEND:**

- 54300I ● SHALLOW MONITORING WELL W/ ID NUMBER
- 06504D ● DEEP MONITORING WELL W/ ID NUMBER
- 699GP08I ◆ DPT GROUNDWATER SAMPLE W/ ID NUMBER



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FIGURE 10.0.4.12  
 MONITORING WELL AND  
 DPT SAMPLING LOCATIONS  
 FOR TURBIDITY STUDY  
 SUBZONE E-4

Statistical analysis of the thallium values in Subzone E-5 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 7.9  $\mu\text{g/L}$  and the mean of the monitoring wells was 2.4  $\mu\text{g/L}$ .

Table 10.0.4.15 details the results of the data in Subzone E-5. Figure 10.0.4.13 identifies the sample locations.

**10.0.4.15  
 Subzone E-5 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
<b>DPT Locations</b>				
037GP019	400	29.90	2.60	10.10
037GP020	118	34.80	2.20	10.00 U
037GP022	105	60.60	4.50	12.80
037GP024	160	10.50	2.80	11.40
037GP027	68	10.00 U	2.00 U	10.00 U
037GP028	45	10.00 U	2.00 U	10.00 U
037GP030	999	158.00	2.30	16.10
037GP031	Not Taken	64.40	2.00 U	10.00 U
037GP033	626	237.00	22.10	14.50
037GP034	237	43.90	2.50	10.20
699GP005	999	139.00	13.80	10.00 U
699GP006	233	178.00	8.40	11.40
699GP007	276	70.40	2.00 U	10.00 U
699GP008	18	29.40	2.00 U	10.00 U
699GP009	101	10.60	2.00 U	10.40
699GP010	197	16.50	2.00 U	10.00 U
699GP011	72	25.60	2.00	10.00 U
699GP012	379	10.00 U	2.00 U	10.00 U
699GP013	59	29.00	2.00 U	10.00 U
699GP014	261	10.00 U	2.00 U	10.00 U
699GP015	72	14.70	2.00 U	10.00 U

**10.0.4.15**  
**Subzone E-5 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
699GP041	115	25.00	2.00 U	10.00 U
699GP051	390	14.90	11.60	19.20
699GP052	999	19.90	19.00	10.00 U
037GP021	Not Taken	13.30	2.00 U	10.20
699GP040	Not Taken	41.00	2.20	10.00 U
<b>Monitoring Wells</b>				
100GW00101	1	20.60	1.00 U	5.00 UJ
100GW00102	0	22.30	0.63 U	3.60 U
100GW00103	0	12.20	0.30 U	2.70 UJ
100GW00104	0	13.50	0.39 U	2.70 UJ
102GW00101	0	5.10 J	1.00 U	5.00 U
102GW00102	0	5.40 J	0.62 U	2.70 U
102GW00103	1	8.40 J	0.30 U	3.10 J
102GW00104	0	2.50 UJ	0.30 U	2.70 U
586GW00101	1	11.40	1.00 U	5.00 U
586GW00102	0	27.70	0.30 U	2.70 UJ
586GW00103	2	23.80	0.30 U	2.70 UJ
586GW00104	0	10.60 J	0.30 U	2.70 U
590GW00101	0	19.90	1.00 U	5.00 U
590GW00102	0	37.60	0.30 U	2.70 UJ
590GW00103	0	25.40	0.30 U	2.70 UJ
590GW00104	0	28.50	0.30 U	4.50 J
590GW01D01	0	5.00 U	1.30 J	5.00 UJ
590GW01D02	0	2.50 U	0.70 J	2.70 UJ
590GW01D03	0	3.80 J	0.57 J	3.10 J
590GW01D04	0	3.80 J	1.20 U	5.20 J
GDEGW00501	0	5.00 U	1.00 U	5.00 U
GDEGW00502	1	2.50 U	0.45 J	5.80 J
GDEGW00503	3	2.50 U	0.44 J	5.40 J
GDEGW00504	3	2.50 U	0.30 U	3.40 U

**10.0.4.15  
 Subzone E-5 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
GDEGW00601	0	18.70	1.00 U	5.00 U
GDEGW00602	0	17.00 U	0.42 J	2.70 UJ
GDEGW00603	2	10.90 U	0.36 J	5.00 U
GDEGW00604	0	7.60 J	0.30 U	2.70 U
GDEGW00901	0	9.40 J	1.00 U	5.00 U
GDEGW00902	0	12.10 J	0.57 U	2.70 U
GDEGW00903	2	10.00	0.30 U	2.70 UJ
GDEGW00904	0	10.20	0.30 U	2.70 UJ
GDEGW01001	1	7.20 J	1.00 U	5.00 U
GDEGW01002	2	6.10 U	0.52 U	5.00 J
GDEGW01003	1	4.90 J	0.81 U	4.90 U
GDEGW01004	0	4.60 U	0.32 U	4.50 UJ
GDEGW01101	0	6.10 J	1.00 U	5.00 U
GDEGW01102	1	3.30 U	0.63 U	2.70 U
GDEGW01103	3	12.30	0.97 U	5.90 UJ
GDEGW01104	9	10.50 U	0.78 U	2.70 UJ
GDEGW05D01	0	5.00 U	1.00 J	5.00 U
GDEGW05D02	5	3.90 U	0.79 J	2.70 UJ
GDEGW05D03	339	4.00 J	1.00 U	5.60 U
GDEGW05D04	203	5.00 J	1.20 J	2.90 U
GDEGW06D01	8	5.00 U	1.00 U	5.00 U
GDEGW06D02	2	2.50 U	1.10 J	2.80 J
GDEGW06D03	270	2.70 J	1.30 U	3.80 U
GDEGW06D04	217	3.70 J	1.30 J	3.10 U
GDEGW09D01	7	77.50	1.00 U	5.00 UJ
GDEGW09D02	8	64.20	1.20 U	2.70 U
GDEGW09D03	3	84.20	0.60 J	6.30 J
GDEGW09D04	6	85.30	0.40 U	2.70 UJ
GDEGW10D01	0	5.00 U	1.00 U	5.00 U
GDEGW10D02	2	2.50 U	0.89 U	2.70 UJ

**10.0.4.15**  
**Subzone E-5 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
GDEGW10D03	0	2.50 U	1.90 U	5.70 U
GDEGW10D04	2	3.10 U	1.20 U	4.40 UJ
GDEGW11D01	0	5.00 U	1.00 U	5.00 U
GDEGW11D02	2	2.50 U	1.10 U	2.70 UJ
GDEGW11D03	1	6.80 J	1.40 U	8.40 UJ
GDEGW11D04	0	6.30 U	1.40 U	5.30 UJ

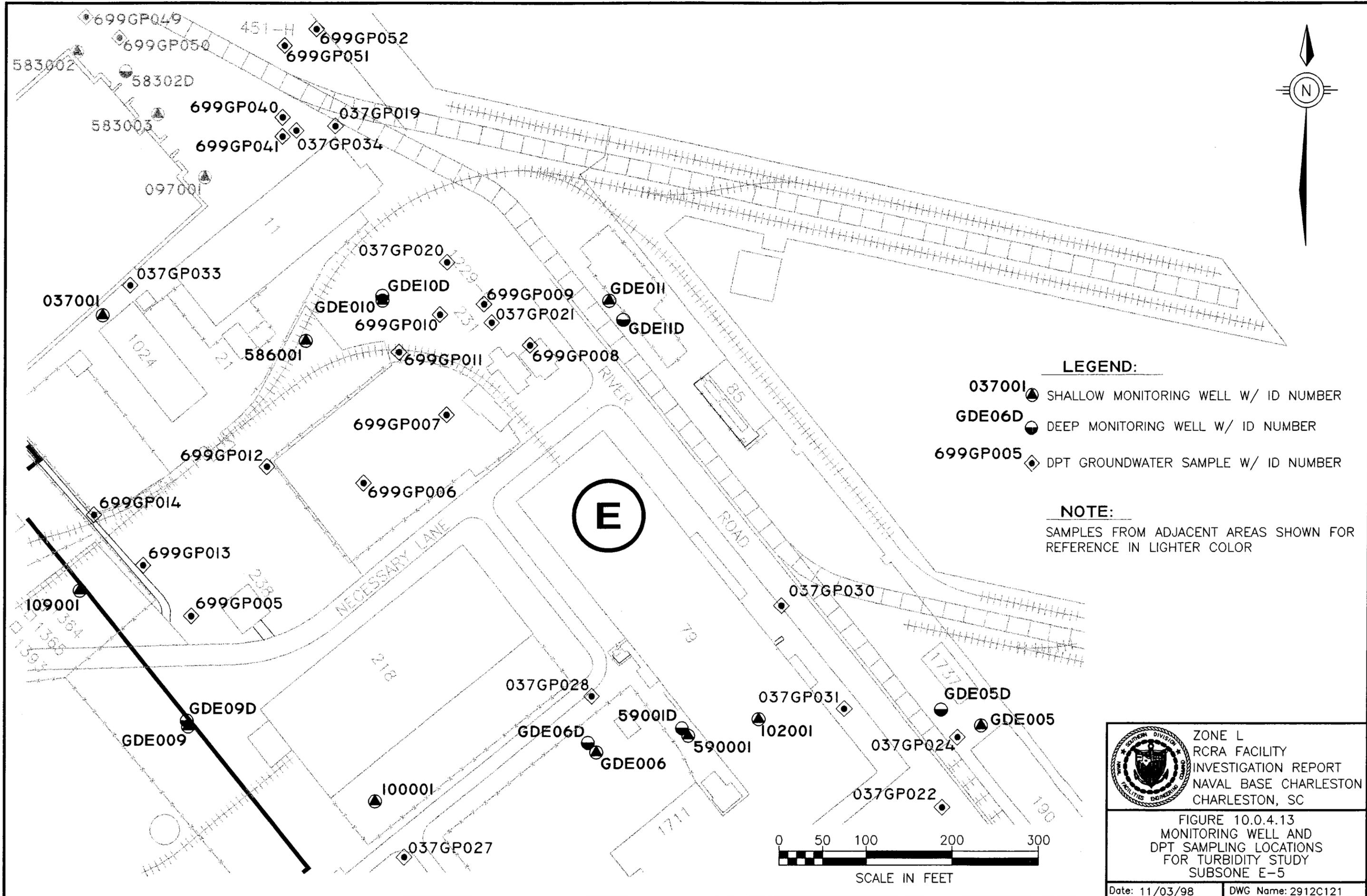
**Subzone E-6**

Statistical analysis of the turbidity values in Subzone E-6 indicates that the turbidity values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 249.4 ntu and the mean of the monitoring wells was 29.9 ntu.

Statistical analysis of the arsenic values in Subzone E-6 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 42.2  $\mu\text{g/L}$  and the mean of the monitoring wells was 18.2  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone E-6 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 2.9  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.4  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone E-6 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 8.3  $\mu\text{g/L}$  and the mean of the monitoring wells was 2.5  $\mu\text{g/L}$ .



**LEGEND:**

- 037001 SHALLOW MONITORING WELL W/ ID NUMBER
- GDE06D DEEP MONITORING WELL W/ ID NUMBER
- 699GP005 DPT GROUNDWATER SAMPLE W/ ID NUMBER

**NOTE:**

SAMPLES FROM ADJACENT AREAS SHOWN FOR REFERENCE IN LIGHTER COLOR



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FIGURE 10.0.4.13  
MONITORING WELL AND  
DPT SAMPLING LOCATIONS  
FOR TURBIDITY STUDY  
SUBZONE E-5

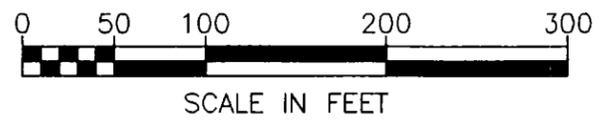


Table 10.0.4.16 details the results of the data in Subzone E-6. Figure 10.0.4.14 identifies the sample locations.

**Table 10.0.4.16  
 Subzone E-6 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
<b>DPT Locations</b>				
037GP016	Not Taken	69.80	3.50	13.30
037GP017	Not Taken	10.00 U	2.00 U	10.00 U
037GP018	999	19.00	2.10	11.30
037GP019	400	29.90	2.60	10.10
037GP020	118	34.80	2.20	10.00 U
037GP021	Not Taken	13.30	2.00 U	10.20
037GP023	13	63.80	3.90	13.20
037GP026	271	57.60	3.90	10.00 U
037GP029	13	10.00 U	2.00 U	10.00 U
037GP17A	118	31.40	3.80	10.00 U
699GP004	280	64.00	2.80	14.20
699GP096	Not Taken	59.60	6.50	10.00 U
699GP097	33	95.40	2.80	10.00 U
<b>Monitoring Wells</b>				
596GW00101	6	11.00	1.00 U	5.00 U
596GW00102	10	17.80	0.50 U	3.40 U
596GW00103	8	12.40	0.34 U	4.90 U
596GW00104	8	15.00	0.34 U	2.70 UJ
596GW00201	10	5.00 U	1.00 U	5.00 U
596GW00202	10	16.20	0.50 U	3.40 U
596GW00203	93	3.20 J	0.32 U	5.30 U
596GW00204	93	2.80 J	0.35 U	2.70 UJ
596GW00301	3	7.60 J	1.00 U	5.00 U
596GW00302	0	24.90	0.50 U	3.40 U
596GW00303	3	28.50	0.39 U	6.00 U
596GW00304	3	44.60	0.30 U	6.70 J

**Table 10.0.4.16  
 Subzone E-6 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
596GW00401	6	5.00 U	1.00 U	5.00 U
596GW00402	4	3.30 U	0.50 U	3.40 U
596GW00403	2	3.60 U	0.35 J	2.70 U
596GW00404	2	2.50 U	0.30 U	2.70 UJ
596GW01D01	2	43.80	1.00 U	5.00 U
596GW01D02	2	27.90	0.50 U	3.40 U
596GW01D03	0	48.40	0.38 U	3.30 U
596GW01D04	0	35.90	0.30 U	2.70 UJ
596GW04D01	1	13.50	1.00 U	5.00 U
596GW04D02	0	17.50	0.40 J	2.70 UJ
596GW04D03	5	6.30 U	0.48 J	2.80 U
596GW04D04	5	4.10 J	0.41 U	7.00 J
598GW00101	0	9.00 J	1.00 U	5.00 U
598GW00102	0	18.00	0.68 J	2.70 UJ
598GW00103	4	17.90	0.69 U	8.20 J
598GW00104	4	43.50	0.51 J	5.00 U
599GW00101	2	5.00 U	1.00 U	5.00 U
599GW00102	0	4.50 U	0.30 U	2.70 UJ
599GW00103	0	2.50 U	0.30 U	3.30 J
599GW00104	0	2.10 UJ	0.20 U	5.00 U
GDEGW00401	1	5.00 U	1.00 U	5.00 U
GDEGW00402	37	2.70 J	0.33 J	2.70 UJ
GDEGW00403	31	12.10 U	0.31 J	6.80 U
GDEGW00404	44	5.50 J	0.34 U	2.70 U
GDEGW00405	44	3.60 J	0.10 U	5.50 U
GDEGW04D01	0	5.00 U	1.00 U	5.00 U
GDEGW04D02	0	2.50 U	0.39 J	2.70 UJ
GDEGW04D03	618	3.80 J	0.59 U	6.70 U
GDEGW04D04	632	2.50 UJ	0.49 J	4.80 U
GDEGW00701	0	5.00 U	1.00 U	5.00 U

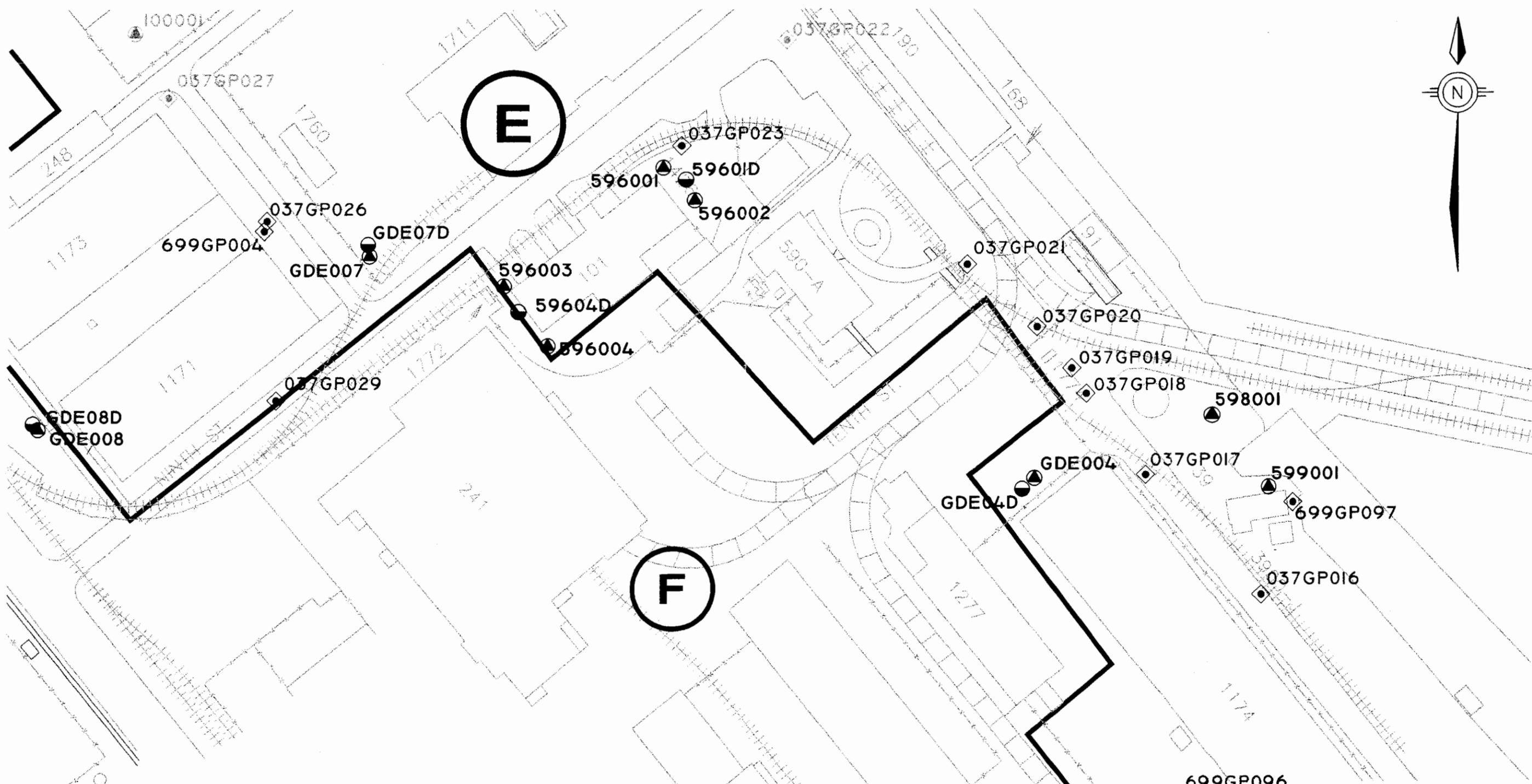
**Table 10.0.4.16**  
**Subzone E-6 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
GDEGW00702	0	2.50 UJ	0.41 U	2.70 U
GDEGW00703	0	2.90 J	0.48 U	2.70 U
GDEGW00704	2	2.50 U	0.30 U	3.70 J
GDEGW07D01	1	18.70	1.00 U	5.00 UJ
GDEGW07D02	1	132.00	0.44 U	4.80 U
GDEGW07D03	0	15.10	0.98 J	3.20 J
GDEGW07D04	0	12.60 U	1.20 J	2.70 U
GDEGW00801	1	56.30	1.00 U	5.00 U
GDEGW00802	1	17.30	1.30 U	4.10 U
GDEGW00803	0	160.00	0.47 U	5.80 U
GDEGW00804	0	106.00	0.31 U	4.20 J
GDEGW08D01	0	5.00 U	1.00 U	5.00 U
GDEGW08D02	6	2.50 UJ	0.95 U	2.70 U
GDEGW08D03	0	2.50 U	1.20 U	4.50 U
GDEGW08D04	0	3.00 J	1.10 U	6.50 J

**Subzone E-7**

Statistical analysis of the turbidity values in Subzone E-7 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 605.3 ntu and the mean of the monitoring wells was 8.4 ntu.

Statistical analysis of the arsenic values in Subzone E-7 indicates that the arsenic values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 43.9  $\mu\text{g/L}$  and the mean of the monitoring wells was 36.8  $\mu\text{g/L}$ .



**LEGEND:**

- 596001  SHALLOW MONITORING WELL W/ ID NUMBER
- 5960ID  DEEP MONITORING WELL W/ ID NUMBER
- 699GP097  DPT GROUNDWATER SAMPLE W/ ID NUMBER

**NOTE:**

SAMPLES FROM ADJACENT AREAS SHOWN FOR REFERENCE IN LIGHTER COLOR



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FIGURE 10.0.4.14  
MONITORING WELL AND  
DPT SAMPLING LOCATIONS  
FOR TURBIDITY STUDY  
SUBZONE E-6

Statistical analysis of the beryllium values in Subzone E-7 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 3.9  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.4  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone E-7 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 6.5  $\mu\text{g/L}$  and the mean of the monitoring wells was 2.3  $\mu\text{g/L}$ .

Table 10.0.4.17 details the results of the data in Subzone E-7. Figure 10.0.4.15 identifies the sample locations.

**Table 10.0.4.17**  
**Subzone E-7 Data Comparison**

<u>Sample ID</u>	<u>Turbidity (ntu)</u>	<u>Arsenic (<math>\mu\text{g/L}</math>)</u>	<u>Beryllium (<math>\mu\text{g/L}</math>)</u>	<u>Thallium (<math>\mu\text{g/L}</math>)</u>
<b>DPT Locations</b>				
037GP015	950	26.90	5.20	10.00 U
037GP025	107	128.00	9.90	17.00
037GP045	84	10.00 U	5.00 U	10.00 U
037GP047	999	29.30	5.00 U	10.00 U
699GP001	999	63.10	2.40	10.00 U
699GP003	999	22.20	2.00 U	10.00 U
699GP096	99	59.60	6.50	10.00 U
699GP002	Not Taken	16.70	2.00 U	10.00 U
<b>Monitoring Wells</b>				
018GW00101	1	5.00 U	1.20 U	5.00 U
018GW00102	0	3.40 J	0.50 U	3.40 U
018GW00103	1	2.70 J	0.30 U	2.70 U
018GW00104	1	2.50 U	0.30 U	2.70 U
018GW00201	0	5.00 U	1.00 U	5.00 U
018GW00202	0	3.30 U	0.50 U	3.40 U

**Table 10.0.4.17**  
**Subzone E-7 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
018GW00203	1	2.70 J	0.30 U	2.70 U
018GW00204	2	2.50 U	0.30 U	2.70 U
106GW00101	0	36.30	1.00 U	5.00 U
106GW00102	1	35.80	0.77 J	3.70 J
106GW00103	1	35.30	0.95 J	2.70 U
106GW00104	1	33.60 J	0.46 U	2.70 U
106GW01D01	0	5.00 U	1.30 J	5.00 U
106GW01D02	10	3.60 J	0.96 J	5.00 J
106GW01D03	11	2.50 U	1.30 U	5.20 U
106GW01D04	10	2.50 U	0.46 U	2.70 U
605GW00101	6	6.80 J	1.10 U	5.00 U
605GW00102	70	11.50	0.50 U	3.40 U
605GW00103	4	11.10	0.30 U	2.70 U
605GW00104	9	10.10 J	0.30 U	2.70 U
605GW00201	0	5.00 U	1.00 U	5.00 U
605GW00202	6	11.70	0.50 U	3.40 U
605GW00203	4	5.40 J	0.30 U	2.70 U
605GW00204	1	4.30 J	0.41 U	2.70 U
605GW00301	3	45.20	1.00 U	5.00 U
605GW00302	0	85.50	0.50 U	3.40 U
605GW00303	1	48.90	0.30 U	2.70 U
605GW00304	0	82.70 J	0.30 U	2.70 U
GDEGW00101	0	5.00 U	1.00 U	5.00 U
GDEGW00102	0	13.40	0.50 U	3.40 U
GDEGW00103	0	13.90	0.41 J	5.40 J
GDEGW00104	0	15.60 J	0.30 U	4.20 J
GDEGW00201	2	316.00	1.00 U	5.00 U
GDEGW00202	0	307.00	0.50 U	3.40 U
GDEGW00203	5	269.00	0.30 U	2.70 U
GDEGW00204	2	249.00	0.30 U	3.80 J

**Table 10.0.4.17**  
**Subzone E-7 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
GDEGW00301	4	51.70	1.00 U	5.00 U
GDEGW00302	9	69.30	0.50 U	3.40 U
GDEGW00303	8	34.40	0.30 UJ	2.70 UJ
GDEGW00304	8	46.10 J	0.30 U	2.70 U
GDEGW01D01	0	5.00 U	1.00 U	5.00 U
GDEGW01D02	1	3.30 U	0.50 U	3.40 U
GDEGW01D03	15	2.60 J	0.63 J	3.30 J
GDEGW01D04	37	2.50 UJ	0.49 J	6.40 U
GDEGW02D01	2	5.00 J	1.00 U	5.00 U
GDEGW02D02	0	2.50 U	0.53 J	3.60 J
GDEGW02D03	4	4.50 J	0.70 J	2.70 U
GDEGW02D04	0	2.80 J	0.31 J	5.10 J
GDEGW03D01	0	5.00 U	1.00 U	5.00 U
GDEGW03D02	0	3.10 J	0.84 J	6.00 J
GDEGW03D03	98	2.70 J	1.10 U	3.80 U
GDEGW03D04	98	2.50 UJ	0.98 J	4.30 U

**Subzone F-1**

Statistical analysis of the turbidity values in Subzone F-1 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 576.8 ntu and the mean of the monitoring wells was 5.5 ntu.

Statistical analysis of the arsenic values in Subzone F-1 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 67.4  $\mu\text{g/L}$  and the mean of the monitoring wells was 5.2  $\mu\text{g/L}$ .



Statistical analysis of the beryllium values in Subzone F-1 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 4.8  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.2  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone F-1 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 5.0  $\mu\text{g/L}$  and the mean of the monitoring wells was 3.4  $\mu\text{g/L}$ .

Table 10.0.4.18 details the results of the data in Subzone F-1. Figure 10.0.4.16 identifies the sample locations.

**Table 10.0.4.18**  
**Subzone F-1 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>DPT Locations</b>				
037GP002	Not Taken	21.20	2.00 U	10.00 U
037GP010	999	124.00	3.10	10.00 U
037GP011	254	10.00 U	2.00 U	10.00 U
037GP058	999	47.20	3.00	10.00 U
037GP059	647	14.10	5.20	10.00 U
037GP060	999	186.00	11.20	10.00 U
037GP061	999	33.20	2.00 U	10.00 U
037GP062	138	196.00	19.00	10.00 U
037GP024	674	84.30	5.40	10.00 U
699GP021	417	77.30	3.70	10.00 U
699GP023	33	49.60	7.40	10.00 U
699GP024	165	32.90	2.00 U	10.00 U
699GP028	597	10.00 U	2.00 U	10.00 U
<b>Monitoring Wells</b>				
109GW00101	0	2.50 U	0.35 U	3.50 J
109GW00102	6	2.10 U	0.37 U	5.00 U

**Table 10.0.4.18**  
**Subzone F-1 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
109GW00103	31	2.10 U	0.20 U	5.00 U
109GW00104	0	2.10 U	0.46 U	5.00 U
GDFGW00101	0	8.50 J	0.33 U	4.80 J
GDFGW00102	5	3.30 J	0.37 J	5.00 U
GDFGW00103	7	6.40 J	0.36 U	5.00 U
GDFGW00104	0	4.10 J	0.20 U	5.00 U
GDFGW01D01	3	9.60 J	0.30 U	6.60 J
GDFGW01D02	2	6.60 J	0.23 J	5.90 J
GDFGW01D03	9	9.00 J	0.27 U	5.00 U
GDFGW01D04	3	9.90 J	0.20 U	5.00 U

**Subzone F-2**

No statistical comparison can be made between DPT sample locations and monitoring wells in Subzone F-2 as no monitoring wells are located in the area.

Table 10.0.4.19 details the results of the data in Subzone F-2. Figure 10.0.4.17 identifies the sample locations.

**Table 10.0.4.19**  
**Subzone F-2 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
<b>DPT Locations</b>				
037GP001	Not taken	91.50	5.20	10.00 U
037GP003	Not taken	49.80	5.90	10.00 U
037GP004	Not taken	61.90	5.00	10.00 U
037GP005	Not taken	65.10	2.00 U	10.00 U
037GP029	10.00	19.40	2.00 U	10.00 U
037GP030	73.00	106.00	2.00 U	10.00 U

**Table 10.0.4.19**  
**Subzone F-2 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
037GP031	980.00	57.20	3.50	10.00 U
037GP032	423.00	92.50	4.80	10.00 U
037GP033	360.00	22.60	2.00 U	10.00 U
037GP034	297.00	91.30	2.00 U	10.00 U
037GP035	137.00	62.20	2.00 U	10.00 U
699GP28A	597.00	12.70	2.00 U	13.60

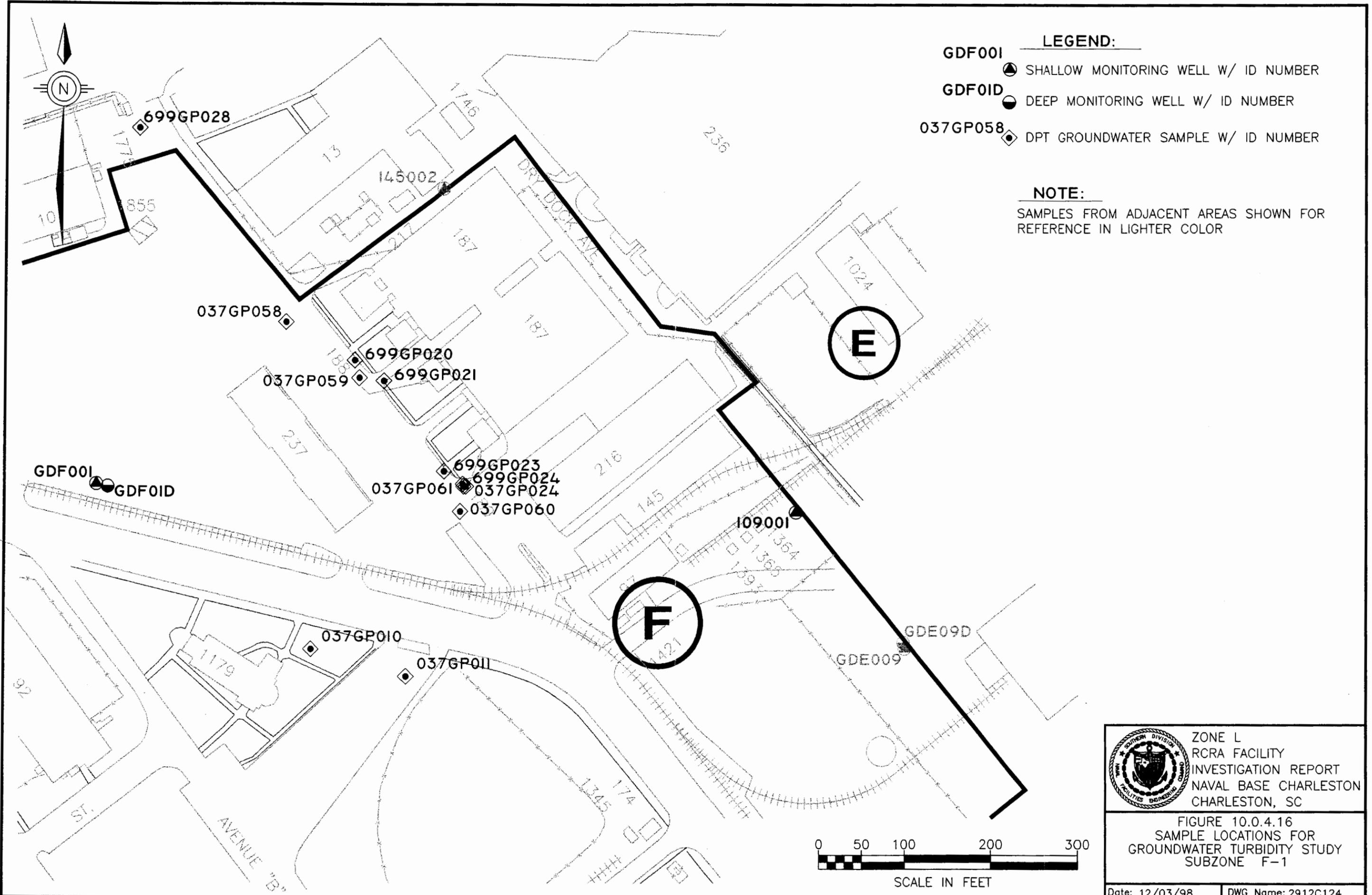
**Subzone F-3**

Statistical analysis of the turbidity values in Subzone F-3 indicates that the turbidity values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 308.2 ntu and the mean of the monitoring wells was 52.9 ntu.

Statistical analysis of the arsenic values in Subzone F-3 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 93.8  $\mu\text{g/L}$  and the mean of the monitoring wells was 12.5  $\mu\text{g/L}$ .

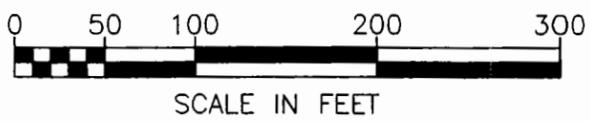
Statistical analysis of the beryllium values in Subzone F-3 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 6.4  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.2  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone F-3 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 7.8  $\mu\text{g/L}$  and the mean of the monitoring wells was 2.6  $\mu\text{g/L}$ .

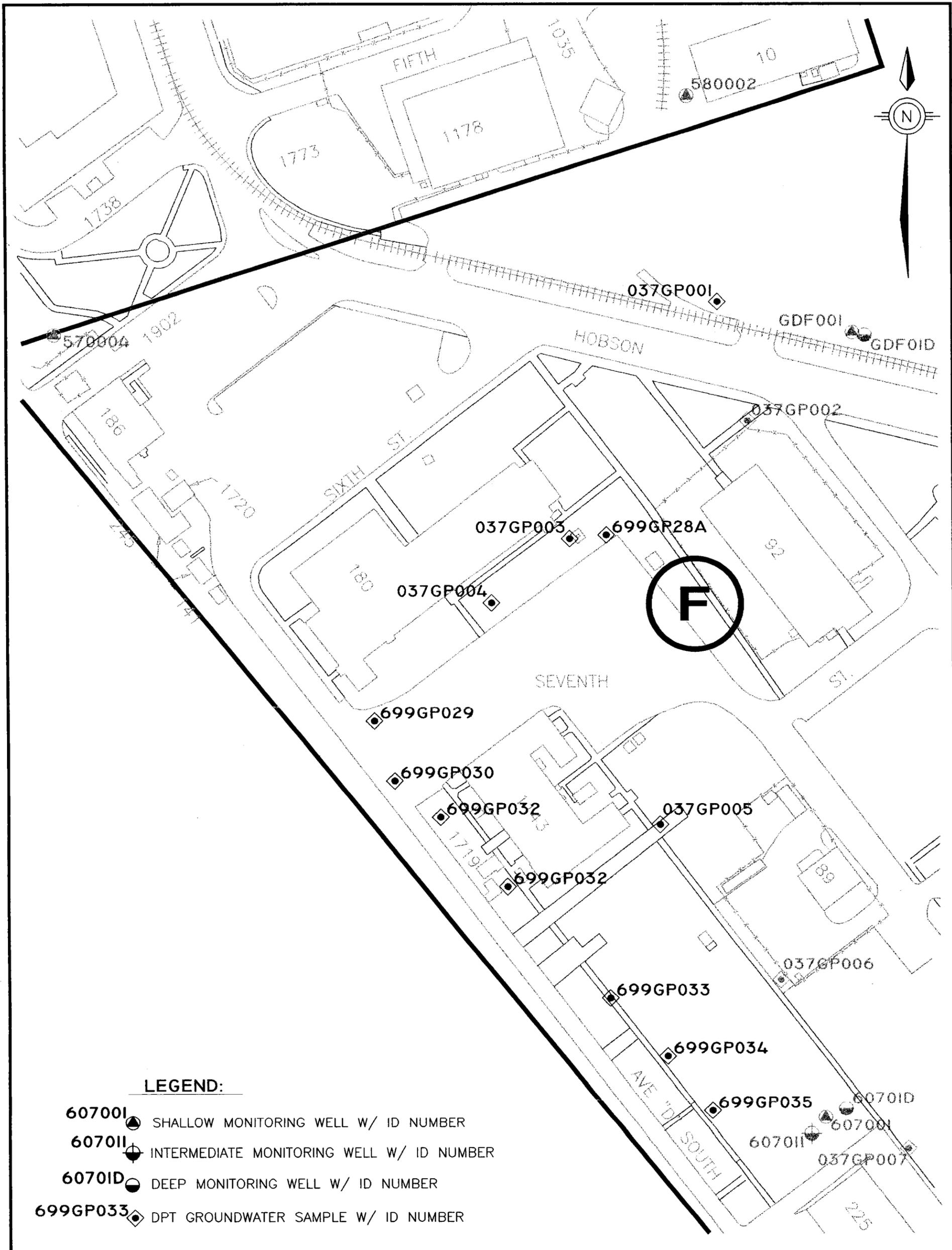


- LEGEND:**
- GDF00I SHALLOW MONITORING WELL W/ ID NUMBER
  - GDF0ID DEEP MONITORING WELL W/ ID NUMBER
  - 037GP058 DPT GROUNDWATER SAMPLE W/ ID NUMBER

**NOTE:**  
 SAMPLES FROM ADJACENT AREAS SHOWN FOR REFERENCE IN LIGHTER COLOR



	ZONE L RCRA FACILITY INVESTIGATION REPORT NAVAL BASE CHARLESTON CHARLESTON, SC
	FIGURE 10.0.4.16 SAMPLE LOCATIONS FOR GROUNDWATER TURBIDITY STUDY SUBZONE F-1
Date: 12/03/98	DWG Name: 2912C124



**LEGEND:**

- 607001 ● SHALLOW MONITORING WELL W/ ID NUMBER
- 607011 ● INTERMEDIATE MONITORING WELL W/ ID NUMBER
- 60701D ● DEEP MONITORING WELL W/ ID NUMBER
- 699GP033 ◆ DPT GROUNDWATER SAMPLE W/ ID NUMBER

**NOTE:**

SAMPLES FROM ADJACENT AREAS SHOWN FOR REFERENCE IN LIGHTER COLOR



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

FIGURE 10.0.4.17  
SAMPLE LOCATIONS FOR  
GROUNDWATER TURBIDITY STUDY  
SUBZONE F-2

Table 10.0.4.2.20 details the results of the data in Subzone F-3. Figure 10.0.4.18 identifies the sample locations.

**Table 10.0.4.20**  
**Subzone F-3 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>DPT Locations</b>				
037GP006	Not Taken	115.00	7.00	10.00 U
037GP007	Not Taken	221.00	33.00	12.10
037GP008	Not Taken	124.00	6.50	10.10
037GP009	Not Taken	137.00	3.20	10.00 U
037GP012	412	82.00	4.60	10.00 U
037GP013	999	332.00	8.50	12.80
037GP014	Not Taken	398.00	31.20	17.40
037GP015	2	40.60	2.50	10.00 U
037GP016	2	11.50	2.00 U	10.00 U
037GP017	Not Taken	11.80	2.00 U	10.00 U
037GP018	Not Taken	99.00	11.90	10.00 U
037GP019	Not Taken	45.80	5.40	10.00 U
037GP020	Not Taken	10.00 U	2.00 U	10.00 U
037GP07A	Not Taken	10.00 U	2.00 U	10.00 U
699GP036	579	46.30	2.00 U	10.00 U
699GP037	25	24.40	2.00 U	11.00
699GP038	75	76.80	5.30	17.10
699GP039	365	18.30	2.00 U	10.00 U
699GP040	99	43.20	2.00 U	10.30
699GP041	524	39.60	2.00 U	10.00 U
<b>Monitoring Wells</b>				
607GW00101	4	2.50 U	0.30 U	2.70 U
607GW00102	7	2.10 U	0.20 U	7.40 J
607GW00103	0	2.10 U	0.20 U	5.00 U
607GW00104	0	2.10 U	0.20 U	5.00 U

**Table 10.0.4.20**  
**Subzone F-3 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
607GW00201	4	9.70 J	0.30 U	2.70 U
607GW00202	2	6.10 J	0.20 U	5.00 U
607GW00203	0	2.50 J	0.20 U	5.00 U
607GW00204	2	5.30 J	0.20 U	5.00 U
607GW00301	3	2.50 U	0.30 U	2.70 U
607GW00302	1	3.30 J	0.41 U	6.20 J
607GW00303	1	5.00 J	0.24 J	5.00 U
607GW00304	0	2.10 U	0.20 U	5.00 U
607GW00401	145	75.20	0.30 U	3.20 U
607GW00402	1	48.30	0.37 U	5.00 U
607GW00403	0	72.70	0.20 U	5.80 J
607GW00404	0	65.10	0.20 U	5.00 U
607GW00601	12	3.00 J	0.30 U	2.70 U
607GW00602	5	2.10 UJ	0.70 U	5.00 U
607GW00603	0	2.10 U	0.20 U	6.70 J
607GW00604	0	2.60 J	0.20 U	5.00 U
607GW00701	866	4.70 J	0.30 U	4.20 U
607GW00702	10	2.10 UJ	0.28 U	5.00 U
607GW00703	999	14.80	0.20 U	5.00 U
607GW00704	9	5.70 J	0.20 U	5.00 U
607GW008A2	0	2.60 U	0.20 U	5.00 U
607GW008A3	0	2.10 U	0.20 U	5.00 U
607GW008A4	0	2.10 U	0.20 U	5.00 U
607GW009A1	0	28.20	0.63 U	5.00 U
607GW009A2	24	31.30	0.30 U	4.60 U
607GW009A3	0	34.90	0.21 J	5.00 U
607GW009A4	0	32.90	0.20 U	5.00 U
607GW01D01	973	11.30	0.46 J	4.10 U
607GW01D02	4	4.60 J	0.20 U	5.00 U
607GW01D03	39	6.10 J	0.20 U	5.00 U

**Table 10.0.4.20  
Subzone F-3 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
607GW01D04	0	7.80 J	0.20 U	5.00 U
607GW01I01	0	2.50 U	0.30 U	2.70 U
607GW01I02	6	2.10 U	0.20 U	5.80 J
607GW01I03	0	2.10 U	0.20 U	5.00 U
607GW01I04	0	6.10 J	0.41 U	5.00 U
607GW02D01	7	8.40 J	0.30 U	2.70 U
607GW02D02	9	7.10 J	0.84 U	5.00 U
607GW02D03	186	7.90 J	0.20 U	5.00 U
607GW02D04	0	30.90	0.20 U	5.00 U
607GW02I01	13	43.30	0.30 U	3.90 U
607GW02I02	6	40.60	0.20 U	5.00 U
607GW02I03	0	44.30	0.20 U	5.00 U
607GW02I04	0	49.30	0.20 U	5.00 U
607GW03D01	46	20.30	0.30 U	2.70 U
607GW03D02	41	15.90	0.20 U	5.50 J
607GW03D03	16	18.60	0.20 U	5.00 U
607GW03D04	5	2.10 U	2.10 J	5.00 U
607GW03I01	0	6.00 J	0.30 U	2.70 U
607GW03I02	5	3.70 J	0.34 U	5.00 U
607GW03I03	0	7.20 J	0.20 U	5.00 U
607GW03I04	0	7.70 J	0.20 U	5.00 U
607GW04D01	291	4.30 J	0.30 U	5.30 U
607GW04D02	15	3.00 J	0.36 U	5.00 U
607GW04D03	20	2.60 J	0.30 U	4.60 U
607GW04D04	0	2.10 U	0.20 U	5.00 U
607GW04I01	25	5.20 J	0.30 U	2.70 U
607GW04I02	8	4.20 J	0.48 U	5.00 U
607GW04I03	4	9.50 J	0.22 J	5.00 U
607GW04I04	0	4.80 J	0.20 U	5.00 U
607GW05D01	1	3.50 J	0.30 U	3.40 U

**Table 10.0.4.20**  
**Subzone F-3 Data Comparison**

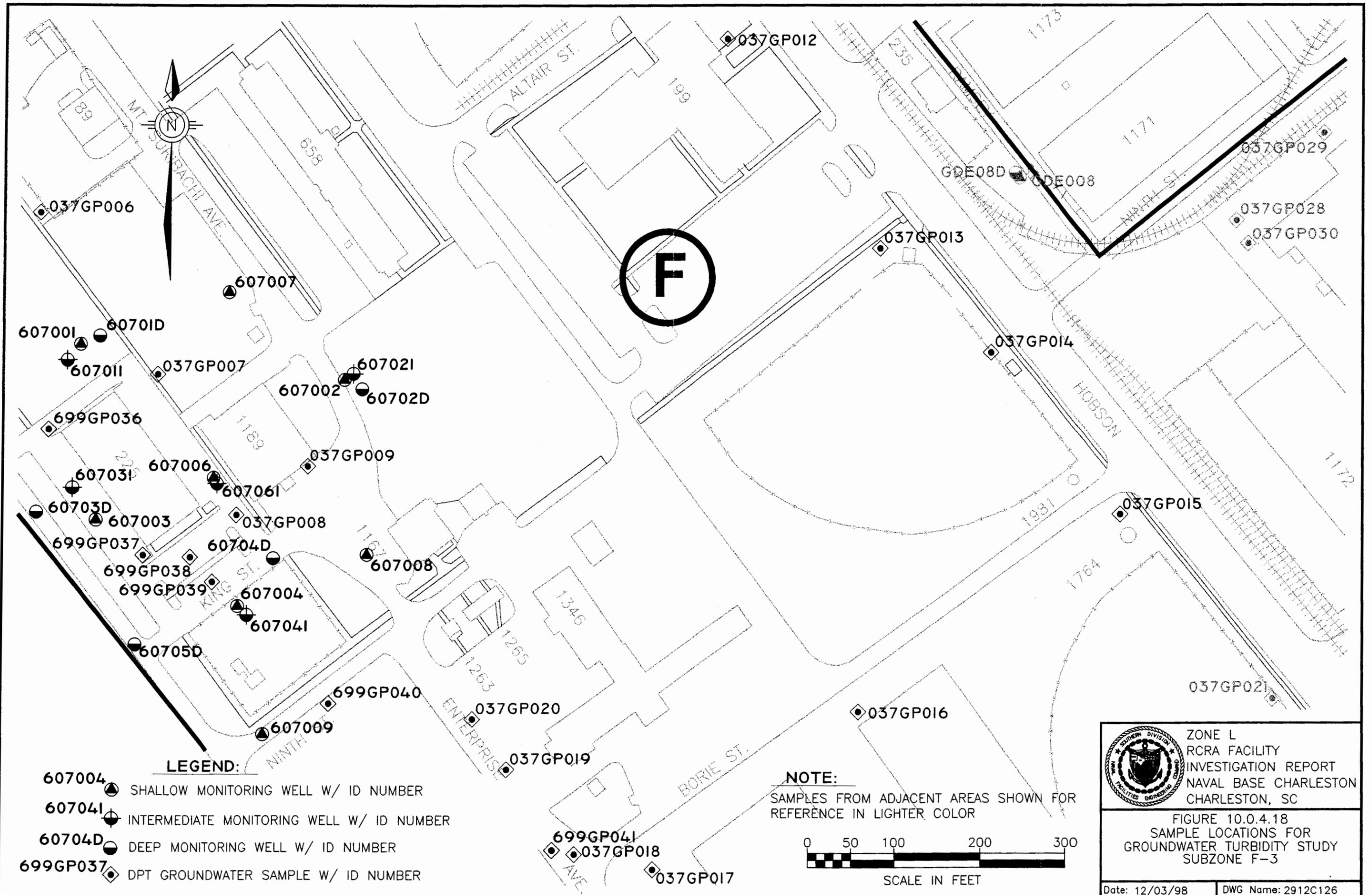
Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
607GW05D02	24	2.10 UJ	0.34 U	5.00 U
607GW05D03	17	2.10 U	0.30 U	4.60 U
607GW05D04	0	2.10 U	2.20 J	5.00 U
607GW06DA2	6	2.10 U	0.30 U	4.60 U
607GW06DA3	0	2.10 U	0.20 U	5.00 U
607GW06DA4	0	2.10 U	0.20 U	5.00 U
607GW06IA2	0	21.40 U	0.20 U	5.00 U
607GW06IA3	0	19.80	0.20 U	5.00 U
607GW06IA4	0	21.60	0.20 U	5.00 U

**Subzone F-4**

Statistical analysis of the turbidity values in Subzone F-4 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 532.6 ntu and the mean of the monitoring wells was 3.5 ntu.

Statistical analysis of the arsenic values in Subzone F-4 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 53.0  $\mu\text{g/L}$  and the mean of the monitoring wells was 3.5  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone F-4 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 2.6  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.8  $\mu\text{g/L}$ .

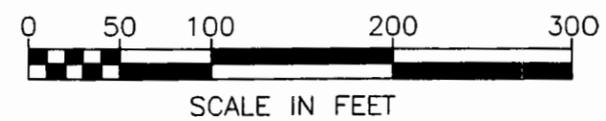


**LEGEND:**

- 607004 ● SHALLOW MONITORING WELL W/ ID NUMBER
- 607041 ● INTERMEDIATE MONITORING WELL W/ ID NUMBER
- 60704D ● DEEP MONITORING WELL W/ ID NUMBER
- 699GP037 ◆ DPT GROUNDWATER SAMPLE W/ ID NUMBER

**NOTE:**

SAMPLES FROM ADJACENT AREAS SHOWN FOR REFERENCE IN LIGHTER COLOR



ZONE L  
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FIGURE 10.0.4.18  
SAMPLE LOCATIONS FOR  
GROUNDWATER TURBIDITY STUDY  
SUBZONE F-3

Statistical analysis of the thallium values in Subzone F-4 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells; however, thallium was detected in only one of the DPT GW sample locations and one of the monitoring wells. The mean of the DPT GW sample locations was 5.4  $\mu\text{g/L}$  and the mean of the monitoring wells was 3.4  $\mu\text{g/L}$ .

Table 10.0.4.21 details the results of the data in Subzone F-4. Figure 10.0.4.19 identifies the sample locations.

**Table 10.0.4.21  
 Subzone F-4 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
<b>DPT Locations</b>				
037GP021	999	18.80	3.30	10.00 U
037GP023	768	28.10	2.00	10.00 U
037GP025	7	29.50	2.00 U	10.00 U
037GP026	905	46.10	3.40	10.00 U
037GP027	999	71.70	4.30	10.00 U
037GP028	522	131.00	4.60	10.00 U
037GP029	10	19.40	2.00 U	10.00 U
037GP030	73	106.00	2.00 U	10.00 U
037GP031	980	57.20	3.50	10.00 U
037GP032	423	92.50	4.80	10.00 U
037GP033	360	22.60	2.00 U	10.00 U
699GP050	345	44.00	2.50	10.00 U
699GP051	Not Taken	21.90	2.00 U	10.10
<b>Monitoring Wells</b>				
613GW00102	8	2.10 U	2.00 J	9.50 J
613GW00103	10	2.10 U	2.00 J	4.60 U
613GW00104	0	2.10 U	0.20 U	5.00 U
613GW00301	0	5.80 J	0.30 U	6.00 U
613GW00302	2	3.90 J	0.41 U	5.00 U
613GW00303	11	16.20 U	0.20 U	5.00 U
613GW00304	2	2.10 U	1.10 J	5.00 U
613GW02D01	3	4.70 J	0.77 J	4.00 U

**Table 10.0.4.21**  
**Subzone F-4 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
613GW02D02	0	2.10 UJ	0.77 U	5.50 J
613GW02D03	0	5.70 U	1.60 J	5.00 U
613GW02D04	3	7.90 J	0.20 U	5.00 U

**Subzone F-5**

Statistical analysis of the turbidity values in Subzone F-5 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT sample locations was 631.0 ntu and the mean of the monitoring wells was 5.7 ntu.

Statistical analysis of the arsenic values in Subzone F-5 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 86.3  $\mu\text{g/L}$  and the mean of the monitoring wells was 7.1  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone F-5 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 7.8  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.2  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone F-5 indicates that the thallium values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 7.2  $\mu\text{g/L}$  and the mean of the monitoring wells was 3.9  $\mu\text{g/L}$ .

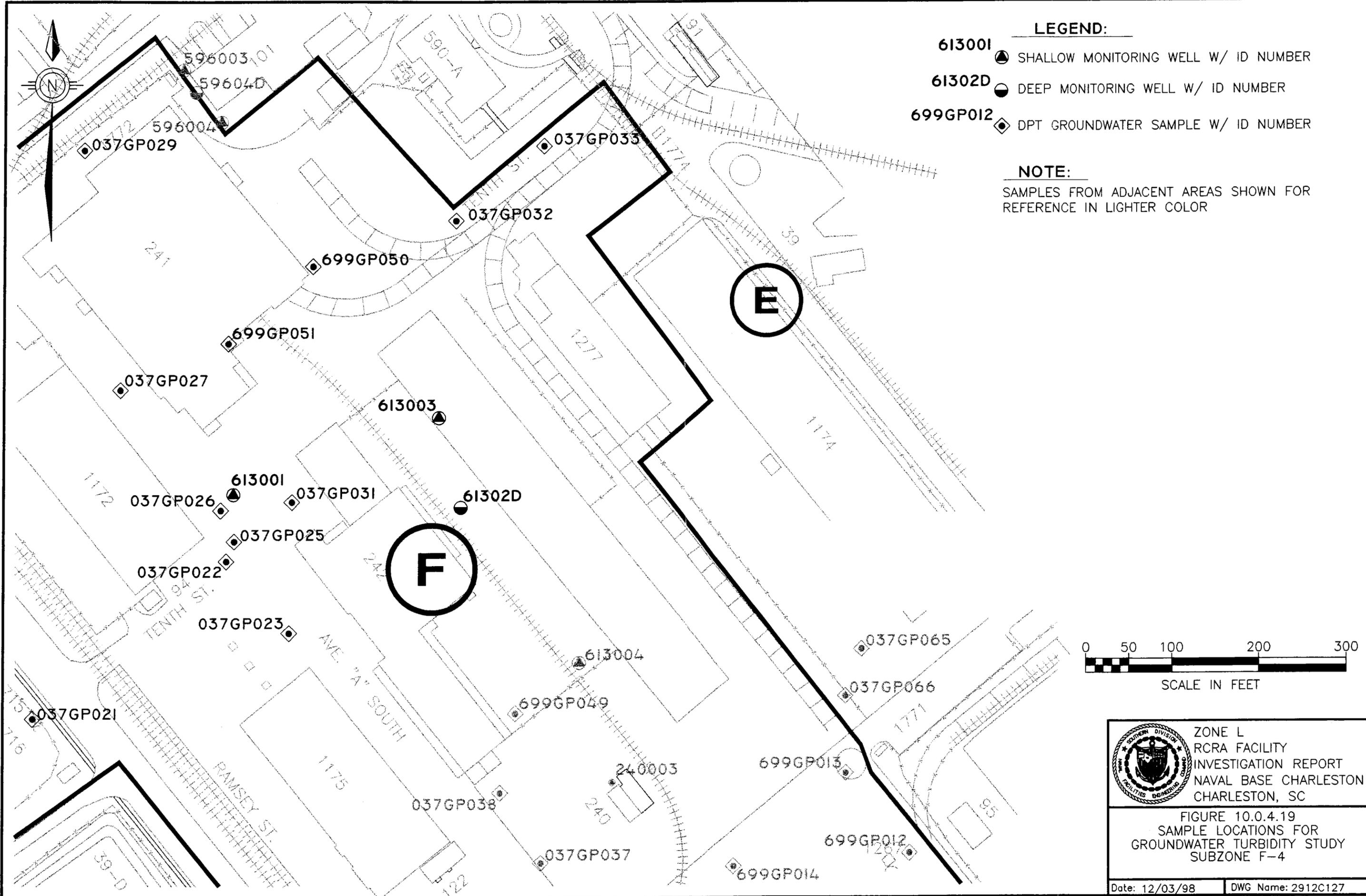


Table 10.0.4.22 details the results of the data in Subzone F-5. Figure 10.0.4.20 identifies the sample locations.

**Table 10.0.4.22**  
**Subzone F-5 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>DPT Locations</b>				
037GP024	674	84.30	5.40	10.00 U
037GP034	297	91.30	2.00 U	10.00 U
037GP035	137	62.20	2.00 U	10.00 U
037GP036	264	30.60	2.00 U	10.00 U
037GP039	28	38.50	2.00 U	10.00 U
037GP040	999	149.00	10.80	10.00 U
037GP041	87	10.00 U	2.00 U	10.00 U
037GP042	344	45.20	2.00 U	10.00 U
037GP043	999	119.00	9.20	10.00 U
037GP050	924	92.00	3.20	10.00 U
037GP051	906	93.40	7.20	10.00 U
037GP052	999	125.00	3.70	10.00 U
037GP053	999	63.30	18.20	12.40
037GP054	992	190.00	23.20	21.00
037GP055	630	54.00	7.70	10.00 U
037GP056	999	89.40	19.30	10.00 U
037GP057	999	486.00	46.10	26.40
699GP011	724	10.00 U	2.00 U	10.00 U
699GP015	999	116.00	2.00 U	10.00 U
699GP016	926	18.20	20.00	10.00 U
699GP043	602	11.60	2.00 U	10.00 U
699GP044	307	10.00 U	2.00	10.00 U
699GP045	40	10.00 U	2.00 U	10.00 U
699GP046	270	61.70	2.00 U	10.00 U
699GP048	Not Taken	118.00	8.80	14.30

**Table 10.0.4.22**  
**Subzone F-5 Data Comparison**

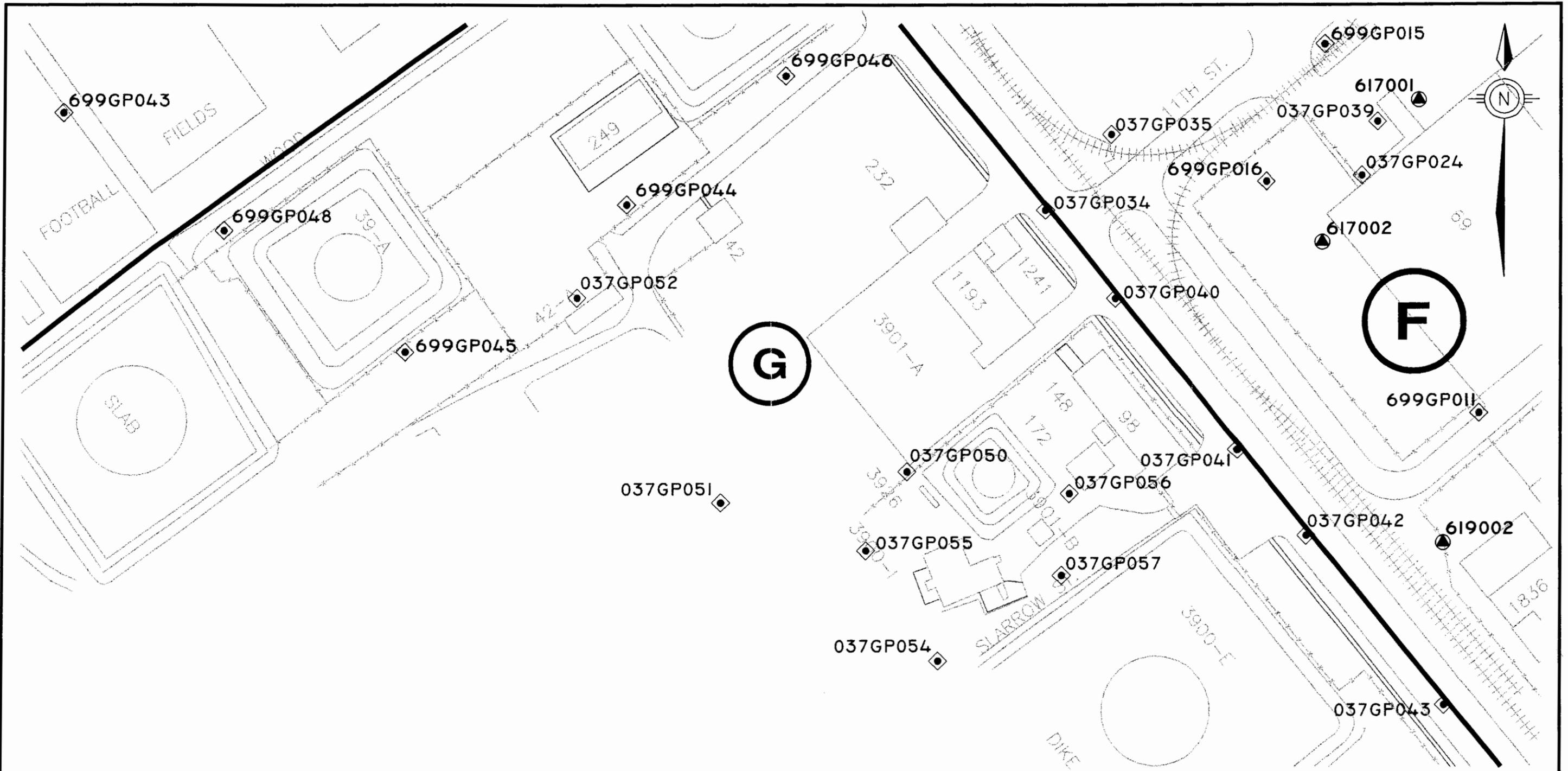
Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>Monitoring Wells</b>				
617GW00101	4	31.70 J	0.94 U	2.70 U
617GW00102	14	7.90 J	0.23 U	5.00 U
617GW00103	1	18.60	0.54 U	5.00 U
617GW00104	4	5.10 U	0.36 U	5.00 U
617GW002A1	10	2.10 U	2.00 U	21.00
617GW002A2	10	2.10 U	0.33 U	5.00 U
617GW002A3	9	2.10 U	0.20 U	5.00 U
617GW002A4	10	2.10 U	0.20 U	5.00 U
619GW00201	0	6.50 J	0.38 U	2.70 U
619GW00202	6	4.90 J	0.20 U	5.10 U
619GW00203	0	5.40 J	0.20 U	5.00 U
619GW00204	0	6.80 U	0.25 U	5.00 U

**Subzone F-6**

Statistical analysis of the turbidity values in Subzone F-6 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 619.5 ntu and the mean of the monitoring wells was 9.3 ntu.

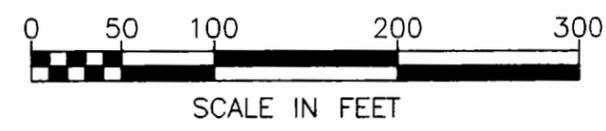
Statistical analysis of the arsenic values in Subzone F-6 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 71.2  $\mu\text{g/L}$  and the mean of the monitoring wells was 8.6  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone F-6 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 5.6  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.2  $\mu\text{g/L}$ .



**LEGEND:**

- 54300I  SHALLOW MONITORING WELL W/ ID NUMBER
- 06504D  DEEP MONITORING WELL W/ ID NUMBER
- 699GP08I  DPT GROUNDWATER SAMPLE W/ ID NUMBER



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FIGURE 10.0.4.20  
SAMPLE LOCATIONS FOR  
GROUNDWATER TURBIDITY STUDY  
SUBZONE F-5

Statistical analysis of the thallium values in Subzone F-6 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 5.5  $\mu\text{g/L}$  and the mean of the monitoring wells was 3.6  $\mu\text{g/L}$ .

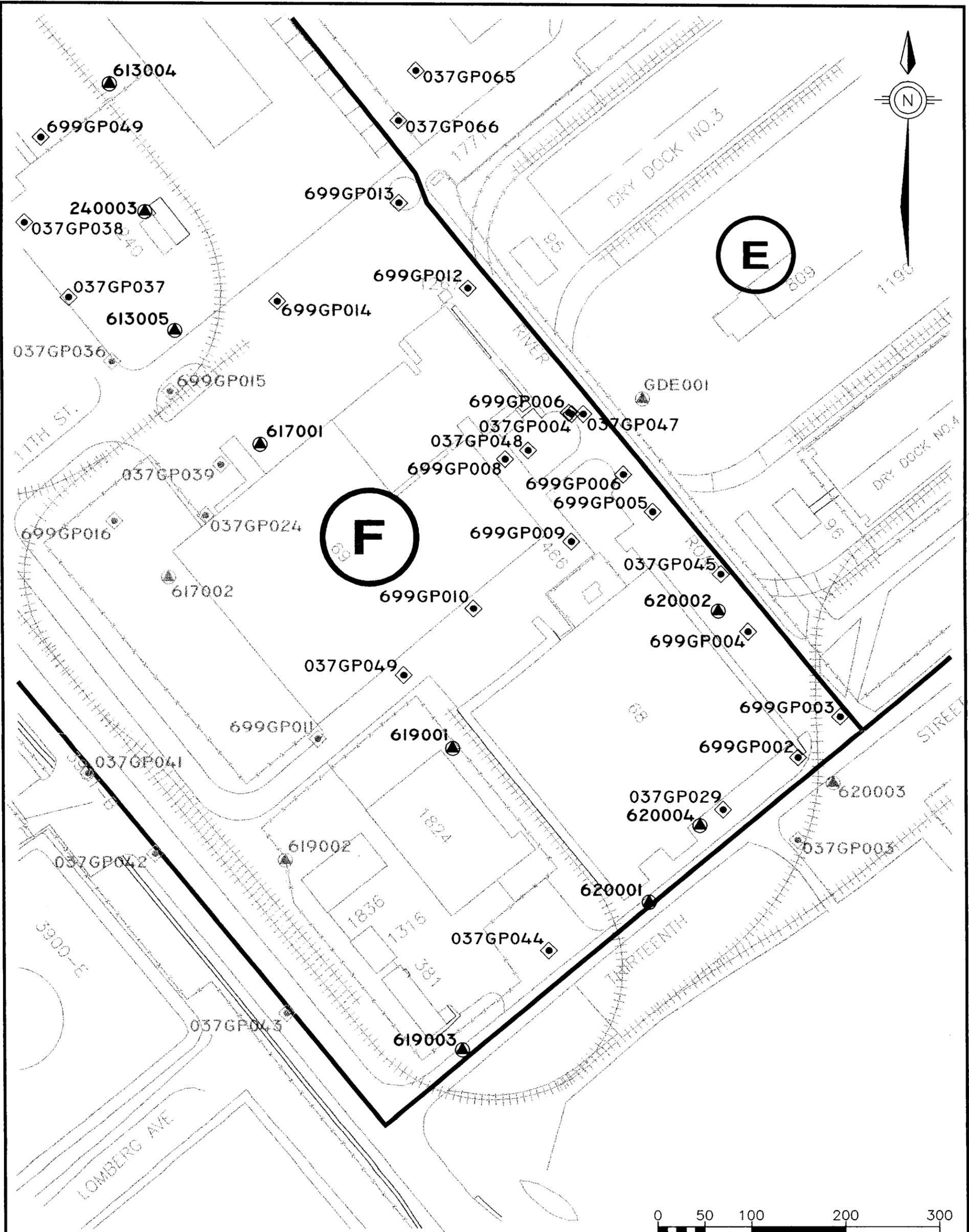
Table 10.0.4.23 details the results of the data in Subzone F-6. Figure 10.0.4.21 identifies the sample locations.

**Table 10.0.4.23**  
**Subzone F-6 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
<b>DPT Locations</b>				
037GP004	Not taken	61.90	5.00	10.00 U
037GP029	10	19.40	2.00 U	10.00 U
037GP037	Not taken	62.30	2.00	10.00 U
037GP038	794	71.70	3.90	10.00 U
037GP044	623	56.30	4.20	10.00 U
037GP045	294	90.90	2.20	10.00 U
037GP047	999	69.00	4.80	10.00 U
037GP048	455	47.00	7.40	10.00 U
037GP049	999	230.00	12.40	12.60
037GP065	999	55.80	13.50	10.00 U
037GP066	798	15.10	2.00 U	10.00 U
699GP001	999	131.00	23.00	10.00 U
699GP002	350	46.60	2.00 U	10.00 U
699GP003	351	41.60	4.00	10.00 U
699GP004	999	56.40	4.10	10.00 U
699GP005	248	52.80	2.00 U	10.00 U
699GP006	111	43.90	2.00 U	10.00 U
699GP007	Not taken	135.00	5.80	10.00 U
699GP008	999	194.00	7.30	10.00 U
699GP009	Not taken	32.00	9.80	10.00 U
699GP010	999	164.00	19.40	10.80
699GP012	Not taken	10.00 U	2.00 U	10.00 U
699GP013	29	10.60	2.00 U	10.00 U
699GP014	714	44.00	2.80	10.00 U
699GP049	Not taken	43.40	2.20	10.00 U

**Table 10.0.4.23**  
**Subzone F-6 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>Monitoring Wells</b>				
240GW00301	4	7.80 J	0.30 U	5.80 U
240GW00302	2	9.40 J	0.25 U	8.60 J
240GW00303	1	22.40 U	0.20 U	5.00 U
240GW00304	4	9.50 J	0.21 U	5.00 U
613GW00401	33	3.30 J	0.39 U	3.20 U
613GW00402	8	3.30 J	0.40 U	7.60 J
613GW00403	5	2.10 UJ	0.20 U	5.00 U
613GW00404	0	10.50	0.24 J	5.00 U
613GW00501	177	9.90 J	0.30 U	7.50 U
613GW00502	13	27.10	0.42 U	6.60 J
613GW00503	0	44.70	0.43 J	5.00 U
613GW00504	0	34.40	0.52 U	5.00 U
619GW00101	0	2.50 U	0.61 U	3.40 J
619GW00102	1	2.10 U	0.20 U	6.80 J
619GW00103	3	9.80 J	0.20 U	5.00 U
619GW00104	0	7.40 U	0.51 U	5.00 U
619GW00301	0	3.00 J	0.70 U	6.60 J
619GW00302	5	8.00 J	0.39 J	7.00 U
619GW00303	23	3.80 J	0.23 U	5.00 U
619GW00304	0	4.50 U	0.60 U	5.00 U
620GW00101	0	9.60 J	0.57 U	11.00
620GW00102	9	8.00 J	0.28 J	6.60 U
620GW00103	0	3.80 J	0.85 J	5.00 U
620GW00104	0	6.30 J	0.20 U	5.00 U
620GW00201	0	7.00 J	0.32 U	2.80 J
620GW00202	2	2.10 U	0.39 J	5.00 U
620GW00203	0	4.90 J	0.20 U	5.00 U
620GW00204	0	3.80 J	0.20 U	5.00 U
620GW004A1	7	5.30 J	0.30 U	5.00 U
620GW004A2	0	7.70	0.30 J	4.60 U
620GW004A3	0	8.30 J	0.20 U	5.00 U
620GW004A4	0	8.70 U	0.20 U	5.00 U

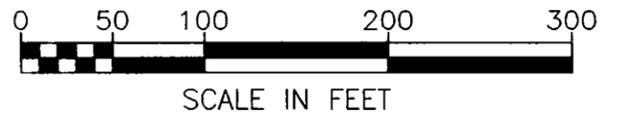


**LEGEND:**

- 543001 SHALLOW MONITORING WELL W/ ID NUMBER
- 06504D DEEP MONITORING WELL W/ ID NUMBER
- 699GP011 DPT GROUNDWATER SAMPLE W/ ID NUMBER

**NOTE:**

SAMPLES FROM ADJACENT AREAS SHOWN FOR REFERENCE IN LIGHTER COLOR



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FIGURE 10.0.4.21  
SAMPLE LOCATIONS FOR  
GROUNDWATER TURBIDITY STUDY  
SUBZONE F-6

**Subzone G-1**

Statistical analysis of the turbidity values in Subzone G-1 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 775.5 ntu and the mean of the monitoring wells was 4.5 ntu.

Statistical analysis of the arsenic values in Subzone G-1 indicates that the arsenic values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 292.3 µg/L and the mean of the monitoring wells was 54.9 µg/L.

Statistical analysis of the beryllium values in Subzone G-1 indicates that the beryllium values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 23.0 µg/L and the mean of the monitoring wells was 0.5 µg/L.

Statistical analysis of the thallium values in Subzone G-1 indicates that the thallium values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 18.8 µg/L and the mean of the monitoring wells was 3.5 µg/L.

Table 10.0.4.24 details the results of the data in Subzone G-1. Figure 10.0.4.22 identifies the sample locations.

**Table 10.0.4.24  
 Subzone G-1 Data Comparison**

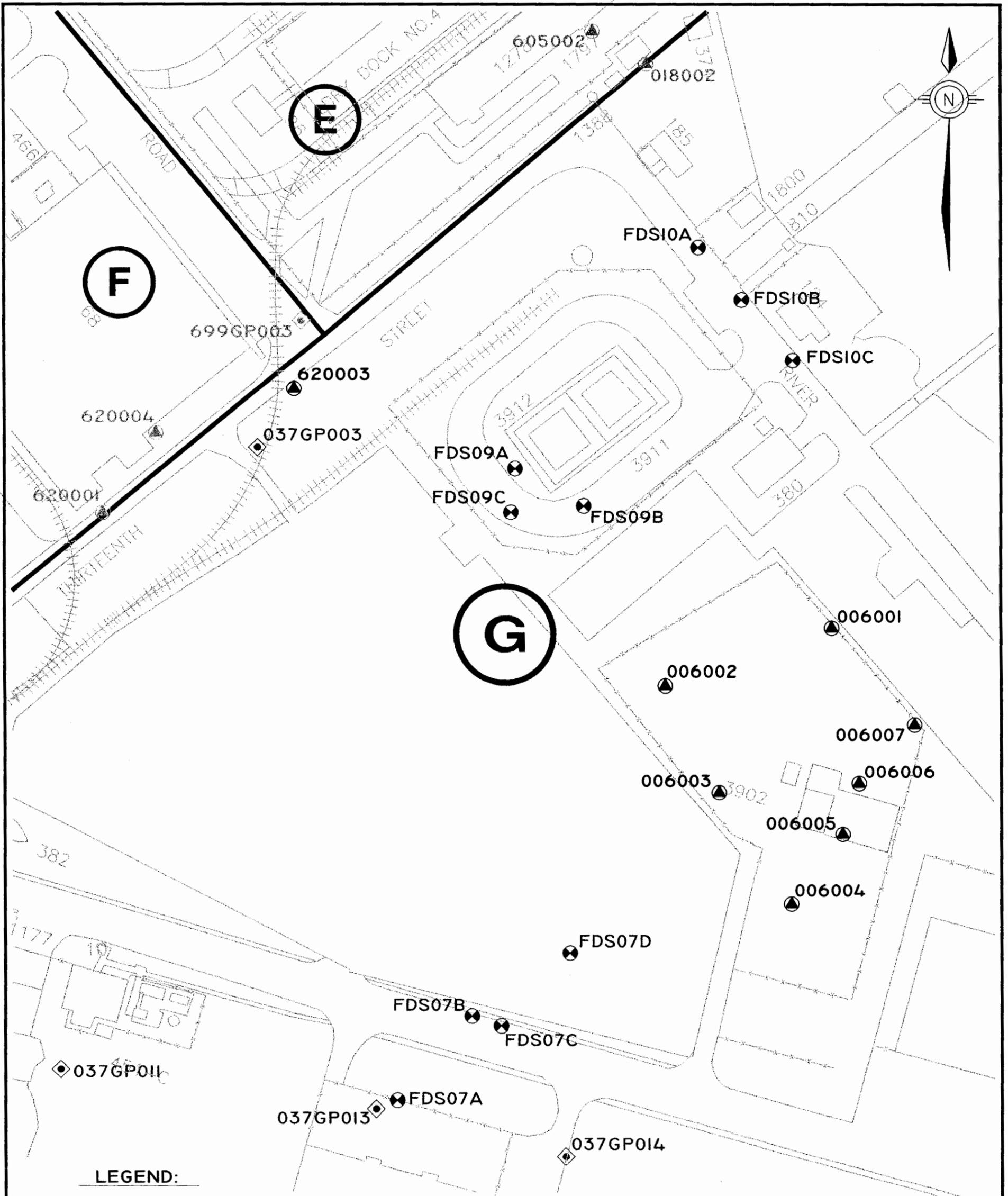
Sample ID	Turbidity (ntu)	Arsenic (µg/L)	Beryllium (µg/L)	Thallium (µg/L)
<b>DPT Locations</b>				
037GP003	999	77.10	2.70	10.00 U
037GP011	999	102.00	13.40	10.00 U
037GP013	495	208.00	28.30	30.10
037GP014	609	782.00	47.60	35.00
<b>Monitoring Wells</b>				
006GW00101	0	8.50 J	1.40 J	6.80 U

**Table 10.0.4.24**  
**Subzone G-1 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
006GW00102	1	2.10 U	0.20 J	5.00 U
006GW00103	0	2.10 U	0.20 U	5.00 U
006GW00104	0	2.90 J	0.20 U	5.00 U
006GW00201	9	6.10 J	1.20 J	2.80 U
006GW00202	10	2.10 U	0.48 J	6.70 J
006GW00203	20	3.40 J	0.76 J	5.00 U
006GW00204	8	5.80 J	0.41 J	5.00 U
006GW00301	46	269.00	0.92 J	7.90 U
006GW00302	4	560.00	0.30 J	6.80 J
006GW00303	1	373.00	0.30 J	5.00 U
006GW00304	0	154.00	0.20 U	6.80 J
006GW00401	4	28.90	0.69 J	5.30 U
006GW00402	1	6.20 J	0.29 J	9.30 J
006GW00403	10	13.90	0.24 J	5.00 U
006GW00404	0	6.90 J	0.20 U	7.10 J
006GW00501	4	7.20 J	1.10 J	4.10 U
006GW00502	1	2.10 U	0.33 J	6.30 J
006GW00503	0	2.50 J	0.65 J	5.00 U
006GW00504	0	3.20 J	0.41 J	5.00 U
006GW00601	2	10.10	1.40 J	2.70 U
006GW00602	2	4.90 J	0.26 J	5.00 U
006GW00603	0	5.50 J	0.29 U	5.00 U
006GW00604	0	17.00	0.29 J	5.00 U
006GW00701	0	17.80	0.36 J	5.90 U
006GW00702	2	4.30 J	0.20 U	5.00 U
006GW00703	0	11.30	0.24 U	5.00 U
006GW00704	0	10.50	0.20 U	5.00 U

**Subzone G-2**

Statistical analysis of the turbidity values in Subzone G-2 indicates that the turbidity values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 582.0 ntu and the mean of the monitoring wells was 1.4 ntu.



**LEGEND:**

▲ SHALLOW MONITORING WELL W/ ID NUMBER

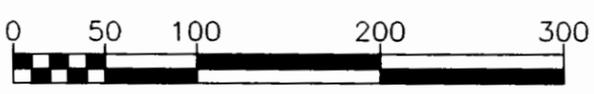
● DEEP MONITORING WELL W/ ID NUMBER

FDS07B ● FUEL DISTRIBUTION SYSTEM MONITORING WELL W/ ID NUMBER

037GP014 ◆ DPT GROUNDWATER SAMPLE W/ ID NUMBER

**NOTE:**

SAMPLES FROM ADJACENT AREAS SHOWN FOR REFERENCE IN LIGHTER COLOR



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FIGURE 10.0.4.22  
MONITORING WELL & DPT SAMPLE  
LOCATIONS FOR TURBIDITY STUDY  
SUBZONE G-1

Statistical analysis of the arsenic values in Subzone G-2 indicates that the arsenic values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 161.1  $\mu\text{g/L}$  and the mean of the monitoring wells was 13.6  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone G-2 indicates that the beryllium values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 6.0  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.4  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone G-2 indicates that the thallium values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 15.3  $\mu\text{g/L}$  and the mean of the monitoring wells was 2.7  $\mu\text{g/L}$ .

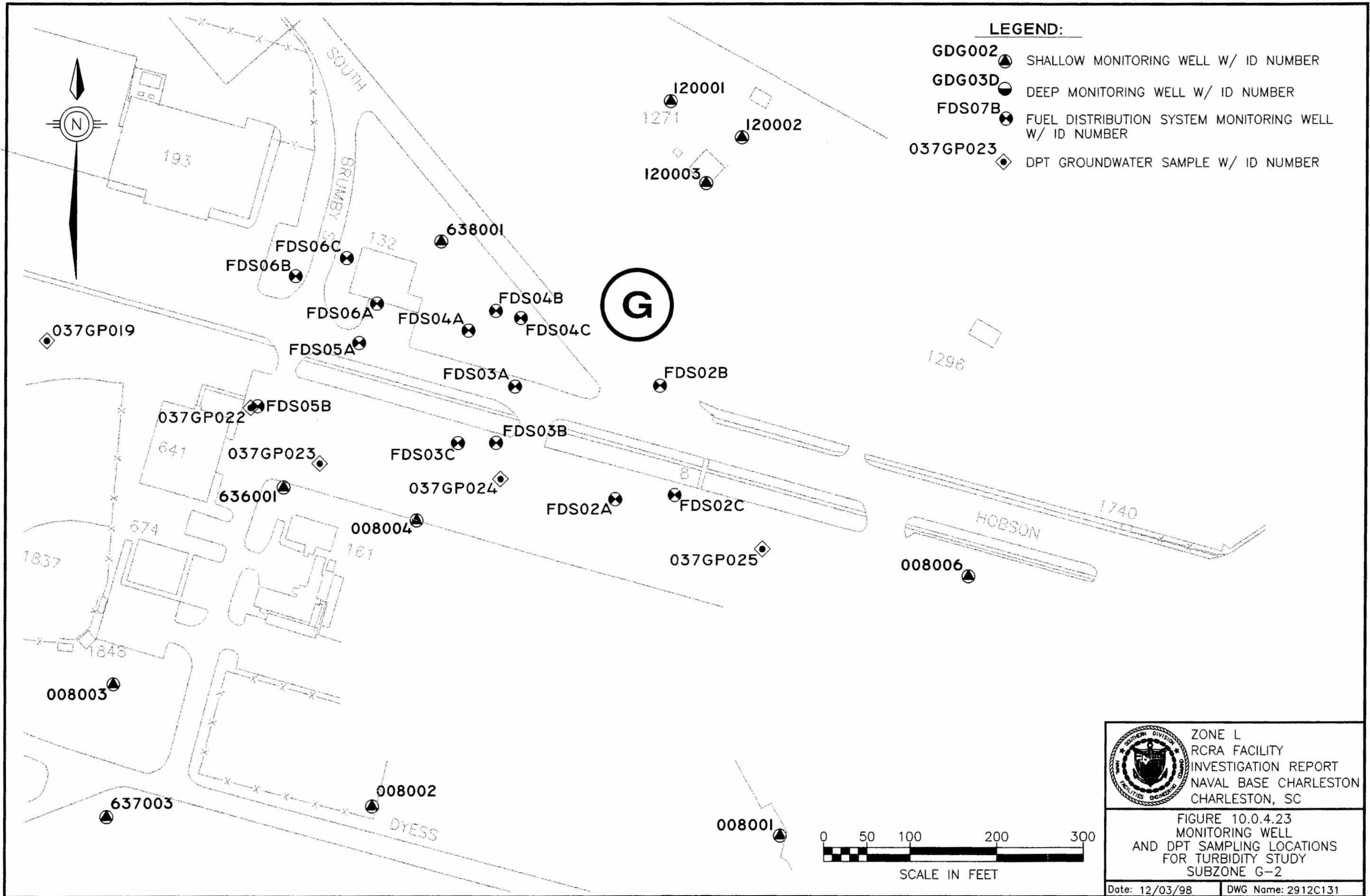
Table 10.0.4.25 details the results of the data in Subzone G-2. Figure 10.0.4.23 identifies the sample locations.

**Table 10.0.4.25  
 Subzone G-2 Data Comparison**

<u>Sample ID</u>	<u>Turbidity (ntu)</u>	<u>Arsenic (<math>\mu\text{g/L}</math>)</u>	<u>Beryllium (<math>\mu\text{g/L}</math>)</u>	<u>Thallium (<math>\mu\text{g/L}</math>)</u>
<b>DPT Locations</b>				
037GP019	999	441.00	11.60	23.50
037GP022	999	159.00	7.50	20.60
037GP023	201	39.50	3.80	12.10
037GP024	129	10.00 U	2.00 U	10.00 U
037GP025	999	15.70	2.30	11.90
<b>Monitoring Wells</b>				
008GW00101	0	6.40 J	1.60 U	2.70 U
008GW00102	0	5.00 J	0.71 J	5.00 UJ
008GW00103	0	5.60 J	1.19 J	5.00 U
008GW00104	0	6.30 U	0.33 J	5.00 U
008GW00201	2	2.50 U	0.69 U	3.90 J
008GW00202	0	2.10 U	0.20 UJ	5.00 UJ
008GW00203	0	2.10 U	0.23 J	5.00 U
008GW00204	0	2.30 U	0.20 U	5.00 U

**Table 10.0.4.25**  
**Subzone G-2 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
008GW00301	0	8.00 J	1.50 U	2.70 U
008GW00302	0	13.00	3.70 J	7.40 J
008GW00303	4	10.20	1.30 J	5.00 U
008GW00304	1	12.10 U	0.32 J	5.00 U
008GW00401	4	4.30 J	1.60 U	4.60 J
008GW00402	0	9.40 J	0.67 J	6.40 J
008GW00403	4	2.30 J	1.10 J	5.00 U
008GW00404	0	4.40 U	0.28 J	5.00 U
008GW00601	14	17.70	0.64 U	2.70 U
008GW00602	0	17.20	0.27 J	5.00 UJ
008GW00603	0	31.70	0.20 U	5.00 U
008GW00604	0	24.70	0.20 U	5.00 U
120GW00101	0	26.50	0.58 U	2.70 U
120GW00102	0	41.10	0.20 UJ	5.00 UJ
120GW00103	0	60.00	0.20 U	5.00 U
120GW00104	0	60.40	0.20 U	5.00 U
120GW00201	0	2.50 U	0.52 U	2.70 U
120GW00202	0	3.70 J	0.20 UJ	5.00 UJ
120GW00203	0	5.80 J	0.20 U	5.00 U
120GW00204	0	11.90	0.20 U	5.00 U
120GW00301	0	35.40	0.38 U	2.70 U
120GW00302	0	32.20	0.20 UJ	5.00 UJ
120GW00303	0	37.30	0.20 U	5.00 U
120GW00304	0	57.70	0.20 U	5.00 U
636GW00101	0	2.50 U	1.40 U	2.70 U
636GW00102	2	10.20	0.41 J	5.00 UJ
636GW00103	0	3.60 J	0.37 U	5.00 U
636GW00104	0	8.20 U	0.20 U	5.00 U
637GW003A1	10	7.90 J	0.50 U	5.00 U
637GW003A2	6	3.40 J	0.20 U	5.00 U
637GW003A3	6	6.10 U	0.20 U	5.00 U
637GW003A4	6	5.70 U	0.20 U	5.00 U
638GW00101	0	5.10 J	0.30 U	2.70 U
638GW00102	1	5.00 J	0.20 UJ	6.40 J
638GW00103	0	4.70 J	0.20 U	5.00 U
638GW00104	0	9.00 U	0.20 U	5.00 U

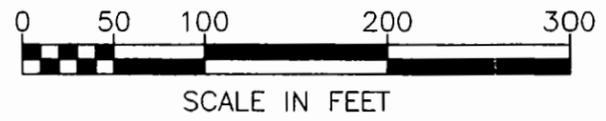


- LEGEND:**
- GDG002 SHALLOW MONITORING WELL W/ ID NUMBER
  - GDG03D DEEP MONITORING WELL W/ ID NUMBER
  - FDS07B FUEL DISTRIBUTION SYSTEM MONITORING WELL W/ ID NUMBER
  - 037GP023 DPT GROUNDWATER SAMPLE W/ ID NUMBER

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 CHARLESTON, SC

FIGURE 10.0.4.23  
 MONITORING WELL  
 AND DPT SAMPLING LOCATIONS  
 FOR TURBIDITY STUDY  
 SUBZONE G-2

Date: 12/03/98      DWG Name: 2912C131



**Subzone H-1**

Statistical analysis of the turbidity values in Subzone H-1 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 419.0 ntu and the mean of the monitoring wells was 3.00 ntu.

Statistical analysis of the arsenic values in Subzone H-1 indicates that the arsenic values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 37.45  $\mu\text{g/L}$  and the mean of the monitoring wells was 11.62  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone H-1 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 2.51  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.22  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone H-1 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 5.71  $\mu\text{g/L}$  and the mean of the monitoring wells was 2.55  $\mu\text{g/L}$ .

Table 10.0.4.26 details the results of the data in Subzone H-1. Figure 10.0.4.24 identifies the sample locations.

**Table 10.0.4.26  
 Subzone H-1 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
<b>DPT Locations</b>				
037GP001	10.00	11.00	2.00 U	10.00 U
037GP002	121.00	17.70	2.00 U	10.00 U
037GP003	999.00	60.90	3.50	12.10
037GP004	34.00	10.00 U	2.00 U	10.00 U
037GP006	641.00	10.00 U	2.00 U	10.00 U

**Table 10.0.4.26**  
**Subzone H-1 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
037GP008	999.00	121.00	5.40	10.00 U
037GP010	177.00	10.00 U	2.00 U	10.00 U
037GP011	997.00	10.00 U	2.00 U	10.00 U
037GP012	86.00	11.90	2.00 U	10.00 U
037GP06A	126.00	132.00	9.90	10.00 U
<b>Monitoring Wells</b>				
013GW00101	0.00	12.10 J	0.30 U	5.80 UJ
013GW00102	0.00	7.40 J	0.20 U	3.70 U
013GW00103	0.00	9.90 J	0.30 U	2.50 UJ
013GW00104	0.00	16.40 J	1.20 U	4.20 J
013GW00701	0.00	3.80 U	0.30 U	5.80 UJ
013GW00702	0.00	2.60 U	0.20 U	3.70 U
013GW00703	0.00	1.80 U	0.30 U	2.50 UJ
013GW00704	0.00	2.50 U	0.36 U	4.40 U
013G130101	0.00	5.10 U	0.30 U	5.80 UJ
013G130102	0.00	4.90 J	0.20 U	3.70 U
013G130103	0.00	2.00 J	0.32 J	2.50 UJ
013G130104	0.00	4.50 J	0.44 U	2.70 U
013G130201	0.00	7.70 U	0.30 U	5.80 UJ
013G130202	0.00	4.10 J	0.20 U	3.70 U
013G130203	0.00	1.80 U	0.30 U	2.50 UJ
013G130204	0.00	4.40 J	0.44 U	3.70 U
653GW00101	0.00	28.40	0.30 U	1.20 J
653GW00102	0.00	38.60	0.30 U	3.30 U
653GW00103	0.00	54.10	0.30 U	2.50 U
653GW00104	0.00	45.00	0.30 U	2.80 J
653GW00201	0.00	14.30	0.30 U	1.00 U
653GW00202	0.00	17.00	0.30 U	3.30 U
653GW00203	0.00	23.40	0.36 U	3.00 U
653GW00204	0.00	10.10	0.30 U	2.70 U
GDHGW00301	8.00	26.60 U	0.30 U	4.00 UJ
GDHGW00302	8.00	24.80	0.20 U	3.70 U

**Table 10.0.4.26**  
**Subzone H-1 Data Comparison**

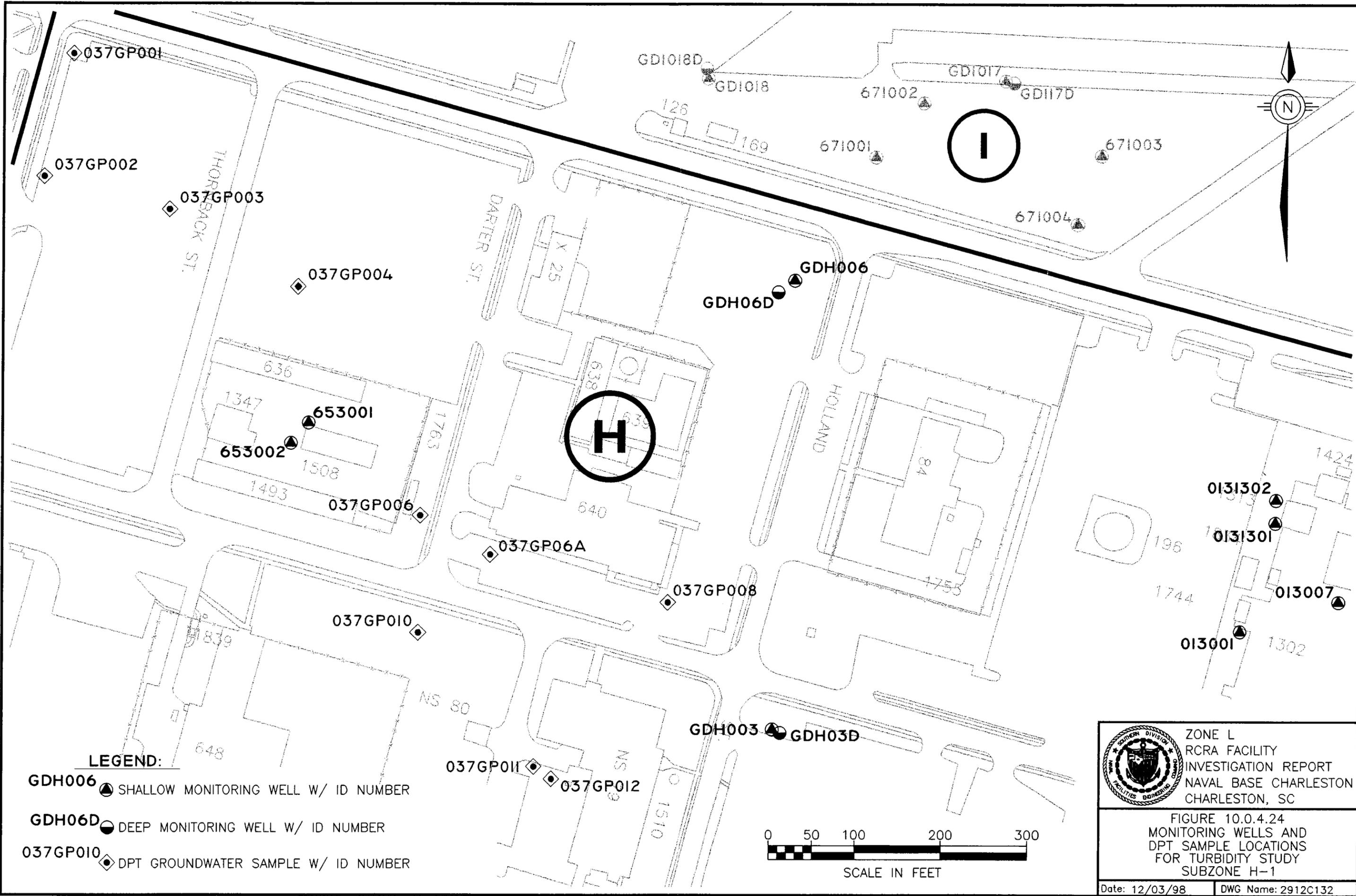
<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
GDHW00303	8.00	41.00 J	0.30 U	12.50 U
GDHW00304	8.00	42.10	0.55 U	4.00 J
GDHW00601	7.00	7.20 J	0.30 U	2.20 J
GDHW00602	7.00	7.30	0.20 U	3.70 U
GDHW00603	7.00	42.70	0.30 U	1.80 UJ
GDHW00604	7.00	27.80	0.59 U	3.50 J
GDHW03D01	0.00	3.80 U	0.30 U	5.00 UJ
GDHW03D02	0.00	2.60 U	0.20 U	3.70 U
GDHW03D03	0.00	2.60 J	0.30 U	6.40 UJ
GDHW03D04	0.00	4.60 U	1.00 J	2.70 U
GDHW06D01	0.00	8.20 J	0.30 U	10.00 U
GDHW06D02	0.00	2.60 U	0.20 U	3.70 U
GDHW06D03	0.00	2.70 J	0.30 U	6.40 UJ
GDHW06D04	0.00	2.50 U	0.96 U	2.70 U

**Subzone H-2**

Statistical analysis of the turbidity values in Subzone H-2 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 627.0 ntu and the mean of the monitoring wells was 0.52 ntu.

Statistical analysis of the arsenic values in Subzone H-2 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 70.09  $\mu\text{g/L}$  and the mean of the monitoring wells was 3.14  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone H-2 indicates that the beryllium values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 5.36  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.20  $\mu\text{g/L}$ .



**LEGEND:**

- GDH006 ● SHALLOW MONITORING WELL W/ ID NUMBER
- GDH06D ● DEEP MONITORING WELL W/ ID NUMBER
- 037GP010 ◆ DPT GROUNDWATER SAMPLE W/ ID NUMBER



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FIGURE 10.0.4.24  
 MONITORING WELLS AND  
 DPT SAMPLE LOCATIONS  
 FOR TURBIDITY STUDY  
 SUBZONE H-1

Statistical analysis of the thallium values in Subzone H-2 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 5.00  $\mu\text{g/L}$  and the mean of the monitoring wells was 1.71  $\mu\text{g/L}$ .

Table 10.0.4.27 details the results of the data in Subzone H-2. Figure 10.0.4.25 identifies the sample locations.

**Table 10.0.4.27**  
**Subzone H-2 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
<b>DPT Locations</b>				
037GP014	Not Taken	88.60	5.30	10.00 U
037GP015	Not Taken	36.10	2.50	10.00 U
037GP016	Not Taken	10.00 U	2.00 U	10.00 U
037GP017	450.00	182.00	11.20	10.00 U
037GP018	60.00	146.00	15.50	10.00 U
037GP019	999.00	20.10	2.00 U	10.00 U
037GP020	999.00	12.80	2.00 U	10.00 U
<b>Monitoring Wells</b>				
013GW00201	1.00	5.70 U	0.30 U	5.80 UJ
013GW00202	1.00	2.60 U	0.20 U	3.70 U
013GW00203	1.00	1.80 U	0.30 U	2.50 UJ
013GW00204	1.00	2.50 UJ	1.30 U	2.70 UJ
013GW00301	0.00	5.90 U	0.30 U	5.80 UJ
013GW00302	0.00	2.60 U	0.20 U	3.70 U
013GW00303	0.00	3.30 J	0.32 J	2.50 UJ
013GW00304	0.00	3.50 UJ	1.20 U	2.70 UJ
013GW00401	2.00	7.10 U	0.30 U	5.80 UJ
013GW00402	2.00	2.60 U	0.20 U	3.70 U
013GW00403	2.00	3.90 J	0.30 U	2.50 UJ
013GW00404	2.00	2.60 UJ	0.43 U	2.70 UJ
017GW00101	0.00	2.30 U	0.30 U	3.10 U
017GW00102	0.00	2.60 U	0.20 U	3.70 U
017GW00103	0.00	6.10 J	0.32 J	2.50 UJ

**Table 10.0.4.27**  
**Subzone H-2 Data Comparison**

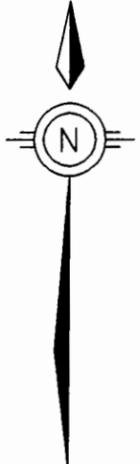
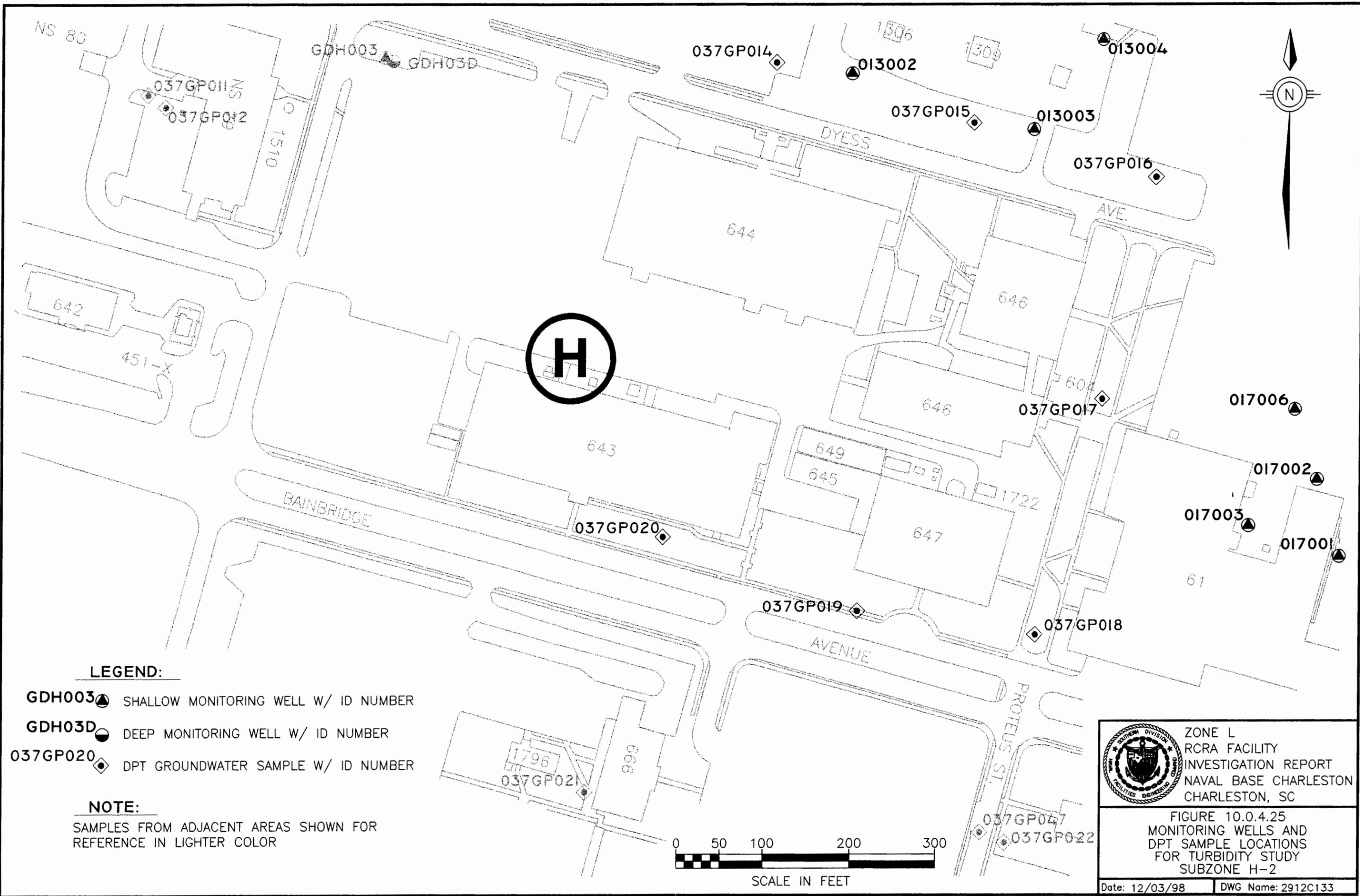
Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
017GW00104	0.00	17.20	0.52 U	2.70 U
017GW00201	0.00	11.70 U	0.30 U	3.10 U
017GW00202	0.00	3.20 J	0.20 U	3.70 U
017GW00203	0.00	3.50 J	0.30 U	2.50 UJ
017GW00204	0.00	2.50 U	0.30 U	3.10 J
017GW00301	0.00	4.60 U	0.30 U	3.10 U
017GW00302	0.00	2.60 U	0.20 U	3.70 U
017GW00303	0.00	2.70 J	0.30 U	2.50 UJ
017GW00304	0.00	7.50 J	0.46 U	2.70 U
017GW00601	0.00	3.10 U	0.30 U	3.30 UJ
017GW00603	0.00	1.80 U	0.30 U	2.50 UJ
017GW00604	0.00	3.40 J	0.74 U	2.70 U

**Subzone H-3**

Statistical analysis of the turbidity values in Subzone H-3 indicates that the turbidity values do not differ significantly between the DPT locations and the monitoring wells because only two turbidities were recorded for the DPT locations. The mean of the DPT locations was 137.50 ntu and the mean of the monitoring wells was 0.80 ntu.

Statistical analysis of the arsenic values in Subzone H-3 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 82.41  $\mu\text{g/L}$  and the mean of the monitoring wells was 3.46  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone H-3 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 5.26  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.21  $\mu\text{g/L}$ .

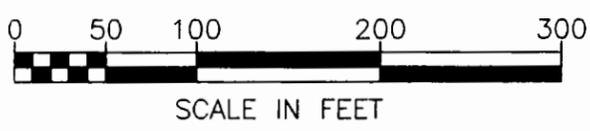


**LEGEND:**

- GDH003 SHALLOW MONITORING WELL W/ ID NUMBER
- GDH03D DEEP MONITORING WELL W/ ID NUMBER
- 037GP020 DPT GROUNDWATER SAMPLE W/ ID NUMBER

**NOTE:**

SAMPLES FROM ADJACENT AREAS SHOWN FOR REFERENCE IN LIGHTER COLOR



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FIGURE 10.0.4.25  
MONITORING WELLS AND  
DPT SAMPLE LOCATIONS  
FOR TURBIDITY STUDY  
SUBZONE H-2

Statistical analysis of the thallium values in Subzone H-3 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 6.08  $\mu\text{g/L}$  and the mean of the monitoring wells was 1.92  $\mu\text{g/L}$ .

Table 10.0.4.28 details the results of the data in Subzone H-3. Figure 10.0.4.26 identifies the sample locations.

**Table 10.0.4.28**  
**Subzone H-3 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
<b>DPT Locations</b>				
037GP018	60.00	146.00	15.50	10.00 U
037GP026	Not Taken	100.00	6.00	10.00 U
037GP027	Not Taken	192.00	9.50	13.60
037GP028	215.00	77.10	3.90	10.00 U
037GP034	Not Taken	10.80	2.00 U	10.00 U
037GP035	Not Taken	12.40	2.00 U	10.00 U
037GP036	Not Taken	10.00 U	2.00 U	10.00 U
037GP037	Not Taken	116.00	4.20	10.00 U
<b>Monitoring Wells</b>				
013GW00501	0.00	4.20 U	0.30 U	5.80 UJ
013GW00502	0.00	2.60 U	0.21 J	3.70 U
013GW00503	0.00	3.70 J	0.30 U	2.50 UJ
013GW00504	0.00	3.00 J	0.38 U	3.20 U
013GW00601	0.00	5.30 U	0.30 U	5.80 UJ
013GW00602	0.00	2.60 U	0.20 U	3.70 U
013GW00603	0.00	2.50 J	0.30 U	2.50 UJ
013GW00604	0.00	3.80 J	0.40 U	2.70 U
017GW00501	0.00	2.70 U	0.30 U	3.30 UJ
017GW00503	0.00	2.00 J	0.30 U	2.50 UJ
017GW00504	0.00	2.50 J	0.77 U	3.00 U
037GW00101	0.00	2.80 J	0.27 J	5.00 U
037GW00102	0.00	10.00 U	5.00 U	10.00 U
136GW00101	0.00	16.50 U	0.30 U	3.40 U

**Table 10.0.4.28**  
**Subzone H-3 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
136GW00102	0.00	9.40 U	0.20 U	3.70 UJ
136GW00103	0.00	8.40 J	0.30 J	6.40 UJ
136GW00104	0.00	10.40	0.30 U	2.70 U
178GW00101	0.00	6.80 U	0.30 U	3.10 U
178GW00102	0.00	2.70 U	1.50 U	3.30 U
178GW00103	0.00	4.00 J	0.30 J	1.60 UJ
178GW00104	0.00	4.70 J	0.30 J	2.70 U
178GW00201	2.00	9.60 U	0.30 U	3.10 U
178GW00202	2.00	5.60 U	0.20 U	3.70 UJ
178GW00203	2.00	5.20 J	0.30 J	1.60 UJ
178GW00204	2.00	5.40 J	0.30 U	2.70 U
660GW00101	2.00	2.10 U	0.30 U	3.10 U
660GW00102	2.00	2.60 U	0.20 U	3.70 UJ
660GW00103	2.00	3.60 J	0.30 J	1.60 UJ
660GW00104	2.00	3.70 J	0.30 U	3.70 J
660GW00201	1.00	5.20 U	0.30 U	3.10 U
660GW00202	1.00	12.10	0.20 U	3.70 UJ
660GW00203	1.00	5.80 J	0.30 J	1.60 UJ
660GW00204	1.00	7.10 J	0.38 J	2.70 U
662GW00101	0.00	5.50 U	0.30 U	3.10 U
662GW00102	0.00	2.60 U	0.20 U	3.70 UJ
662GW00103	0.00	1.50 J	0.30 J	1.60 UJ
662GW00104	0.00	2.50 U	0.30 U	4.00 J
662GW00201	0.00	2.20 U	0.30 U	3.60 U
662GW00202	0.00	2.60 U	0.20 U	3.70 UJ
662GW00203	0.00	3.50 J	0.30 J	1.60 UJ
662GW00204	0.00	2.90 J	0.30 U	3.10 J
663GW00101	0.00	6.40 U	0.30 U	3.10 U
663GW00102	0.00	4.40 U	0.20 U	3.70 UJ
663GW00103	0.00	9.00 J	0.30 U	2.50 UJ
663GW00104	0.00	7.10 J	1.80 U	2.70 UJ
663GW00201	0.00	7.80 U	0.30 U	3.10 U

**Table 10.0.4.28**  
**Subzone H-3 Data Comparison**

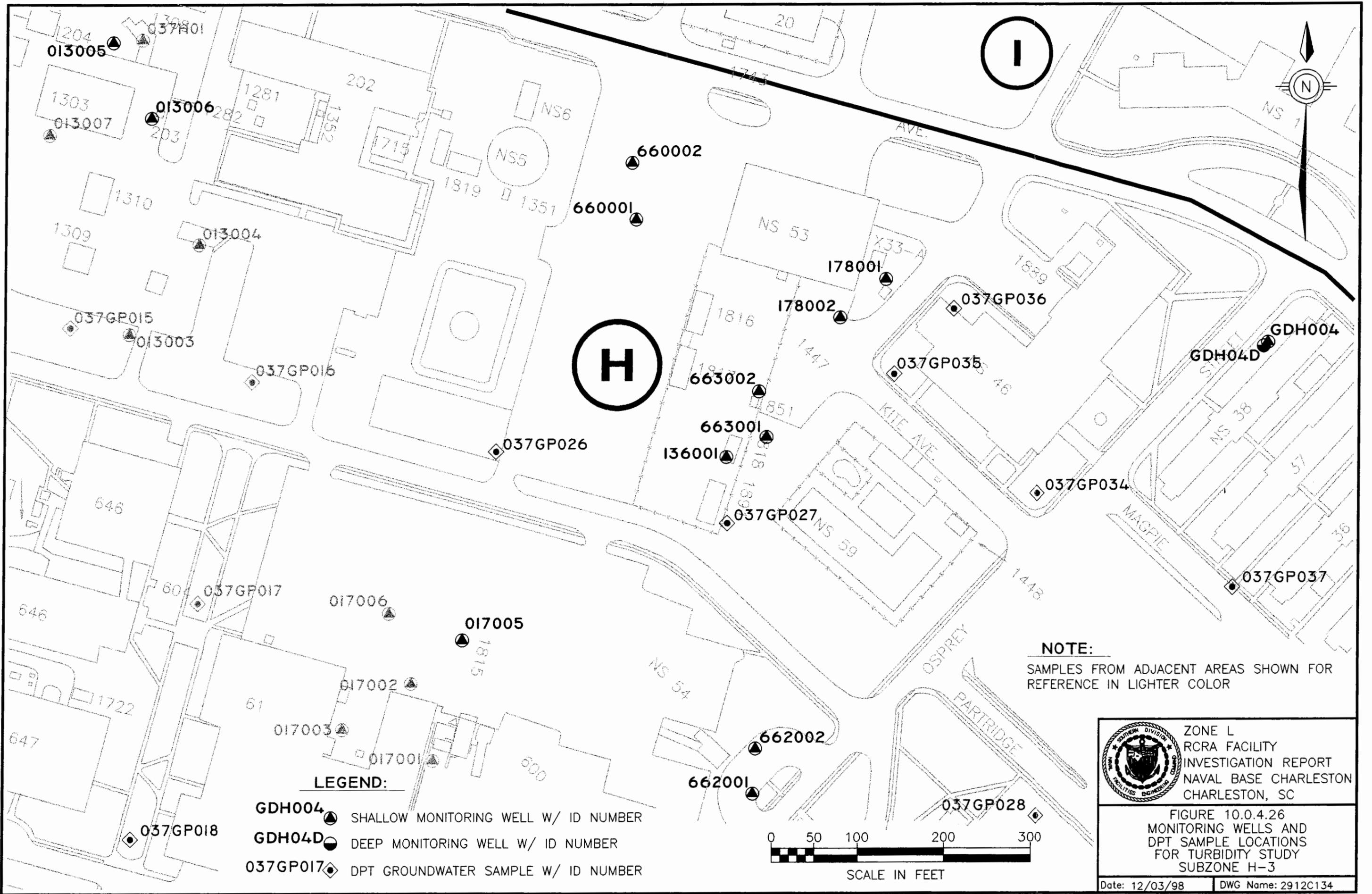
Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
663GW00202	0.00	3.20 U	0.20 U	3.70 UJ
663GW00203	0.00	6.20 J	0.30 U	2.50 UJ
663GW00204	0.00	9.80 J	1.70 U	2.70 UJ
GDHGW00401	5.00	0.80 U	0.30 U	1.90 J
GDHGW00402	5.00	2.60 U	0.20 U	3.70 UJ
GDHGW00403	5.00	3.10 J	0.30 U	1.60 UJ
GDHGW00404	5.00	8.80 U	0.39 U	5.30 J
GDHGW04D01	1.00	2.60 J	0.30 U	10.00 U
GDHGW04D02	1.00	2.60 U	0.20 U	3.70 UJ
GDHGW04D03	1.00	1.50 U	0.30 U	6.40 UJ
GDHGW04D04	1.00	2.50 U	1.00 J	5.90 J

**Subzone H-4**

Statistical analysis of the turbidity values in Subzone H-4 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 702.20 ntu and the mean of the monitoring wells was 1.50 ntu.

Statistical analysis of the arsenic values in Subzone H-4 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 80.00  $\mu\text{g/L}$  and the mean of the monitoring wells was 1.69  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone H-4 indicates that the beryllium values do not differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 4.46  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.15  $\mu\text{g/L}$ .




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FIGURE 10.0.4.26  
 MONITORING WELLS AND  
 DPT SAMPLE LOCATIONS  
 FOR TURBIDITY STUDY  
 SUBZONE H-3

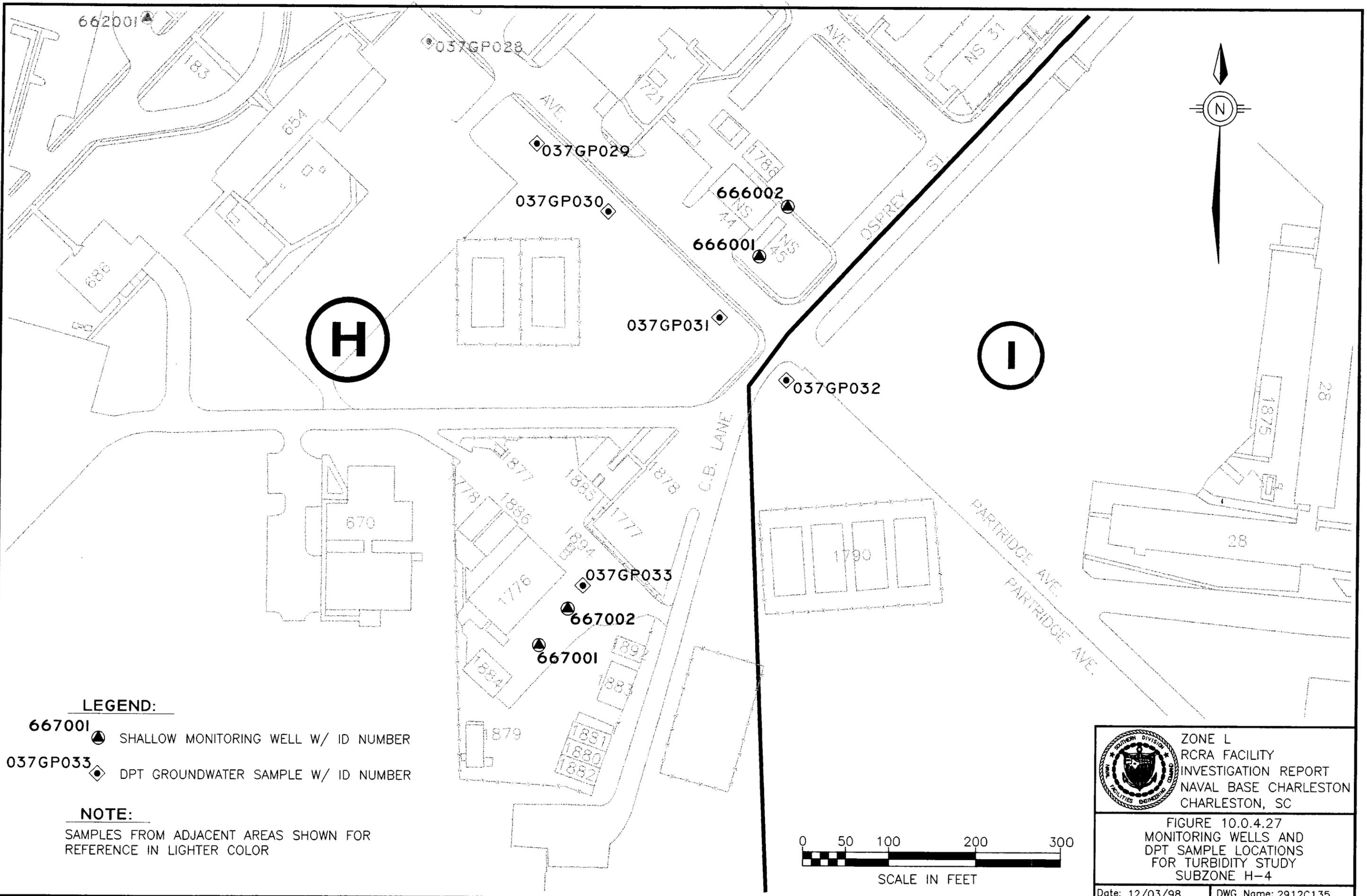
Date: 12/03/98      DWG Name: 2912C134

Statistical analysis of the thallium values in Subzone H-4 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 5.00  $\mu\text{g/L}$  and the mean of the monitoring wells was 2.02  $\mu\text{g/L}$ .

Table 10.0.4.29 details the results of the data in Subzone H-4. Figure 10.0.4.27 identifies the sample locations.

**Table 10.0.4.29  
 Subzone H-4 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>DPT Locations</b>				
037GP029	134.00	21.00	2.00 U	10.00 U
037GP030	380.00	86.20	3.20	10.00 U
037GP031	999.00	92.50	5.70	10.00 U
037GP032	999.00	173.00	11.40	10.00 U
037GP033	999.00	27.30	2.00 U	10.00 U
<b>Monitoring Wells</b>				
666GW00101	1.00	2.10 U	0.30 U	3.10 U
666GW00102	1.00	6.20 U	0.20 U	3.70 UJ
666GW00103	1.00	3.20 J	0.30 UJ	6.40 UJ
666GW00104	1.00	5.70 J	0.30 U	2.70 U
666GW00201	5.00	2.10 U	0.30 U	3.10 U
666GW00202	5.00	2.60 U	0.20 U	3.70 UJ
666GW00203	5.00	1.50 UJ	0.30 UJ	1.60 UJ
666GW00204	5.00	2.50 U	0.30 U	3.10 J
667GW00101	0.00	2.10 U	0.30 U	3.10 U
667GW00102	0.00	2.60 U	0.20 U	3.70 UJ
667GW00103	0.00	1.50 UJ	0.30 UJ	6.40 UJ
667GW00104	0.00	2.60 U	0.30 U	2.70 UJ
667GW00201	0.00	2.60 U	0.30 U	3.10 U
667GW00202	0.00	2.60 U	0.20 U	3.70 UJ
667GW00203	0.00	1.50 UJ	0.30 UJ	6.40 UJ
667GW00204	0.00	3.80 U	0.38 J	5.10 UJ

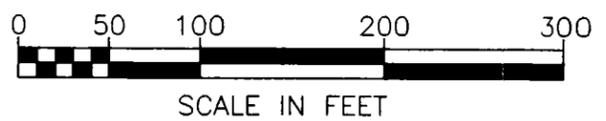


**LEGEND:**

- 667001  SHALLOW MONITORING WELL W/ ID NUMBER
- 037GP033  DPT GROUNDWATER SAMPLE W/ ID NUMBER

**NOTE:**

SAMPLES FROM ADJACENT AREAS SHOWN FOR REFERENCE IN LIGHTER COLOR



	<p>ZONE L RCRA FACILITY INVESTIGATION REPORT NAVAL BASE CHARLESTON CHARLESTON, SC</p>
	<p>FIGURE 10.0.4.27 MONITORING WELLS AND DPT SAMPLE LOCATIONS FOR TURBIDITY STUDY SUBZONE H-4</p>
<p>Date: 12/03/98      DWG Name: 2912C135</p>	

**Subzone H-5**

Statistical analysis of the turbidity values in Subzone H-5 indicates that the turbidity values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 465.7 ntu and the mean of the monitoring wells was 3.8 ntu.

Statistical analysis of the arsenic values in Subzone H-5 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 68.7  $\mu\text{g/L}$  and the mean of the monitoring wells was 3.5  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone H-5 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 4.0  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.2  $\mu\text{g/L}$ .

Statistical analysis of the thallium values in Subzone H-5 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 6.5  $\mu\text{g/L}$  and the mean of the monitoring wells was 3.0  $\mu\text{g/L}$ .

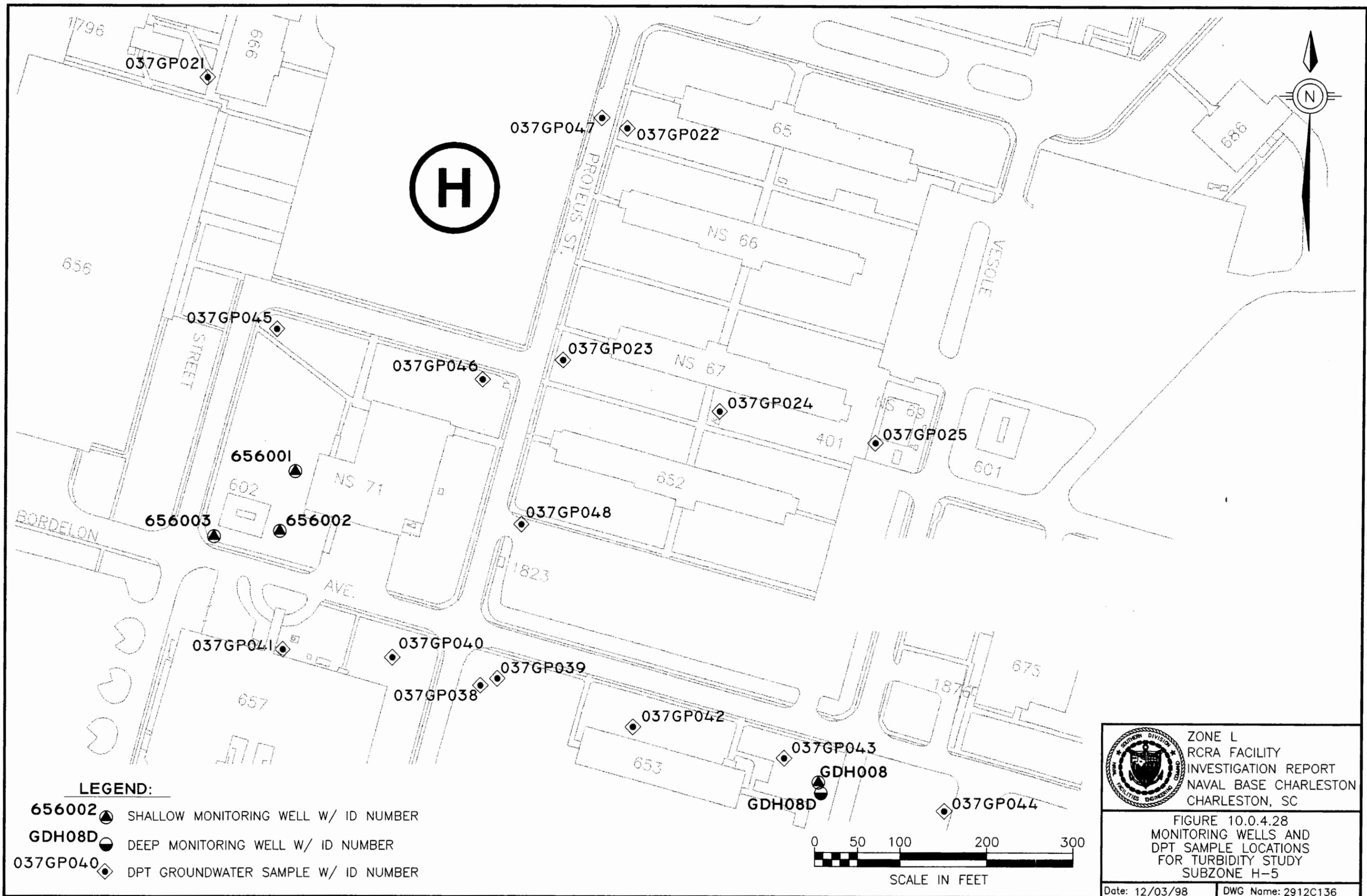
Table 10.0.4.30 details the results of the data in Subzone H-5. Figure 10.0.4.28 identifies the sample locations.

**Table 10.0.4.30  
 Subzone H-5 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>DPT Locations</b>				
037GP021	68.00	120.00	6.30	10.00 U
037GP022	9.00	242.00	14.10	17.30
037GP023	240.00	84.90	4.50	10.00 U
037GP024	234.00	29.90	2.60	10.00 U
037GP025	999.00	20.00	2.00 U	10.00 U
037GP038	Not Taken	19.90	2.00 U	10.00 U

**Table 10.0.4.30**  
**Subzone H-5 Data Comparison**

<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
037GP039	81.00	139.00	6.00	10.00 U
037GP043	999.00	63.20	4.10	10.00 U
037GP044	74.00	45.70	3.90	10.00 U
037GP045	999.00	34.20	2.20	10.00 U
037GP046	573.00	13.20	2.00 U	10.70
037GP047	847.00	11.90	2.00 U	10.00 U
<b>Monitoring Wells</b>				
017GW00401	0.00	4.20 U	0.30 U	3.10 U
017GW00402	0.00	4.90 J	0.20 U	3.70 U
017GW00403	0.00	3.20 J	0.30 U	2.50 UJ
017GW00404	0.00	4.70 J	0.47 U	2.70 U
656GW00101	9.00	20.90 U	0.30 U	5.80 UJ
656GW00102	9.00	3.00 U	0.20 U	3.70 UJ
656GW00103	9.00	10.70	0.30 U	2.50 UJ
656GW00104	9.00	16.60 J	1.20 U	4.20 J
656GW00201	1.00	2.10 U	0.30 U	3.10 U
656GW00202	1.00	2.60 U	0.20 U	3.70 UJ
656GW00203	1.00	4.50 J	0.30 U	2.50 UJ
656GW00204	1.00	4.20 UJ	1.20 U	4.50 J
656GW00301	4.00	4.30 U	0.30 U	3.10 U
656GW00302	4.00	2.60 U	0.20 U	4.10 J
656GW00303	4.00	9.00 U	0.30 U	23.20 J
656GW00304	4.00	5.80 UJ	0.93 U	3.30 J
GDHGW00801	2.00	1.60 U	0.30 U	1.00 U
GDHGW00802	2.00	2.70 U	0.20 U	3.30 U
GDHGW00803	2.00	1.60 J	0.30 U	1.60 UJ
GDHGW00804	2.00	2.50 U	0.37 U	2.70 UJ
GDHGW08D01	7.00	0.80 U	0.30 U	5.60 J
GDHGW08D02	7.00	2.70 U	0.20 U	3.70 UJ
GDHGW08D03	7.00	2.00 J	0.30 U	6.40 UJ
GDHGW08D04	7.00	2.50 U	0.89 U	2.70 UJ

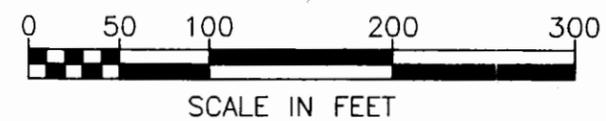


**H**



**LEGEND:**

- 656002  SHALLOW MONITORING WELL W/ ID NUMBER
- GDH08D  DEEP MONITORING WELL W/ ID NUMBER
- 037GP040  DPT GROUNDWATER SAMPLE W/ ID NUMBER



	ZONE L RCRA FACILITY INVESTIGATION REPORT NAVAL BASE CHARLESTON CHARLESTON, SC
	FIGURE 10.0.4.28 MONITORING WELLS AND DPT SAMPLE LOCATIONS FOR TURBIDITY STUDY SUBZONE H-5
Date: 12/03/98      DWG Name: 2912C136	

**Subzone I-1**

Subzone I-1 had only one DPT groundwater location and results for arsenic, beryllium, and thallium were used as a single point comparison.

Table 10.0.4.31 details the results of the data in zone I-1. Figure 10.0.4.29 identifies the sample locations.

**Table 10.0.4.31  
 Subzone I-1 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic (µg/L)	Beryllium (µg/L)	Thallium (µg/L)
<b>DPT Locations</b>				
037GP001	123	191.00	6.70	10.00 U
<b>Monitoring Wells</b>				
671GW00101	0	3.20 U	0.20 U	4.50 U
671GW00102	1	5.00 U	1.00 U	5.00 U
671GW00103	0	10.10	1.00 U	5.00 U
671GW00104	0	7.70 U	0.50 U	5.50 J
671GW00201	10	3.20 U	0.20 U	4.50 U
671GW00202	2	5.00 U	1.00 U	5.00 U
671GW00203	0	5.00 U	1.00 U	5.00 U
671GW00204	0	5.90 U	0.53 U	2.70 U
671GW00301	0	31.40	0.20 U	4.50 U
671GW00302	4	42.00	1.00 U	5.00 U
671GW00303	0	28.80	1.00 U	5.00 U
671GW00304	0	38.90	0.54 U	6.60 J
671GW00401	2	17.20	0.20 U	4.50 U
671GW00402	3	9.90 J	1.00 U	5.00 U
671GW00403	5	9.90 J	1.00 U	5.00 U
671GW00404	7	10.00 U	0.48 J	2.70 UJ
GDIGW01701	0	20.90	0.20 U	4.50 U
GDIGW01702	4	66.30	1.00 U	5.40 J
GDIGW01703	2	33.50	1.00 U	5.00 U
GDIGW01704	2	46.20	0.37 U	2.70 UJ
GDIGW01801	0	3.20 U	0.20 U	4.50 U

**Table 10.0.4.31  
 Subzone I-1 Data Comparison**

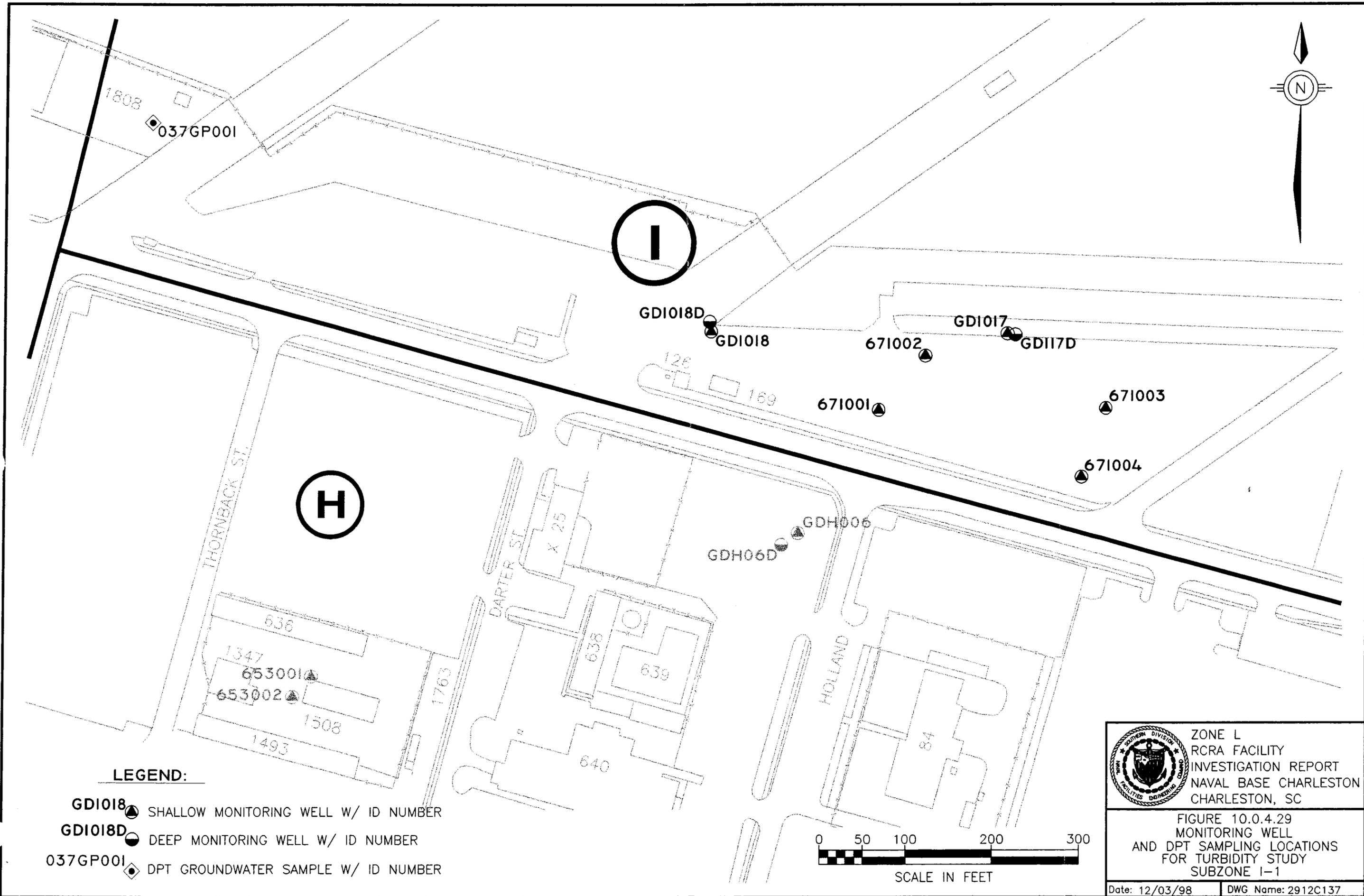
Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
GDIGW01802	8	5.00 U	1.00 U	5.00 U
GDIGW01803	4	5.00 U	1.00 U	5.00 U
GDIGW01804	0	2.50 U	0.42 U	2.70 U
GDIGW17D01	0	3.20 U	0.20 U	4.50 U
GDIGW17D02	3	5.00 U	1.00 U	6.30 J
GDIGW17D03	0	5.00 U	1.00 U	5.00 UJ
GDIGW17D04	0	24.80 J	2.80 U	15.40 J
GDIGW18D01	4	3.20 U	0.26 U	4.50 U
GDIGW18D02	8	5.00 U	1.00 U	5.20 J
GDIGW18D03	9	5.00 U	1.00 U	5.20 J
GDIGW18D04	0	4.70 U	0.95 U	6.10 J

**Subzone I-2**

Statistical analysis of the turbidity values in Subzone I-2 indicates that the values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 458.4 ntu and the mean of the monitoring wells was 31.4 ntu.

Statistical analysis of the arsenic values in Subzone I-2 indicates that the arsenic values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 12.9  $\mu\text{g/L}$  and the mean of the monitoring wells was 4.2  $\mu\text{g/L}$ .

Statistical analysis of the beryllium values in Subzone I-2 indicates that the beryllium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 1.0  $\mu\text{g/L}$  and the mean of the monitoring wells was 0.4  $\mu\text{g/L}$ .



**LEGEND:**

- GDI018 ● SHALLOW MONITORING WELL W/ ID NUMBER
- GDI018D ● DEEP MONITORING WELL W/ ID NUMBER
- 037GP001 ◊ DPT GROUNDWATER SAMPLE W/ ID NUMBER



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FIGURE 10.0.4.29  
 MONITORING WELL  
 AND DPT SAMPLING LOCATIONS  
 FOR TURBIDITY STUDY  
 SUBZONE I-1

Statistical analysis of the thallium values in Subzone I-2 indicates that the thallium values differ significantly between the DPT locations and the monitoring wells. The mean of the DPT locations was 5.0  $\mu\text{g/L}$  and the mean of the monitoring wells was 2.3  $\mu\text{g/L}$ .

Table 10.0.4.32 details the results of the data in Subzone I-2. Figure 10.0.4.30 identifies the sample locations.

**Table 10.0.4.32**  
**Subzone I-2 Data Comparison**

Sample ID	Turbidity (ntu)	Arsenic ( $\mu\text{g/L}$ )	Beryllium ( $\mu\text{g/L}$ )	Thallium ( $\mu\text{g/L}$ )
<b>DPT GW Sample Location</b>				
037GP005	297	10.00 U	2.00 U	10.00 U
037GP007	999	14.30	2.00 U	10.00 U
037GP008	57	10.00 U	2.00 U	10.00 U
037GP009	379	14.20	2.00 U	10.00 U
037GP010	150	10.00 U	2.00 U	10.00 U
037GP011	999	20.60	2.00 U	10.00 U
037GP012	328	26.20	2.00 U	10.00 U
<b>Monitoring Wells</b>				
675GW00101	0	3.20 U	0.20 U	4.50 U
675GW00102	9	5.00 U	1.00 U	5.00 U
675GW00103	0	5.00 U	1.00 U	5.00 U
675GW00104	0	2.50 U	0.31 J	2.70 U
675GW00201	0	3.20 U	0.20 U	4.50 U
675GW00202	4	5.00 U	1.00 U	5.00 U
675GW00203	0	5.00 U	1.00 U	5.00 U
675GW00204	9	7.10 J	0.36 J	2.70 U
676GW00101	0	3.20 U	0.20 U	4.50 U
676GW00102	2	5.00 U	1.00 U	5.00 U
676GW00103	1	5.00 U	1.00 U	5.00 U
676GW00104	2	2.50 U	0.34 J	4.00 U
677GW00201	0	3.20 U	0.20 U	4.50 U
677GW00202	6	5.00 U	1.00 U	5.00 U
677GW00203	2	6.10 J	1.00 U	5.00 U

**Table 10.0.4.32**  
**Subzone I-2 Data Comparison**

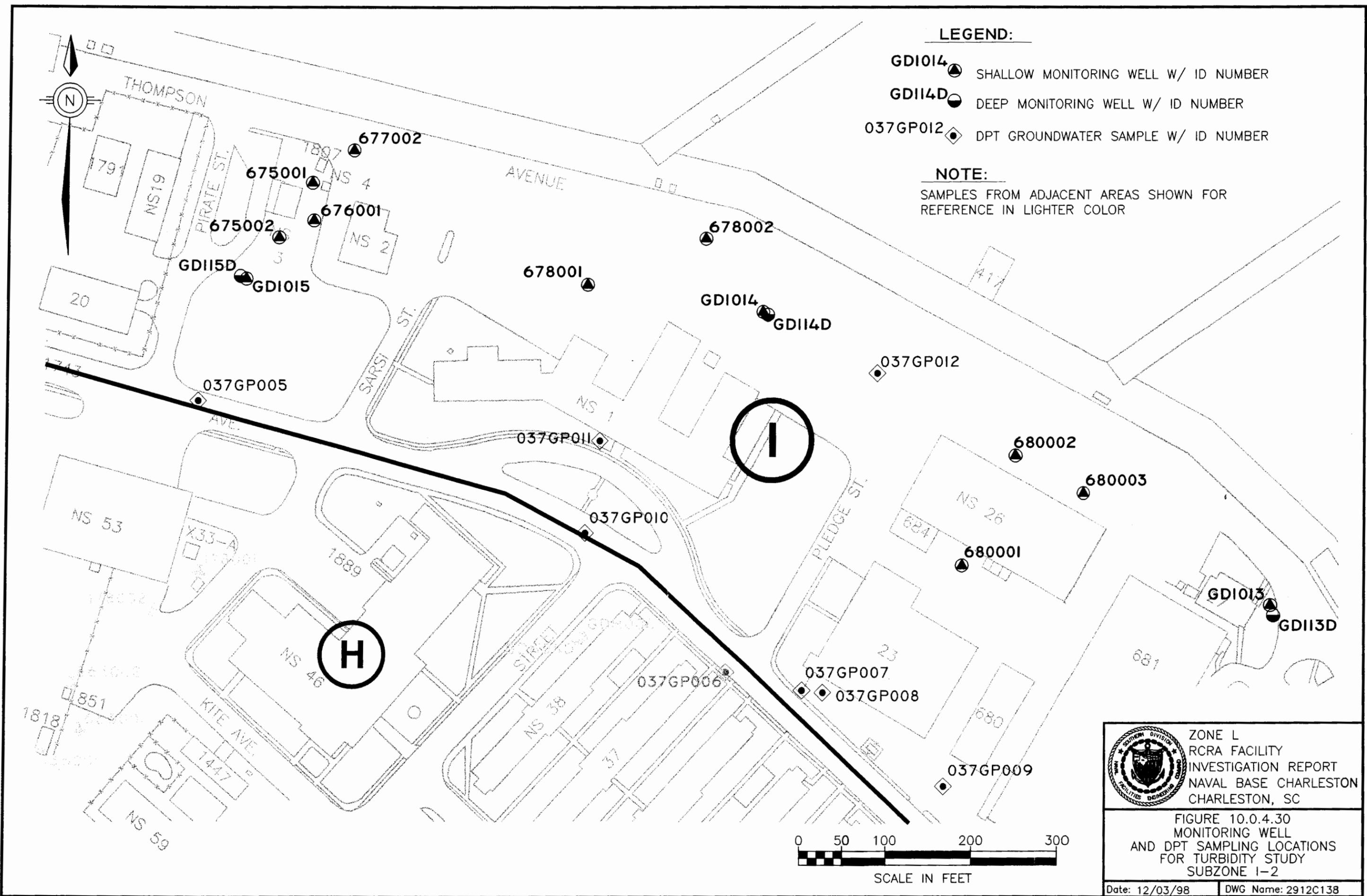
<b>Sample ID</b>	<b>Turbidity (ntu)</b>	<b>Arsenic (<math>\mu\text{g/L}</math>)</b>	<b>Beryllium (<math>\mu\text{g/L}</math>)</b>	<b>Thallium (<math>\mu\text{g/L}</math>)</b>
677GW00204	4	11.10 U	0.70 J	4.60 J
678GW00101	5	3.20 U	0.20 U	4.50 U
678GW00102	2	5.00 U	1.00 U	5.00 U
678GW00103	0	11.60	1.00 U	5.00 U
678GW00104	3	2.50 U	0.30 U	2.70 UJ
678GW00201	0	3.20 U	0.33 U	4.50 U
678GW00202	10	5.00 U	1.00 U	5.00 U
678GW00203	0	5.00 U	1.00 U	5.00 U
678GW00204	4	7.40 U	0.30 U	2.70 UJ
GDIGW01301	0	9.70 J	0.20 U	4.50 UJ
GDIGW01302	6	12.00	1.00 U	5.00 U
GDIGW01303	6	19.00	1.00 U	5.00 U
GDIGW01304	2	23.80	0.46 J	2.70 UJ
GDIGW01401	1	3.20 U	0.20 U	4.50 U
GDIGW01402	2	12.40	1.00 U	5.00 U
GDIGW01403	0	11.10	1.00 U	5.00 U
GDIGW01404	0	6.10 U	0.32 J	2.70 UJ
GDIGW01501	0	3.20 U	0.20 U	4.50 U
GDIGW01502	0	5.00 U	1.00 UJ	5.00 UJ
GDIGW01503	176	5.00 U	1.00 U	5.00 U
GDIGW01504	0	2.50 U	0.48 U	2.70 UJ
GDIGW13D01	0	3.20 U	0.20 U	4.50 U
GDIGW13D02	2	5.00 U	1.00 J	5.00 U
GDIGW13D03	2	6.50 J	1.00 U	5.00 UJ
GDIGW13D04	9	2.50 U	1.00 J	2.70 UJ
GDIGW14D01	5	3.20 U	0.23 U	4.50 U
GDIGW14D02	Not Taken	5.00 U	1.00 J	5.00 UJ
GDIGW14D03	999	5.00 U	1.00 U	5.00 UJ
GDIGW14D04	205	2.50 U	0.87 J	2.70 UJ
GDIGW15D01	0	3.20 U	0.20 U	4.50 U
GDIGW15D02	0	5.00 U	1.00 UJ	5.00 UJ
GDIGW15D03	0	5.00 U	1.00 U	7.10 J
GDIGW15D04	0	2.50 U	0.90 U	2.70 UJ

**LEGEND:**

- GDI014  SHALLOW MONITORING WELL W/ ID NUMBER
- GDI14D  DEEP MONITORING WELL W/ ID NUMBER
- 037GP012  DPT GROUNDWATER SAMPLE W/ ID NUMBER

**NOTE:**

SAMPLES FROM ADJACENT AREAS SHOWN FOR REFERENCE IN LIGHTER COLOR



	ZONE L RCRA FACILITY INVESTIGATION REPORT NAVAL BASE CHARLESTON CHARLESTON, SC
	FIGURE 10.0.4.30 MONITORING WELL AND DPT SAMPLING LOCATIONS FOR TURBIDITY STUDY SUBZONE 1-2
Date: 12/03/98      DWG Name: 2912C138	

**10.1 Subzone A**

The boundaries of Subzone A for the Zone L RFI are the existing areas investigated in the Zone A RFI. Data from the Zone A environmental samples have been compared to data from the Zone L investigation. Existing sample locations for Zone A are presented in Figures 10.1.1 and 10.1.2.

**10.1.1 Subzone A, SWMU 37**

Sampling in Subzone A, SWMU 37 consisted of two groundwater samples collected from Zone L monitoring wells (MWs) and six soil samples (five upper interval and one lower interval) collected using a hand auger, which were analyzed for VOCs, SVOCs, metals, cyanide, and pesticides/PCBs. Also collected were 20 groundwater and 10 soil samples using DPT methods and analyzed for VOCs, metals, and cyanide. Sample locations are presented in Figures 10.1.3 through 10.1.7.

**10.1.1.1 Nature of Contamination in Subzone A, SWMU 37, DPT Soil**

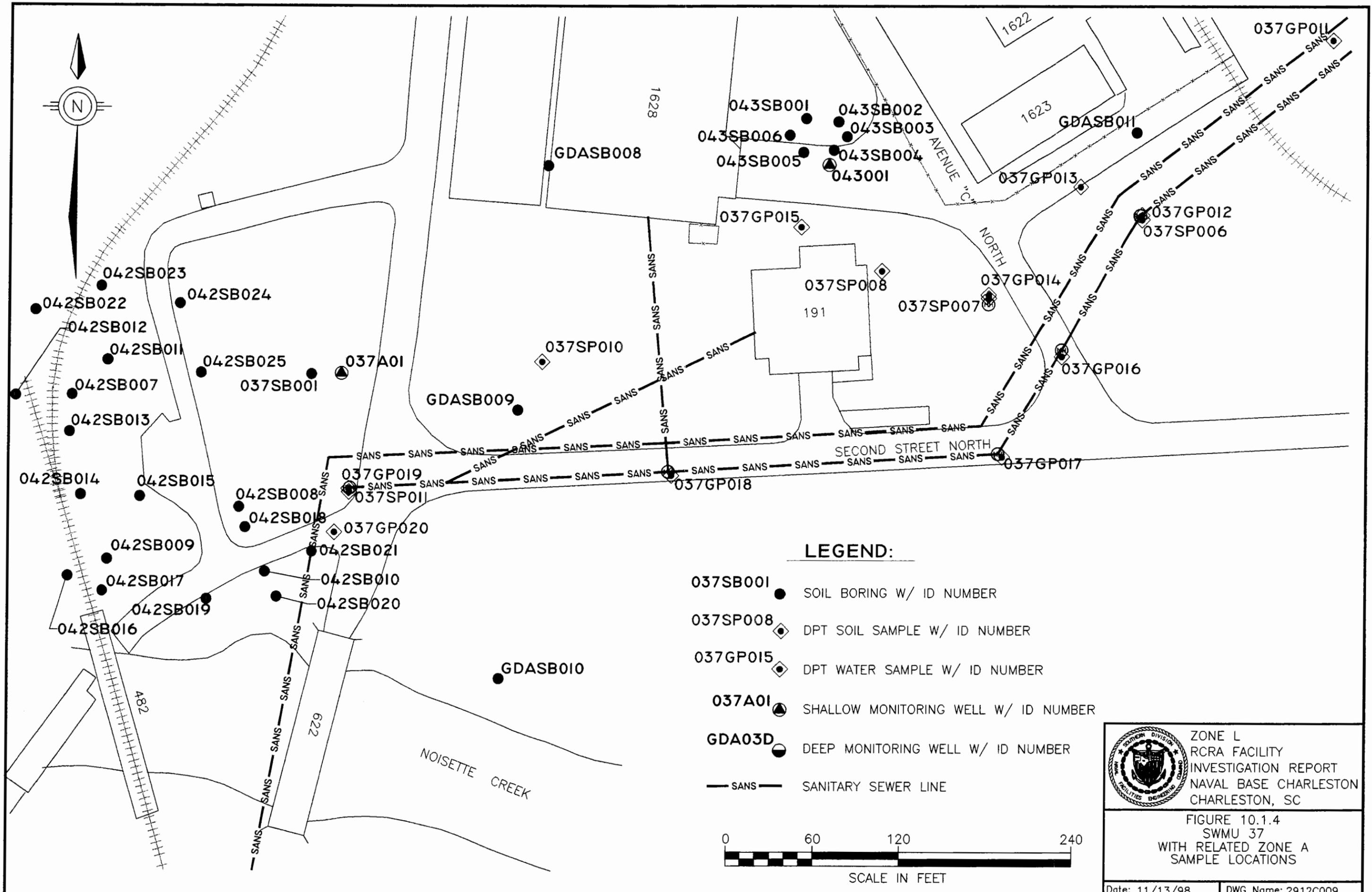
Organic compound analytical results for soil obtained by DPT collection are summarized in Table 10.1.1. Inorganic analytical results are summarized in Table 10.1.2. Appendix C contains the complete data report for all samples collected in Zone L.

**Volatile Organic Compounds Detected in DPT Soil**

Two VOCs were detected in the DPT soil samples, none of which exceeded their RBCs.

**Metals/Cyanide Detected in DPT Soil**

Ten DPT samples were collected and analyzed for metals and cyanide. As summarized in Table 10.1.2, aluminum (1/10), arsenic (10/10), chromium (1/10), and iron (10/10) exceeded their RBCs in the DPT soil samples. In addition, three chromium concentrations exceeded its SSL. Table 10.1.3 summarizes the sample locations of RBC and SSL exceedances.



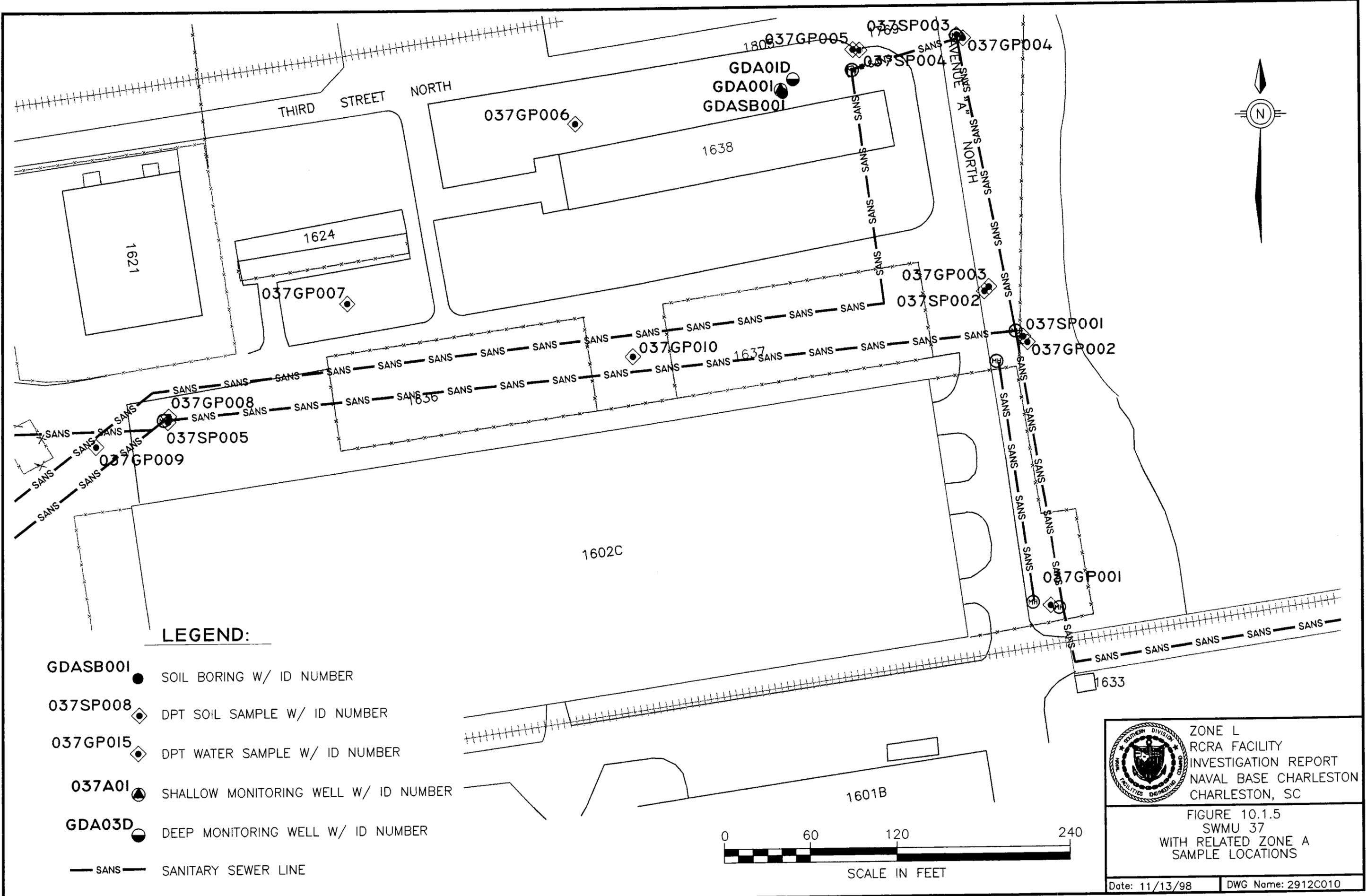
**LEGEND:**

- 037SB001 ● SOIL BORING W/ ID NUMBER
- 037SP008 ◊ DPT SOIL SAMPLE W/ ID NUMBER
- 037GP015 ◊ DPT WATER SAMPLE W/ ID NUMBER
- 037A01 ● SHALLOW MONITORING WELL W/ ID NUMBER
- GDA03D ● DEEP MONITORING WELL W/ ID NUMBER
- SANS — SANITARY SEWER LINE



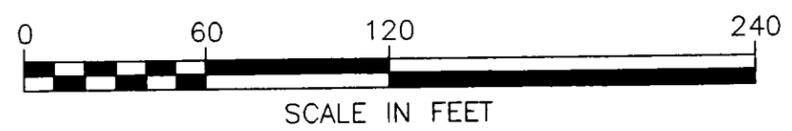
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 CHARLESTON, SC

FIGURE 10.1.4  
 SWMU 37  
 WITH RELATED ZONE A  
 SAMPLE LOCATIONS



**LEGEND:**

- GDA001** ● SOIL BORING W/ ID NUMBER
- 037SP008** ◆ DPT SOIL SAMPLE W/ ID NUMBER
- 037GP015** ◆ DPT WATER SAMPLE W/ ID NUMBER
- 037A01** ▲ SHALLOW MONITORING WELL W/ ID NUMBER
- GDA03D** ● DEEP MONITORING WELL W/ ID NUMBER
- SANS —** SANITARY SEWER LINE



	<p>ZONE L RCRA FACILITY INVESTIGATION REPORT NAVAL BASE CHARLESTON CHARLESTON, SC</p>
	<p>FIGURE 10.1.5 SWMU 37 WITH RELATED ZONE A SAMPLE LOCATIONS</p>
<p>Date: 11/13/98      DWG Name: 2912C010</p>	



1632

1157

037SB004 ●  
037SB003 ●  
037SB005 ●  
037A02 ▲  
037SB002 ●

**LEGEND:**

- 037SB004 ● SOIL BORING W/ ID NUMBER
- 037A02 ▲ SHALLOW MONITORING WELL W/ ID NUMBER

1156

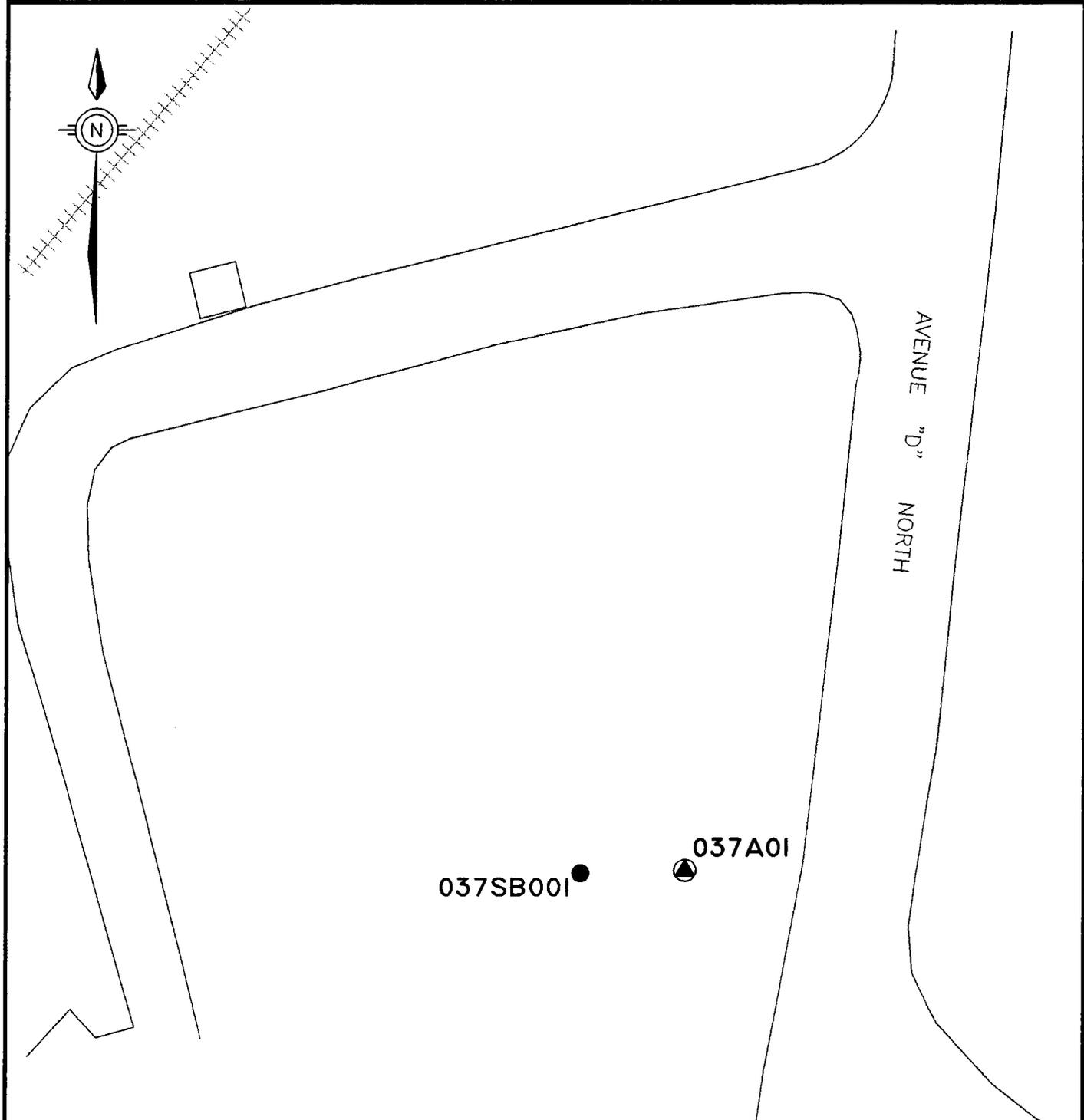


SCALE IN FEET



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FIGURE 10.1.6  
SWMU 37  
OIL/WATER SEPARATOR  
SAMPLE LOCATIONS



**LEGEND:**

037SB001 ● SOIL BORING W/ ID NUMBER

037A01 ▲ SHALLOW MONITORING WELL W/ ID NUMBER

— SANS — SANITARY SEWER LINE



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FIGURE 10.1.7  
SWMU 37  
SEPTIC TANK  
SAMPLE LOCATIONS

**Table 10.1.1**  
**SWMU 37, Zone L, Subzone A**  
**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
<b>Volatile Organic Compounds (µg/kg)</b>							
2-Butanone (MEK)	2/10	5.53-5.72	5.63	4700000	0	3900 c	NO
Acetone	4/10	5.53-48.3	18.4	780000	0	8000	NO

**Notes:**

- µg/kg = Micrograms per kilogram
- RBC = Risk-based concentration
- GW = Groundwater
- SSL = Soil screening level
- c = Calculated soil to groundwater SSL value (See Table 6.2 in Zone A RFI Report)

**Table 10.1.2**  
**SWMU 37, Zone L, Subzone A**  
**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
<b>Inorganic Elements (mg/kg)</b>								
Cyanide (CN)	2/10	0.360-0.790	0.580	160	ND	0	20	NO
Aluminum (Al)	10/10	4880-8310	6615	7800	12800	1	560000 c	NO
Arsenic (As)	10/10	1.53-5.17	3.42	0.430	9.44	10	15	NO
Barium (Ba)	10/10	9.39-28.1	16.8	550	53.0	0	820	NO
Beryllium (Be)	3/10	0.240-0.41	0.3100	16	ND	0	32	NO
Calcium (Ca)	10/10	1140-47700	18798	NA	NA	NA	NA	NO
Chromium (Cr)	10/10	5.00-39.3	15.5	39.0	50.4	1	19	YES
Cobalt (Co)	9/10	0.550-1.43	0.960	470	4.40	0	990 c	NO
Copper (Cu)	10/10	2.16-24.4	7.47	310	165	0	5600 c	NO
Iron (Fe)	10/10	2700-8820	5748	2300	NA	10	NA	NO
Lead (Pb)	10/10	6.99-56.7	21.9	400	140	0	400	NO
Magnesium (Mg)	10/10	212-1620	756	NA	NA	NA	NA	NO

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 Charleston Naval Complex  
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 Revision: 0

**Table 10.1.2**  
**SWMU 37, Zone L, Subzone A**  
**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
Manganese (Mn)	10/10	12.8-42.5	29.3	160	98.1	0	480 <sup>c</sup>	NO
Mercury (Hg)	2/10	0.040-0.060	0.050	NA	0.300	NA	1	NO
Nickel (Ni)	10/10	1.77-9.94	5.04	160	13.6	0	65	NO
Potassium (K)	10/10	159-549	286	NA	NA	NA	NA	NO
Selenium (Se)	2/10	0.820-0.920	0.870	39.0	1.20	0	2.6	NO
Sodium (Na)	10/10	157-375	245	NA	NA	NA	NA	NO
Vanadium (V)	10/10	5.46-20.4	14.3	55.0	29.2	0	3000	NO
Zinc (Zn)	10/10	10.0-87.6	28.1	2300	207.6	0	6200	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 soil to groundwater SSL value (See Table 6.2 in Zone A RFI Report)

**Table 10.1.3**  
**SWMU 37, Zone L, Subzone A DPT Soil Sample Locations with**  
**Metals Detections Exceeding RBCs and/or SSLs**

Metal	Sample ID	Concentrations Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Aluminum	037SP005A1	8310	Y	N	7800	5.60E+5
Arsenic	037SP001A1	5.03	Y	N	0.43	15
	037SP002A1	3.84	Y	N		
	037SP003A1	3.82	Y	N		
	037SP004A1	1.59	Y	N		
	037SP005A1	5.17	Y	N		
	037SP006A1	5.01	Y	N		
	037SP007A1	4.30	Y	N		
	037SP008A1	2.11	Y	N		
	037SP010A1	1.78	Y	N		
	037SP011A1	1.53	Y	N		
Chromium	037SP001A1	19.1	N	Y	39.0	19
	037SP005A1	39.3	Y	Y		
	037SP006A1	19.2	N	Y		

**Table 10.1.3**  
 SWMU 37, Zone L, Subzone A DPT Soil Sample Locations with  
 Metals Detections Exceeding RBCs and/or SSLs

Metal	Sample ID	Concentrations Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Iron	037SP001A1	7110	Y	N	2300	NA
	037SP002A1	5850	Y	N		
	037SP003A1	6910	Y	N		
	037SP004A1	4030	Y	N		
	037SP005A1	8820	Y	N		
	037SP006A1	6910	Y	N		
	037SP007A1	6490	Y	N		
	037SP008A1	5030	Y	N		
	037SP010A1	3630	Y	N		
	037SP011A1	2700	Y	N		

**Notes:**  
 mg/kg = Milligrams per kilogram  
 RBC = Risk-based concentration  
 SSL = Soil screening level  
 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 A RFI Report.

**10.1.1.2 Nature of Contamination in Subzone A, SWMU 37, DPT Groundwater** 1

Twenty DPT groundwater samples were collected for analysis of VOCs, metals, and cyanide with 2  
 the results for detected compounds shown in Tables 10.1.4 (VOCs) and 10.1.5 (metals and 3  
 cyanide). 4

**Table 10.1.4**  
 SWMU 37, Zone L, Subzone A  
 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
<b>Volatile Compounds (µg/L)</b>									
Acetone	13/20	5.28-253	34.5	370	NA	0	NA	NO	NO
Carbon disulfide	2/20	20.7-69.9	45.3	100	NA	0	NA	NO	NO

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

**Table 10.1.5**  
**SWMU 37, Zone L, Subzone A**  
**Inorganic Detections for DPT Groundwater**

Element	Freq. of Detection	Range of Detected Conc.	Mean of Detected Conc.
<b>Inorganic Elements (<math>\mu\text{g/L}</math>)</b>			
Cyanide (CN)	5/20	5.30-15.1	10.5
Aluminum (Al)	20/20	1280-593000	125585
Antimony (Sb)	11/20	8.20-272	37.8
Arsenic (As)	13/20	10.6-1120	182.8
Barium (Ba)	20/20	51.5-2670	479.3
Beryllium (Be)	10/20	2.20-24.8	9.11
Cadmium (Cd)	5/20	3.80-18.4	8.46
Calcium (Ca)	20/20	2130-1120000	313084
Chromium (Cr)	19/20	7.80-978	230.9
Cobalt (Co)	13/20	5.40-204	37.9
Copper (Cu)	14/20	8.10-704	149.4
Iron (Fe)	20/20	7880-855000	168079
Lead (Pb)	19/20	4.90-3310	355.7
Magnesium (Mg)	20/20	3260-470000	100553
Manganese (Mn)	20/20	165-6050	1183
Mercury (Hg)	9/20	0.200-1.40	0.609
Nickel (Ni)	16/20	8.90-303	73.7
Potassium (K)	20/20	2280-154000	42186
Selenium (Se)	9/20	7.50-33.0	16.5
Silver (Ag)	4/20	6.00-63.3	26.2
Sodium (Na)	20/20	6530-4090000	637607
Thallium (Tl)	3/20	12.9-25.9	55.1
Tin (Sn)	1/20	800	800
Vanadium (V)	18/20	10.7-1760	346.9
Zinc (Zn)	14/20	31.7-1850	530.2

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

**Volatile Organic Compounds Detected in DPT Groundwater**

Of the 20 DPT groundwater samples collected, two VOC compounds were detected - acetone (13/20) and carbon disulfide (2/20). No detected concentrations of these compounds, however, exceeded MCLs or tap water RBCs.

**Inorganics Detected in DPT Groundwater**

As stated in Section 10.0, inorganic results from DPT groundwater have not been compared with RBCs or MCLs.

**10.1.1.3 Nature of Contamination in Subzone A, SWMU 37 Soil Borings**

Six soil samples (five upper interval and one lower interval) were collected using a hand auger and submitted for VOC, SVOC, metals, cyanide, chlorinated pesticide and PCB analyses. Surface interval sample results were compared to RBCs, and subsurface results were compared to SSLs. The results for detected compounds are summarized in Tables 10.1.6 (organics) and 10.1.7 (inorganics).

**Volatile Organic Compounds Detected in Soil Borings**

Benzene (2/5), chlorobenzene (1/5), ethylbenzene (1/5), toluene (2/5), and xylene (total) (1/5), were detected in the soil samples collected. None of these, concentration, exceeded their respective RBCs or SSLs.

**Semivolatile Organic Compounds Detected in Soil Borings**

Benzo(a)anthracene (1/5), benzo(a)pyrene (2/5), benzo(b)fluoranthene (3/5), benzo(k)fluoranthene (2/5), benzoic acid (2/5), chrysene (2/5), fluoranthene (2/5), and pyrene (2/5) were all detected in surface soil boring samples. None of these concentrations exceeded their RBCs or SSLs.

**Table 10.1.6**  
**SWMU 37, Zone L, Subzone A**  
**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
<b>Volatile Organic Compounds (<math>\mu\text{g}/\text{kg}</math>)</b>								
Benzene	Upper	2/5	2.00	2.00	22000	0	15	NO
Chlorobenzene	Upper	1/5	3.00	160	160000	0	650	NO
Ethylbenzene	Upper	1/5	1.00	1.00	780000	0	6500	NO
Toluene	Upper	2/5	3.00-9.00	6.00	1600000	0	6000	NO
Xylene (Total)	Upper	1/5	8.00	8.00	16000000	0	70000 c	NO
<b>Semivolatile Compounds (<math>\mu\text{g}/\text{kg}</math>)</b>								
B(a)P Equiv.	Upper	3/5	4.20-75.3	41.7	88	0	1600 c	NO
Benzo(a)anthracene	Upper	1/5	42.0	42.0	880	0	800	NO
Benzo(a)pyrene	Upper	2/5	41.0-61.0	51.0	88	0	4000	NO
Benzo(b)fluoranthene	Upper	3/5	40.0-94.0	59.0	880	0	2300	NO
Benzo(k)fluoranthene	Upper	2/5	43.0-68.0	56.0	8800	0	24000	NO
Benzoic acid	Upper	2/5	40.0-46.0	43.0	31000000	0	200000	NO
Chrysene	Upper	2/5	43.0-51.0	47.0	88000	0	80000	NO
Fluoranthene	Upper	2/5	45.0-69.0	57.0	310000	0	2100000	NO
Pyrene	Upper	2/5	68.0-88.0	78.0	230000	0	2100000	NO
<b>Chlorinated Pesticides (<math>\mu\text{g}/\text{kg}</math>)</b>								
4,4'-DDD	Upper	2/5	5.00-13.0	9.00	2700	0	8000	NO
4,4'-DDE	Upper	3/5	3.20-6.20	4.60	1900	0	27000	NO
4,4'-DDT	Upper	1/5	5.20	5.20	1900	0	16000	NO
Endosulfan I	Upper	1/5	2.90	2.90	47000	0	9000	NO
alpha-Chlordane	Upper	3/5	2.50-2.90	2.60	490	0	5000	NO
gamma-Chlordane	Upper	4/5	1.80-5.70	4.50	490	0	5000	NO

**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 = 10, adapted from USEPA Soil Screening Guidance: Technical Background Document, May 1996 (first preference), or calculated using values from Table 6.2 in Zone A RFI Report

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Charleston Naval Complex  
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Revision: 0*

**Table 10.1.7  
SWMU 37, Zone L, Subzone A  
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
<b>Inorganic Elements (mg/kg)</b>									
Cyanide (CN)	Upper	3/5	0.090-0.100	0.100	160	ND	0	20	NO
Aluminum (Al)	Upper	5/5	3620-5970	4534	7800	12800	0	560000 c	NO
	Lower	1/1	7330	7330	NA	28240	NA		
Antimony (Sb)	Upper	2/5	0.660-14.4	7.53	3.10	ND	1	2.7	YES
Arsenic (As)	Upper	5/5	1.50-4.90	2.70	0.430	9.44	5	15	NO
	Lower	1/1	3.70	3.70	NA	9.84	NA		
Barium (Ba)	Upper	5/5	9.20-23.8	14.6	550	53.0	0	820	NO
	Lower	1/1	22.6	22.6	NA	40.0	NA		
Beryllium (Be)	Upper	5/5	0.120-0.250	0.170	16.0	ND	0	32	NO
	Lower	1/1	0.260	0.260	NA	ND	NA		
Cadmium (Cd)	Upper	5/5	0.070-0.500	0.200	7.80	ND	0	4	NO
	Lower	1/1	0.080	0.080	NA	ND	NA		
Calcium (Ca)	Upper	5/5	1010-50400	17100	NA	NA	NA	NA	NO
	Lower	1/1	755	755	NA	NA	NA		
Chromium (Cr)	Upper	5/5	6.10-9.90	7.66	39	50.4	0	19	NO
	Lower	1/1	9.80	9.80	NA	63.4	NA		
Cobalt (Co)	Upper	5/5	0.410-1.10	0.730	470	4.40	0	990 c	NO
	Lower	1/1	1.10	1.10	NA	1.70	NA		
Copper (Cu)	Upper	5/5	3.40-14.2	6.48	310	165	0	5600 c	NO
	Lower	1/1	1.40	1.40	NA	33.6	NA		
Iron (Fe)	Upper	5/5	2730-6930	3760	2300	NA	5	NA	NO
	Lower	1/1	6560	6560	NA	NA	NA		
Lead (Pb)	Upper	5/5	10.0-56.2	26.6	400	140	0	400	NO
	Lower	1/1	18.7	18.7	NA	22.01	NA		
Magnesium (Mg)	Upper	5/5	309-725	449	NA	NA	NA	NA	NO
	Lower	1/1	443	443	NA	NA	NA		
Manganese (Mn)	Upper	5/5	18.1-51.9	35.5	160	98.1	0	480 c	NO
	Lower	1/1	33.7	33.7	NA	85.5	NA		

**Table 10.1.7**  
**SWMU 37, Zone L, Subzone A**  
**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	2/5	0.050-0.070	NA	2.30	0.300	NA	1	NO
Nickel (Ni)	Upper	5/5	2.20-5.10	3.06	160	13.5	0	65	NO
	Lower	1/1	2.60	2.60	NA	35.0	NA		
Potassium (K)	Upper	5/5	121-320	194	NA	NA	NA	NA	NO
	Lower	1/1	238	238	NA	NA	NA		
Selenium (Se)	Upper	2/5	0.310-0.760	0.540	39	1.20	0	2.6	NO
	Lower	1/1	0.760	0.760	NA	1.74	NA		
Sodium (Na)	Upper	5/5	152-270	200	NA	NA	NA	NA	NO
	Lower	1/1	118	118	NA	NA	NA		
Tin (Sn)	Upper	2/5	0.970-1.40	1.19	4700	ND	0	5500 c	NO
	Lower	1/1	1.40	1.40	NA	ND	NA		
Vanadium (V)	Upper	4/5	6.30-15.6	9.25	55	29.2	0	3000	NO
	Lower	1/1	12.7	12.7	NA	77.3	NA		
Zinc (Zn)	Upper	5/5	11.8-150	43.2	2300	207	0	6200	NO
	Lower	1/1	12.9	12.9	NA	164	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 = 10, adapted from USEPA Soil Screening Guidance: Technical Background Document, May 1996 (first preference), or calculated using values from Table 6.2 in Zone A RFI Report

### Chlorinated Pesticides Detected in Soil Borings

4,4'-DDD (2/5), 4,4'-DDE (3/5), 4,4'-DDT (1/5), endosulfan I (1/5), alpha-chlordane (3/5), and gamma-chlordane (4/5) were all detected in surface soil boring samples. None of these concentrations exceeded their RBCs or SSLs.

**Metals/Cyanide Detected in Soil Borings**

Antimony was detected at 037SB004A1 at a concentration of 14.4 mg/kg, exceeding its RBC of 3.10. Arsenic was detected at all five surface soil sample locations. The detected concentrations were 3.40 mg/kg at 037SB001A1, 2.10 mg/kg at 037SB002A1, 1.70 mg/kg at 037SB003A1, 4.90 mg/kg at 037SB004A1, and 1.50 mg/kg at 037SB005A1, all exceeding the 0.43 mg/kg RBC. Iron detected at 037SB001A1 (6930 mg/kg), 037SB002A1 (3030 mg/kg), 037SB003A1 (2760 mg/kg), 037SB004A1 (3350 mg/kg), and 037SB005A1 (2730 mg/kg) exceeded the RBC of 2300 mg/kg.

**10.1.1.4 Nature of Contamination in Subzone A, SWMU 37, Shallow Monitoring Well Groundwater**

Two shallow monitoring wells were installed to assess groundwater quality for Subzone A at the locations shown in Figures 10.1.6 and 10.1.7. Samples were collected and submitted for VOC, SVOC, chlorinated pesticides, PCB, metals, and cyanide analyses. No organic compounds were detected in these samples, and results for inorganics are summarized in Table 10.1.8.

**Metals/Cyanide Detected in Monitoring Well Groundwater**

Eighteen inorganics were detected in groundwater samples collected from the two shallow monitoring wells installed in Subzone A, six of which exceeded tap water RBCs. These exceedances include detected concentrations of aluminum (1/2), antimony (1/2), arsenic (2/2), iron (2/2), manganese (1/2), and thallium (1/2). The aluminum concentration from 037GW001A1 of 4280 µg/L exceeds the RBC of 3700 µg/L. Antimony was detected at 037SB001A1 at a concentration of 3.50 µg/L. This exceeds its RBC of 1.50 µg/L. Arsenic concentrations in both 037GW001A1 (4.30 µg/L) and 037GW002A1 (2.60 µg/L) exceeded the RBC of 0.05 µg/L. Iron concentrations in both wells; 3060 µg/L at 037GW001A1 and 18200 µg/L at 037GW002A1 exceed the RBC of 1100 µg/L. One of the detected concentrations of manganese, 211 µg/L from

037GW002A1, exceeded the RBC of 73 µg/L. Thallium was detected in 037GW001A1 at a concentration of 8.20 µg/L, which exceeds both the RBC of 0.26 µg/L and the MCL of 2.00 µg/L.

1  
2  
3

Table 10.1.8  
 SWMU 37, Zone L, Subzone A  
 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
<b>Inorganic Elements (µg/L)</b>										
Aluminum (Al)	2/2	311-4280	2296	3700	3210	NA	1	NA	YES	NO
Antimony (Sb)	1/2	3.50	3.50	1.5	ND	6	1	NA	YES	NO
Arsenic (As)	2/2	2.60-4.30	3.45	0.045	7.4	50	2	36	YES	NO
Barium (Ba)	2/2	69-111	90	260	104	2000	0	NA	NO	NO
Beryllium (Be)	1/2	1.70	1.70	7.30	ND	4	0	NA	NO	NO
Calcium (Ca)	2/2	133000-180000	156500	NA	NA	NA	NA	NA	NO	NO
Chromium (Cr)	1/2	6.10	6.10	18	8.7	100	0	50	NO	NO
Copper (Cu)	1/2	1.70	1.70	150	15.7	1300	0	2.9	NO	NO
Iron (Fe)	2/2	3060-18200	10630	1100	NA	NA	2	NA	YES	NO
Magnesium (Mg)	2/2	54100-517000	285550	NA	NA	NA	NA	NA	NO	NO
Manganese (Mn)	2/2	46.4-211	128.7	73	577	NA	1	NA	YES	NO
Nickel (Ni)	1/2	2.00	2.00	73	ND	100	0	8.3	NO	NO
Potassium (K)	2/2	32700-155000	93850	NA	NA	NA	NA	NA	NO	NO
Sodium (Na)	2/2	499000-4420000	2459500	NA	NA	NA	NA	NA	NO	NO
Thallium (Tl)	1/2	8.20	8.20	0.26	ND	2	1	21.3	YES	NO
Vanadium (V)	2/2	2.40-8.00	5.20	26	5.4	NA	0	NA	NO	NO
Zinc (Zn)	1/2	11.9	11.9	1100	83.2	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

**10.1.2 Subzone A, AOC 699**

Sampling at AOC 699 in Subzone A consisted of one groundwater sample collected using DPT methods and analyzed for VOCs. No compounds were detected above detection limits in this sample.

**10.1.3 Subzone A, AOC 504**

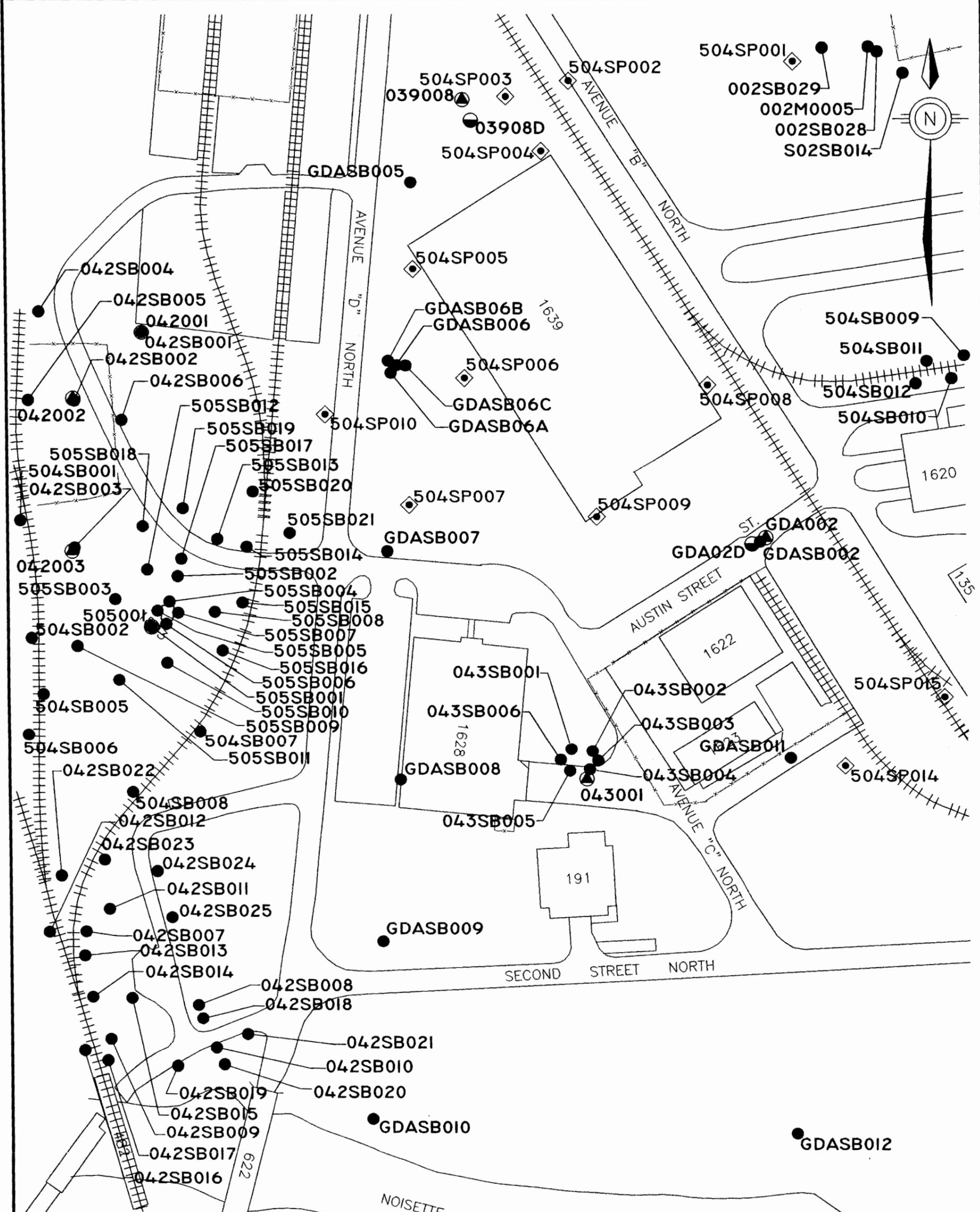
AOC 504 sampling in Subzone A consisted of 10 upper interval and 10 lower interval soil borings and 15 soil samples collected using DPT methods. No groundwater samples were collected at AOC 504. The soil boring samples were analyzed for VOCs, SVOCs, metals, cyanide, herbicides, pesticides, and PCBs. The DPT samples were analyzed for VOCs, metals, and cyanide. The locations of these samples are presented in Figures 10.1.8 through 10.1.10.

**10.1.3.1 Nature of Contamination in Subzone A, AOC 504, DPT Soil**

Fifteen soil samples were collected for analysis of VOCs, metals, and cyanide, the results of which are shown in Table 10.1.9. No VOCs were detected in the DPT samples.

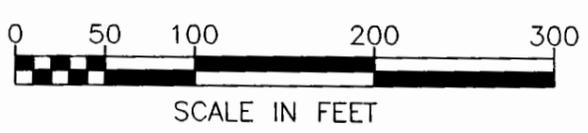
**Metals/Cyanide Detected in DPT Soil**

Aluminum (4/15), antimony (2/15), arsenic (14/15), iron (14/15), and manganese (1/15) had concentrations that exceeded RBCs, and concentrations of antimony (2/15), chromium (1/15), and mercury (1/15) that exceeded SSLs. These are summarized in Table 10.1.10.



**LEGEND:**

- 504SB002 SOIL BORING W/ ID NUMBER
- ◆ 504SP011 DPT SOIL SAMPLE W/ ID NUMBER
- ⊙ GDA003 SHALLOW MONITORING WELL W/ ID NUMBER
- ⊙ GDA03D DEEP MONITORING WELL W/ ID NUMBER
- ++++ RAILROAD TRACKS



	ZONE L RCRA FACILITY INVESTIGATION REPORT NAVAL BASE CHARLESTON CHARLESTON, SC
	FIGURE 10.1.9 AOC 504 WITH RELATED ZONE A SAMPLE LOCATIONS
Date: 11/13/98   DWG Name: 2912C013	



**Table 10.1.9**  
**AOC 504, Zone L, Subzone A**  
**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
<b>Inorganic Elements (mg/kg)</b>								
Aluminum (Al)	15/15	4410-13100	7206	7800	12800	5	560000 c	NO
Antimony (Sb)	5/15	1.93-13.5	4.68	3.10	ND	2	2.7	YES
Arsenic (As)	14/15	1.75-14.6	5.31	0.430	9.44	14	15	NO
Barium (Ba)	15/15	9.51-140	29.0	550	53.0	0	820	NO
Beryllium (Be)	5/15	0.240-0.310	0.274	16.0	ND	5	32	NO
Cadmium (Cd)	3/15	0.360-1.81	0.887	7.80	ND	0	4	NO
Calcium (Ca)	15/15	677-151000	19204	NA	NA	NA	NA	NO
Chromium (Cr)	15/15	5.80-19.7	10.8	39.0	50.4	0	19	YES
Cobalt (Co)	13/15	0.630-3.64	1.39	470	4.4	0	990 c	NO
Copper (Cu)	15/15	1.51-65.5	17.5	310	165	0	5600 c	NO
Iron (Fe)	15/15	2280-19200	7421	2300	NA	14	NA	NO
Lead (Pb)	15/15	6.23-175	31.7	400	140	0	400	NO
Magnesium (Mg)	15/15	153-3530	892	NA	NA	NA	NA	NO
Manganese (Mn)	15/15	8.30-299	51.2	160	98.1	1	480 c	NO
Mercury (Hg)	7/15	0.050-1.35	0.331	NA	0.3	NA	1	YES
Nickel (Ni)	15/15	1.06-12.9	4.97	160	13.55	0	65	NO
Potassium (K)	15/15	94.3-1560	374.8	NA	NA	NA	NA	NO
Selenium (Se)	6/15	0.660-1.38	0.888	39.0	1.2	0	2.6	NO
Sodium (Na)	15/15	161-1160	321	NA	NA	NA	NA	NO
Tin (Sn)	3/15	3.57-43.5	17.5	4700	ND	0	5500 c	NO
Vanadium (V)	15/15	5.10-23.4	14.4	55.0	29.24	0	3000	NO
Zinc (Zn)	15/15	5.45-456	76.4	2300	207.6	0	6200	NO

**Notes:**

- |            |   |  |     |   |                      |
|------------|---|--|-----|---|----------------------|
| mg/kg      | = | Milligrams per kilogram  | GW  | = | Groundwater          |
| RBC        | = | Risk-based concentration   | SSL | = | Soil screening level |
| NA         | = | Not applicable   | c   | = | Calculated SSL       |
| ND         | = | Not detected   |     |   |                      |
| 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 A RFI Report |     |   |                      |

**Table 10.1.10**  
**AOC 504, Zone L, Subzone A**  
**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	504SP002A1	9520	Y	N	7800	5.6E+05
	504SP003A1	9160	Y	N		
	504SP006A1	13100	Y	N		
	504SP013A1	11100	Y	N		
Antimony	504SP002A1	13.5	Y	Y	3.10	2.7
	504SP005A1	3.77	Y	Y		
Arsenic	504SP001A1	3.73	Y	N	0.43	15
	504SP002A1	7.51	Y	N		
	504SP003A1	6.51	Y	N		
	504SP004A1	4.21	Y	N		
	504SP005A1	14.6	Y	N		
	504SP006A1	2.26	Y	N		
	504SP007A1	4.48	Y	N		
	504SP008A1	7.13	Y	N		
	504SP009A1	4.08	Y	N		
	504SP011A1	1.75	Y	N		
	504SP012A1	6.19	Y	N		
	504SP013A1	4.43	Y	N		
	504SP014A1	3.27	Y	N		
	504SP015A1	4.18	Y	N		
	Chromium	504SP005A1	19.7	N		
Iron	504SP001A1	8470	Y	N	2300	NA
	504SP002A1	14400	Y	N		
	504SP003A1	7560	Y	N		
	504SP004A1	7100	Y	N		
	504SP005A1	19200	Y	N		
	504SP006A1	6560	Y	N		
	504SP007A1	6160	Y	N		
	504SP008A1	4860	Y	N		
	504SP009A1	6320	Y	N		
	504SP011A1	3400	Y	N		
	504SP012A1	5730	Y	N		
	504SP013A1	7360	Y	N		
	504SP014A1	4800	Y	N		
	504SP015A1	7120	Y	N		
	Manganese	504SP002A1	299	Y		
Mercury	504SP015A1	1.35	N	Y	NA	1

*Notes:*  
 mg/kg = Milligrams per kilograms  
 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 A RFI Report

### **10.1.3.2 Nature of Contamination in AOC 504, Subzone A Soil Borings**

Ten soil samples were collected and analyzed for VOCs, SVOCs, chlorinated pesticides, PCBs, metals and cyanide. Analytical results are summarized in Tables 10.1.11 and 10.1.12.

#### **Volatile Organic Compounds Detected in Soil Borings**

Acetone and chloromethane were detected in the soil boring samples, none of which exceeded RBCs or SSLs.

#### **Semivolatile Organic Compounds Detected in Soil Borings**

As summarized in Table 10.1.11 two VOCs were detected in soil boring samples. Exceedances of RBCs and/or SSLs occurred at the following sample locations: benzo(a)anthracene at 504SB006A1 with a detected concentration of 1700  $\mu\text{g}/\text{kg}$  compared to the RBC of 880  $\mu\text{g}/\text{kg}$  and SSL of 880  $\mu\text{g}/\text{kg}$ ; benzo(a)pyrene's RBC of 88  $\mu\text{g}/\text{kg}$  exceeded at seven locations - 504SB002A1 (110  $\mu\text{g}/\text{kg}$ ), 504SB005A1 (180  $\mu\text{g}/\text{kg}$ ), 504SB006A1 (1900  $\mu\text{g}/\text{kg}$ ), 504SB007A1 (125  $\mu\text{g}/\text{kg}$ ), 504SB009A1 (380  $\mu\text{g}/\text{kg}$ ), 504SB011A1 (190  $\mu\text{g}/\text{kg}$ ), and 504SB012A1 (93  $\mu\text{g}/\text{kg}$ ); benzo(b)fluoranthene at 504SB006A1 (1200  $\mu\text{g}/\text{kg}$ ) exceeded the RBC of 88  $\mu\text{g}/\text{kg}$ ; dibenz(a,h)anthracene at 504SB006A1 (870  $\mu\text{g}/\text{kg}$ ) and 504SB009A1 (120  $\mu\text{g}/\text{kg}$ ) exceeded the RBC of 88  $\mu\text{g}/\text{kg}$  with a detected concentration of 870  $\mu\text{g}/\text{kg}$ ; and indeno(1,2,3-cd)pyrene at 504SB006A1 had a concentration of 1400  $\mu\text{g}/\text{kg}$ , exceeding its RBC of 880  $\mu\text{g}/\text{kg}$ .

#### **Chlorinated Pesticides Detected in Soil Borings**

4,4'-DDD, 4,4'-DDE, 4,4'-DDT, dieldrin, endosulfan II, endrin aldehyde, heptachlor, heptachlor epoxide, and gamma-chlordane were detected in some soil boring samples. Only the concentrations of dieldrin at 504SB010A1 (6.4  $\mu\text{g}/\text{kg}$ ) and 504SB011A1 (9.0  $\mu\text{g}/\text{kg}$ ) exceeded the chlorinated pesticide's RBC (40  $\mu\text{g}/\text{kg}$ ) and SSL (2  $\mu\text{g}/\text{kg}$ ).

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**Table 10.1.11**  
**AOC 504, Zone L, Subzone A**  
**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
<b>Volatil Organic Compounds (<math>\mu\text{g}/\text{kg}</math>)</b>								
Acetone	Lower	3/10	8.00-20.0	14.0	NA	0	8000	NO
Chloromethane	Upper	1/10	7.00	7.00	49000	0	3.7 c	YES
<b>Semivolatile Compounds (<math>\mu\text{g}/\text{kg}</math>)</b>								
2-Methylnaphthalene	Upper	1/10	54.0	54.0	3100000	0	230000 c	NO
4-Methylphenol (p-Cresol)	Upper	1/10	72.0	72.0	390000	0	670 c	NO
Acenaphthene	Upper	1/10	86.0	86.0	470000	0	290000	NO
Acenaphthylene	Upper	5/10	40.0-1900	420.2	310000	0	96000 c	NO
Anthracene	Upper	5/10	47.0-1600	359.1	23000000	0	5900000 c	NO
B(a)P Equiv.	Upper	8/10	113-3220	628	88	8	1600 c	YES
	Lower	3/10	0.042-53.5	19.4	NA	NA		
Benzo(a)anthracene	Upper	8/10	54.0-1700	333.4	880	1	800	YES
Benzo(a)pyrene	Upper	8/10	84.0-1900	382.8	88	7	4000	NO
	Lower	1/10	49.0	49.0	NA	0		
Benzo(b)fluoranthene	Upper	8/10	140-1200	354.4	880	1	2300	NO
	Lower	1/10	45.0	45.0	NA	0		
Benzo(g,h,i)perylene	Upper	7/10	66.0-2700	503.5	310000	0	12000000 c	NO
	Lower	2/10	52.0-77.0	64.5	NA	0		
Benzo(k)fluoranthene	Upper	6/10	140-1800	500	8800	0	24000	NO
	Lower	1/10	42.0	42.0	NA	0		
Butylbenzylphthalate	Upper	2/10	64.0-75.0	69.5	1600000	0	930000	NO
	Lower	1/10	56.0	56.0	NA	0		
Chrysene	Upper	8/10	77.0-1600	360.8	88000	0	80000	NO
	Lower	2/10	42.0-49.0	45.5	NA	0		
Dibenz(a,h)anthracene	Upper	5/10	46.0-870	230.4	88	2	800	NO
Dibenzofuran	Upper	1/10	42.0	42.0	310000	0	6800 c	NO
Fluoranthene	Upper	8/10	96.0-2200	446.5	310000	0	2100000	NO
	Lower	1/10	38.0	38.0	NA	0		

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**Table 10.1.11**  
**AOC 504, Zone L, Subzone A**  
**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
Fluorene	Upper	1/10	120	120	310000	0	280000	NO
Indeno(1,2,3-cd)pyrene	Upper	8/10	68.0-1400	281.9	880	1	7000	NO
	Lower	1/10	41.0	41.0	NA	0		
Naphthalene	Upper	1/10	71.0	71.0	310000	0	42000	NO
Phenanthrene	Upper	3/10	120-1200	496.7	310000	0	660000 c	NO
Phenol	Upper	1/10	55.0	55.0	4700000	0	50000	NO
Pyrene	Upper	8/10	89.0-2400	495.4	230000	0	2100000	NO
	Lower	3/10	41.0-52.0	46.7	NA	0		
bis(2-Ethylhexyl) phthalate (BEHP)	Upper	1/10	71.0	71.0	4600	0	1800000	NO
	Lower	1/10	110	110	NA	0		
<b>Chlorinated Pesticides (<math>\mu\text{g}/\text{kg}</math>)</b>								
4,4'-DDD	Upper	1/10	8.00	8.00	2700	0	8000	NO
4,4'-DDE	Upper	4/10	3.30-15.0	9.55	1900	0	27000	NO
	Lower	2/10	4.10-49.0	26.6	NA	0		
4,4'-DDT	Upper	7/10	5.20-20.0	11.4	1900	0	16000	NO
	Lower	3/10	6.20-180	65.2	NA	0		
Dieldrin	Upper	2/10	6.40-9.00	7.70	40	0	2	YES
Endosulfan II	Lower	1/10	8.40	8.40	NA	0	9000	NO
Endrin aldehyde	Upper	2/10	6.70-33.0	19.9	2300	0	500	NO
	Lower	2/10	6.10-7.60	6.85	NA	0		
Heptachlor	Upper	1/10	4.10	4.10	140	0	11000	NO
Heptachlor epoxide	Upper	1/10	7.90	7.90	70	0	330	NO
	Lower	1/10	18.0	18.0	NA	0		
gamma-Chlordane	Upper	1/10	2.90	2.90	490	0	5000	NO

**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 = 10, adapted from USEPA Soil Screening Guidance: Technical Background Document, May 1996 (first preference), or calculated using values from Table 6.2 in Zone A RFI Report

## Metals/Cyanide Detected in Soil Borings

As summarized in Table 10.1.12, 22 inorganic analytes were detected in the 10 surface and 10 lower interval soil samples collected using a hand auger. Surface samples were compared to residential RBCs and SSLs. Four inorganic analytes - aluminum, arsenic, iron, and thallium had concentrations exceeding their RBC values and concentrations of arsenic, chromium, and thallium exceeded their SSLs. These are summarized in Table 10.1.13.

Sample locations with detected concentrations of analytes that exceed either RBC, SSL, MCL values are shown in Figures 10.1.11 through 10.1.32.

**Table 10.1.12**  
**AOC 504, Zone L, Subzone A**  
**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
<b>Inorganic Elements (mg/kg)</b>									
Aluminum (Al)	Upper	10/10	3795-8740	6009	7800	12800	2	560000 c	NO
	Lower	10/10	1010-9070	3427	NA	28240	NA		
Antimony (Sb)	Upper	4/10	0.390-2.10	1.08	3.10	ND	0	2.7	YES
	Lower	2/10	0.530-4.40	2.47	NA	ND	NA		
Arsenic (As)	Upper	10/10	2.10-16.4	6.51	0.430	9.44	10	15	YES
	Lower	6/10	0.690-16.5	4.69	NA	9.84	NA		
Barium (Ba)	Upper	10/10	13.2-60.3	26.3	550	53.0	0	820	NO
	Lower	7/10	5.20-49.4	19.9	NA	40.0	NA		
Beryllium (Be)	Upper	10/10	0.110-0.380	0.220	16.0	ND	0	32	NO
	Lower	10/10	0.050-0.260	0.210	NA	ND	NA		
Cadmium (Cd)	Upper	7/10	0.080-0.440	0.220	3.90	ND	0	4	NO
	Lower	4/10	0.080-0.430	0.210	NA	ND	NA		
Calcium (Ca)	Upper	8/10	224-8140	2241	NA	NA	NA	NA	NO
	Lower	6/10	143-2700	786	NA	NA	NA		

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**Table 10.1.12  
AOC 504, Zone L, Subzone A  
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
Chromium (Cr)	Upper	10/10	3.40-25.7	11.3	39	50.4	0	19	YES
	Lower	10/10	1.60-24.2	5.81	NA	63.4	NA		
Cobalt (Co)	Upper	4/10	0.97-1.90	1.37	470	4.40	0	990 c	NO
	Lower	2/10	1.00-1.10	1.05	NA	1.70	NA		
Copper (Cu)	Upper	8/10	1.30-37.9	13.4	310	165	0	5600 c	NO
	Lower	6/10	0.730-16.6	5.65	NA	33.6	NA		
Iron (Fe)	Upper	10/10	2800-9710	6517	2300	NA	10	NA	NO
	Lower	6/10	1140-23100	5935	NA	NA	NA		
Lead (Pb)	Upper	10/10	3.30-232	79.5	400	140	0	400	NO
	Lower	6/10	1.20-135	41.1	NA	22.0	NA		
Magnesium (Mg)	Upper	6/10	130-421	275	NA	NA	NA	NA	NO
	Lower	6/10	83.3-616	230.7	NA	NA	NA		
Manganese (Mn)	Upper	8/10	11.8-51.2	29.5	160	98.1	0	480 c	NO
	Lower	6/10	8.20-44.8	20.7	NA	85.5	NA		
Mercury (Hg)	Upper	3/10	0.050-0.090	0.200	NA	0.300	NA	1	NO
	Lower	1/10	0.080	0.080	NA	ND	NA		
Nickel (Ni)	Upper	10/10	1.90-6.80	3.93	160	13.5	0	65	NO
	Lower	10/10	0.430-3.50	1.51	NA	35.0	NA		
Potassium (K)	Upper	8/10	145-319	212.5	NA	NA	NA	NA	NO
	Lower	5/10	36.8-1000	239.1	NA	NA	NA		
Sodium (Na)	Upper	6/10	118-218	179	NA	NA	NA	NA	NO
	Lower	6/10	165-201	180	NA	NA	NA		
Thallium (Tl)	Upper	1/10	1.30	1.30	0.55	ND	1	0.36	YES
	Lower	1/10	1.50	1.50	NA	ND	NA		
Tin (Sn)	Upper	6/10	1.10-8.50	3.57	4700	ND	0	5500 c	NO
	Lower	6/10	0.970-12.3	3.33	NA	ND	NA		
Vanadium (V)	Upper	10/10	4.70-20.0	13.5	55	29.2	0	3000	NO
	Lower	9/10	2.40-33.4	7.19	NA	77.3	NA		

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**Table 10.1.12  
AOC 504, Zone L, Subzone A  
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
Zinc (Zn)	Upper	10/10	6.00-147	62.5	2300	207	0	6200	NO
	Lower	6/10	2.40-209	78.2	NA	164	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 = 10, adapted from USEPA Soil Screening Guidance: Technical Background Document, May 1996 (first preference), or calculated using values from Table 6.2 in Zone A RFI Report

**Table 10.1.13  
AOC 504, Zone L, Subzone A  
Soil Boring 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	504SB005A1	8030	Y	N	7800	5.6E+05
	504SB011A1	8740	Y	N		
Arsenic	504SB001A1	2.10	Y	N	0.43	15
	504SB002A1	7.80	Y	N		
	504SB005A1	16.4	Y	Y		
	504SB006A1	10.9	Y	N		
	504SB007A1	5.70	Y	N		
	504SB008A1	4.60	Y	N		
	504SB009A1	5.30	Y	N		
	504SB010A1	3.80	Y	N		
	504SB011A1	5.00	Y	N		
	504SB012A1	3.50	Y	N		
Chromium	504SB008A2	16.5	N	Y	39.0	19
	504SB011A1	25.7	N	Y		
	504SB008A2	24.2	N	Y		

**Table 10.1.13**  
**AOC 504, Zone L, Subzone A**  
**Soil Boring 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	504SB001A1	2800	N	N	2300	N/A
	504SB002A1	7490	N	N		
	504SB005A1	9110	N	N		
	504SB006A1	8730	N	N		
	504SB007A1	4750	N	N		
	504SB008A1	4230	N	N		
	504SB009A1	5460	N	N		
	504SB010A1	6430	N	N		
	504SB011A1	9710	N	N		
	504SB012A1	6460	N	N		
Thallium	504SB0005A1	1.30	Y	Y	0.55	0.36

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

**10.1.4 Fate and Transport Assessment for SWMU 37 and AOC 504 in Subzone A** 1

Section 10.1 contains short descriptions of the portions of SWMU 37 and AOC 504 within 2  
 Subzone A. Environmental media sampled as part of the RFI for these sites include surface soil 3  
 borings, subsurface soil borings, and shallow groundwater (monitoring wells and DPT samples). 4  
 Potential constituent migration pathways investigated for SWMU 37 and AOC 504 include soil 5  
 to groundwater and groundwater to surface water. Soil to air and soil to sediment cross media fate 6  
 and transport were determined not to be a concern. 7

The fate and transport screening comparison for SWMU 37 and AOC 504 soil and groundwater 9  
 samples included referencing of previous Zone RFI Reports when applicable. Contaminants of 10  
 potential concern were identified for each sample media and sampling method (i.e., soil boring 11  
 versus DPT soil sampling) in Section 10.1. The Zone A RFI Report was consulted to identify any 12

sites within the subzone A that are associated geographically with the Zone L sample points. 1  
Analytical results from samples with overlapping sites were compared to data generated during 2  
the Zone A RFI. If concentrations at Zone L sample points associated with overlapping sites were 3  
higher than those of the referenced Zone A RFI Report or if new fate and transport COPCs were 4  
identified, further evaluation will be deferred to the Zone A RFI and included as an addendum. 5  
If Zone L sample concentrations were less than or equal to those in the Zone A RFI Report, it was 6  
assumed that the Zone L fate and transport conclusions would be similar to those of the Zone A 7  
RFI and no further evaluation is needed. Zone L sampling locations that are not associated with 8  
any overlapping RFI sites are summarized in the fate and transport COPC tables and fate and 9  
transport evaluations provided in the following sections. 10

#### **10.1.4.1 Soil to Groundwater Cross-Media Transport** 11

##### **SWMU 37** 12

In Section 10.1, Tables 10.1.1, 10.1.2, 10.1.6, and 10.1.7 compare maximum detected organic 13  
and inorganic constituent concentrations in soil boring and DPT soil samples from SWMU 37 to 14  
SSLs considered protective of groundwater. To provide a conservative screen, generic soil 15  
screening levels were used; leachate entering the aquifer was assumed to be diluted by a ratio of 16  
10:1, with no attenuation of constituents in soil (DAF=10). Background reference values for 17  
inorganics were noted but did not enter into the screening process. 18

The screening comparisons in the four tables mentioned above identify the constituents with the 19  
potential to impact groundwater quality. Table 10.1.14 provides a summary of SWMU 37 soil 20  
samples reporting SSL exceedances, along with the names of associated Zone A sites overlapping 21  
the areas where some of these soil samples were collected. Fate and transport concerns at Zone L 22  
sample locations not associated with any overlapping Zone A sites are evaluated below. In these 23  
evaluations, shallow groundwater monitoring wells within 200 feet downgrading of Zone L 24  
sampling locations were used for comparing local groundwater quality to soil concentrations. 25  
26  
27

**Table 10.1.14**  
**SMWU 37, Zone L, Subzone A**  
**Fate and Transport COPCs**

Exceedance Location	Overlapping Site	Fate and Transport COPCs	COPCs to be Further Evaluated?	Reference Document
<b>Soil Borings</b>				
037SB004	None	Antimony	Yes	None
<b>DPT Soil</b>				
037SP001	None	Chromium	Yes	None
037SP005	None	Chromium	Yes	None
037SP006	None	Chromium	Yes	None
<b>Groundwater</b>				
037GW001	SWMU 42/AOC 505	Thallium	Yes	Table 10.5.9*

**Notes:**

\*Zone A RFI Report (EnSafe, 1998)

Antimony was detected in only two of 16 total soil boring and DPT soil samples, and was reported at a concentration exceeding its soil to groundwater SSL of 2.7 mg/kg in only one SWMU 37 surface soil sample, 037SB004 (14.4 mg/kg). It was not detected in the first-round groundwater sample from shallow well 037A02, approximately 20 feet downgrading from 037SB004, indicating that soil concentrations are protective of groundwater at this location.

Chromium was detected in all 16 soil boring and DPT soil samples, and was reported exceeding its soil to groundwater SSL of 19 mg/kg in three DPT samples: 037SP001 (19.1 mg/kg), 037SP005 (39.3 mg/kg) and 037SP006 (19.2 mg/kg). Sample 037SP006 is approximately 190 feet away and generally upgradient from Zone A shallow well 043001, which reported a first-round chromium detection of 1.2 µg/L, indicating that soil concentrations are not a threat to groundwater. Although there are no monitoring wells near the other two DPT sample locations to evaluate the soil to groundwater pathway, all three reported soil chromium detections in these

samples were below the Zone A chromium background reference concentrations of 63.4 mg/kg for subsurface soil.

#### **AOC 504**

In Section 10.1, Tables 10.1.9, 10.1.11, and 10.1.12 compare maximum detected organic and inorganic constituent concentrations in soil boring and DPT soil samples from AOC 504 to SSLs considered protective of groundwater, using the conventions described above. Table 10.1.15 provides a summary of AOC 504 soil samples reporting SSL exceedances, along with the names of any overlapping Zone A sites. Fate and transport concerns at Zone L samples locations not associated with any overlapping Zone A site are evaluated below. In these evaluations, shallow groundwater monitoring wells within 200 feet downgrading of Zone L sampling locations were used for comparing local groundwater quality to soil concentrations.

Two organic compounds, chloromethane and dieldrin, and one inorganic, chromium, were reported at concentrations exceeding their respective SSLs in four soil boring samples (504SB009 through SB012) taken in a cluster north of Building 1620. Chloromethane, detected in one of 35 total soil boring and DPT soil samples at AOC 504, was found at 7  $\mu\text{g}/\text{kg}$  in upper interval soil at 504SB010 (SSL = 3.7  $\mu\text{g}/\text{kg}$ ). Dieldrin (SSL = 2  $\mu\text{g}/\text{kg}$ ) was detected in two upper interval soil samples: 6.4  $\mu\text{g}/\text{kg}$  in 504SB010 and 9  $\mu\text{g}/\text{kg}$  in 504SB011. Chromium was detected in all 35 soil boring and DPT soil samples at AOC 504, and exceeded its soil to groundwater SSL of 19 mg/kg at one location, 504SB011 (upper interval, 25.7 mg/kg). However, the mean chromium concentration reported in the four sample near Building 1620 was 16.7 mg/kg in surface soil and 4.5 mg/kg in subsurface soil, indicating that relatively high chromium concentrations have not migrated downward through the soil. All chromium detections in AOC 504 soil samples were below the Zone A chromium background concentration of 50.4 mg/kg for surface soils and 63.4 mg/kg for subsurface soils. The soil to groundwater pathways could not be evaluated for any of these constituents at this site since no downgrading shallow monitoring wells exist within 200 feet.

**Table 10.1.15**  
**AOC 504, Zone L, Subzone A**  
**Fate and Transport COPCs**

Exceedance Location	Overlapping Site	Fate and Transport COPCs	COPCs to be further Evaluated?	Reference Document
<b>Soil Borings</b>				
504SB005	SWMU 42, AOC 505	Arsenic	No <sup>a</sup>	Table 10.5.9*
		Thallium	Yes	Table 10.5.9*
504SB006	SWMU 42, AOC 505	Arsenic	No <sup>a</sup>	Table 10.5.9*
		Benzo(a)anthracene	No <sup>a</sup>	Table 10.5.8*
		Benzo(a)pyrene	No <sup>a</sup>	Table 10.5.8*
		Benzo(a)fluoranthene	No <sup>a</sup>	Table 10.5.8*
		Benzo(k)fluoranthene	No <sup>a,b</sup>	Table 10.5.8*
		Chrysene	No <sup>a,b</sup>	Table 10.5.8*
		Dibenz(a,h)anthracene	Yes	Table 10.5.8*
Indeno(1,2,3-cd)pyrene	No <sup>a,b</sup>	Table 10.5.8*		
504SB007	SWMU 42, AOC 505	Antimony	No <sup>a</sup>	Table 10.5.9*
504SB008	SWMU 42, AOC 505	Arsenic	No <sup>a</sup>	Table 10.5.9*
		Thallium	Yes	Table 10.5.9*
504SB010	None	Chloromethane	Yes	None
		Dieldrin	Yes	None
504SB011	None	Chromium	Yes	None
		Dieldrin	Yes	None
<b>DPT Soil</b>				
504SP002	SWMU 42, AOC 505	Antimony	No <sup>a</sup>	Table 10.5.9*
504SP005	SWMU 42, AOC 505	Antimony	No <sup>a</sup>	Table 10.5.9*
		Chromium	No <sup>a</sup>	Table 10.5.9*
504SP015	None	Mercury	Yes	None

**Notes:**

\*Zone A RFI Report (EnSafe, 1997)

<sup>a</sup> Zone L concentrations are within the range of those in reference document.

<sup>b</sup> Zone L maximum concentration less than corresponding regulatory limit.

Mercury was detected in 11 of 35 soil samples at AOC 504 and exceeded its SSL of 1 mg/kg in 1  
 one DPT sample, 504SP015 (1.35 mg/kg). There are no shallow monitoring wells downgrading 2  
 within 200 feet of 504SP015 from which to evaluate the soil to groundwater pathway for mercury. 3

**10.1.4.2 Groundwater to Surface Water Cross-Media Transport**

**SWMU 37**

In Section 10.1, Tables 10.1.4, 10.1.5, and 10.1.8 compare maximum detected organic and 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.

The screening comparisons in the three tables mentioned above identify the constituents with the potential to impact downgrading groundwater quality; no surface water quality threats were identified. Table 10.1.14 provides a summary of SWMU 37 groundwater samples reporting exceedances of RBCs or surface water screening levels, along with the names of overlapping Zone A sites. For subzone A, all groundwater exceedances and sample locations are associated with an overlapping Zone A site.

**10.1.4.3 Fate and Transport Summary**

Two organic compounds – chloromethane and dieldrin – and three inorganics – antimony, chromium, and mercury – were reported at concentrations exceeding their soil to groundwater SSLs from Subzone A soil samples at locations not associated with existing Zone A sites. The chloromethane, dieldrin, and one of the chromium exceedances were associated with AOC 504 soil boring samples taken in an area north of Building 1620, but since no shallow groundwater monitoring wells exist within 200 feet downgrading from the samples, the soil to groundwater pathways for each constituent could not be evaluated.

Antimony and mercury exceeded their corresponding SSLs in only one sample each. The antimony soil to groundwater pathway could be evaluated as protective of groundwater quality. The mercury soil to groundwater pathway could not be evaluated since no shallow groundwater monitoring wells exist within 200 feet downgrading of the mercury exceedance location. Although chromium was detected at concentrations exceeding its SSL of 19 mg/kg in three soil samples from SWMU 37 and two from AOC 504, this SSL is based on the assumption that all detected chromium is hexavalent; in reality, the highest reported hexavalent chromium detection in any Zone A soil sample was 0.12 mg/kg. All chromium detections in SWMU 37 and AOC 504 soil samples were below background concentrations.

Zone A SSL exceedances in soil samples were isolated occurrences, generally found in upper interval samples. Samples collected from locations with overlapping Zone A sites will be evaluated in an addendum to the Zone A RFI report.

### **10.1.5 Human Health Risk Assessment for SWMU 37 and AOC 504 Subzone A**

#### **10.1.5.1 Site Background and Investigative Approach**

Section 10.1.1 and 10.1.3 provide a description for SWMU 37 and AOC 504 as well as a discussion of the sampling activities that took place during the Zone L RFI activities.

#### **10.1.5.2 COPC Identification**

##### **SWMU 37 Soil**

Based on the screening comparisons described in Section 7 of this RFI and presented in Table 10.1.7, antimony was identified as a COPC for soil. Antimony was reported at a maximum concentration above its residential RBC in only one SWMU 37 soil sample (037SB004). Since there are no existing Zone A sites located in the area where this sample was taken, a risk assessment is provided to evaluate the significance of soil concentrations of antimony.

**AOC 504 Soil**

Based on the screening comparisons described in Section 7 of this RFI and presented in Tables 10.1.9, 10.1.10, 10.1.11, and 10.1.12, aluminum, arsenic, antimony, manganese, thallium, and BEQs were identified as COPCs for soil. Table 10.1.16 provides a summary of AOC 504 soil samples that reported exceedences along with any associated sites that overlapped the area where these soil samples were taken. As shown, many of the soil samples reporting exceedences were collected in the vicinity of SWMU 42 and AOC 505. The exceptions were soil samples 504SB009, 504SB011, and 504SB012; all reported exceedences of BEQs. Since there are no existing Zone A sites located in the area where these samples were taken, a risk assessment is provided to evaluate the significance of soil concentrations of BEQs. The remaining were compared with data generated during the Zone A RFI and the results are provided in Table 10.1.16. 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 A RFI, then the conclusions for Zone L would be the similar and therefore no further evaluation would be necessary. Conversely, if for

**Table 10.1.16**  
**AOC 504, Zone L, Subzone A**  
**Risk Assessment COPCs**

Exceedance Location	Overlapping Site	Risk Assessment COPCs	COPCs to be further Evaluated?	Reference Document
<b>Soil Borings</b>				
504SB002	SWMU 42; AOC 505	BEQs	No <sup>a</sup>	Table 10.5.10 in Section 10.5.6*
504SB005	SWMU 42; AOC 505	Arsenic	No <sup>a</sup>	Table 10.5.10 in Section 10.5.6*
		Thallium	Yes	Table 10.5.10 in Section 10.5.6*
		BEQs	No <sup>a</sup>	Table 10.5.10 in Section 10.5.6*
504SB006	SWMU 42; AOC 505	Arsenic	No <sup>a</sup>	Table 10.5.10 in Section 10.5.6*
		BEQs	No <sup>a</sup>	Table 10.5.10 in Section 10.5.6*
504SB007	SWMU 42; AOC 505	Antimony	Yes	Table 10.5.10 in Section 10.5.6*
		BEQs	No <sup>a</sup>	Table 10.5.10 in Section 10.5.6*
504SB008	SWMU 42; AOC 505	Arsenic	No <sup>a</sup>	Table 10.5.10 in Section 10.5.6*
		Thallium	Yes	Table 10.5.10 in Section 10.5.6*

**Table 10.1.16**  
**AOC 504, Zone L, Subzone A**  
**Risk Assessment COPCs**

Exceedance Location	Overlapping Site	Risk Assessment COPCs	COPCs to be further Evaluated?	Reference Document
<b>DPT Soil</b>				
504SP002	SWMU 42; AOC 505	Antimony	Yes	Table 10.5.10 in Section 10.5.6*
		Manganese	No <sup>a</sup>	Table 10.5.10 in Section 10.5.6*
504SP005	SWMU 42; AOC 505	Antimony	Yes	Table 10.5.10 in Section 10.5.6*
		Arsenic	No <sup>a</sup>	Table 10.5.10 in Section 10.5.6*
504SP006	SWMU 42; AOC 505	Aluminum	Yes	Table 10.5.10 in Section 10.5.6*

**Notes:**

\*Zone A RFI Report (EnSafe, 1998)

<sup>a</sup> Zone L concentrations within the range of those in referenced document.

any reason the data generated during the Zone L RFI revealed something that was not evaluated 1  
 during the Zone A RFI (data reported higher than that presented in the Zone A RFI, or new 2  
 COPCs), then further evaluation should be deferred to the Zone A RFI and included as an 3  
 addendum. Recommendations are provided in Section 11. 4

**SWMU 37 Groundwater** 5

Based on the screening comparisons described in Section 7 of this RFI and presented in 6  
 Table 10.1.18, aluminum, antimony, and thallium were identified as COPCs for groundwater. 7  
 Table 10.1.17 provides a summary of SWMU 37 groundwater samples that reported exceedences 8  
 along with any associated sites that overlapped the area where these groundwater samples were 9  
 taken. Monitoring well NBCL037001A was the only monitoring well with reported exceedences; 10  
 it is located in the vicinity of SWMU 42 and AOC 505. Data generated using samples collected 11  
 from monitoring well NBCL037001A were compared to groundwater data generated during the 12  
 Zone A RFI. The results of this comparison are provided in Table 10.1.17. It was assumed that 13  
 if the data generated during the Zone L RFI were less than or within the range of the data 14

generated during the Zone A 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 A RFI (data reported higher than that presented in the Zone A RFI, or new COPCs), then further evaluation should be deferred to the Zone A RFI and included as an addendum. Recommendations are provided in Section 11.

**10.1.5.3 Exposure Assessment**

**Potentially Exposed Populations**

Potentially exposed populations include 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 soil conditions. Current site workers' exposure would be less than that assumed for the hypothetical future site worker scenario because of their limited soil contact. Therefore, future worker assessment is considered to be protective of current site users. The future site resident scenario was built on the premise that current buildings would be removed and replaced with dwellings.

**Table 10.1.17**  
**SMWU 37, Zone L, Subzone A**  
**Risk Assessment COPCs**

Exceedance Location	Overlapping Site	Risk Assessment COPCs	COPCs to be further Evaluated?	Reference Document
<b>Groundwater</b>				
037GW001	SWMU 42/AOC 505	Aluminum	No	Table 10.5.11*
		Antimony	Yes	Table 10.5.11*
		Thallium	Yes	Table 10.5.11*

*Notes:*

\*Zone A RFI Report (EnSafe, 1998)

**Table 10.1.18  
Exposure Pathways Summary — SWMU 37 and AOC 504  
NAVBASE — Subzone A  
Charleston, South Carolina**

Potentially Exposed Population	Medium and Exposure Pathway	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
<b>Current Land Uses</b>			
<b>Current Site Users/Maintenance</b>	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	Groundwater COPCs were only identified in areas where there were overlapping sites. Therefore no risk assessment is provided.
	Shallow groundwater, Inhalation of volatilized shallow groundwater contaminants	No	Groundwater COPCs were only identified in areas where there were overlapping sites. Therefore no risk assessment is provided.
	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.
<b>Future Land Uses</b>			
<b>Future Site Residents (Child and Adult) and Future Site Worker</b>	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	Groundwater COPCs were only identified in areas where there were overlapping sites. Therefore no risk assessment is provided.
	Shallow groundwater, Inhalation of volatilized contaminants during domestic use	No	Groundwater COPCs were only identified in areas where there were overlapping sites. Therefore no risk assessment is provided.

**Table 10.1.18  
 Exposure Pathways Summary — SWMU 37 and AOC 504  
 NAVBASE — Subzone A  
 Charleston, South Carolina**

<b>Potentially Exposed Population</b>	<b>Medium and Exposure Pathway</b>	<b>Pathway Selected for Evaluation?</b>	<b>Reason for Selection or Exclusion</b>
	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 Pathways**

Exposure pathways for the site workers are dermal contact, and incidental ingestion of soils. 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 soil. Uniform exposure was assumed for all sample locations. Table 10.1.18 presents the justification for exposure pathways assessed in this HHRA.

**Exposure Unit Area**

The two areas that are the focus for the risk assessment for subzone A include the area just to the east of Building 1175 (antimony) and the area just to the north of Building 1620 (BEQs). There were four soil samples collected from the area just to the east of Building 1175 (037SB002, 037SB003, 037SB004, and 037SB005). There were also four soil samples collected just to the north of Building 1620 (504SB009, 504SB010, 504SB011, and 504SB012). The risk assessment uses these exposure areas and associated soil data to evaluate the soil pathways.

## Exposure Point Concentrations

As discussed in Section 7 of this RFI, UCLs were calculated for datasets consisting of at least 10 samples. Because there were only four data points for each exposure unit, the exposure point concentration was set equal to the maximum concentration for each COPC.

## Quantification of Exposure

### *Soil*

CDIs for ingestion and dermal contact with soils are shown in Tables 10.1.19 and 10.1.20 respectively. CDIs for both exposure unit areas are shown in each table.

### 10.1.5.4 Toxicity Assessment

Toxicity assessment terms and methods are discussed in Section 7 of this report. Table 10.1.21 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 are provided in the following paragraphs.

*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).

Table 10.1.19  
 Chronic Daily Intakes (CDI)  
 Incidental Ingestion of Surface Soil  
 SWMU 37 and AOC 504, Subzone A  
 Charleston Naval Complex  
 Charleston, South Carolina

Chemical	Fraction Ingested from Contaminated Source *	Exposure Point Concentration (mg/kg)	Future Resident adult H-CDI (mg/kg-day)	Future Resident child H-CDI (mg/kg-day)	Future Resident lwa C-CDI (mg/kg-day)	Current Worker adult H-CDI (mg/kg-day)	Current Worker adult C-CDI (mg/kg-day)
Antimony	1	14.4	1.97E-05	1.84E-04	2.25E-05	7.05E-06	2.52E-06
Benzo(a)pyrene equiv.	1	0.62	8.47E-07	7.91E-06	9.68E-07	3.03E-07	1.08E-07

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 10.1.20  
 Chronic Daily Intakes (CDI)  
 Dermal Contact with Surface Soil  
 SWMU 37 and AOC 504, Subzone A  
 Charleston Naval Complex  
 Charleston, South Carolina

Chemical	Exposure Point Concentration (mg/kg)	Fraction Contacted from Contaminated Source *	Dermal Absorption Factor (unitless)	Future Resident adult H-CDI (mg/kg-day)	Future Resident child H-CDI (mg/kg-day)	Future Resident lwa C-CDI (mg/kg-day)	Current Worker adult H-CDI (mg/kg-day)	Current Worker adult C-CDI (mg/kg-day)
Antimony	14.4	1	0.001	8.09E-07	2.67E-06	5.06E-07	5.78E-07	2.06E-07
Benzo(a)pyrene equiv.	0.62	1	0.01	3.47E-07	1.15E-06	2.17E-07	2.48E-07	8.86E-08

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 10.1.21  
 Toxicological Database Information  
 for Chemicals of Potential Concern  
 SWMU 37, Subzone A  
 Charleston Naval Complex

**Non-Carcinogenic Toxicity Data**

Chemical	Oral Reference Dose (mg/kg/day)	Confidence Level	Critical Effect	Uncertainty Factor Oral	Inhalation Reference Dose (mg/kg/day)	Confidence Level	Critical Effect	Uncertainty Factor Inhalation
Antimony	0.0004	a	Low	1000	ND		blood glucose and cholesterol	ND
Benzo(a)pyrene Equivalents	ND			ND	ND			ND

NOTES:

- a Integrated Risk Information System (IRIS)
- b EPA Environmental Criteria and Assessment Office - Cincinnati (provisional)
- ND Not determined due to lack of information

**Benzo(a)pyrene equivalents** include the following list of polynuclear aromatic hydrocarbons: 1

Benzo(a)anthracene	TEF	0.1	2
Benzo(a)pyrene	TEF	1.0	3
Benzo(b)fluoranthene	TEF	0.1	4
Benzo(k)fluoranthene	TEF	0.01	5
Chrysene	TEF	0.001	6
Dibenz(a,h)anthracene	TEF	1.0	7
Indeno(1,2,3-cd)pyrene	TEF	0.1	8

Some PAHs are toxic to the liver, kidney, and blood. However, the toxic effects of the PAHs 9  
 above have not been well established. There are no RfDs for the PAHs above due to a lack of 10  
 data. All PAHs listed above are classified by USEPA as B2 carcinogens, and their carcinogenicity 11  
 is addressed relative to that of benzo(a)pyrene, having an oral SF of 7.3 (mg/kg-day)<sup>-1</sup>. Toxicity 12  
 Equivalency Factors, also set by USEPA, are multipliers that are applied to the detected 13  
 concentrations, which are subsequently used to calculate excess cancer risk. These multipliers are 14  
 discussed further in the exposure and toxicity assessment sections. Most carcinogenic PAHs have 15  
 been classified as carcinogenic due to animal studies using large doses of purified PAHs. There 16  
 is some doubt as to the validity of these listings, and the SFs listed in USEPA's RBC table are 17  
 provisional. However, these PAHs are carcinogens when the exposure involves a mixture of other 18  
 carcinogenic substances (e. g., coal tar, soot, cigarette smoke). As listed in IRIS, the basis for the 19  
 benzo(a)pyrene B2 classification is that human data specifically linking benzo(a)pyrene to a 20  
 carcinogenic effect are lacking. There are, however, multiple animal studies in many species 21  
 demonstrating benzo(a)pyrene to be carcinogenic by numerous routes. 22

**Benzo(a)pyrene** has produced positive results in numerous genotoxicity assays. At the June 1992 23  
 CRAVE Work Group meeting, a revised risk estimate for benzo(a)pyrene was verified (see 24

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  $\mu\text{g/L}$  drinking water or risk per  $\mu\text{g/m}^3$  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 exists 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 of no human data exists and there is no 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 exists and there is no 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).

**10.1.5.5 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 10.1.22 and 10.1.23 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 collected north of Building 1620 are 7E-06 and 3E-6, respectively. BEQs were the primary contributor to risk projections.

The computed hazard indices computed for soil collected east of Building 1175 based on the adult resident were 0.05 for the soil ingestion pathway and 0.01 for the dermal contact pathway. The computed hazard indices based on child resident were 0.5 for the soil ingestion pathway and 0.03 for the dermal contact pathway.

***Hypothetical Site Workers***

For the soils collected north of Building 1620, site worker ILCRs are 8E-07 and 1E-06 for the ingestion and dermal contact pathways, respectively. BEQs were the primary contributors for each pathway. For the soils collected east of Building 1157, hazard indices for the ingestion and dermal pathways were 0.02 and 0.007, respectively.

Table 10.1.22  
Hazard Quotients and Incremental Lifetime Cancer Risks  
Incidental Surface Soil Ingestion  
SWMU 37 and AOC 504, Subzone A  
Charleston Naval Complex  
Charleston, SC

Chemical	Oral RfD Used (mg/kg-day)	Oral SF Used (mg/kg-day) <sup>-1</sup>	Future Resident adult Hazard Quotient	Future Resident child Hazard Quotient	Future Resident lwa ILCR	Current Worker adult Hazard Quotient	Current Worker adult ILCR
Antimony	0.0004	NA	0.049	0.46	ND	0.018	ND
Benzo(a)pyrene equiv.	NA	7.3	ND	ND	7.1E-06	ND	7.9E-07
SUM Hazard Index/ILCR (Antimony)			0.05	0.5	ND	0.02	ND
SUM Hazard Index/ILCR (Benzo(a)pyrene equiv.)			ND	ND	7E-06	ND	8E-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

Table 10.1.23  
Hazard Quotients and Incremental Lifetime Cancer Risks  
Dermal Contact With Surface Soil  
SWMU 37 and AOC 504, Subzone A  
Charleston Naval Complex  
Charleston, SC

Chemical	Dermal Adjustment	Oral RfD Used (mg/kg-day)	Oral SF Used (mg/kg-day) <sup>-1</sup>	Future Resident adult Hazard Quotient	Future Resident child Hazard Quotient	Future Resident lwa ILCR	Current Worker adult Hazard Quotient	Current Worker adult ILCR
Antimony	0.2	8E-05	NA	0.010	0.033	ND	0.0072	ND
Benzo(a)pyrene equiv.	0.5	NA	14.6	ND	ND	3.2E-06	ND	1.3E-06
SUM Hazard Index/ILCR (Antimony)				0.01	0.03	ND	0.007	ND
SUM Hazard Index/ILCR (Benzo(a)pyrene equiv.)				ND	ND	3E-06	ND	1E-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)

Table 10.1.24  
 Summary of Risk and Hazard-based COCs  
 SWMU 37 and AOC 504, Subzone A  
 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	Antimony	0.049	0.46	ND	0.018	ND	2
		Benzo(a)pyrene equiv.	ND	ND	7.1E-06	ND	7.9E-07	
	Dermal Contact	Antimony	0.010	0.033	ND	0.0072	ND	2 4
		Benzo(a)pyrene equiv.	ND	ND	3.2E-06	ND	1.3E-06	
Sum of All Pathways (Antimony)			0.06	0.5	ND	0.02	ND	
Sum of All Pathways (Benzo(a)pyrene equiv.)			ND	ND	1E-05	ND	2E-06	

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.

## **COCs Identified**

Chemicals of concern were identified based on cumulative (all pathway) risk and hazard projected for this site, as shown in Table 10.1.24. 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 exceeds 1E-6 or whose hazard quotient exceeds 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.

### *Soils*

#### **Hypothetical Site Residents**

BEQs were identified as the soil pathway COCs based on their contribution to cumulative ILCR projections.

#### **Hypothetical Site Workers**

BEQs were identified as the soil pathway COCs based on their contribution to cumulative ILCR projections.

### **10.1.5.6 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 is 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.

#### **Determination of Exposure Point Concentrations**

Maximum concentrations were used as the exposure point concentrations for this site. In risk assessment where there are less than 10 data points for each COPC, maximum concentrations provide reasonable maximum exposure point concentrations. 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.

#### **10.1.5.7 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. To add perspective to the risk assessment, point risk and hazard maps are presented below. 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 1  
over the entire site rather than specific points. Risk maps are still useful because they allow the 2  
reader to visualize the contribution of risk or hazard index due to individual COCs. 3

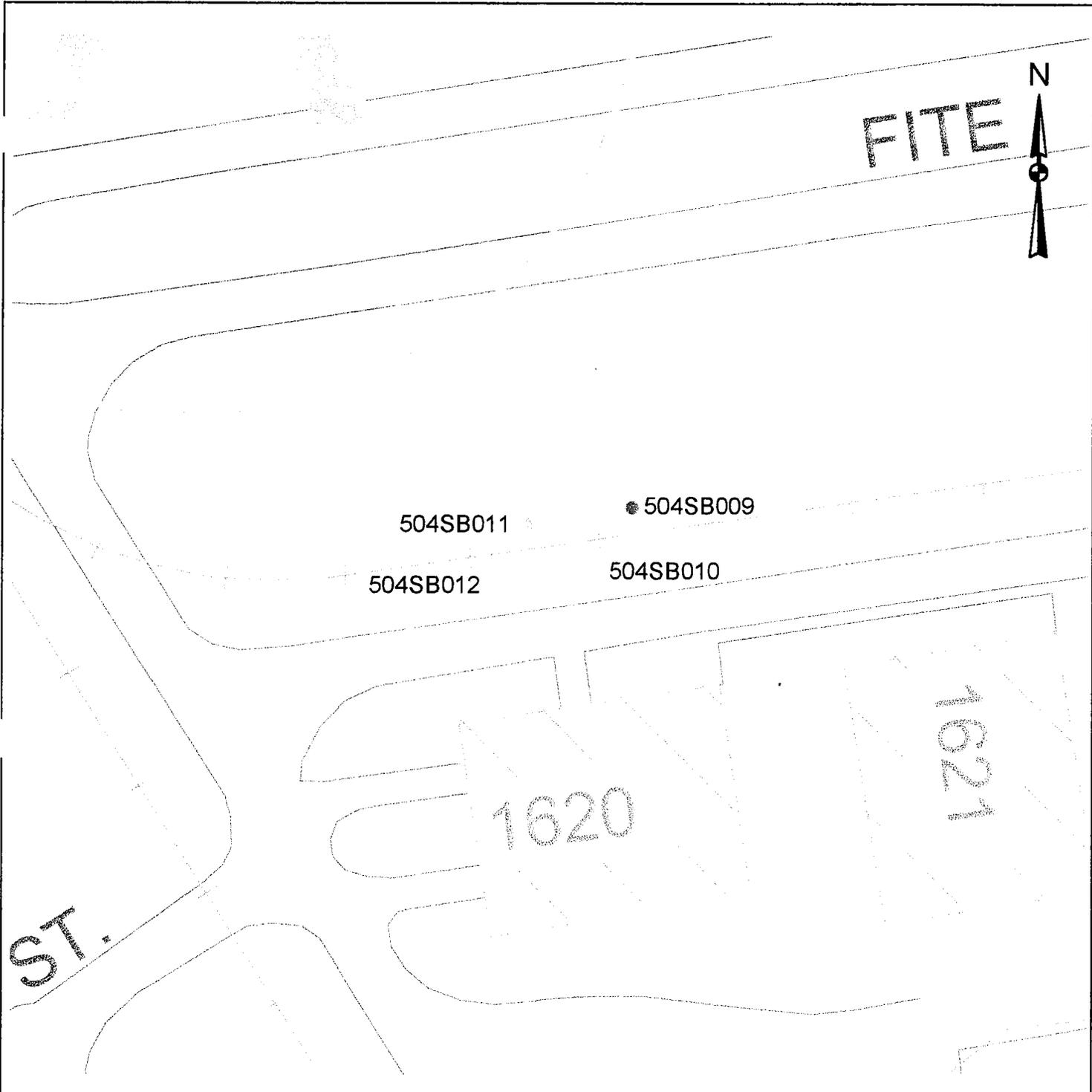
**Soil** 4

Figure 10.1.33 illustrates point risk for soil pathways under a residential scenario. Point hazard 5  
estimates for residential and site worker scenario are all below one and point risk estimates for the 6  
site worker were all below 1E-06. As a result, these point risk and hazard maps are not presented. 7  
Table 10.1.25 provides the contribution of individual COPCs to cumulative risk and hazard at each 8  
sample location. As shown, concentrations of BEQs in soil locations north of Building 1620 9  
contribute to risk projections above 1E-06 for each soil location. Risk estimates range from 5E-06 10  
(504SB011) to 1E-05 (504SB009). 11

**10.1.5.8 Remedial Goal Options** 12

**Soil** 13

RGOs for carcinogens were based on the lifetime weighted average site resident or site workers 14  
as presented in Table 10.1.26 for soils. 15



**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  
 FACILITY INVESTIGATION  
 NAVAL BASE CHARLESTON  
 CHARLESTON, SC

FIGURE 10.1.33  
 ZONE L - SUBZONE A  
 AOC 504

SOIL POINT RISK  
 RESIDENTIAL SCENARIO

Table 10.1.25  
 Point Estimates of Risk and Hazard  
 SWMU 37 and AOC 504, Subzone A, 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)
037	B002	Antimony (Sb)	ND	mg/kg	NA	NA	NA	NA
037	B003	Antimony (Sb)	ND	mg/kg	NA	NA	NA	NA
037	B004	Antimony (Sb)	14.4	mg/kg	0.4936	NA	0.0248	NA
037	B005	Antimony (Sb)	0.66	mg/kg	0.0226	NA	0.0011	NA
504	B009	Benzo(a)pyrene equiv.	618.41	ug/kg	NA	10.24	NA	0.034
504	B010	Benzo(a)pyrene equiv.	517.28	ug/kg	NA	8.57	NA	0.029
504	B011	Benzo(a)pyrene equiv.	297.2	ug/kg	NA	4.92	NA	0.017
504	B012	Benzo(a)pyrene equiv.	483.3	ug/kg	NA	8.00	NA	0.027

Table 10.1.26  
 Remedial Goal Options for Soil  
 SWMU 37 and AOC 504, Subzone A  
 Charleston Naval Complex  
 Charleston, South Carolina

**Residential-Based Remedial Goal Options**

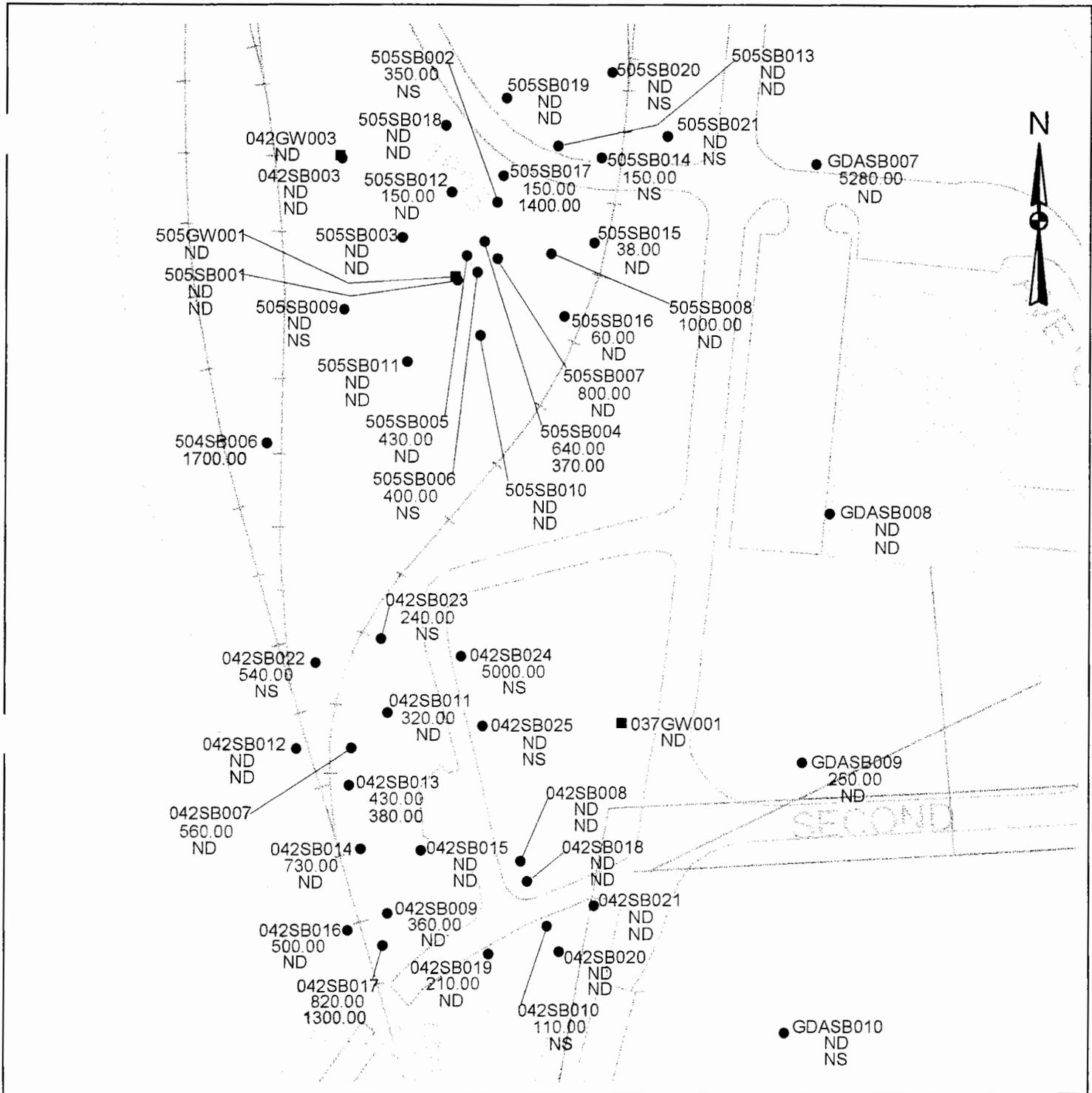
Chemical	Slope Factor (mg/kg-day) <sup>-1</sup>	Reference Dose (mg/kg-day)	EPC mg/kg	Hazard-Based Remedial Goal Options			Risk-Based Remedial Goal Options			Background Concentration mg/kg
				3 mg/kg	1 mg/kg	0.1 mg/kg	1E-06 mg/kg	1E-05 mg/kg	1E-04 mg/kg	
Benzo(a)pyrene equiv.	7.3	NA	0.62	ND	ND	ND	0.060	0.60	6.0	NA

**Worker-Based Remedial Goal Options**

Chemical	Slope Factor (mg/kg-day) <sup>-1</sup>	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	
Benzo(a)pyrene equiv.	7.3	NA	0.62	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
- mg/kg-day milligrams per kilogram per day
- mg/kg milligrams per kilogram



**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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

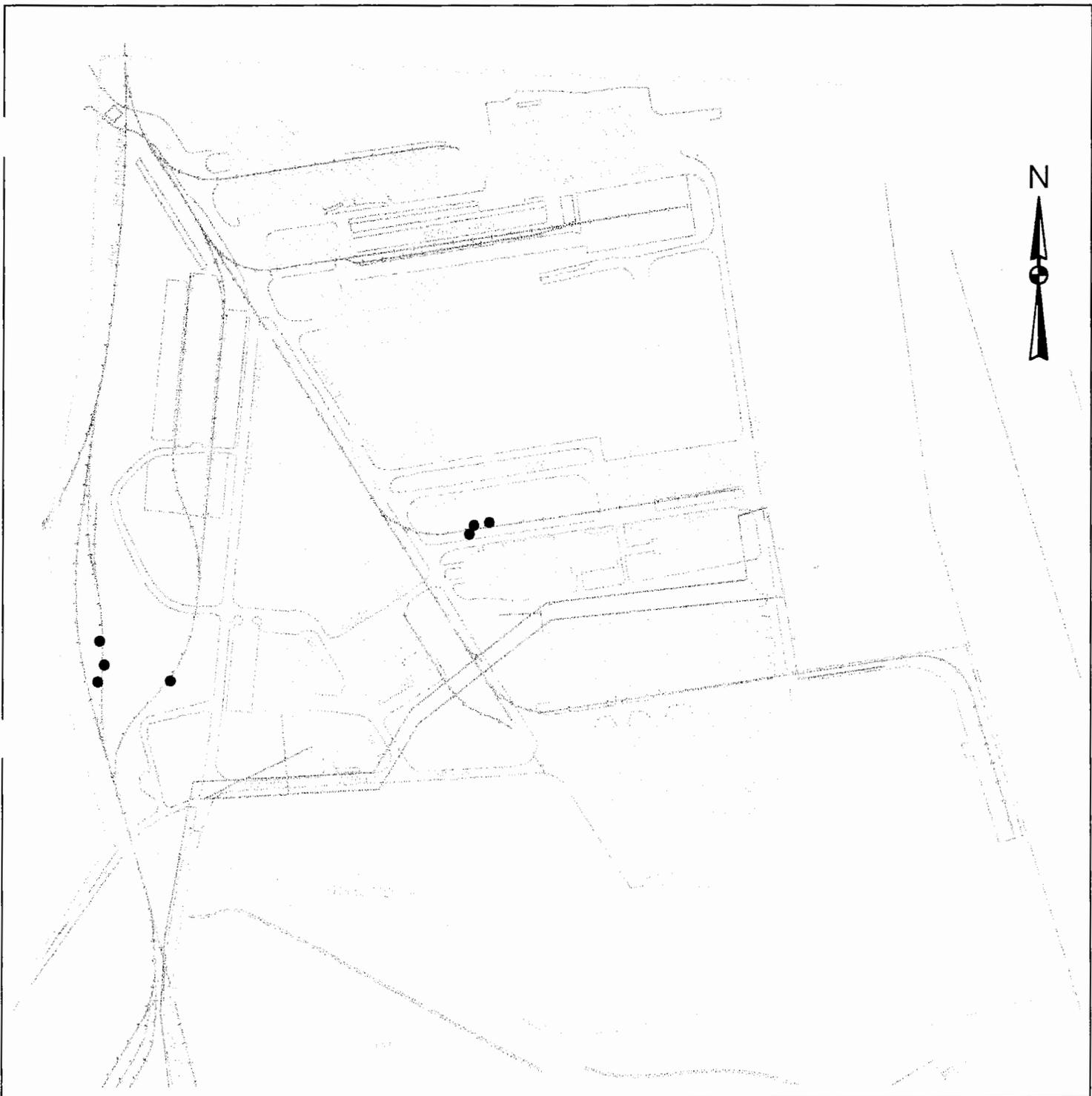
SUBZONE BOUNDARY     RAILROAD  
 SANITARY SEWER LINE     STORM SEWER LINE



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

FIGURE 10.1.11  
 ZONE L - SUBZONE A  
 BENZO(A)ANTHRACENE  
 ZONE L EXCEEDANCES WITH ZONE A  
 SOIL AND GW CONCENTRATIONS

RBC = 880 ug/kg    SSL = 800 ug/kg    MCL = NONE



**LEGEND**

● ZONE L SOIL BORING LOCATION

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

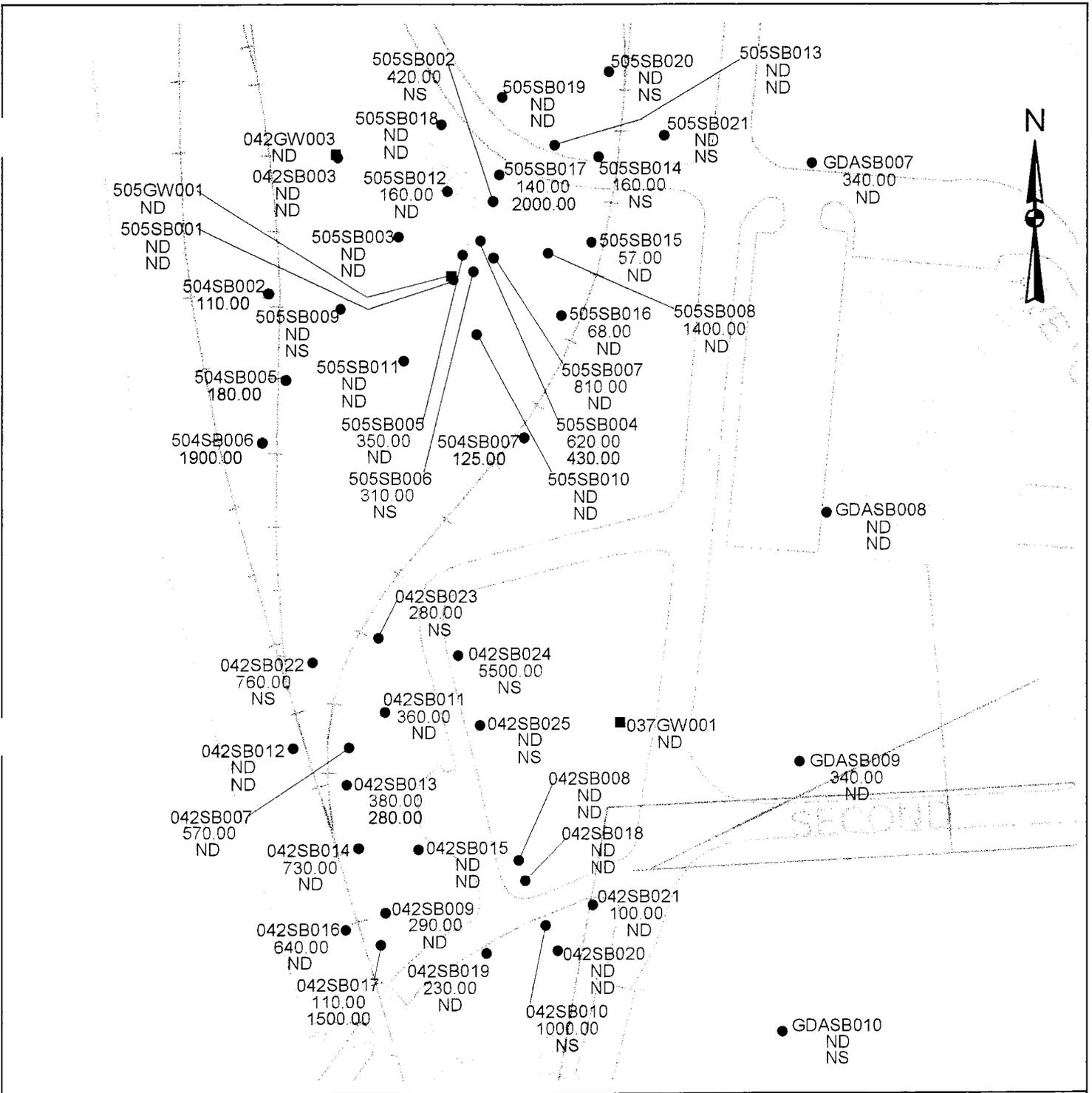
300      0      300      600 Feet



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

FIGURE 10.1.12  
 ZONE L - SUBZONE A  
 BENZO(A)PYRENE  
 ZONE L EXCEEDANCES

RBC = 88.0 ug/kg    SSL = 4000 ug/kg    MCL = 0.20 ug/L



**LEGEND**

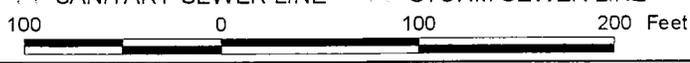
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (ug/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (ug/kg)
- 12.30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

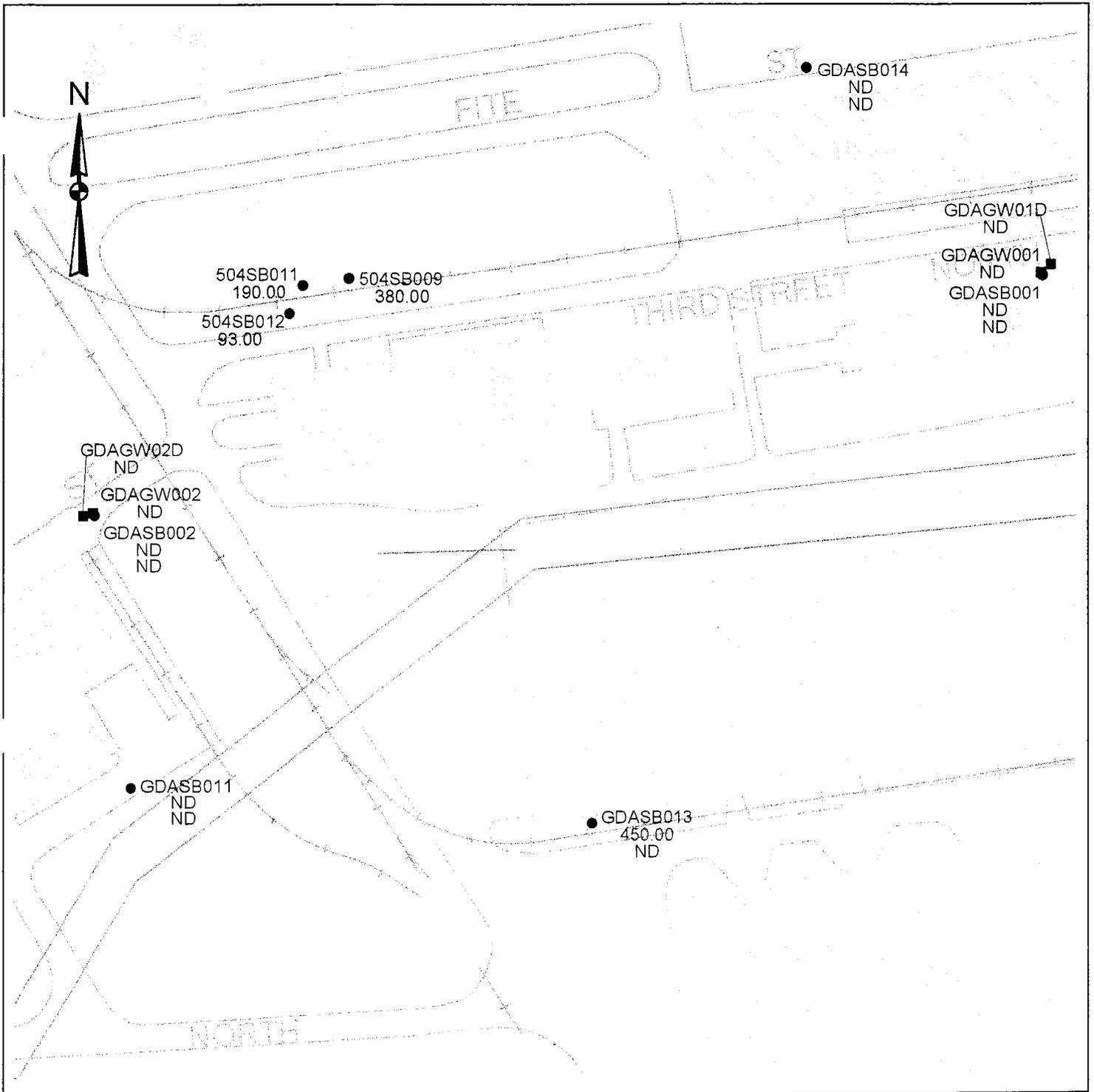


ZONE L - RCRA  
FACILITY INVESTIGATION  
NAVAL BASE CHARLESTON  
CHARLESTON, SC

FIGURE 10.1.13  
ZONE L - SUBZONE A  
BENZO(A)PYRENE  
ZONE L EXCEEDANCES WITH ZONE A  
SOIL AND GW CONCENTRATIONS

RBC = 88.0 ug/kg SSL = 4000 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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

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

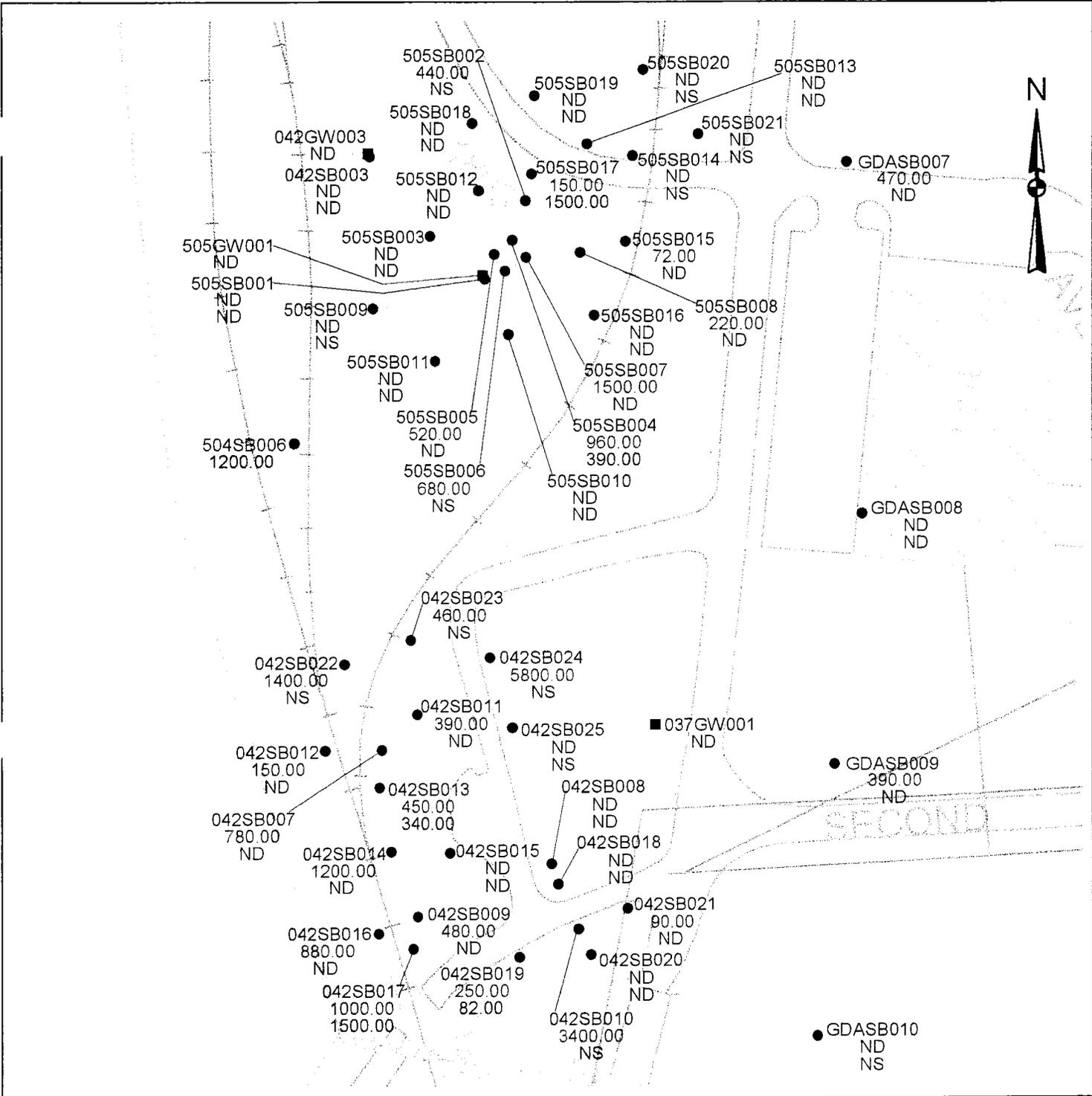
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ZONE L - RCRA  
FACILITY INVESTIGATION  
NAVAL BASE CHARLESTON  
CHARLESTON, SC

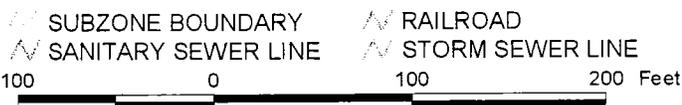
FIGURE 10.1.14  
ZONE L - SUBZONE A  
BENZO(A)PYRENE  
ZONE L EXCEEDANCES WITH ZONE A  
SOIL AND GW CONCENTRATIONS

RBC = 88.0 ug/kg SSL = 4000 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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

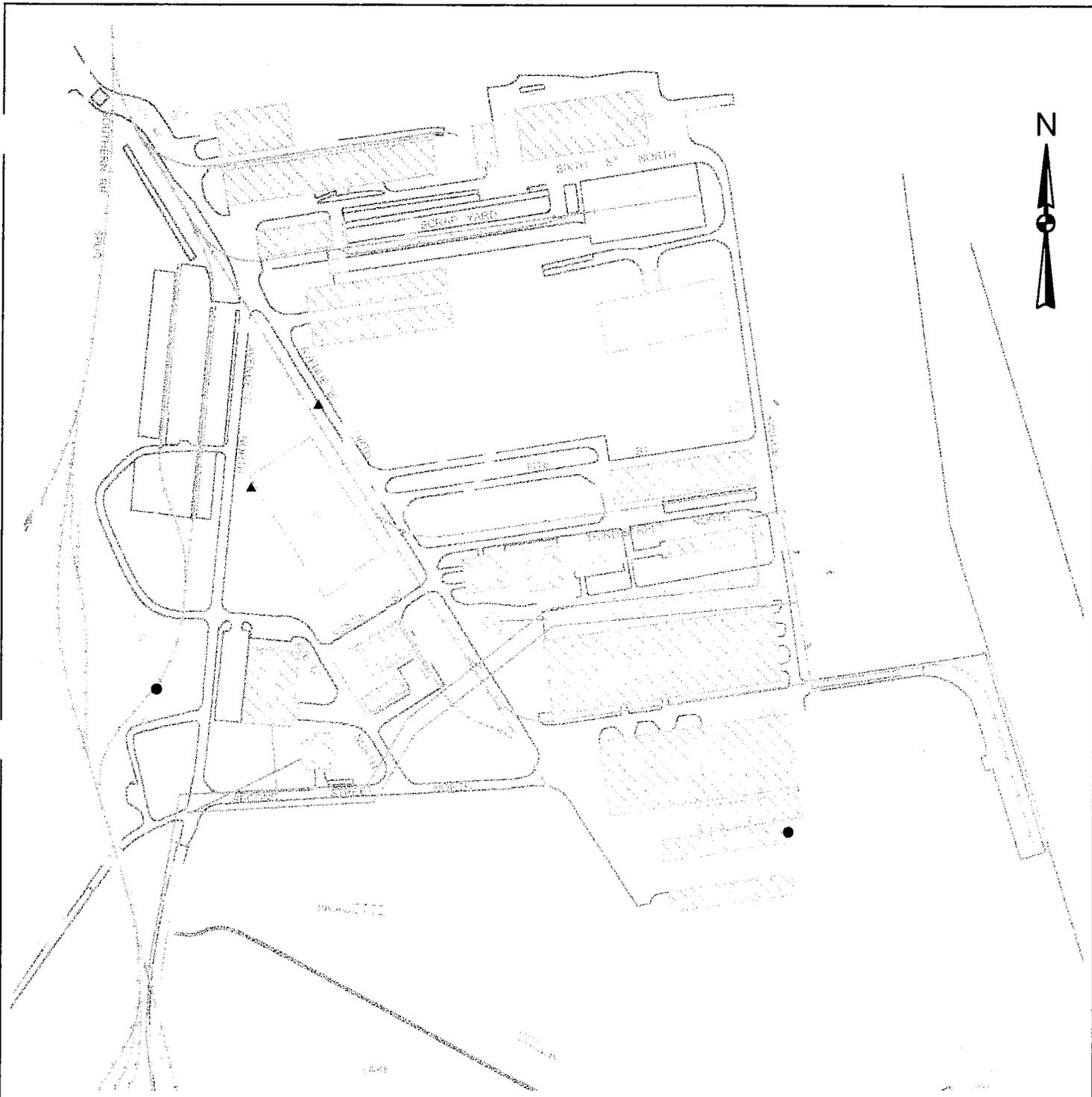


ZONE L - RCRA  
FACILITY INVESTIGATION  
NAVAL BASE CHARLESTON  
CHARLESTON, SC

FIGURE 10.1.15  
ZONE L - SUBZONE A  
BENZO(B)FLUORANTHENE  
ZONE L EXCEEDANCES WITH ZONE A  
SOIL AND GW CONCENTRATIONS

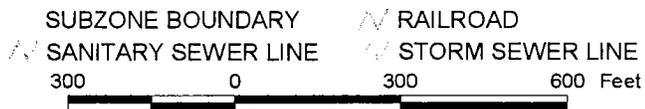
RBC = 880 ug/kg SSL = 2300 ug/kg MCL = NONE





**LEGEND**

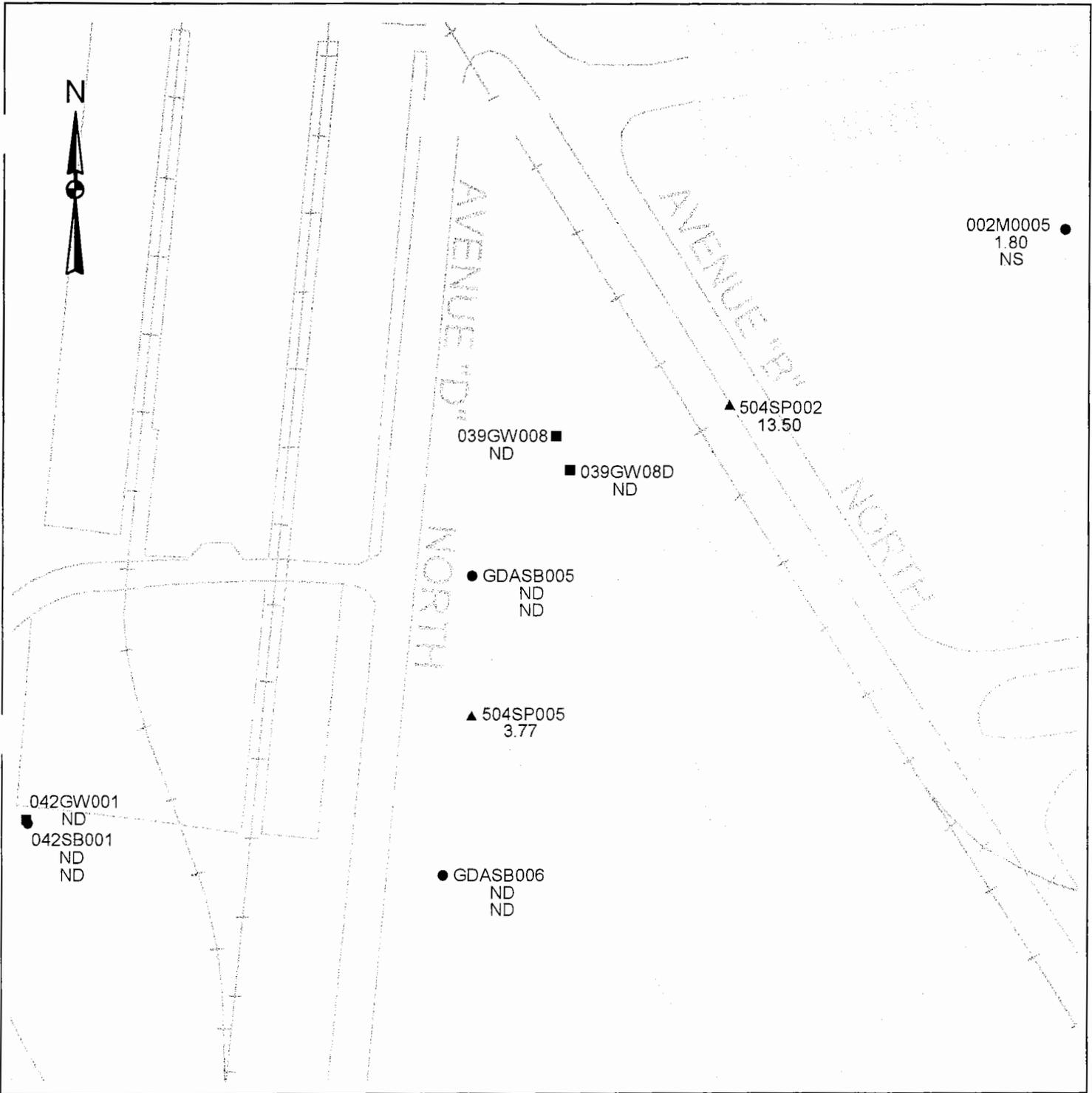
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION



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

FIGURE 10.1.17  
 ZONE L - SUBZONE A  
 ANTIMONY  
 ZONE L EXCEEDANCES

RBC = 3.10 mg/kg    SSL = 2.70 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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- SANITARY SEWER LINE
- STORM SEWER LINE

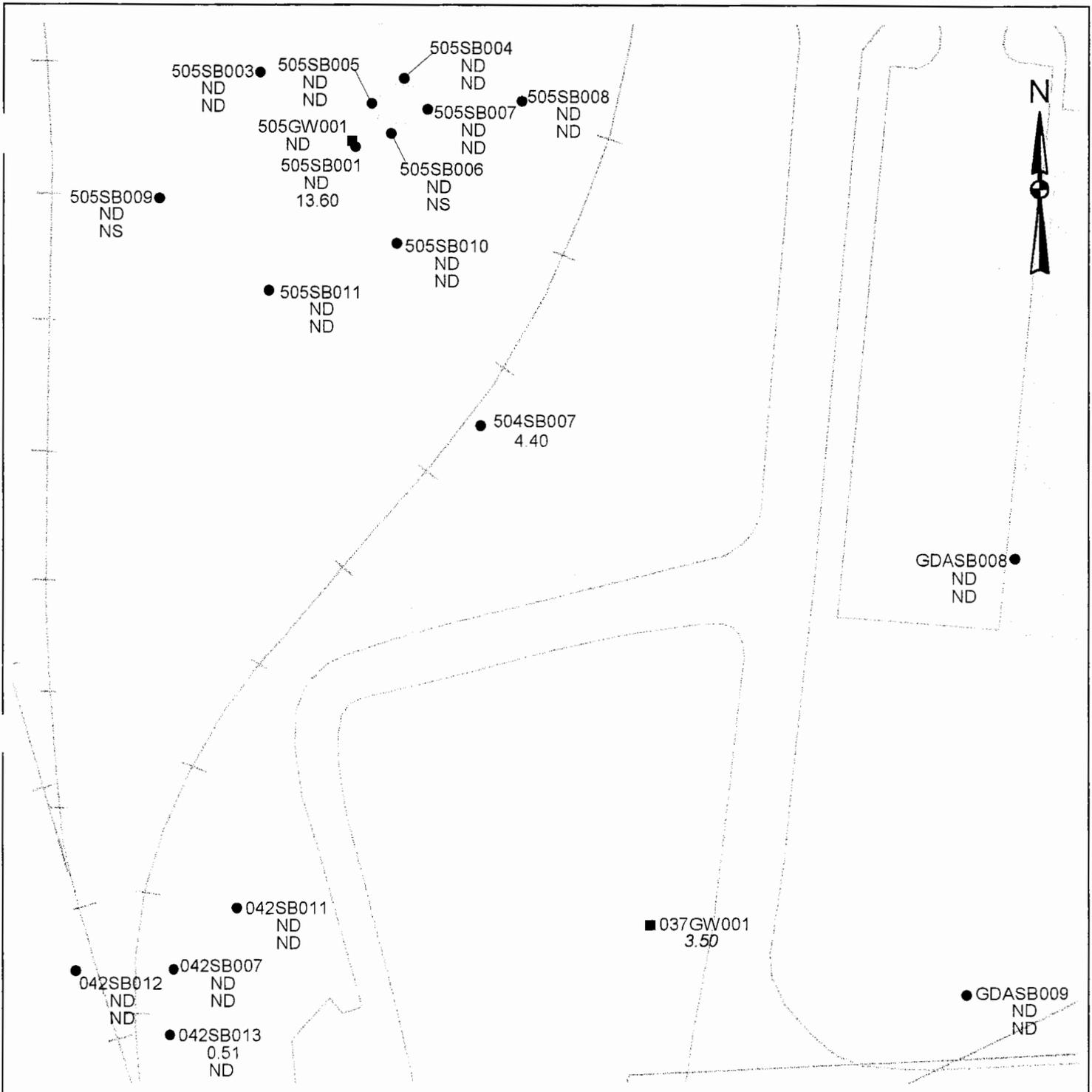


ZONE L - RCRA  
FACILITY INVESTIGATION  
NAVAL BASE CHARLESTON  
CHARLESTON, SC

FIGURE 10.1.18  
ZONE L - SUBZONE A  
ANTIMONY  
ZONE L EXCEEDANCES WITH ZONE A  
SOIL AND GW CONCENTRATIONS

RBC = 3.10 mg/kg SSL = 2.70 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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- SANITARY SEWER LINE
- STORM SEWER LINE



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

FIGURE 10.1.19  
ZONE L - SUBZONE A  
ANTIMONY  
ZONE L EXCEEDANCES WITH ZONE A  
SOIL AND GW CONCENTRATIONS

60 0 60 120 Feet

RBC = 3.10 mg/kg SSL = 2.70 mg/kg MCL = 6.00 ug/L



037SB004 ● 14.40

■ 037GW002 ND

■ GDAGW03D 7.10

GDAGW003 ND

● GDASB003 ND ND

### 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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

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

80 0 80 160 Feet



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

FIGURE 10.1.20  
ZONE L - SUBZONE A  
ANTIMONY  
ZONE L EXCEEDANCES WITH ZONE A  
SOIL AND GW CONCENTRATIONS

RBC = 3.10 mg/kg SSL = 2.70 mg/kg MCL = 6.00 ug/L



**LEGEND**

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

SUBZONE BOUNDARY      // RAILROAD  
 SANITARY SEWER LINE      // STORM SEWER LINE

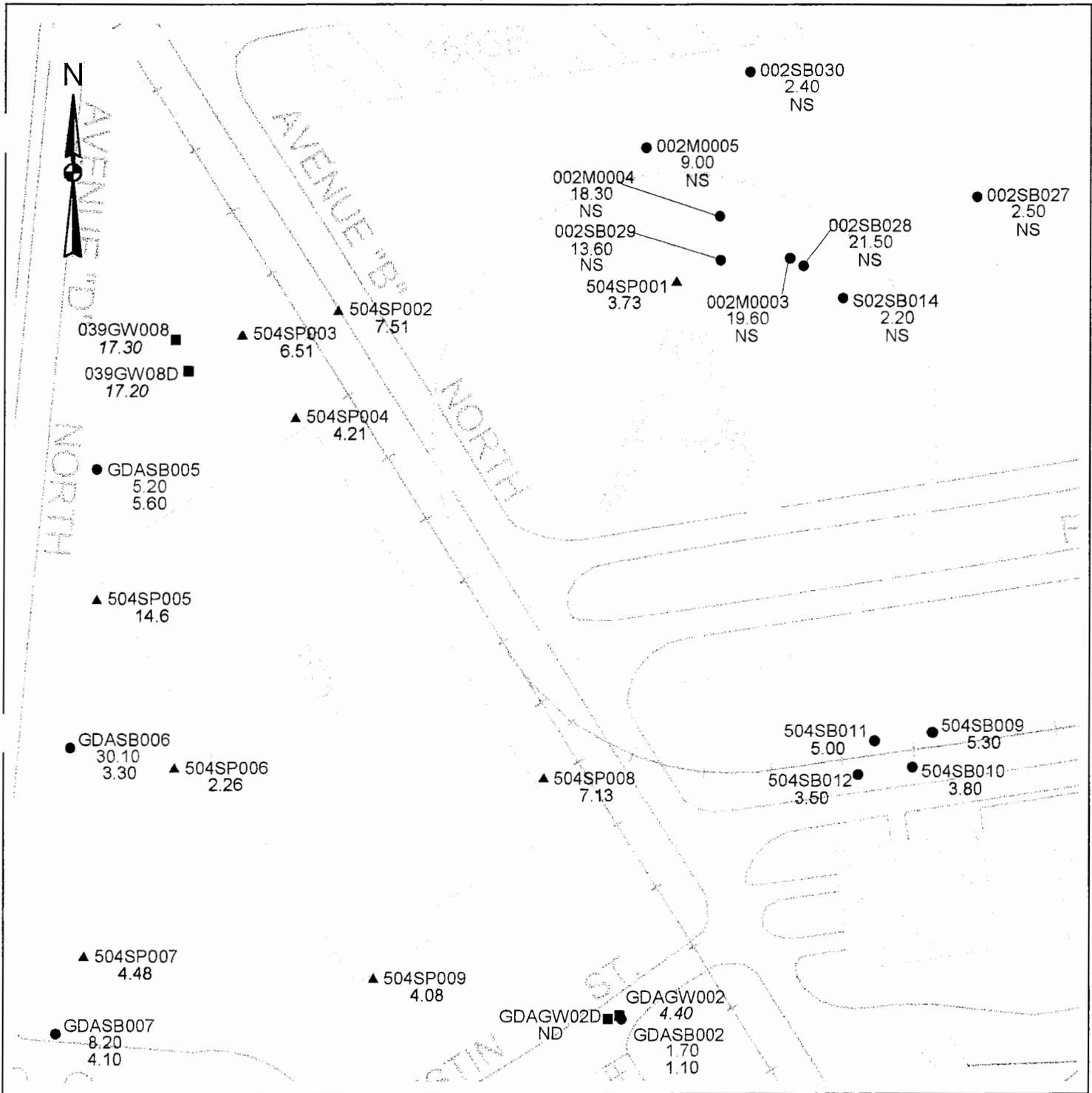
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ZONE L - RCRA  
 FACILITY INVESTIGATION  
 NAVAL BASE CHARLESTON  
 CHARLESTON, SC

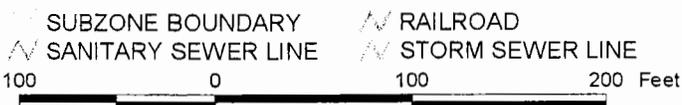
FIGURE 10.1.21  
 ZONE L - SUBZONE A  
 ARSENIC  
 ZONE L EXCEEDANCES

RBC = 0.43 mg/kg    SSL = 15.0 mg/kg    MCL = 50.0 ug/L



**LEGEND**

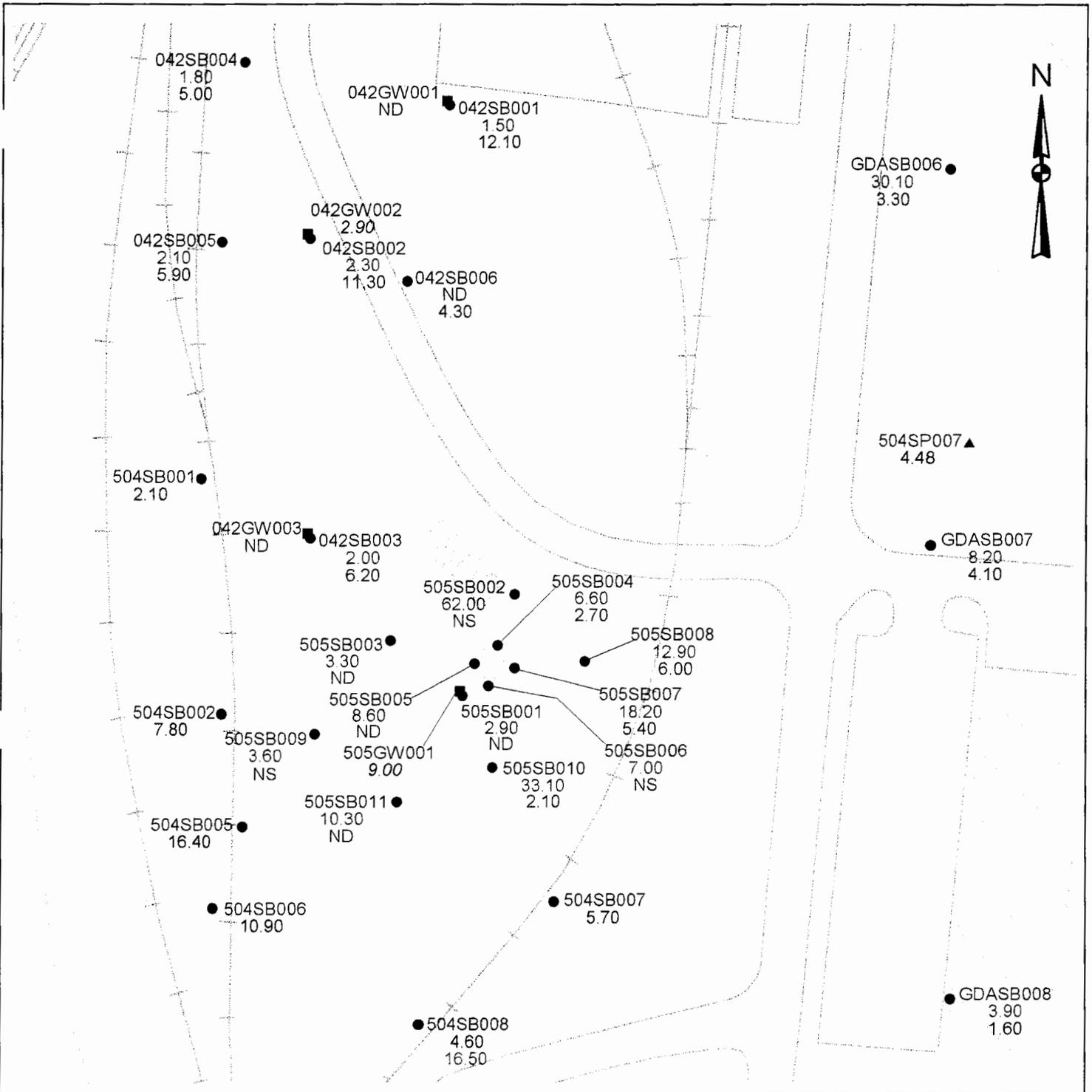
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (mg/kg)
- 12.30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



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

FIGURE 10.1.22  
ZONE L - SUBZONE A  
ARSENIC  
ZONE L EXCEEDANCES WITH ZONE A  
SOIL AND GW CONCENTRATIONS

RBC = 0.43 mg/kg SSL = 15.0 mg/kg MCL = 50.0 ug/L



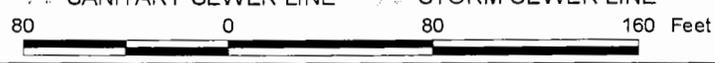
**LEGEND**

- ▲ 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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- SANITARY SEWER LINE
- STORM SEWER LINE

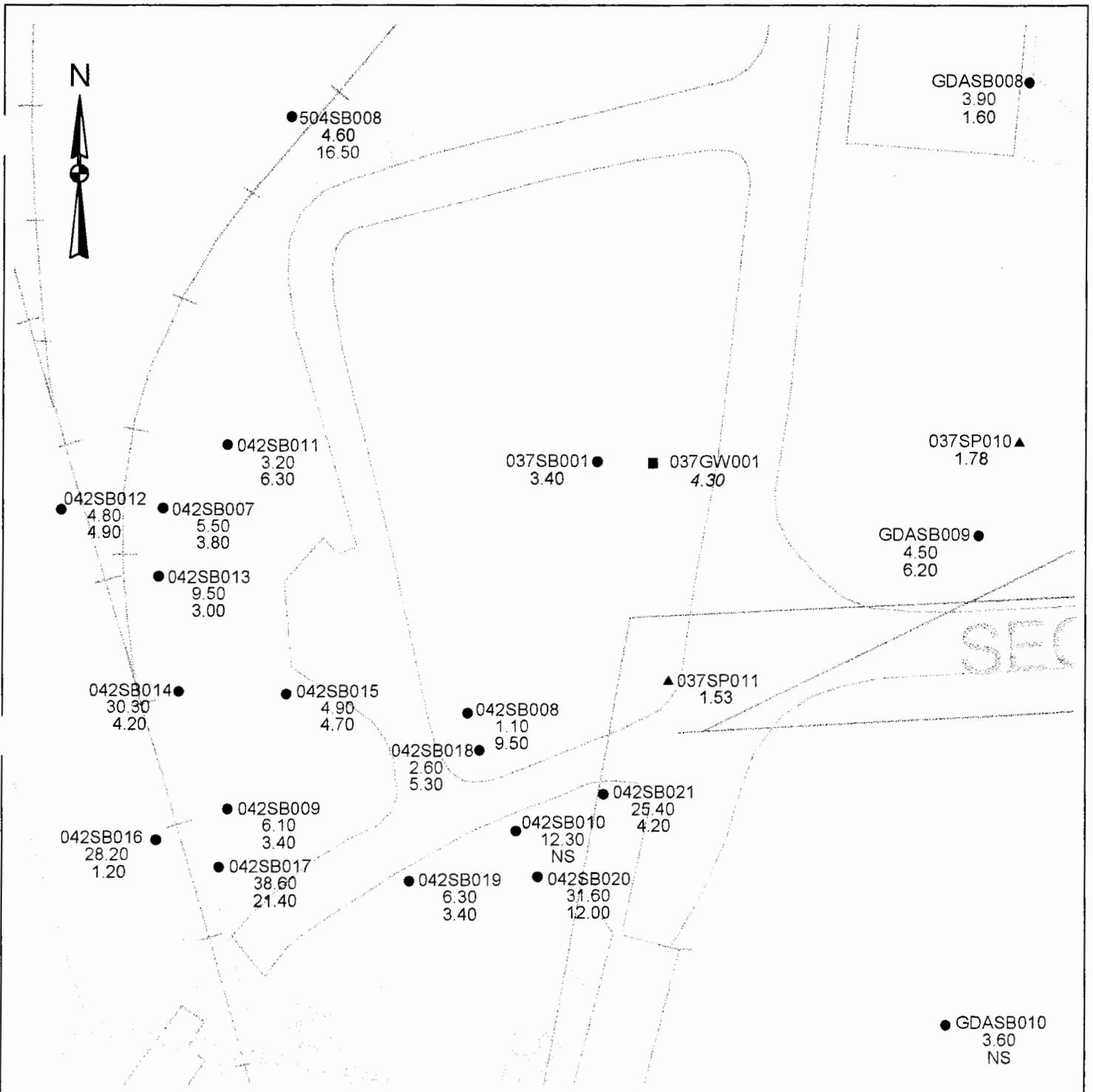


ZONE L - RCRA  
FACILITY INVESTIGATION  
NAVAL BASE CHARLESTON  
CHARLESTON, SC

FIGURE 10.1.23  
ZONE L - SUBZONE A  
ARSENIC  
ZONE L EXCEEDANCES WITH ZONE A  
SOIL AND GW CONCENTRATIONS



RBC = 0.43 mg/kg SSL = 15.0 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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

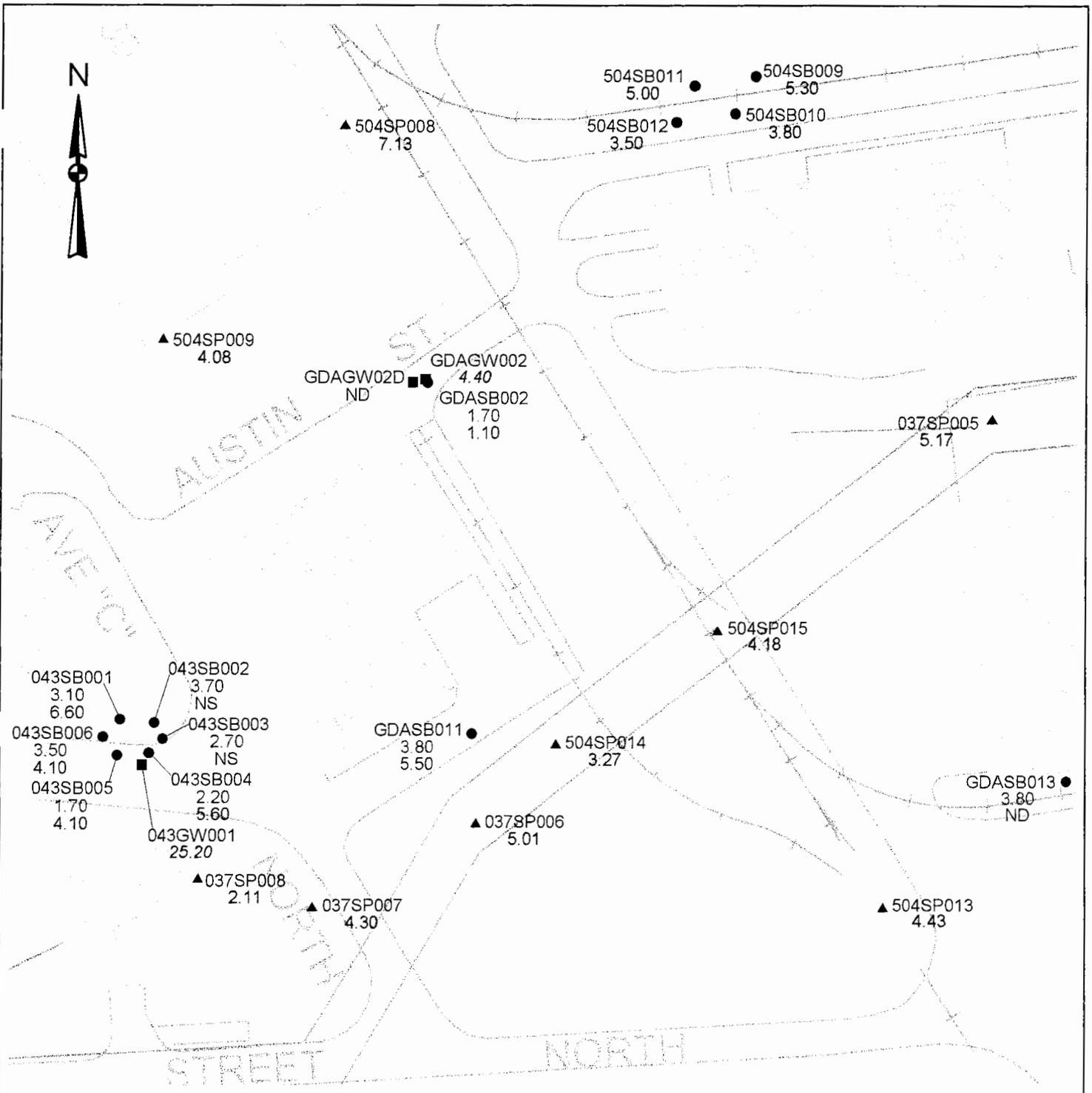
- SUBZONE BOUNDARY
  - RAILROAD
  - SANITARY SEWER LINE
  - STORM SEWER LINE
- 50 0 50 100 Feet



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

FIGURE 10.1.24  
ZONE L - SUBZONE A  
ARSENIC  
ZONE L EXCEEDANCES WITH ZONE A  
SOIL AND GW CONCENTRATIONS

RBC = 0.43 mg/kg SSL = 15.0 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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

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

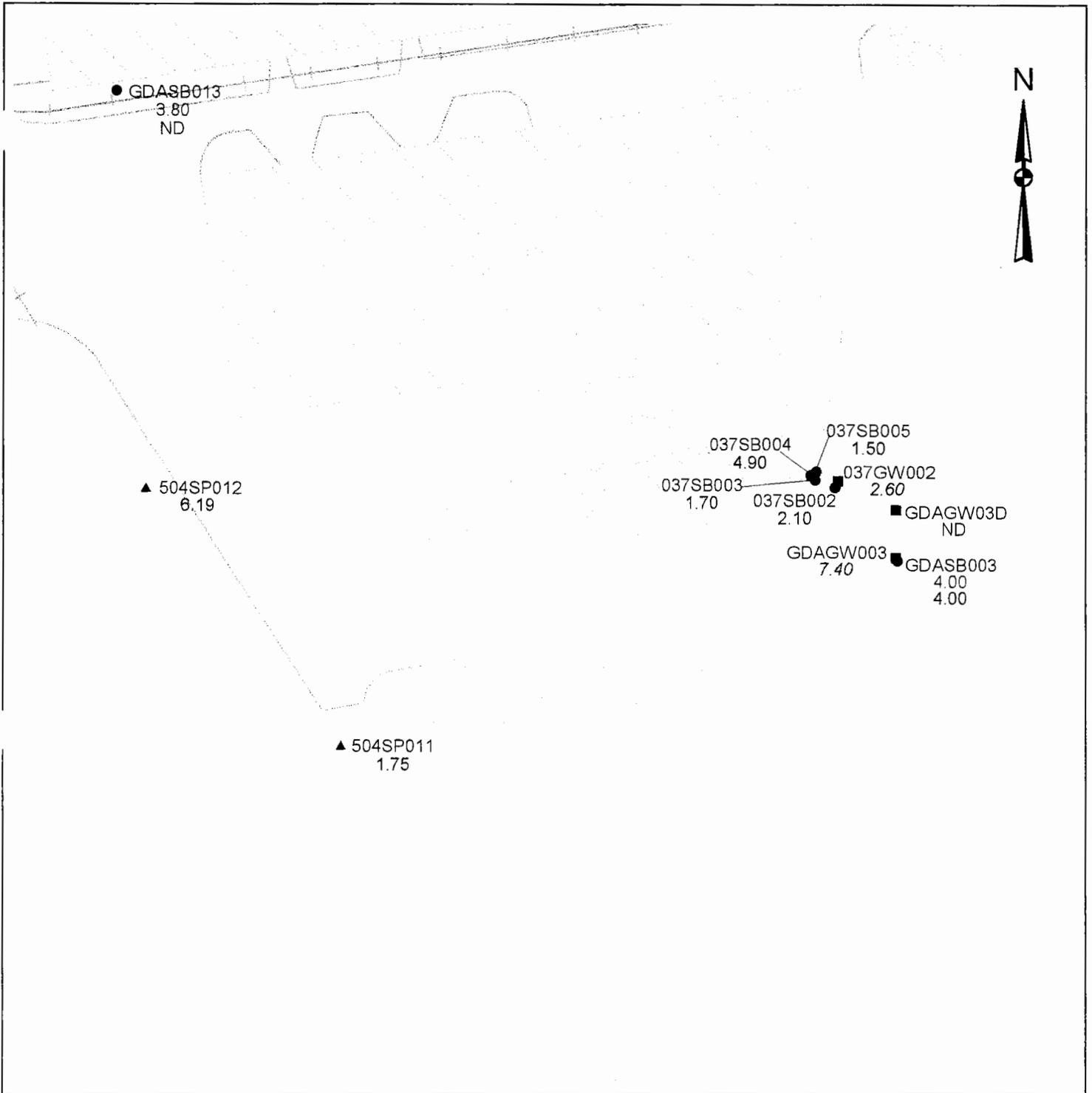
90 0 90 180 Feet



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

FIGURE 10.1.25  
ZONE L - SUBZONE A  
ARSENIC  
ZONE L EXCEEDANCES WITH ZONE A  
SOIL AND GW CONCENTRATIONS

RBC = 0.43 mg/kg SSL = 15.0 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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

SUBZONE BOUNDARY      RAILROAD  
 SANITARY SEWER LINE      STORM SEWER LINE

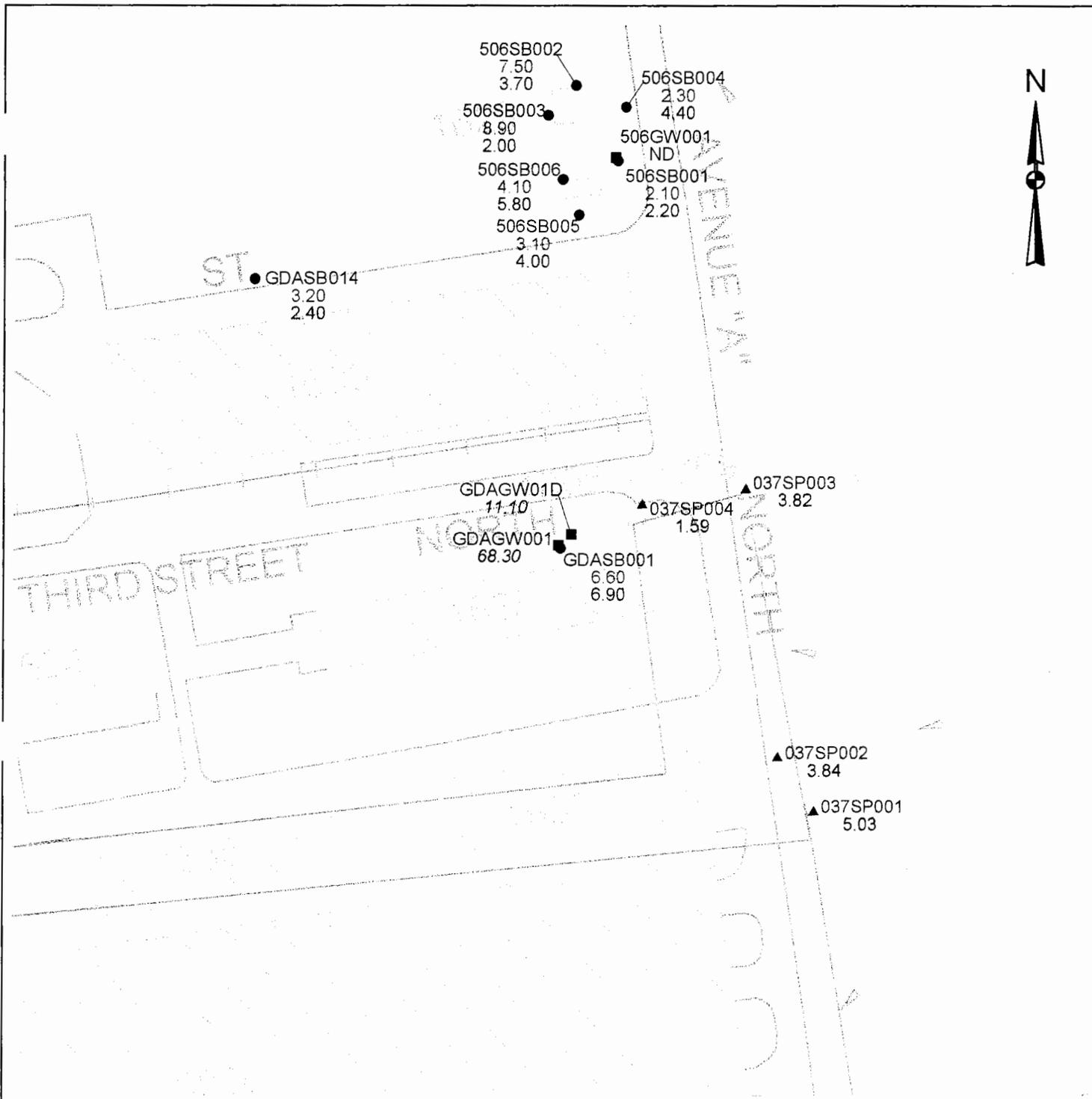
100      0      100      200 Feet



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

FIGURE 10.1.26  
 ZONE L - SUBZONE A  
 ARSENIC  
 ZONE L EXCEEDANCES WITH ZONE A  
 SOIL AND GW CONCENTRATIONS

RBC = 0.43 mg/kg    SSL = 15.0 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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- SANITARY SEWER LINE
- STORM SEWER LINE

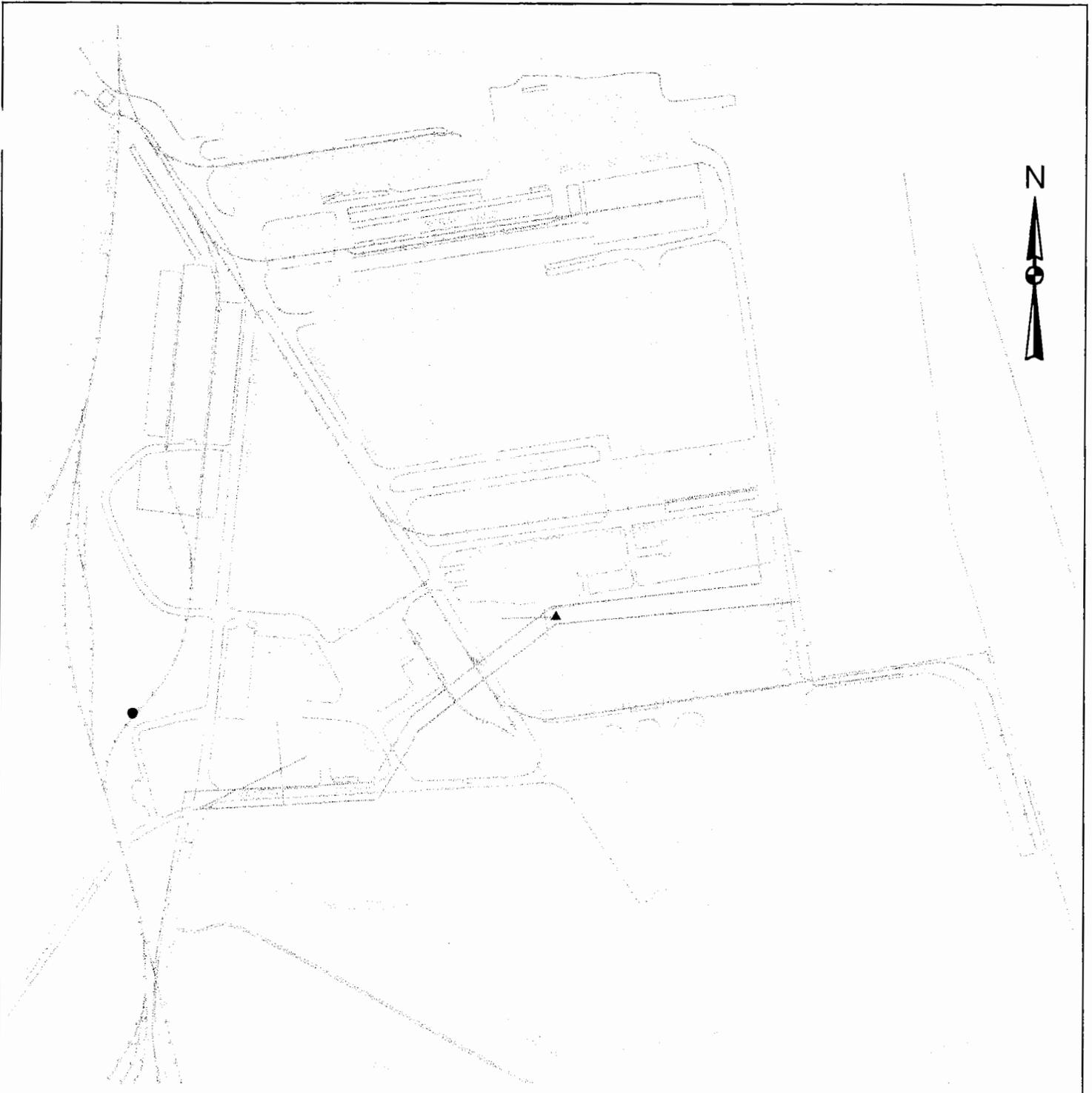


ZONE L - RCRA  
FACILITY INVESTIGATION  
NAVAL BASE CHARLESTON  
CHARLESTON, SC

FIGURE 10.1.27  
ZONE L - SUBZONE A  
ARSENIC  
ZONE L EXCEEDANCES WITH ZONE A  
SOIL AND GW CONCENTRATIONS

90 0 90 180 Feet

RBC = 0.43 mg/kg SSL = 15.0 mg/kg MCL = 50.0 ug/L



**LEGEND**

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

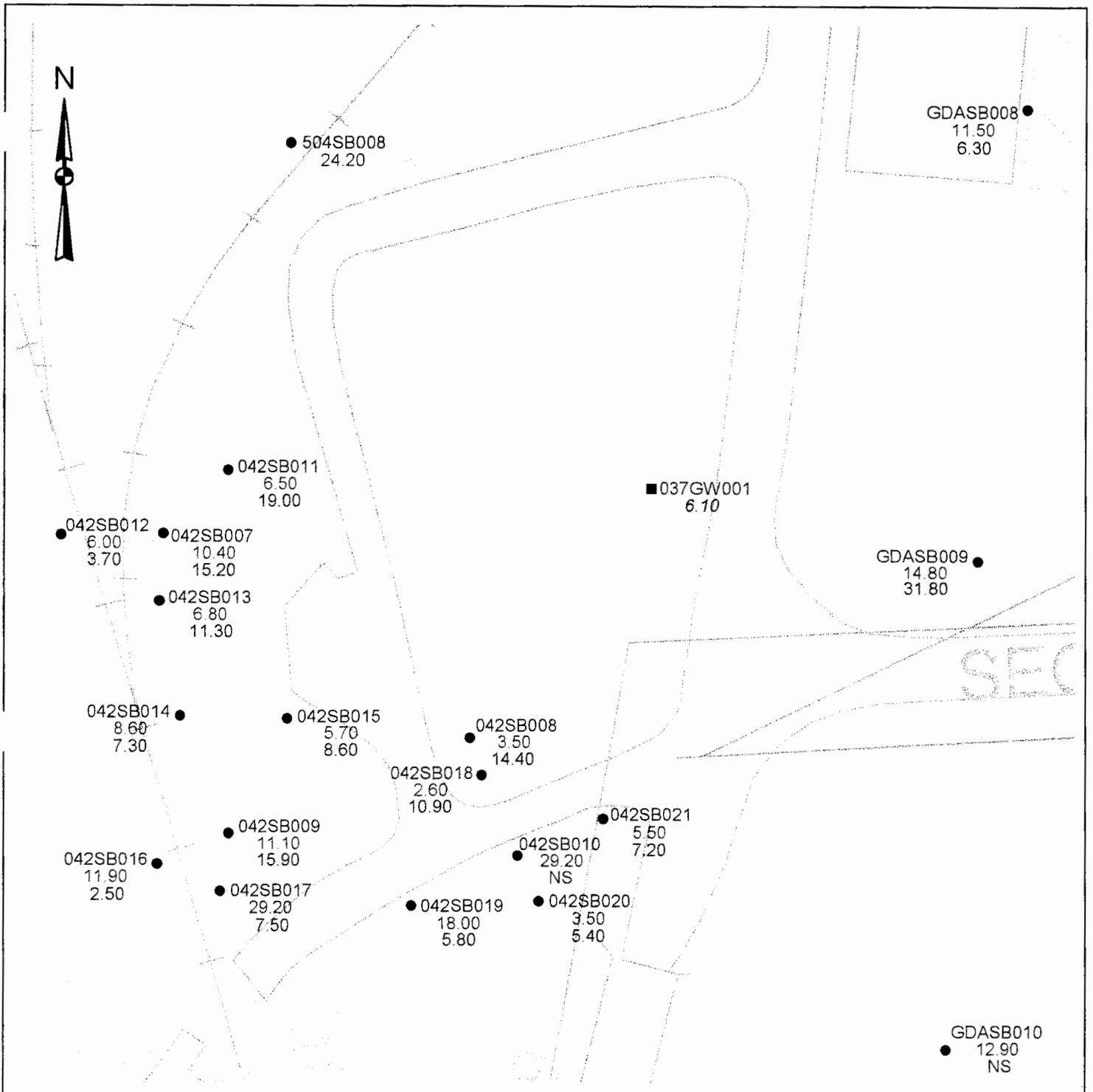
SUBZONE BOUNDARY      RAILROAD  
 SANITARY SEWER LINE      STORM SEWER LINE  
 300                      0                      300                      600 Feet



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

FIGURE 10.1.28  
 ZONE L - SUBZONE A  
 CHROMIUM  
 ZONE L EXCEEDANCES

RBC = 39.0 mg/kg    SSL = 19.0 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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

SUBZONE BOUNDARY    RAILROAD  
 SANITARY SEWER LINE    STORM SEWER LINE

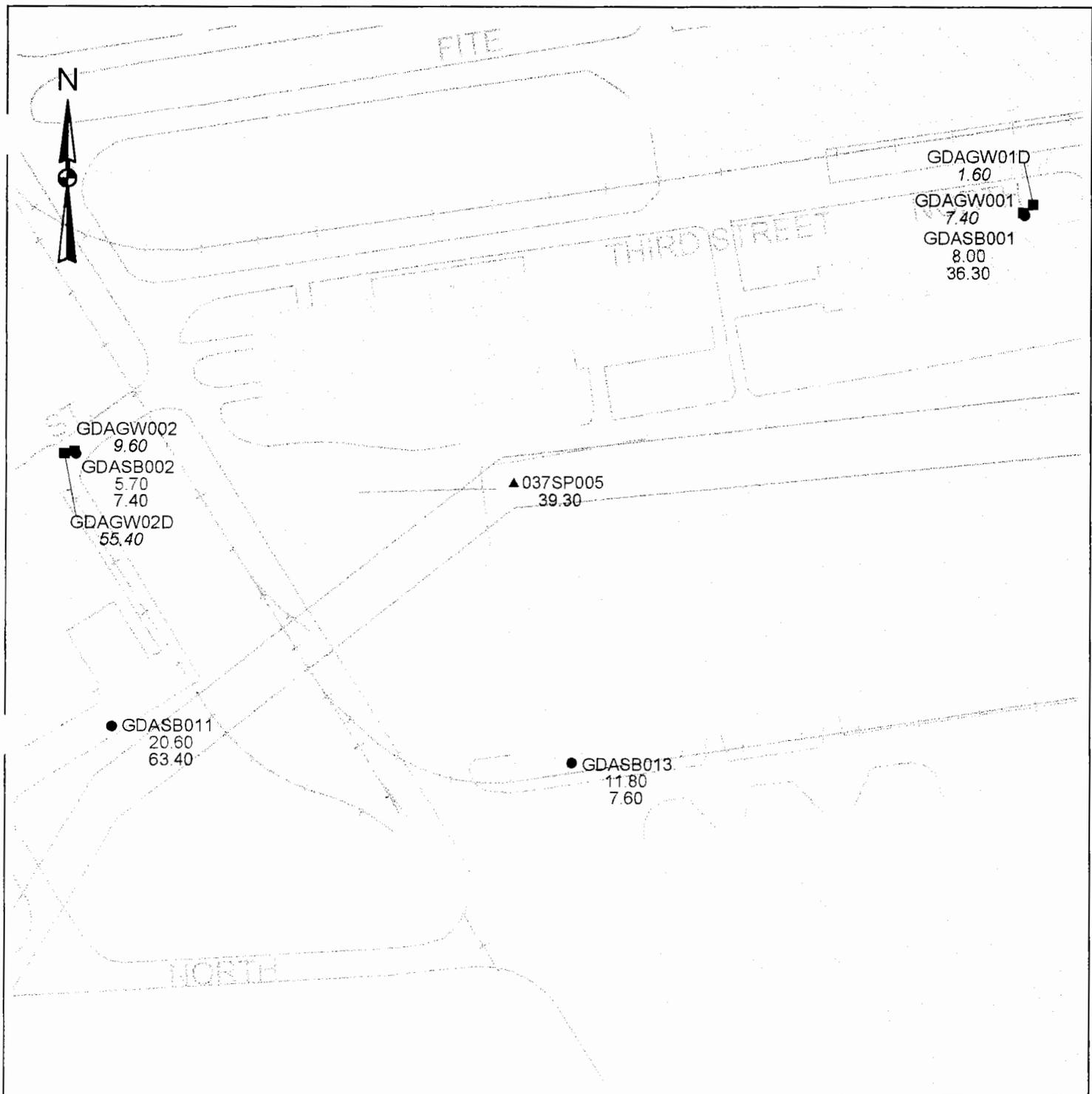
50      0      50      100 Feet



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

FIGURE 10.1.29  
 ZONE L - SUBZONE A  
 CHROMIUM  
 ZONE L EXCEEDANCES WITH ZONE A  
 SOIL AND GW CONCENTRATIONS

RBC = 39.0 mg/kg    SSL = 19.0 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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

SUBZONE BOUNDARY      RAILROAD  
 SANITARY SEWER LINE      STORM SEWER LINE

100      0      100      200 Feet

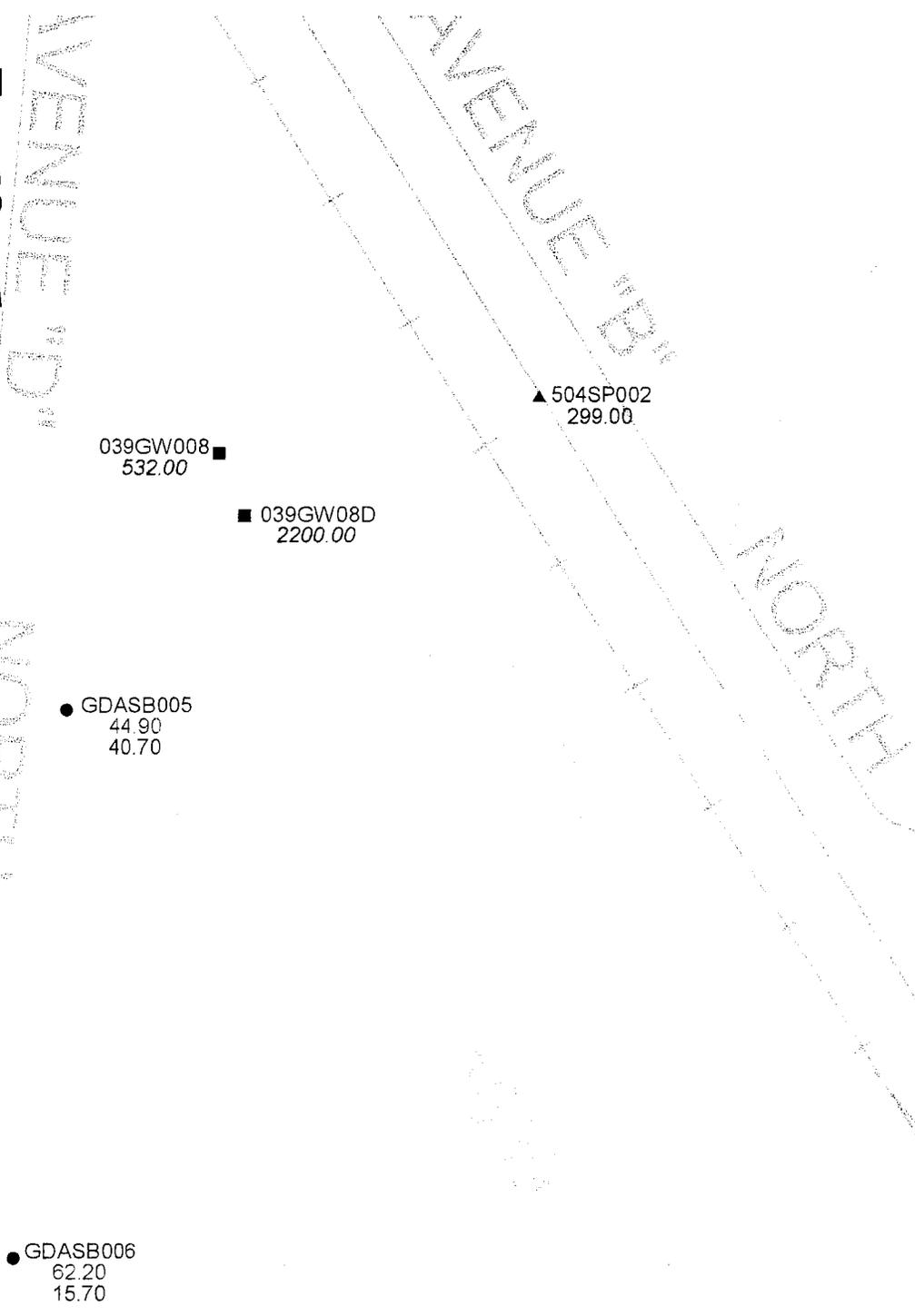


ZONE L - RCRA  
 FACILITY INVESTIGATION  
 NAVAL BASE CHARLESTON  
 CHARLESTON, SC

FIGURE 10.1.30  
 ZONE L - SUBZONE A  
 CHROMIUM  
 ZONE L EXCEEDANCES WITH ZONE A  
 SOIL AND GW CONCENTRATIONS

RBC = 39.0 mg/kg    SSL = 19.0 mg/kg    MCL = 100 ug/L

002M0005●  
172.00  
NS



**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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

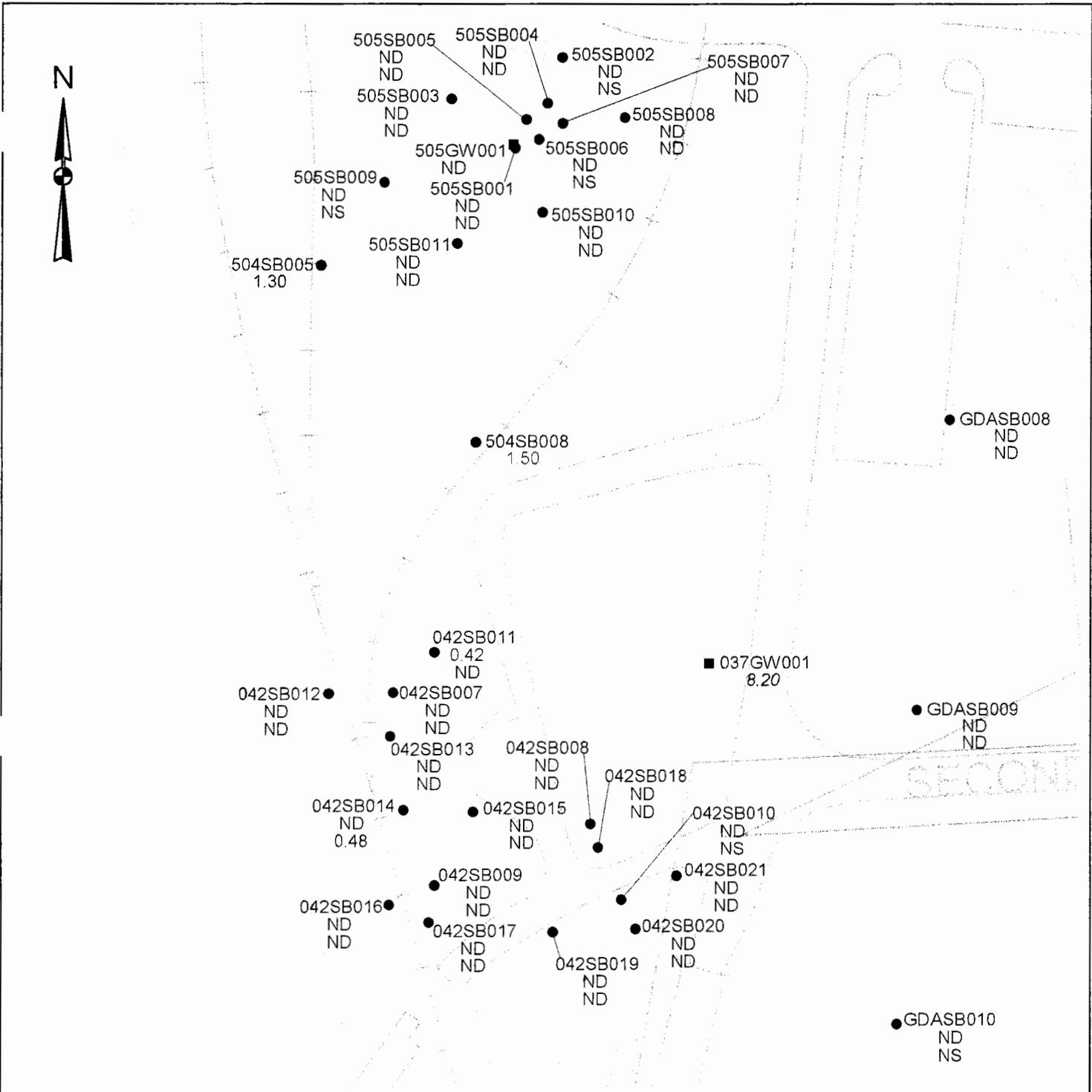
- SUBZONE BOUNDARY
- RAILROAD
- SANITARY SEWER LINE
- STORM SEWER LINE



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

FIGURE 10.1.31  
ZONE L - SUBZONE A  
MANGANESE  
ZONE L EXCEEDANCES WITH ZONE A  
SOIL AND GW CONCENTRATIONS

RBC = 160 mg/kg SSL = 480 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 A SOIL BORING LOCATION
- 12.30 ZONE A SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE A SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

SUBZONE BOUNDARY      RAILROAD  
 SANITARY SEWER LINE      STORM SEWER LINE

70      0      70      140 Feet



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

FIGURE 10.1.32  
 ZONE L - SUBZONE A  
 THALLIUM  
 ZONE L EXCEEDANCES WITH ZONE A  
 SOIL AND GW CONCENTRATIONS

RBC = 0.55 mg/kg    SSL = 0.36 mg/kg    MCL = 2.00 ug/L

**10.2 SUBZONE B**

The Subzone B boundaries for the Zone L RFI are the existing areas investigated in the Zone B RFI report. Data from Zone B environmental samples have been compared to data from the Zone L investigation. Existing sample locations for Zone B are presented in Figures 10.2.1 and 10.2.2.

**10.2.1 SWMU 37, Subzone B**

Sampling in Subzone B, SWMU 37, consisted of nine DPT soil samples and 10 DPT groundwater samples, which were analyzed for VOCs, metals and cyanide. These sample locations are presented in Figures 10.2.3 through 10.2.5. No soil boring or groundwater monitoring well samples were taken for SWMU 37, Subzone B.

**10.2.1.1 Nature of Contamination in Subzone B, SWMU 37, DPT Soil Samples**

VOC analytical results for the nine soil samples obtained by DPT collection are summarized in Table 10.2.1 and inorganic analytical results are summarized in Table 10.2.2, Appendix C contains a complete data report for all samples collected in Zone L.

**Volatile Organic Compounds Detected in DPT Soil**

Acetone (6/9), 2-butanone (MEK) (4/9), and carbon disulfide (2/9) were detected in the DPT samples, although none exceeded their RBC values.

**Metals/Cyanide Detected in DPT Soil**

As indicated in Table 10.2.2, antimony (1/9), arsenic (9/9), iron (9/9) and mercury (1/9) were found at levels above their RBC values. Table 10.2.3 summarizes the sample locations of RBC and SSL exceedances.

### 10.2.3.1 Nature of Contamination in Subzone B, AOC 504, DPT Soil

Fourteen DPT soil samples were collected and analyzed for VOCs, metals and cyanide. Analytical results are presented in Table 10.2.6. No concentrations were found above RBC values for VOCs or cyanide.

#### Metals/Cyanide Detected in DPT Soil

Table 10.2.6 summarizes the concentrations of aluminum (3/14), arsenic (13/14), iron (13/14), lead (1/14), manganese (1/14), and thallium (2/14) that exceeded their RBC values. Locations of these samples are summarized in Table 10.2.7. This table also lists samples that have SSL exceedances for arsenic, lead, and thallium.

**Table 10.2.6**  
**AOC 504, Zone L, Subzone B**  
**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
<b>Inorganic Elements (mg/kg)</b>								
Aluminum (Al)	14/14	1530-13900	5232	7800	15500	3	1000000 c	NO
Antimony (Sb)	1/14	1.95	1.95	3.10	ND	0	5	NO
Arsenic (As)	13/14	1.67-95.5	34.4	0.430	17.1	13	29	YES
Barium (Ba)	14/14	8.69-361	44.8	550	98.7	0	1600	NO
Beryllium (Be)	11/14	0.250-0.710	0.441	16.0	1.23	0	63	NO
Calcium (Ca)	14/14	388-45700	11831	NA	NA	NA	NA	NO
Chromium (Cr)	14/14	3.45-36.1	12.9	39.0	75.7	0	19	YES
Cobalt (Co)	10/14	0.860-3.22	1.95	470	21.9	0	2000 c	NO
Copper (Cu)	14/14	3.10-146	28.9	310	225	0	11200 c	NO
Iron (Fe)	14/14	1970-26100	8360	2300	NA	13	NA	NO
Lead (Pb)	14/14	8.34-1740	159	400	114	1	400	YES
Magnesium (Mg)	14/14	182-2840	909	NA	NA	NA	NA	NO
Manganese (Mn)	14/14	26.5-196	84.9	160	464	1	950 c	NO

**Table 10.2.6**  
**AOC 504, Zone L, Subzone B**  
**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
Mercury (Hg)	14/14	0.040-0.260	0.112	NA	1.55	NA	2	NO
Nickel (Ni)	14/14	1.02-12.6	5.62	160	43.6	0	130	NO
Potassium (K)	14/14	114-922	355	NA	NA	NA	NA	NO
Selenium (Se)	7/14	0.590-1.18	0.877	39.0	2.8	0	5	NO
Sodium (Na)	14/14	199-1060	415	NA	NA	NA	NA	NO
Thallium (Tl)	2/14	1.59-2.36	1.98	0.55	ND	2	0.7	YES
Tin (Sn)	2/14	15.3-41.7	28.5	4700	14.8	0	11000 c	NO
Vanadium (V)	14/14	4.83-27.9	12.0	55.0	52.6	0	6000	NO
Zinc (Zn)	14/14	15.5-610	103.9	2300	366	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 B RFI Report

**Table 10.2.7**  
**AOC 504, Zone L, Subzone B**  
**DPT Soil Sample Locations**  
**with Metals Detections Exceeding RBCs and/or SSLs**

Analyte	Sample ID	Concentration Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)			
Aluminum	504SP008E1	13,900	Y	N	7,800	100,000			
	504SP009E1	9,400	Y	N					
	504SP010E1	10,200	Y	N					
Arsenic	504SP001E1	4.57	Y	N	0.430	29			
	504SP002E1	2.10	Y	N					
	504SP003E1	3.46	Y	N					
	504SP004E1	7.78	Y	N					
	504SP005E1	3.80	Y	N					
	504SP007E1	1.67	Y	N					
	504SP008E1	95.5	Y	Y					
	504SP009E1	85.9	Y	Y					
	504SP010E1	84.9	Y	Y					
	504SP011E1	24.5	Y	Y					
	504SP012E1	31.7	Y	Y					
	504SP013E1	88.8	Y	Y					
	504SP014E1	12.8	Y	Y					
	Beryllium	504SP003E1	0.27	Y			N	0.150	63
504SP004E1		0.40	Y	N					
504SP005E1		0.31	Y	N					
504SP007E1		0.25	Y	N					
504SP008E1		0.71	Y	N					
504SP009E1		0.62	Y	N					
504SP010E1		0.70	Y	N					
504SP011E1		0.41	Y	N					
504SP012E1		0.34	Y	N					
504SP013E1		0.50	Y	N					
504SP014E1		0.34	Y	N					
Iron		504SP001E1	3200	Y	N/A	2300	NA		
		504SP002E1	3750	Y	N//A				
		504SP003E1	3390	Y	N/A				
	504SP004E1	26100	Y	N/A					
	504SP005E1	9000	Y	N/A					
	504SP007E1	2760	Y	N/A					
	504SP008E1	11300	Y	N//A					
	504SP009E1	8730	Y	N/A					
	504SP010E1	11600	Y	N/A					
	504SP011E1	5970	Y	N/A					
	504SP012E1	3730	Y	N/A					
	504SP013E1	5250	Y	N/A					
	504SP014E1	20300	Y	N/A					
	Lead	504SP004E1	1740	Y	Y			400.	400
Manganese	504SP009E1	196	Y	N	180.	950			

**Table 10.2.7**  
**AOC 504, Zone L, Subzone B**  
**DPT Soil Sample Locations**  
**with Metals Detections Exceeding RBCs and/or SSLs**

Analyte	Sample ID	Concentration Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Thallium	504SP004E1	2.36	Y	Y	0.29	0.7
	504SP014E1	1.59	Y	Y		

*Notes:*  
 mg/kg = Milligrams per kilogram  
 RBC = Risk-based concentration  
 SSL = Soil Screening Level  
 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 the Zone B RFI Report.

**10.2.3.2 Nature of Contamination in Subzone B, AOC 504, Soil Boring Samples** 1

Thirteen soil boring samples (seven upper interval and six lower interval) were collected and submitted for VOCs, SVOCs, metals, cyanide, chlorinated pesticides, and PCB analyses. Results are summarized in Table 10.2.8 (organics) and Table 10.2.9 (inorganics). 2  
3  
4

**Volatile Organic Compounds Detected in Soil Borings** 5  
6

Acetone was detected in only one of the six lower interval samples. No other organic compounds were detected. 7  
8

**Semivolatile Organic Compounds Detected in Soil Borings** 9  
10

Concentrations of benzo(a)anthracene (2/7), benzo(a)pyrene (3/7), benzo(b)fluoranthene (2/7), dibenzo(a,h)anthracene (3/7), indeno(1,2,3-cd)pyrene (2/7) exceeded their RBC values for upper interval soil. There were no exceedances of SSL values. 11  
12  
13

**Table 10.2.8**  
**AOC 504, Zone L, Subzone B**  
**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
<b>Volatile Organic Compounds (<math>\mu\text{g}/\text{kg}</math>)</b>								
Acetone	Lower	1/6	10.0	10.0	NA	NA	16000	NO
<b>Semivolatile Compounds (<math>\mu\text{g}/\text{kg}</math>)</b>								
2-Methylnaphthalene	Upper	1/7	46.0	46.0	310000	0	460000 c	NO
Acenaphthylene	Upper	3/7	78-510	239	310000	0	190000 c	NO
Anthracene	Upper	4/7	74-370	189	23000000	0	12000000	NO
B(a)P Equiv.	Upper	6/7	4.50-5004	1603	88	3	3200 c	YES
	Lower	1/6	163	163	NA	NA		
Benzo(a)anthracene	Upper	5/7	38.0-2300	823.2	880	2	2000	YES
	Lower	1/6	110	110	NA	NA		
Benzo(a)pyrene	Upper	5/7	42.0-3300	1272.6	88	3	8000	NO
	Lower	1/6	130	130	NA	NA		
Benzo(b)fluoranthene	Upper	6/7	45.0-3800	1238.5	880	2	5000	NO
	Lower	1/6	150	150	NA	NA		
Benzo(g,h,i)perylene	Upper	4/7	42.0-1900	935.5	310000	0	23000000 c	NO
	Lower	1/6	60.0	60.0	NA	NA		
Benzo(k)fluoranthene	Upper	4/7	67.0-3100	1319.3	8800	0	49000	NO
	Lower	1/6	140	140	NA	NA		
Butylbenzylphthalate	Upper	1/7	41.0	41.0	1600000	0	930000	NO
	Lower	1/6	44.0	44.0	NA	NA		
Chrysene	Upper	5/7	49.0-2800	1073.8	88000	0	160000	NO
	Lower	1/6	110	110	NA	NA		
Dibenz(a,h)anthracene	Upper	3/7	160-880	566.7	88	3	2000	NO
Di-n-butylphthalate	Lower	1/6	61.0	61.0	NA	NA	2300000	NO
Fluoranthene	Upper	5/7	39.0-2400	977.8	310000	0	4300000	NO
	Lower	2/6	84.0-95.0	89.5	NA	NA		

**Table 10.2.8**  
**AOC 504, Zone L, Subzone B**  
**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
Indeno(1,2,3-cd)pyrene	Upper	4/7	38.0-1800	849.5	880	2	14000	NO
	Lower	1/6	54.0	54.0	NA	NA		
Naphthalene	Upper	1/7	61.0	61.0	310000	0	84000	NO
Phenanthrene	Upper	4/7	55.0-570	353.8	310000	0	130000 c	NO
Pyrene	Upper	5/7	41.0-3300	1078.6	230000	0	4200000	NO
	Lower	2/6	57.0-110	83.5	NA	NA		
<b>Chlorinated Pesticides (µg/kg)</b>								
4,4'-DDE	Upper	1/7	11.0	11.0	1900	0	16000	NO
4,4'-DDT	Upper	3/7	8.30-410	160.4	1900	0	32000	NO
Endosulfan sulfate	Upper	1/7	10.0	10.0	47000	0	9300 c	NO
Endrin	Upper	2/7	28.0-170	99.0	2300	0	1000	NO
Endrin aldehyde	Upper	2/7	18.0-94.0	56.0	2300	0	1000	NO
	Lower	1/6	3.20	3.20	NA	NA		
Endrin ketone	Upper	2/7	6.10-19.0	25.1	2300	0	1000	NO
Heptachlor epoxide	Upper	2/7	1.90-4.00	2.95	70	0	700	NO
alpha-Chlordane	Upper	2/7	16.0-89.0	52.5	490	0	10000	NO
<b>Polychlorinated biphenyls (µg/kg)</b>								
Aroclor-1254	Upper	2/7	460-2100	1280	320	2	1000	YES

**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 B RFI Report

**Table 10.2.9**  
**AOC 504, Zone L, Subzone B**  
**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
<b>Inorganic Elements (mg/kg)</b>									
Cyanide (CN)	Upper	3/7	0.120-0.220	0.160	160	ND	0	40	NO
	Lower	3/6	0.160-2.10	0.957	NA	ND	NA		
Aluminum (Al)	Upper	7/7	926-7170	3929	7800	15500	0	1000000 <sup>c</sup>	NO
	Lower	6/6	319-8580	3756	NA	17700	NA		
Antimony (Sb)	Upper	3/7	1.20-3.00	1.87	3.10	ND	0	5	NO
	Lower	2/6	0.630-0.740	0.685	NA	ND	NA		
Arsenic (As)	Upper	7/7	23.7-98.2	50.4	0.430	17.1	7	29	YES
	Lower	5/6	1.70-22.2	9.36	NA	10.8	NA		
Barium (Ba)	Upper	7/7	4.70-98.9	34.2	550	98.7	0	1600	NO
	Lower	6/6	2.90-37.1	13.2	NA	65.0	NA		
Beryllium (Be)	Upper	5/7	0.210-0.660	0.504	16.0	1.23	0	63	NO
	Lower	4/6	0.090-0.600	0.365	NA	1.61	NA		
Cadmium (Cd)	Upper	5/7	0.130-0.480	0.314	7.80	ND	0	8	NO
	Lower	2/6	0.510-0.740	0.625	NA	ND	NA		
Calcium (Ca)	Upper	7/7	1680-161000	54197	NA	NA	NA	NA	NO
	Lower	6/6	1160-256000	84272	NA	NA	NA		
Chromium (Cr)	Upper	7/7	3.60-34.7	14.6	39	75.7	0	38	YES
	Lower	6/6	1.20-62.3	23.3	NA	48.1	NA		
Cobalt (Co)	Upper	4/7	1.20-3.10	2.48	470	21.9	0	2000 <sup>c</sup>	NO
	Lower	2/6	1.05-1.30	1.18	NA	10.6	NA		
Copper (Cu)	Upper	7/7	1.40-49.9	20.5	310	225	0	11200 <sup>c</sup>	NO
	Lower	6/6	0.710-17.1	6.62	NA	47.0	NA		
Iron (Fe)	Upper	7/7	1330-10500	5800	2300	NA	5	NA	NO
	Lower	6/6	421-8980	4674	NA	NA	NA		
Lead (Pb)	Upper	7/7	2.10-377	96.9	400	114	0	400	NO
	Lower	5/6	3.05-22.6	9.71	NA	145	NA		

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 Section 10: Site-Specific Evaluations  
 Revision: 0

**Table 10.2.9**  
**AOC 504, Zone L, Subzone B**  
**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
Magnesium (Mg)	Upper	7/7	209-3040	1270	NA	NA	NA	NA	NO
	Lower	5/6	69.0-19500	5511	NA	NA	NA		
Manganese (Mn)	Upper	7/7	12.9-138	63.9	160	464	0	950 c	NO
	Lower	6/6	3.70-87.7	41.7	NA	288	NA		
Mercury (Hg)	Upper	5/7	0.060-2.70	1.08	NA	1.55	NA	2	YES
	Lower	1/6	0.070	0.070	NA	2.00	NA		
Nickel (Ni)	Upper	7/7	1.50-12.1	7.33	160	43.6	0	130	NO
	Lower	5/6	0.460-30.7	13.0	NA	29.9	NA		
Potassium (K)	Upper	7/7	78.4-660	358.6	NA	NA	NA	NA	NO
	Lower	5/6	30.5-1415	608.1	NA	NA	NA		
Selenium (Se)	Upper	1/7	0.640	0.640	39.0	2.80	0	5	NO
	Lower	3/6	0.340-3.80	1.88	NA	3.80	NA		
Sodium (Na)	Upper	4/7	349-1110	717	NA	NA	NA	NA	NO
	Lower	4/6	168-1380	772	NA	NA	NA		
Thallium (Tl)	Upper	1/7	0.860	0.860	0.55	ND	1	0.7	YES
Tin (Sn)	Upper	7/7	0.810-8.80	3.24	4700	14.8	0	11000 c	NO
	Lower	6/6	0.700-1.90	1.23	NA	1.30	NA		
Vanadium (V)	Upper	7/7	2.70-19.6	12.1	55	52.6	0	6000	NO
	Lower	6/6	0.810-35.9	16.2	NA	102	NA		
Zinc (Zn)	Upper	5/7	33.2-203	110.8	2300	366	0	12000	NO
	Lower	5/6	6.00-58.9	31.7	NA	238	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 B RFI Report

**Chlorinated Pesticides Detected in Soil Borings**

As shown in Table 10.2.8, none of the chlorinated pesticides were detected at concentrations above their RBC and SSL values.

**Polychlorinated Biphenyls Detected in Soil Borings**

Aroclor-1254 was detected in two of the seven upper interval soil samples at a concentration above its RBC value. The concentrations did not exceed SSL values. No other PCBs were detected.

**Metals/Cyanide Detected in Soil Borings**

As summarized in Table 10.2.10, arsenic (7/7), chromium (2/7), iron (7/7), and thallium (1/7) exceeded their RBC values for upper interval soil. In the lower interval, chromium (2/6) exceeded its SSL.

Sample locations with detected concentrations of analytes that exceed either RBC, SSL, or MCL values are shown in Figures 10.2.9 through 10.2.24.

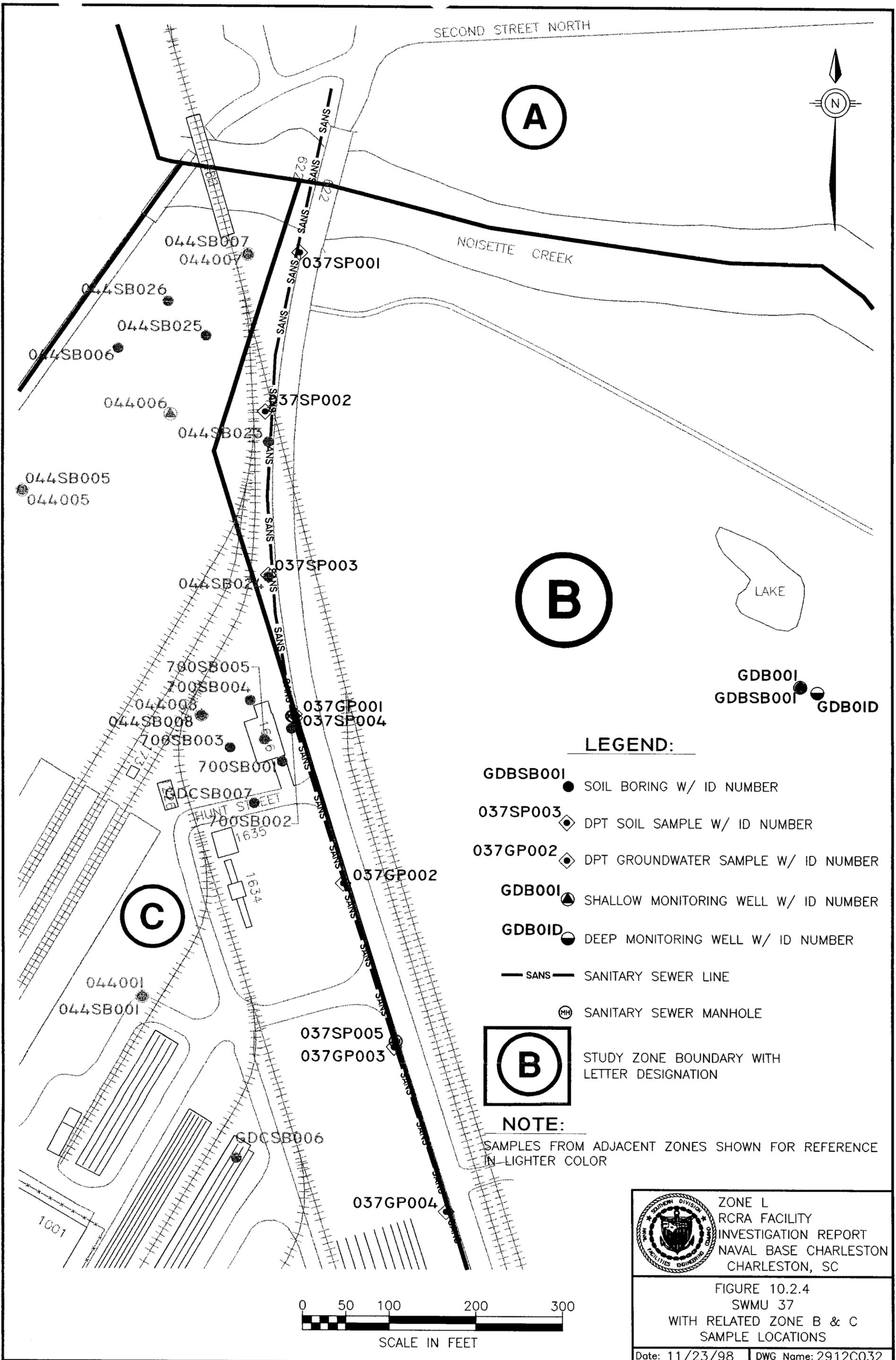
**Table 10.2.10**  
**AOC 504, Subzone B DPT Soil Sample Locations**  
**with Metals Detections which Exceed RBCs and/or SSLs**

Analyte	Sample ID	Concentration Detected (mg/kg)	RBC Exceeded (Y/N)	SSL Exceeded (Y/N)	RBC (mg/kg)	SSL (mg/kg)
Arsenic	504SB002B1	30.30	Y	N	0.43	29
	504SB003B1	98.20	Y	N		
	504SB004B1	23.70	Y	N		
	504SB005B1	56.40	Y	N		
	504SB006B1	65.20	Y	N		
	504SB007B1	27.30	Y	N		
	504SB008B1	51.40	Y	N		
Chromium	504SB005B2	62.30	N	Y	39.00	38.00
	504SB008B2	58.40	N	Y		
Iron	504SB002B1	4,370	Y	N	2300	NA
	504SB003B1	9,900	Y	N		
	504SB005B1	10,500	Y	N		
	504SB006B1	9,100	Y	N		
	504SB008B1	3,380	Y	N		
Thallium	504SB006B1	0.86	Y	N	0.55	0.70

**10.2.4 Fate and Transport Assessment for SWMU 37 and AOC 504 in Subzone B**

Section 10.2 contains short descriptions of the portions of SWMU 37 and AOC 504 within Subzone B. Environmental media sampled as part of the RFI for these sites include surface soil borings, subsurface soil borings, and shallow groundwater (monitoring well and DPT samples). Potential constituent migration pathways investigated for SWMU 37 and AOC 504 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 and AOC 504 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 10.2. The Zone B RFI Report was consulted to identify any sites within the subzone B that are associated geographically with the Zone L sample points. Analytical results from samples with overlapping sites were compared to data generated during



SECOND STREET NORTH

**A**



NOISETTE CREEK

**B**

GDB001  
GDBSB001 GDB01D

**LEGEND:**

- GDBSB001 ● SOIL BORING W/ ID NUMBER
- 037SP003 ◊ DPT SOIL SAMPLE W/ ID NUMBER
- 037GP002 ◊ DPT GROUNDWATER SAMPLE W/ ID NUMBER
- GDB001 ▲ SHALLOW MONITORING WELL W/ ID NUMBER
- GDB01D ● DEEP MONITORING WELL W/ ID NUMBER
- SANS — SANITARY SEWER LINE
- Ⓜ SANITARY SEWER MANHOLE

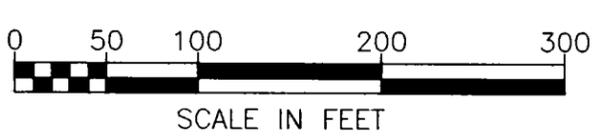
**B**

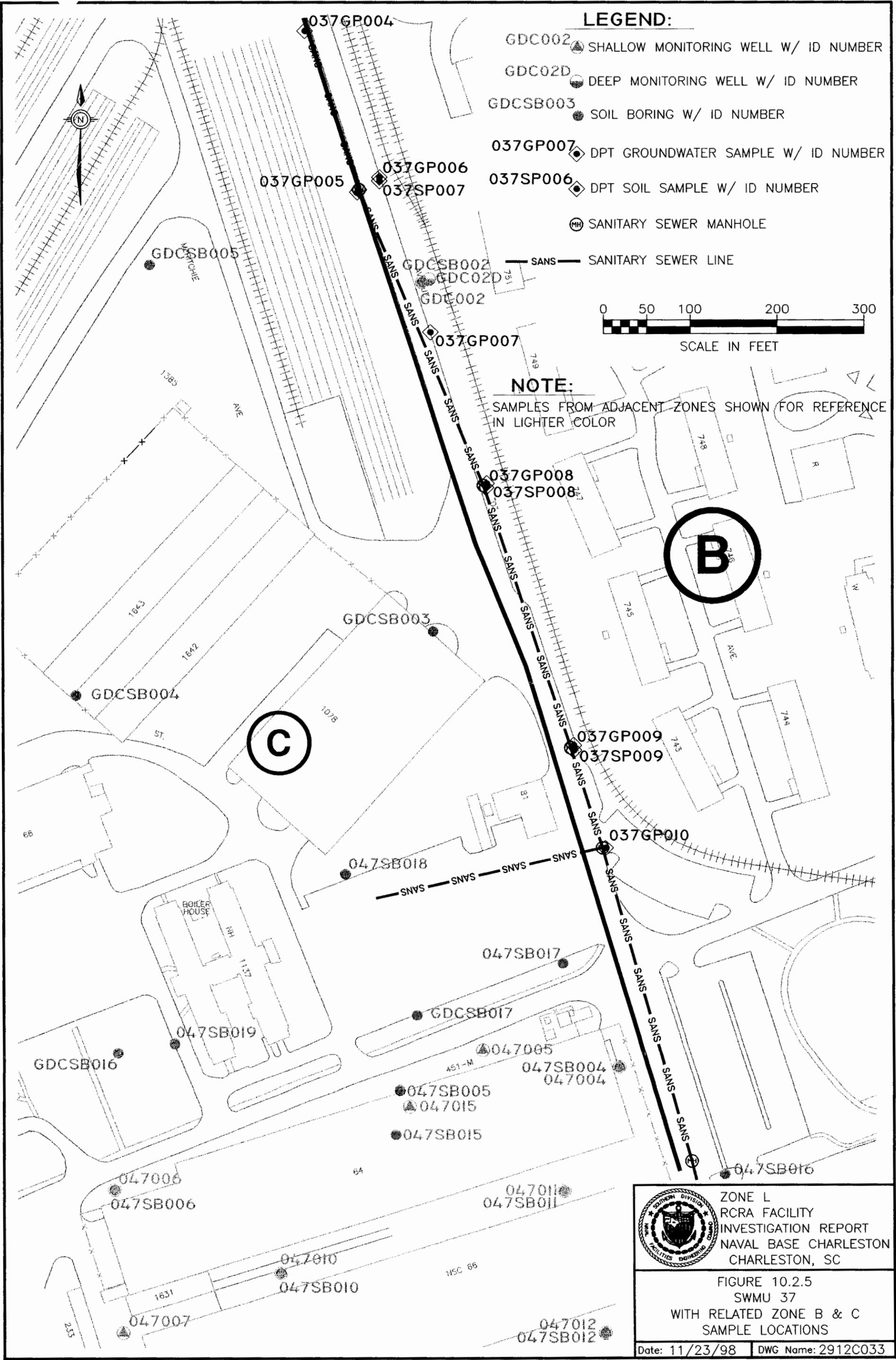
STUDY ZONE BOUNDARY WITH LETTER DESIGNATION

**NOTE:**

SAMPLES FROM ADJACENT ZONES SHOWN FOR REFERENCE IN LIGHTER COLOR

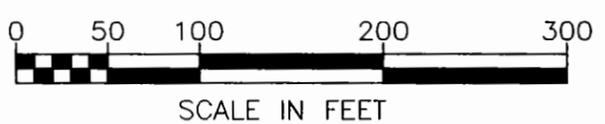
	ZONE L RCRA FACILITY INVESTIGATION REPORT NAVAL BASE CHARLESTON CHARLESTON, SC
	FIGURE 10.2.4 SWMU 37 WITH RELATED ZONE B & C SAMPLE LOCATIONS
Date: 11/23/98   DWG Name: 2912C032	





**LEGEND:**

- GDC002 SHALLOW MONITORING WELL W/ ID NUMBER
- GDC02D DEEP MONITORING WELL W/ ID NUMBER
- GDCSB003 SOIL BORING W/ ID NUMBER
- 037GP007 DPT GROUNDWATER SAMPLE W/ ID NUMBER
- 037SP006 DPT SOIL SAMPLE W/ ID NUMBER
- SANITARY SEWER MANHOLE
- SANS SANITARY SEWER LINE



**NOTE:**

SAMPLES FROM ADJACENT ZONES SHOWN FOR REFERENCE IN LIGHTER COLOR

	<p>ZONE L RCRA FACILITY INVESTIGATION REPORT NAVAL BASE CHARLESTON CHARLESTON, SC</p>
	<p>FIGURE 10.2.5 SWMU 37 WITH RELATED ZONE B &amp; C SAMPLE LOCATIONS</p>
<p>Date: 11/23/98      DWG Name: 2912C033</p>	

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

#### **10.2.4.1 Soil to Groundwater Cross-Media Transport**

##### **SWMU 37**

In Section 10.2, Tables 10.2.1 and 10.2.2 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.

Table 10.2.11 provides a summary of SWMU 37 soil samples reporting SSL exceedances, along with the names of any overlapping Zone B or Zone C sites. As presented in Table 10.2.11, there are no SWMU 37 soil constituents exceeding soil to groundwater SSLs collected from locations not associated with Zone C sites.

##### **AOC 504**

In Section 10.2, Tables 10.2.6, 10.2.8, and 10.2.9 compare maximum detected organic and inorganic constituent concentrations in soil boring and DPT soil samples from AOC 504 to SSLs considered protective of groundwater, using the conventions described above. The screening

**Table 10.2.11**  
**SMWU 37, Zone L, Subzone B**  
**Fate and Transport COPCs**

Exceedance Location	Overlapping Site	Fate and Transport COPCs	COPCs to be further Evaluated?	Reference Document
<b>DPT Soil</b>				
037SP002	Zone C SWMU 44	Mercury	Yes	Table 10.1.13*
037SB003	Zone C SWMU 44	Arsenic	No <sup>a</sup>	Table 10.1.13*

*Notes:*

\*Zone C RFI Report (EnSafe, 1997)

<sup>a</sup> Zone L concentrations are within the range of those in reference document.

comparisons in these tables identify the constituents with the potential to impact groundwater quality. Table 10.2.12 provides a summary of AOC 504 soil samples reporting SSL exceedances, along with the names of any overlapping Zone B sites. Fate and transport concerns at Zone L sample locations not associated with any overlapping Zone B 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.

Arsenic was detected in 25 of 27 total soil boring and DPT soil samples at AOC 504, with 11 exceeding arsenic's soil to groundwater SSL of 29 mg/kg. Of the eleven, ten soil samples were not associated with a Zone B site. There are no monitoring wells within 200 feet downgradient from either the soil borings or DPT sample locations from which to evaluate the soil to groundwater pathway.

Mercury was detected in 20 of 27 total soil boring and DPT soil samples at AOC 504. Of the 20, only the upper-level sample at 504SB003 (2.70 mg/kg) exceeded mercury's soil to groundwater SSL of 2.0 mg/kg. There are no monitoring wells within 200 feet downgradient from either the soil borings or DPT sample locations from which to evaluate the soil to groundwater pathway.

**Table 10.2.12**  
**AOC 504, Zone L, Subzone B**  
**Fate and Transport COPCs**

Exceedance Location	Overlapping Site	Fate and Transport COPCs	COPCs to be further Evaluated?	Reference Document
<b>Soil Borings</b>				
504SB002	None	Arsenic	Yes	None
504SB003	None	Arsenic Mercury	Yes Yes	None None
504SB005	None	Arsenic Chromium	Yes Yes	None None
504SB006	None	Aroclor-1254 BEQs Arsenic Thallium	Yes Yes Yes Yes	None None None None
504SB008	None	Arsenic Chromium	Yes Yes	None None
<b>DPT Soil</b>				
504SP004	None	Lead Thallium	Yes Yes	None None
504SP008	None	Arsenic	Yes	None
504SP009	None	Arsenic	Yes	None
504SP010	None	Arsenic	Yes	None
504SP012	None	Arsenic	Yes	None
504SP013	None	Arsenic	Yes	None
504SP014	None	Thallium	Yes	None

All 27 soil boring and DPT soil samples at AOC 504 reported chromium detections, with two locations, 504SB005 (lower interval of 62.3 mg/kg) and 504SB008 (lower interval of 58.4 mg/kg), exceeding chromium's soil to groundwater SSL of 38 mg/kg. These two sites exceeded chromium's Zone B background reference concentration for subsurface soils of 48.1 mg/kg. Since there are no monitoring wells within 200 feet downgradient from these soil boring locations, the soil to groundwater cross-media pathway cannot be evaluated.

Arochlor-1254 was detected in two of seven soil samples at AOC 504, and was found exceeding its SSL of 1000  $\mu\text{g}/\text{kg}$  at location 504SB006 (2100  $\mu\text{g}/\text{kg}$ ). There are no monitoring wells within 200 feet downgradient from this soil boring location such that the soil to groundwater pathway cannot be evaluated.

Thallium was detected in three of 21 soil samples in AOC 504. All three of the sites, 504SB006 (0.86 mg/kg), 504SP004 (2.36 mg/kg), and 504SP014 (1.59 mg/kg), exceeded thallium's soil to groundwater SSL of 0.7 mg/kg.

Lead was detected in 25 of 27 soil samples at AOC 504. The only reported SSL exceedance was in the DPT soil location 504SP006 (1740 mg/kg vs. 400 mg/kg SSL). Since there are no monitoring wells within 200 feet downgradient from either the soil boring or DPT sample locations, the soil to groundwater pathway cannot be evaluated.

BEQs were detected in seven of thirteen soil boring samples at AOC 504. The only reported SSL exceedance was in the soil boring location 504SB006 (5004  $\mu\text{g}/\text{kg}$  vs. 3200  $\mu\text{g}/\text{kg}$ ). Since there are no monitoring wells within 200 feet downgradient from either the soil boring or DPT sample locations, the soil to groundwater pathway cannot be evaluated.

#### **10.2.4.2 Groundwater to Surface Water Cross-Media Transport**

##### **SWMU 37**

In Section 10.2, Tables 10.2.4, and 10.2.5 compare maximum detected organic and 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.

None of the constituents in Subzone B groundwater samples exceeded the criteria listed above, as indicated in Table 10.2.11. As a result, the groundwater to surface water migration pathway is not a concern at SWMU 37.

#### **10.2.4.3 Fate and Transport Summary**

Two organic compounds – Arochlor-1254 and BEQs – and five inorganics – arsenic, mercury, chromium, thallium and lead – were reported at concentrations exceeding their soil to groundwater SSLs from Zone B soil samples at locations not associated with existing Zone B sites. Because no downgradient monitoring wells exist 200 feet downgradient from the exceedance locations, soil to ground water cross-media transport evaluations were not possible. Zone B SSL exceedances in soil samples were isolated occurrences, generally found in upper interval samples with the exceptions of chromium in the lower interval samples of 504SB005 and 504SB008.

Samples collected from locations with overlapping Zone B sites will be evaluated in an addendum to the Zone B RFI report.

### **10.2.5 Human Health Risk Assessment for SWMU 37 and AOC 504 Subzone B**

#### **10.2.5.1 Site Background and Investigative Approach**

Sections 10.2.1 and 10.2.3 provides a description for SWMU 37 and AOC 504 as well as a discussion of the sampling activities that took place during the Zone L RFI activities.

**10.2.5.2 COPC Identification**

**SWMU 37 Soil**

Based on the screening comparisons described in Section 7 of this RFI and presented in Table 10.2.2 antimony, arsenic, and mercury were identified as COPCs for soil. Table 10.2.13 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. The soil samples which reported exceedances were collected in the vicinity of SWMU 44. Data generated during the Zone L subzone B RFI were compared to data generated during the SWMU 44 RFI and the results of this comparison are provided in Table 10.2.13. 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 SWMU 44 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 SWMU 44 RFI (data reported higher than that presented in the SWMU 44 RFI, or new COPCs), then further evaluation should be deferred to the SWMU 44 RFI and included as an addendum. Recommendations are provided in Section 11.

**AOC 504 Soil**

Based on the screening comparisons described in Section 7 of this RFI and presented in Tables 10.2.6, 10.2.8, and 10.2.9 Aroclor-1254, arsenic, thallium, lead, and BEQS were identified as COPCs for soil. Table 10.2.14 provides a summary of AOC 504 soil samples that reported exceedances along with any associated sites that overlapped the area where these soil

**Table 10.2.13**  
**SMWU 37, Zone L, Subzone B**  
**Risk Assessment COPCs**

Exceedance Location	Overlapping Site	Risk Assessment COPCs	COPCs to be further Evaluated?	Reference Document
<b>DPT Soil</b>				
037SB002	Zone C SWMU 44	Antimony	Yes	Table 10.1.20 in Section 10.6.9*
		Arsenic	Yes	Table 10.1.20 in Section 10.6.9*
		Mercury	Yes	Table 10.1.20 in Section 10.6.9*

**Notes:**

\*Zone C RFI Report (EnSafe, 1997)

**Table 10.2.14**  
**AOC 504, Zone L, Subzone B**  
**Risk Assessment COPCs**

Exceedance Location	Overlapping Site	Risk Assessment COPCs	COPCs to be further Evaluated?	Reference Document
<b>DPT Soil</b>				
504SP004 504SP008 504SP009 504SP010 504SP011 504SP012 504SP012	None	BEQ's Arochlor 1254 Arsenic Lead Thallium	Yes	None
<b>Soil Borings</b>				
504SP004 504SP008 504SP009 504SP010 504SP011 504SP012 504SP012	None	BEQ's Arochlor 1254 Arsenic Lead Thallium	Yes	None

samples were taken. As shown, none of the soil samples reporting exceedances were collected in the vicinity of any existing SWMU or AOC. Since there are no existing sites located in the area where these samples were taken, a risk assessment is provided to evaluate the significance of soil concentrations of these COPCs.

**SWMU 37 Groundwater**

Based on the screening comparisons described in Section 7 of this RFI and presented in Tables 10.2.4, and 10.2.5, no COPCs were identified for groundwater.

**10.2.5.3 Exposure Assessment**

**Potentially Exposed Populations**

Potentially exposed populations include 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 soil conditions. Current site workers' exposure would be less than that assumed for the hypothetical future site worker scenario because of their limited soil contact. Therefore, future worker assessment is considered to be protective of current site users. The future site resident scenario was built on the premise that current buildings would be removed and replaced with dwellings.

**Exposure Pathways**

Exposure pathways for the site workers are dermal contact and incidental ingestion of soils. 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 soil. Uniform exposure was assumed for all sample locations. Table 10.2.15 presents the justification for exposure pathways assessed in this HHRA.

**Table 10.2.15**  
**Exposure Pathways Summary — AOC 504**  
**CNC — Subzone A**  
**Charleston, South Carolina**

Potentially Exposed Population	Medium and Exposure Pathway	Pathway Selected for Evaluation?	Reason for Selection or Exclusion
<b>Current Land Uses</b>			
<b>Current Site Users/Maintenance</b>	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	No COPCs were identified for groundwater.
	Shallow groundwater, Inhalation of volatilized shallow groundwater contaminants	No	No COPCs were identified for groundwater.
	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.
<b>Future Land Uses</b>			
<b>Future Site Residents (Child and Adult) and Future Site Worker</b>	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	No COPCs were identified for groundwater.
	Shallow groundwater, Inhalation of volatilized contaminants during domestic use	No	No COPCs were identified for groundwater.

**Table 10.2.15**  
**Exposure Pathways Summary – AOC 504**  
**CNC – Subzone A**  
**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**

1

The focus for the risk assessment for Subzone B is the area along the western boundary of Zone B. All of the AOC 504 soil samples (seven samples) and all of the AOC 504 DPT soil samples (14 samples) were used to characterize the soil pathways for Subzone B.

2

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**Exposure Point Concentrations**

5

As discussed in Section 7 of this RFI, UCLs were calculated for datasets consisting of at least 10 samples. Because there were only seven data points for Aroclor-1254 and BEQs, the EPCs for these COPCs was set equal to their maximum concentrations. The 95% UCL calculated for arsenic exceeded its maximum concentration and, as a result, the maximum concentration was used as the EPC. The EPCs for lead and thallium were set equal to their respective 95% UCLs. Table 10.2.16 presents the statical analysis of COPCs.

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Table 10.2.16  
 Statistical Analysis of COPCs  
 AOC 504, Subzone B  
 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			
Aroclor 1254	7	NA	NA	NA	NA	2.1	2.1 MAX Used
Arsenic	21	2.895	1.530	3.36	184	98.2	98 MAX Used
Benzo(a)pyrene equiv.	7	NA	NA	NA	NA	5.0	5.0 MAX Used
Lead	21	3.631	1.463	3.254	319.1	1740	319 UCL Used
Thallium	21	-0.6109	0.5678	2.054	0.83	2.36	0.83 UCL 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 val  
 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

## Quantification of Exposure 1

### *Soil* 2

CDIs for ingestion and dermal contact with soils are shown in Tables 10.2.17 and 10.2.18, 3  
respectively. 4

#### 10.2.5.4 Toxicity Assessment 5

Toxicity assessment terms and methods are discussed in Section 7 of this report. Table 10.2.19 6  
presents toxicological information specific to each COPC evaluated in this risk assessment. This 7  
information was used in the quantification of risk/hazard associated with soil contaminants. Brief 8  
toxicological profiles are provided in the following paragraphs. 9

*PCB Aroclors* are a group of chlorinated hydrocarbons (such as *Aroclor-1254*) that accumulate 10  
in fat tissue. Occupational exposure (both inhalation and dermal) to PCBs causes eye and lung 11  
irritation, loss of appetite, liver enlargement, increased serum liver enzyme levels, rashes and 12  
chlordane, and decreased birth weight of infants in heavily exposed worker/mothers. Of the 13  
effects listed above, the liver is the primary target organ (Klaassen, et al, 1986) (Dreisbach, et al, 14  
1987). USEPA classified PCB aroclors as group B2 probable human carcinogens, primarily based 15  
on animal data. Oral ingestion of PCBs causes liver and stomach tumors in rat studies. The 16  
cancer potency of PCB mixtures is determined using a tiered approach. The high risk and 17  
persistence tier uses an upper-bound slope factor of  $2.0 \text{ (mg/kg-day)}^{-1}$  and is appropriate for food 18  
chain exposures, sediment and soil ingestion, dust or aerosol inhalation, and dermal exposure. The 19  
low risk and persistence tier uses an upper-bound slope factor of  $0.4 \text{ (mg/kg-day)}^{-1}$  and is 20  
appropriate for ingestion of water soluble congeners and inhalation of evaporated congeners. The 21  
lowest risk and persistence tier uses an upper-bound slope factor of  $0.07 \text{ (mg/kgf-day)}^{-1}$  and is 22  
appropriate for PCB congener mixtures with congeners having more than four chlorines 23  
comprising less than 1/2% of the mixture. 24

Table 10.2.17  
 Chronic Daily Intakes (CDI)  
 Incidental Ingestion of Surface Soil  
 AOC 504, Subzone B  
 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)
Aroclor 1254	1	2.1	2.88E-06	2.68E-05	3.29E-06	1.03E-06	3.67E-07
Arsenic	1	98	1.35E-04	1.26E-03	1.54E-04	4.80E-05	1.72E-05
Benzo(a)pyrene equiv.	1	5.0	6.85E-06	6.40E-05	7.83E-06	2.45E-06	8.74E-07
Lead	1	319	4.37E-04	4.08E-03	5.00E-04	1.56E-04	5.58E-05
Thallium	1	0.83	1.13E-06	1.06E-05	1.30E-06	4.05E-07	1.45E-07

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 10.2.18  
 Chronic Daily Intakes (CDI)  
 Dermal Contact with Surface Soil  
 AOC 504, Subzone B  
 Charleston Naval Complex  
 Charleston, South Carolina

Chemical	Exposure Point Concentration (mg/kg)	Fraction Contacted from Contaminated Source *	Dermal Absorption Factor (unitless)	Future Resident adult H-CDI (mg/kg-day)	Future Resident child H-CDI (mg/kg-day)	Future Resident lwa C-CDI (mg/kg-day)	Current Worker adult H-CDI (mg/kg-day)	Current Worker adult C-CDI (mg/kg-day)
Aroclor 1254	2.1	1	0.01	1.18E-06	3.89E-06	7.38E-07	8.42E-07	3.01E-07
Arsenic	98	1	0.001	5.52E-06	1.82E-05	3.45E-06	3.94E-06	1.41E-06
Benzo(a)pyrene equiv.	5.0	1	0.01	2.81E-06	9.28E-06	1.76E-06	2.01E-06	7.17E-07
Lead	319	1	0.001	1.79E-05	5.92E-05	1.12E-05	1.28E-05	4.57E-06
Thallium	0.83	1	0.001	4.65E-08	1.53E-07	2.91E-08	3.32E-08	1.19E-08

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 10.2.19  
 Toxicological Database Information  
 for Chemicals of Potential Concern  
 AOC 504, Subzone B  
 Charleston Naval Complex

**Non-Carcinogenic Toxicity Data**

Chemical	Oral Reference Dose (mg/kg/day)	Confidence Level	Critical Effect	Uncertainty Factor Oral	Inhalation Reference Dose (mg/kg/day)	Confidence Level	Critical Effect	Uncertainty Factor Inhalation
Arsenic	0.0003	a	M	3	ND		hyperpigmentation	ND
Benzo(a)pyrene Equivalents	ND			ND	ND			ND
Lead	ND			ND	ND			ND
PCB Aroclor-1260	ND			ND	ND			ND
Thallium	8E-05	a	L	3000	ND		Increased SGOT	

NOTES:

a Integrated Risk Information System (IRIS)  
 ND Not determined due to lack of information

Table 10.2.19  
 Toxicological Database Information  
 for Chemicals of Potential Concern  
 AOC 504, Subzone B  
 Charleston Naval Complex

**Carcinogenic Toxicity Data**

Chemical	Oral Slope Factor [(mg/kg/day)] <sup>-1</sup>		Inhalation Slope Factor [(mg/kg/day)] <sup>-1</sup>		Weight of Evidence	Tumor Type
Arsenic	1.5	a	15.1	a	A	various
Benzo(a)pyrene Equivalents	7.3	a			B2	mutagen
Lead	ND		ND		B2	
PCB Aroclor-1260	2		2		B2	hepatocellular carcinoma
Thallium	ND		ND			

NOTES:

a Integrated Risk Information System (IRIS)  
 ND Not determined due to lack of information

*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)<sup>-1</sup>. A inhalation slope factor of 15.1 (mg/kg-day)<sup>-1</sup> 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)<sup>-1</sup>. 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 exists and there is no 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 of no human data exists and there is no 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 of no human data exists and there is no 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).

**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 confusing nature of lead toxicity. Lead accumulates in fat tissue, and 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).

**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).

#### 10.2.5.5 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 10.2.20 and 10.2.21 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 3E-04 and 5E-5, respectively. Arsenic and BEQs were the primary contributor to risk projections. Aroclor-1254 was a secondary contributor.

The computed hazard indices computed for soil based on the adult resident were 0.6 for the soil ingestion pathway and 0.2 for the dermal contact pathway. The computed hazard indices based on child resident were 6 for the soil ingestion pathway and 0.7 for the dermal contact pathway. Arsenic and Aroclor-1254 were the primary contributors to hazard index projections. Thallium was a secondary contributor.

Table 10.2.20  
Hazard Quotients and Incremental Lifetime Cancer Risks  
Incidental Surface Soil Ingestion  
AOC 504, Subzone B  
Charleston Naval Complex  
Charleston, SC

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
Aroclor 1254	2E-05	2	0.14	1.3	6.6E-06	0.051	7.3E-07
Arsenic	0.0003	1.5	0.45	4.2	2.3E-04	0.16	2.6E-05
Benzo(a)pyrene equiv.	NA	7.3	ND	ND	5.7E-05	ND	6.4E-06
Lead	NA	NA	ND	ND	ND	ND	ND
Thallium	7E-05	NA	0.016	0.15	ND	0.0058	ND
SUM Hazard Index/ILCR			0.6	6	3E-04	0.2	3E-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 10.2.21  
Hazard Quotients and Incremental Lifetime Cancer Risks  
Dermal Contact With Surface Soil  
AOC 504, Subzone B  
Charleston Naval Complex  
Charleston, SC

Chemical	Dermal Adjustment	Oral RfD Used (mg/kg-day)	Oral SF Used (mg/kg-day) <sup>-1</sup>	Future	Future	Future	Current	Current
				Resident adult Hazard Quotient	Resident child Hazard Quotient	Resident lwa ILCR	Worker adult Hazard Quotient	Worker adult ILCR
Aroclor 1254	0.5	1E-05	4	0.12	0.39	3.0E-06	0.084	1.2E-06
Arsenic	0.2	6E-05	7.5	0.092	0.30	2.6E-05	0.066	1.1E-05
Benzo(a)pyrene equiv.	0.5	NA	14.6	ND	ND	2.6E-05	ND	1.0E-05
Lead	0.2	NA	NA	ND	ND	ND	ND	ND
Thallium	0.2	1.4E-05	NA	0.0033	0.011	ND	0.0024	ND
<b>SUM Hazard Index/ILCR</b>				<b>0.2</b>	<b>0.7</b>	<b>5E-05</b>	<b>0.2</b>	<b>2E-05</b>

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)

**Hypothetical Site Workers**

The site worker ILCRs for the ingestion and dermal contact pathways are 3E-05 and 2E-05, respectively. Arsenic and BEQs were the primary contributors for each pathway. Hazard indices for the ingestion and dermal pathways were both 0.2.

**COCs Identified**

Chemicals of concern were identified based on cumulative (all pathway) risk and hazard projected for this site, as shown in Table 10.2.22. 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.

**Soils**

**Hypothetical Site Residents**

Aroclor-1254, arsenic, BEQs, and thallium were identified as the soil pathway COCs based on their contribution to cumulative ILCR and/or hazard index projections.

**Hypothetical Site Workers**

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

Table 10.2.22  
 Summary of Risk and Hazard-based COCs  
 AOC 504, Subzone B  
 Charleston Naval Complex  
 Charleston, South Carolina

Medium	Exposure Pathway		Future	Future	Future	Site Worker		Identification		
			Resident Adult Hazard Quotient	Resident Child Hazard Quotient	Resident lwa ILCR	Hazard Quotient	ILCR	of COCs		
Surface Soil	Incidental Ingestion	Aroclor 1254	0.14	1.3	6.6E-06	0.051	7.3E-07	1	2	
		Arsenic	0.45	4.2	2.3E-04	0.16	2.6E-05	1	2 4	
		Benzo(a)pyrene equiv.	ND	ND	5.7E-05	ND	6.4E-06	2	4	
		Lead	ND	ND	ND	ND	ND			
		Thallium	0.016	0.15	ND	0.0058	ND	1		
	Dermal Contact	Aroclor 1254	0.12	0.39	3.0E-06	0.084	1.2E-06	1	2 4	
		Arsenic	0.092	0.30	2.6E-05	0.066	1.1E-05	1	2 4	
		Benzo(a)pyrene equiv.	ND	ND	2.6E-05	ND	1.0E-05	2	4	
		Lead	ND	ND	ND	ND	ND			
		Thallium	0.0033	0.011	ND	0.0024	ND			
	<b>Sum of All Pathways</b>			<b>0.8</b>	<b>6</b>	<b>3E-04</b>	<b>0.4</b>	<b>6E-05</b>		

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.

**10.2.5.6 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.

**Determination of Exposure Point Concentrations**

Maximum concentrations or 95% UCL concentrations were used as the exposure point concentrations for this site. The EPCs used in the risk assessment provide for a reasonable maximum estimate of chronic daily intakes. As a result, the EPCs would tend to overestimate risk and hazard. The 95% UCL for arsenic exceeded its maximum concentration and as a result, its maximum concentration was used as the EPC. This is usually due to a high degree of variability in the data and is sometimes indicative of a hot spot area of arsenic concentrations. As a result, the risk and hazard associated with arsenic may be an under- or an over-estimate based on the distribution of arsenic concentration. Risk maps are provided in the Risk Summary Section so that the risk and hazard implications of the distribution of arsenic data can be evaluated.

**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.

**10.2.5.7 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. To add perspective to the risk assessment point risk and hazard maps are presented below. Point risk maps are based on the unlikely assumption that potential future site residents 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 10.2.25 and 10.2.26 illustrates point risk and point hazard estimates for soil pathways under a residential scenario. Table 10.2.23 provides the contribution of individual COPCs to cumulative risk and hazard at each sample location for both the residential and site worker scenarios. As shown, concentrations of arsenic contribute to risk projections above 1E-06 for each soil location. The highest concentrations of arsenic were reported in samples collected along the railroad tracks. Aroclor-1254 and BEQs contributed to risk estimates above 1E-06 in the soil samples collected along the railroad tracks. Risk estimate range from 4E-06 (504SP007) to 3E-04 (504SB003) with a mean risk of 1E-04 (assuming a deminimus risk of 1E-07 for sample locations

Table 10.2.23  
Point Estimates of Risk and Hazard  
AOC 504, Subzone B, 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	B002	Arsenic (As)	mg/kg	30.3	1.3849	79.14	0.0697	11.20
504	B002	Benzo(a)pyrene equiv.	ug/kg	457.74	NA	7.58	NA	1.54
504	B002	Lead (Pb)	mg/kg	10.6	NA	NA	NA	NA
		Total			1.385	86.72	0.070	12.74
504	B003	Arsenic (As)	mg/kg	98.2	4.4885	256.50	0.2258	36.29
504	B003	Benzo(a)pyrene equiv.	ug/kg	3475.6	NA	57.56	NA	11.70
504	B003	Lead (Pb)	mg/kg	377	NA	NA	NA	NA
		Total			4.489	314.06	0.226	47.99
504	B004	Arsenic (As)	mg/kg	23.7	1.0833	61.90	0.0545	8.76
504	B004	Benzo(a)pyrene equiv.	ug/kg	262.92	NA	4.35	NA	0.89
504	B004	Lead (Pb)	mg/kg	84.7	NA	NA	NA	NA
		Total			1.083	66.26	0.054	9.64
504	B005	Arsenic (As)	mg/kg	56.4	2.5779	147.32	0.1297	20.84
504	B005	Benzo(a)pyrene equiv.	ug/kg	994.93	NA	16.48	NA	3.35
504	B005	Lead (Pb)	mg/kg	107	NA	NA	NA	NA
		Total			2.578	163.79	0.130	24.19
504	B006	Aroclor-1254	ug/kg	2100	1.7318	9.53	0.1356	1.94
504	B006	Arsenic (As)	mg/kg	65.2	2.9801	170.30	0.1499	24.09
504	B006	Benzo(a)pyrene equiv.	ug/kg	5003.8	NA	82.86	NA	16.85
504	B006	Lead (Pb)	mg/kg	87.4	NA	NA	NA	NA
504	B006	Thallium (Tl)	mg/kg	0.86	0.1474	NA	0.0074	NA
		Total			4.859	262.69	0.293	42.88
504	B007	Arsenic (As)	mg/kg	27.3	1.2478	71.31	0.0628	10.09
504	B007	Benzo(a)pyrene equiv.	ug/kg	427.54	NA	7.08	NA	1.44
504	B007	Lead (Pb)	mg/kg	2.1	NA	NA	NA	NA
		Total			1.248	78.39	0.063	11.53
504	B008	Aroclor-1254	ug/kg	460	0.3793	2.09	0.0297	0.42
504	B008	Arsenic (As)	mg/kg	51.4	2.3494	134.26	0.1182	18.99
504	B008	Benzo(a)pyrene equiv.	ug/kg	264.24	NA	4.38	NA	0.89
504	B008	Lead (Pb)	mg/kg	10.1	NA	NA	NA	NA
		Total			2.729	140.72	0.148	20.31
504	P001	Arsenic (As)	mg/kg	4.57	0.2089	11.94	0.0105	1.69
504	P001	Lead (Pb)	mg/kg	8.91	NA	NA	NA	NA
		Total			0.209	11.94	0.011	1.69
504	P002	Arsenic (As)	mg/kg	2.1	0.0960	5.49	0.0048	0.78
504	P002	Lead (Pb)	mg/kg	39.8	NA	NA	NA	NA
		Total			0.096	5.49	0.005	0.78
504	P003	Arsenic (As)	mg/kg	3.46	0.1581	9.04	0.0080	1.28
504	P003	Lead (Pb)	mg/kg	14.8	NA	NA	NA	NA
		Total			0.158	9.04	0.008	1.28
504	P004	Arsenic (As)	mg/kg	7.78	0.3556	20.32	0.0179	2.87
504	P004	Lead (Pb)	mg/kg	1740	NA	NA	NA	NA
504	P004	Thallium (Tl)	mg/kg	2.36	0.4045	NA	0.0203	NA
		Total			0.760	20.32	0.038	2.87
504	P005	Arsenic (As)	mg/kg	3.8	0.1737	9.93	0.0087	1.40
504	P005	Lead (Pb)	mg/kg	32	NA	NA	NA	NA
		Total			0.174	9.93	0.009	1.40
504	P006	Lead (Pb)	mg/kg	35.3	NA	NA	NA	NA
		Total			NA	NA	NA	NA
504	P007	Arsenic (As)	mg/kg	1.67	0.0763	4.36	0.0038	0.62
504	P007	Lead (Pb)	mg/kg	8.34	NA	NA	NA	NA
		Total			0.076	4.36	0.004	0.62
504	P008	Arsenic (As)	mg/kg	95.5	4.3651	249.45	0.2196	35.29
504	P008	Lead (Pb)	mg/kg	46.3	NA	NA	NA	NA
		Total			4.365	249.45	0.220	35.29
504	P009	Arsenic (As)	mg/kg	85.9	3.9263	224.37	0.1975	31.74
504	P009	Lead (Pb)	mg/kg	50.2	NA	NA	NA	NA
		Total			3.926	224.37	0.198	31.74

Table 10.2.23  
 Point Estimates of Risk and Hazard  
 AOC 504, Subzone B, 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	P010	Arsenic (As)	mg/kg	84.9	3.8806	221.76	0.1952	31.37
504	P010	Lead (Pb)	mg/kg	87.8	NA	NA	NA	NA
		Total			3.881	221.76	0.195	31.37
504	P011	Arsenic (As)	mg/kg	24.5	1.1198	63.99	0.0563	9.05
504	P011	Lead (Pb)	mg/kg	66.6	NA	NA	NA	NA
		Total			1.120	63.99	0.056	9.05
504	P012	Arsenic (As)	mg/kg	31.7	1.4489	82.80	0.0729	11.71
504	P012	Lead (Pb)	mg/kg	8.7	NA	NA	NA	NA
		Total			1.449	82.80	0.073	11.71
504	P013	Arsenic (As)	mg/kg	88.8	4.0589	231.95	0.2042	32.81
504	P013	Lead (Pb)	mg/kg	52.6	NA	NA	NA	NA
		Total			4.059	231.95	0.204	32.81
504	P014	Arsenic (As)	mg/kg	12.8	0.5851	33.43	0.0294	4.73
504	P014	Lead (Pb)	mg/kg	36.3	NA	NA	NA	NA
504	P014	Thallium (Tl)	mg/kg	1.59	0.2725	NA	0.0137	NA
		Total			0.858	33.43	0.043	4.73

Table 10.2.24  
 Remedial Goal Options Surface Soil  
 AOC 504, Subzone B  
 Charleston Naval Complex  
 Charleston, South Carolina

**Residential-Based Remedial Goal Options**

Chemical	Slope Factor (mg/kg-day) <sup>-1</sup>	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	
Aroclor 1254	2	2E-05	2.1	3.6	1.2	0.12	0.22	2.2	22	NA
Arsenic	1.5	0.0003	98	66	22	2.2	0.38	3.8	38	17.1
Benzo(a)pyrene equiv.	7.3	NA	5.0	ND	ND	ND	0.060	0.60	6.0	NA
Thallium	NA	7E-05	0.83	15	5.1	0.51	ND	ND	ND	NA

**Worker-Based Remedial Goal Options**

Chemical	Slope Factor (mg/kg-day) <sup>-1</sup>	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	
Aroclor 1254	2	2E-05	2.1	46	15	1.5	1.1	11	108	NA
Arsenic	1.5	0.0003	98	1305	435	43.5	2.7	27	271	17.1
Benzo(a)pyrene equiv.	7.3	NA	5.0	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

that reported no carcinogenic COPCs). As shown, point hazard index estimates exceeded one at most locations. Arsenic was the primary contributor to hazard index estimates. Point hazard index estimates ranged from 0.08 (504SP007) to 5 (504SB006) with a mean hazard index of 2 (assuming a de minimus hazard of 0.1 for samples that reported no noncarcinogenic COPCs).

Figures 10.2.27 and 10.2.28 illustrate point risk and point hazard estimates for soil pathways under a site worker scenario. Table 10.2.23 provides the contribution of individual COPCs to cumulative risk and hazard at each sample location for both the residential and site worker scenarios. As shown, concentrations of arsenic contribute to risk projections above 1E-06 for most soil locations. The highest concentrations of arsenic were reported in samples collected along the railroad tracks. Aroclor-1254 and BEQs contributed to risk estimates above 1E-06 in the soil samples collected along the railroad tracks. Risk estimate range from 6E-07 (504SP007) to 5E-05 (504SB003) with a mean risk of 2E-05 (assuming a de minimus risk of 1E-07 for sample locations that reported no carcinogenic COPCs). As shown, point hazard index estimates do not exceed one at any location.

#### **10.2.5.8 Remedial Goal Options**

##### **Soil**

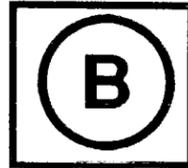
RGOs for carcinogens were based on the lifetime weighted average site resident or site workers as presented in Table 10.2.24 for soils.



**LEGEND:**

- 504SB003 ● SOIL BORING W/ ID NUMBER
- GDB001 ▲ SHALLOW MONITORING WELL W/ ID NUMBER
- GDB0ID ● DEEP MONITORING WELL W/ ID NUMBER

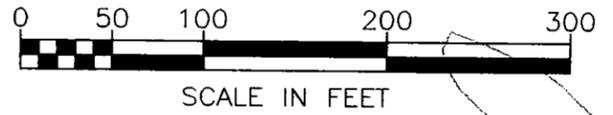
+++++ RAILROAD TRACKS



STUDY ZONE BOUNDARY WITH LETTER DESIGNATION

**NOTE:**

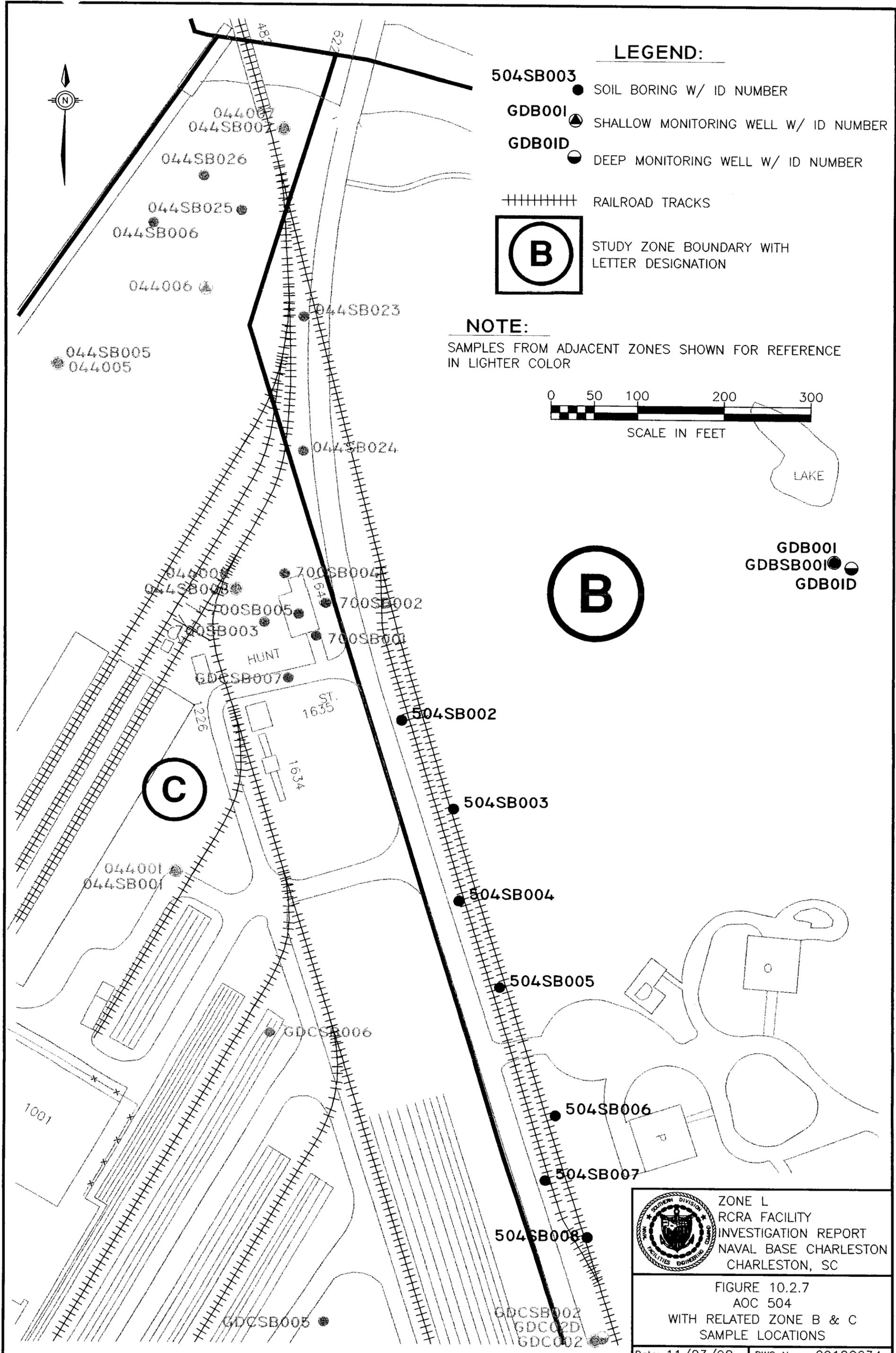
SAMPLES FROM ADJACENT ZONES SHOWN FOR REFERENCE IN LIGHTER COLOR



SCALE IN FEET

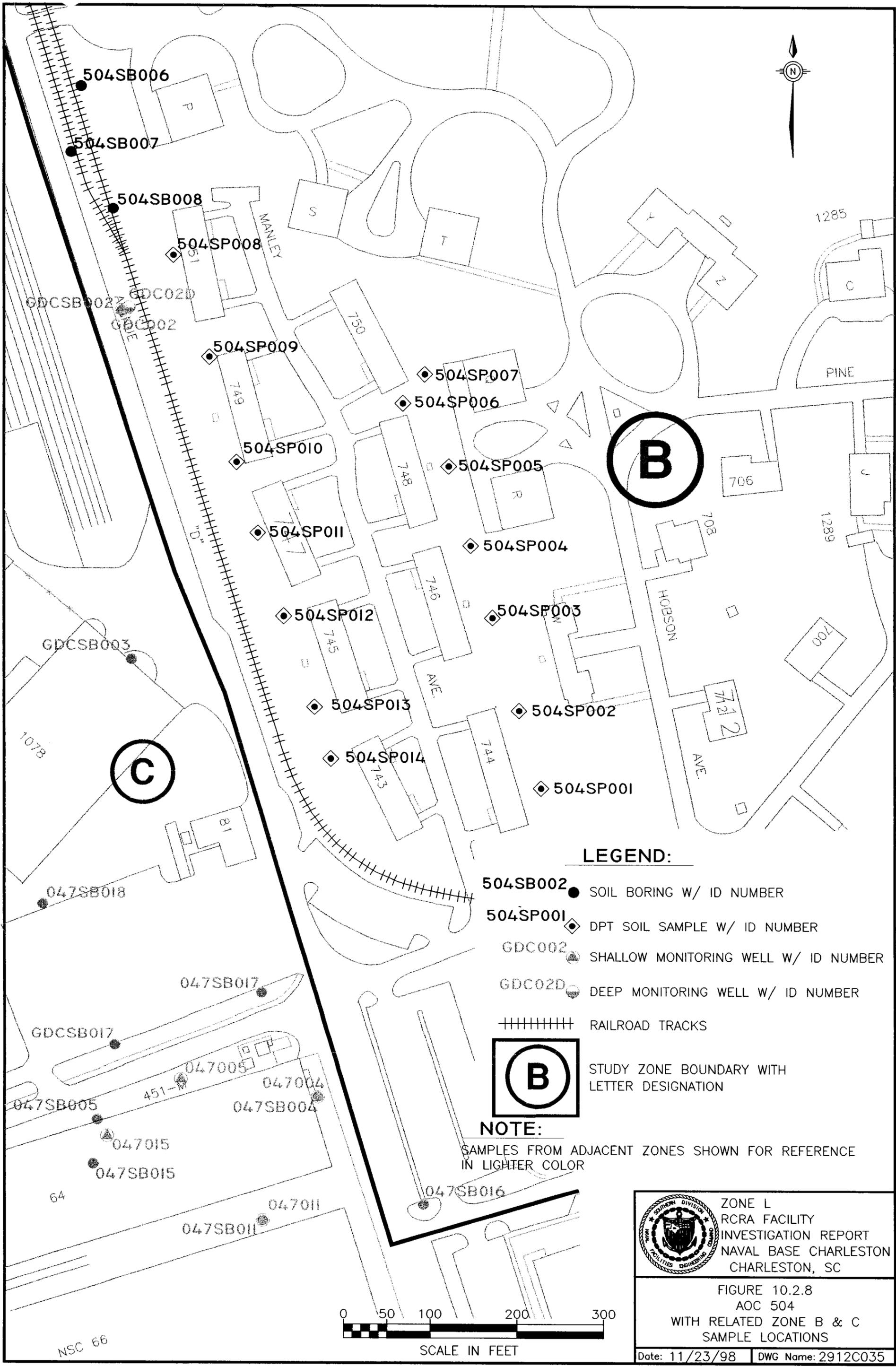
LAKE

- GDB001 ●
- GDBSB001 ●
- GDB0ID ●



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

FIGURE 10.2.7  
AOC 504  
WITH RELATED ZONE B & C  
SAMPLE LOCATIONS

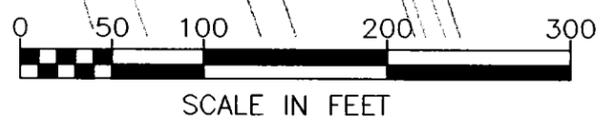


**LEGEND:**

- 504SB002 ● SOIL BORING W/ ID NUMBER
- 504SP001 ◆ DPT SOIL SAMPLE W/ ID NUMBER
- GDC002 ● SHALLOW MONITORING WELL W/ ID NUMBER
- GDC02D ● DEEP MONITORING WELL W/ ID NUMBER
- +++++ RAILROAD TRACKS
- (B)** STUDY ZONE BOUNDARY WITH LETTER DESIGNATION

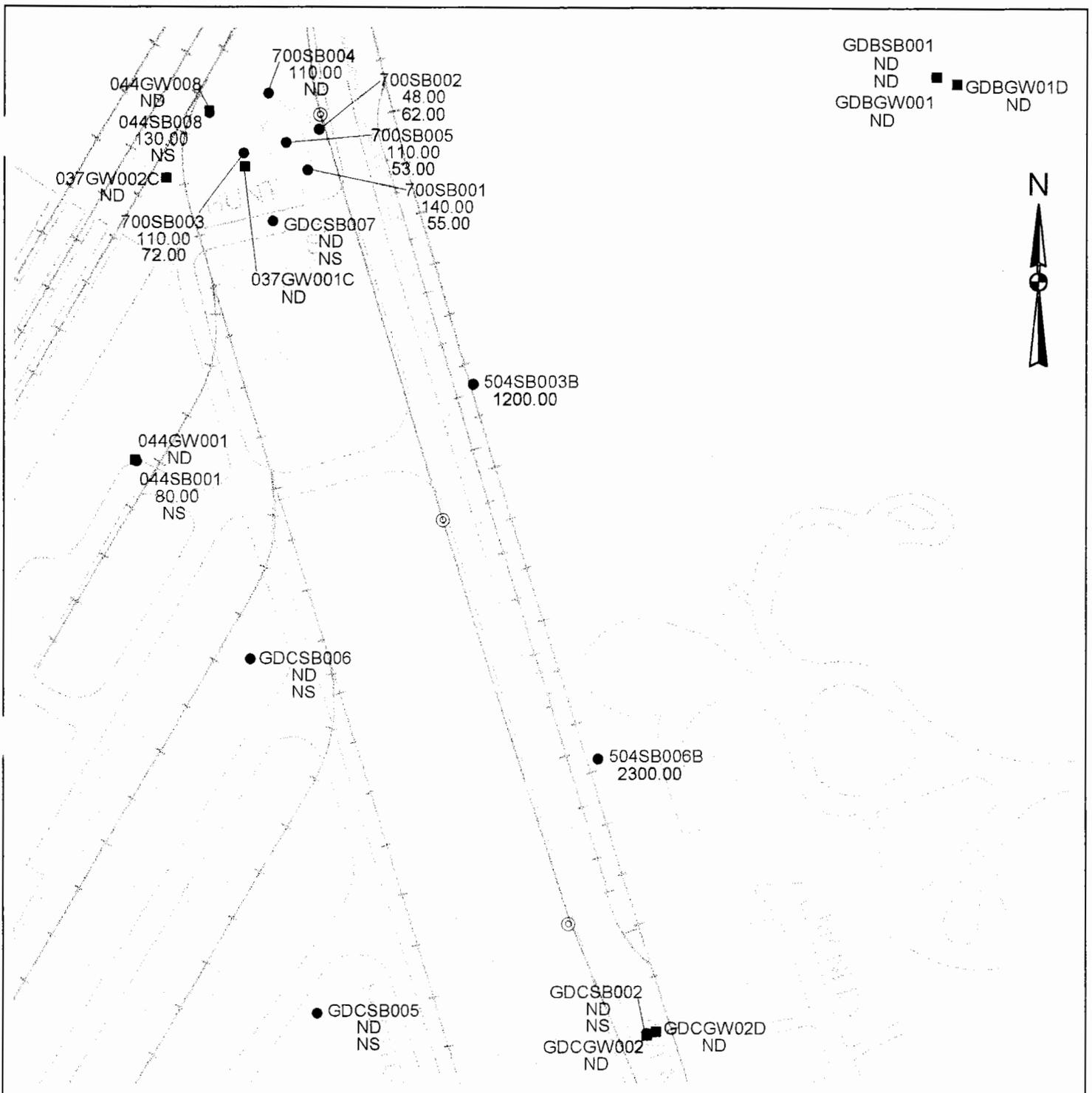
**NOTE:**

SAMPLES FROM ADJACENT ZONES SHOWN FOR REFERENCE IN LIGHTER COLOR




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

FIGURE 10.2.8  
 AOC 504  
 WITH RELATED ZONE B & C  
 SAMPLE LOCATIONS



GDBSB001 ND  
 ND ND  
 GDBGW001 ND  
 GDBGW01D ND



**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 B OR C SOIL BORING LOCATION
- 12.30 ZONE B OR C SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE B OR C SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

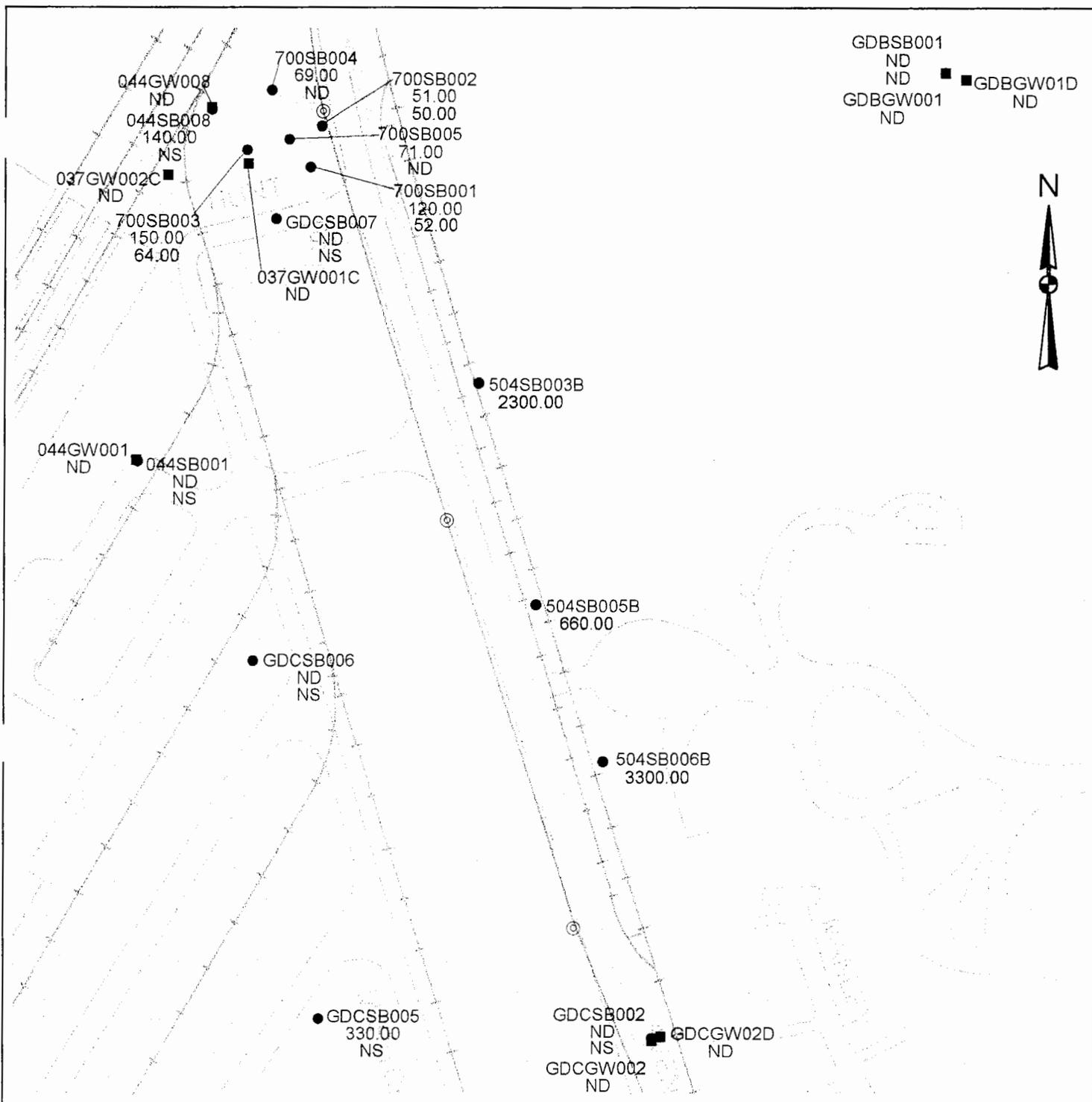
100 0 100 200 Feet



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

FIGURE 10.2.9  
 ZONE L - SUBZONE B  
 BENZO(A)ANTHRACENE  
 ZONE L EXCEEDANCES WITH ZONES B AND C  
 SOIL AND GW CONCENTRATIONS

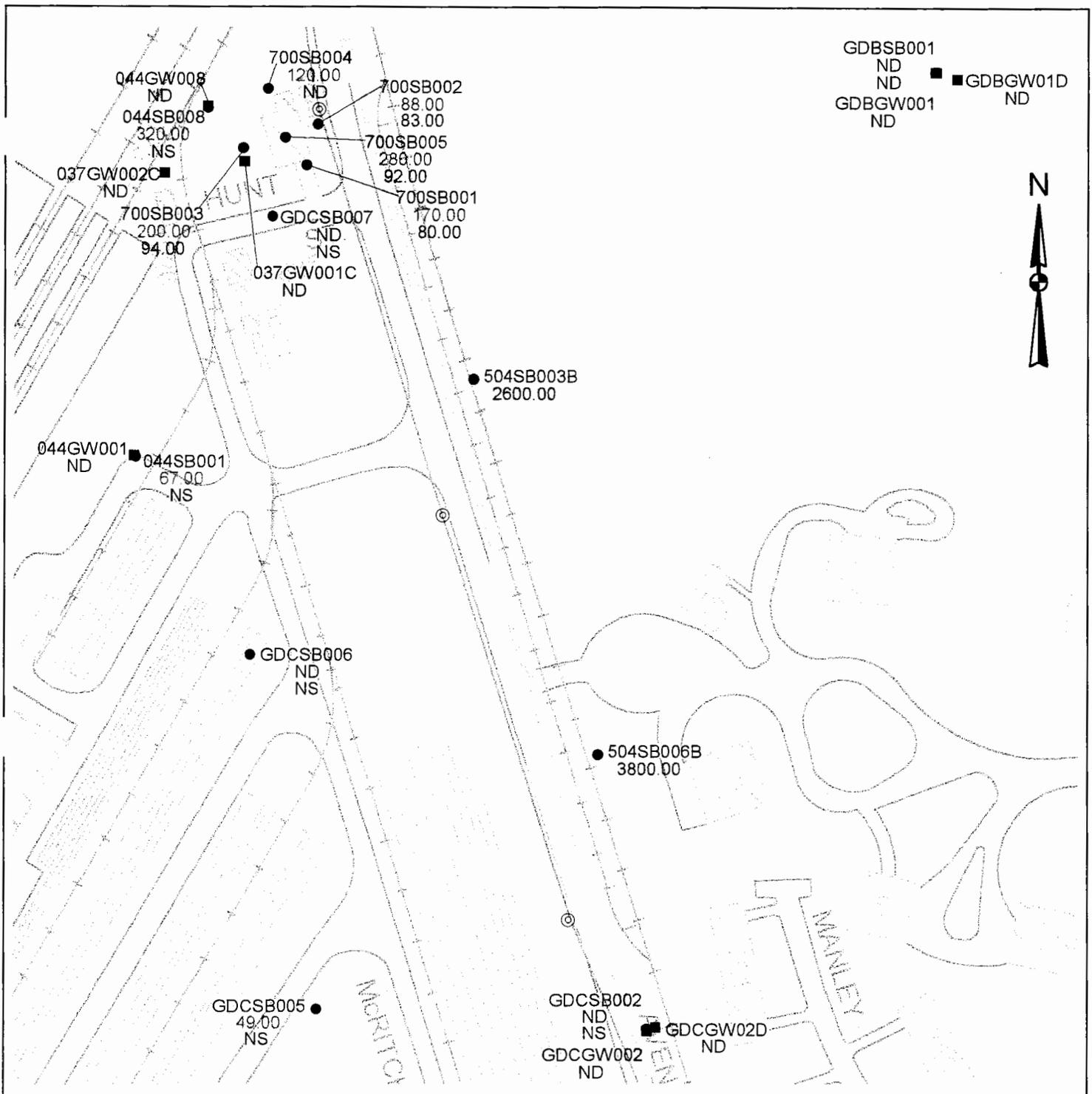
RBC = 880 ug/kg SSL = 2000 ug/kg MCL = NONE



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

FIGURE 10.2.10  
 ZONE L - SUBZONE B  
 BENZO(A)PYRENE  
 ZONE L EXCEEDANCES WITH ZONES B AND C  
 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 B OR C SOIL BORING LOCATION
- 12.30 ZONE B OR C SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE B OR C SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

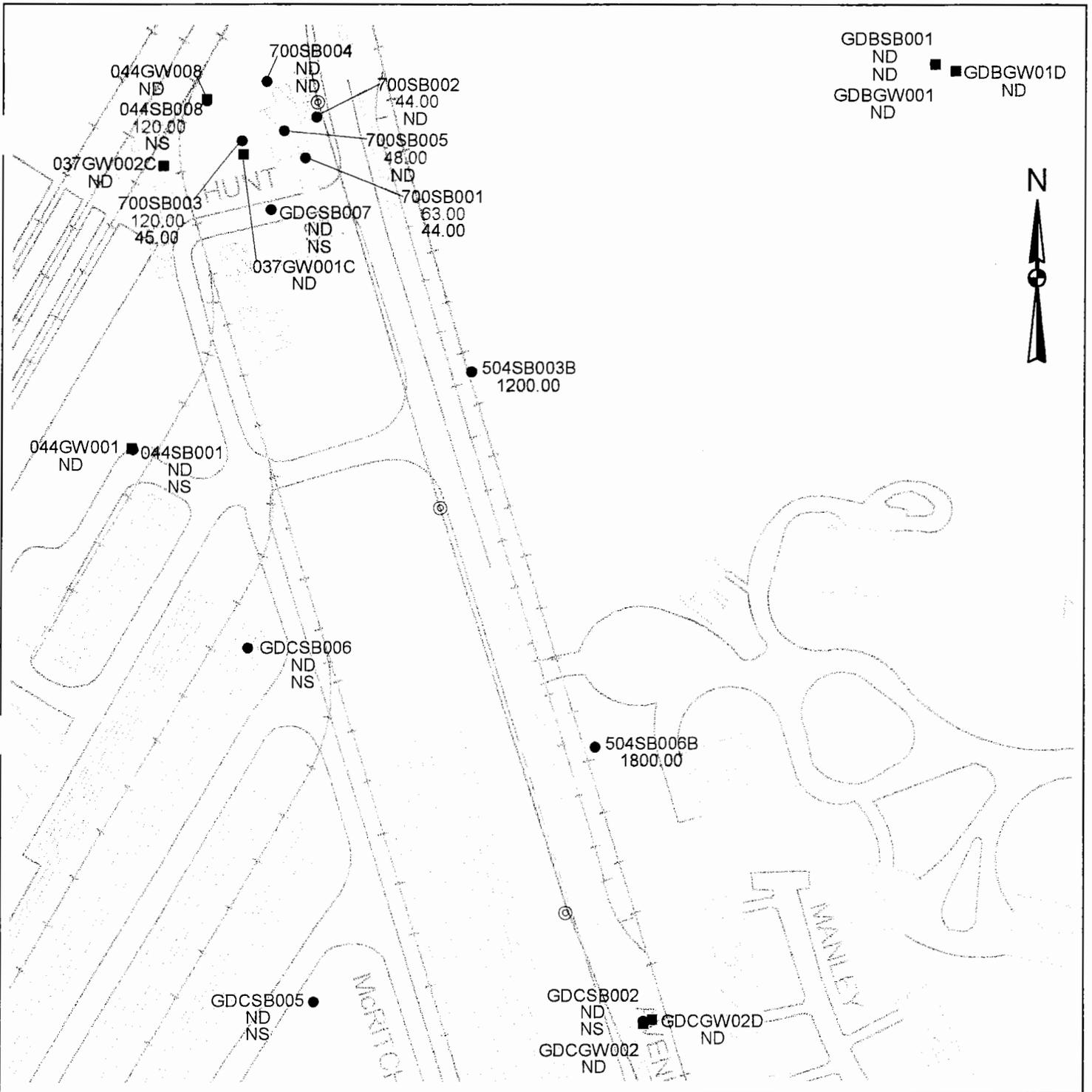
100 0 100 200 Feet



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

FIGURE 10.2.11  
ZONE L - SUBZONE B  
BENZO(B)FLUORANTHENE  
ZONE L EXCEEDANCES WITH ZONES B AND C  
SOIL AND GW CONCENTRATIONS

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



**LEGEND**

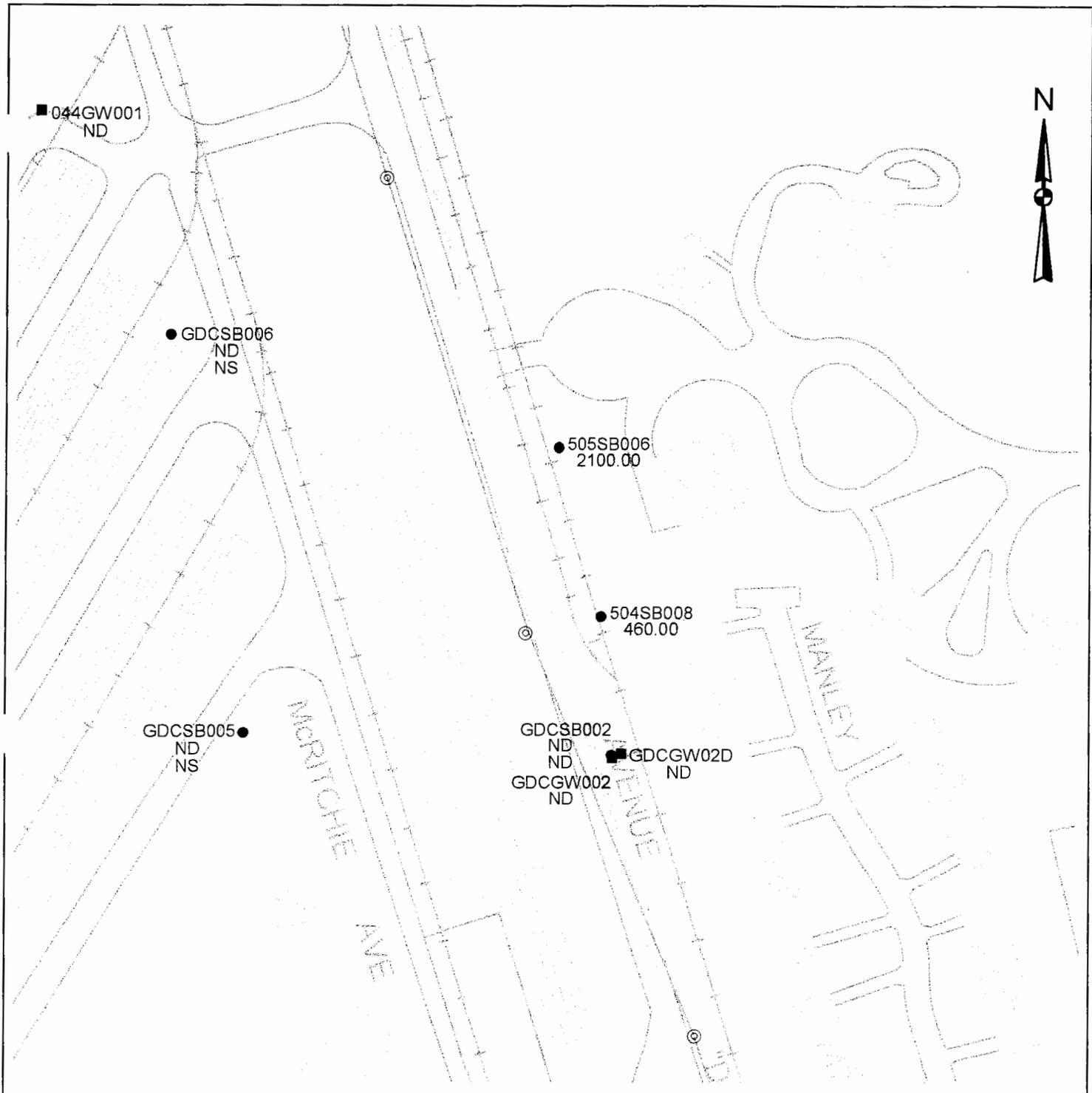
- ▲ ZONE L DPT SOIL LOCATION
  - ZONE L SOIL BORING LOCATION
  - 12.30 ZONE L DPT OR SURFACE SOIL CONC. (ug/kg)
  - 12.30 ZONE L SUBSURFACE SOIL CONC. (ug/kg)
  - MONITORING WELL LOCATION
  - 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
  - ZONE B OR C SOIL BORING LOCATION
  - 12.30 ZONE B OR C SURFACE SOIL CONC. (ug/kg)
  - 12.30 ZONE B OR C 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  
FACILITY INVESTIGATION  
NAVAL BASE CHARLESTON  
CHARLESTON, SC

FIGURE 10.2.12  
ZONE L - SUBZONE B  
INDENO(1,2,3-CD)PYRENE  
ZONE L EXCEEDANCES WITH ZONES B AND C  
SOIL AND GW CONCENTRATIONS

RBC = 880 ug/kg SSL = 14000 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 B OR C SOIL BORING LOCATION
- 12.30 ZONE B OR C SURFACE SOIL CONC. (ug/kg)
- 12.30 ZONE B OR C SUBSURFACE SOIL CONC. (ug/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

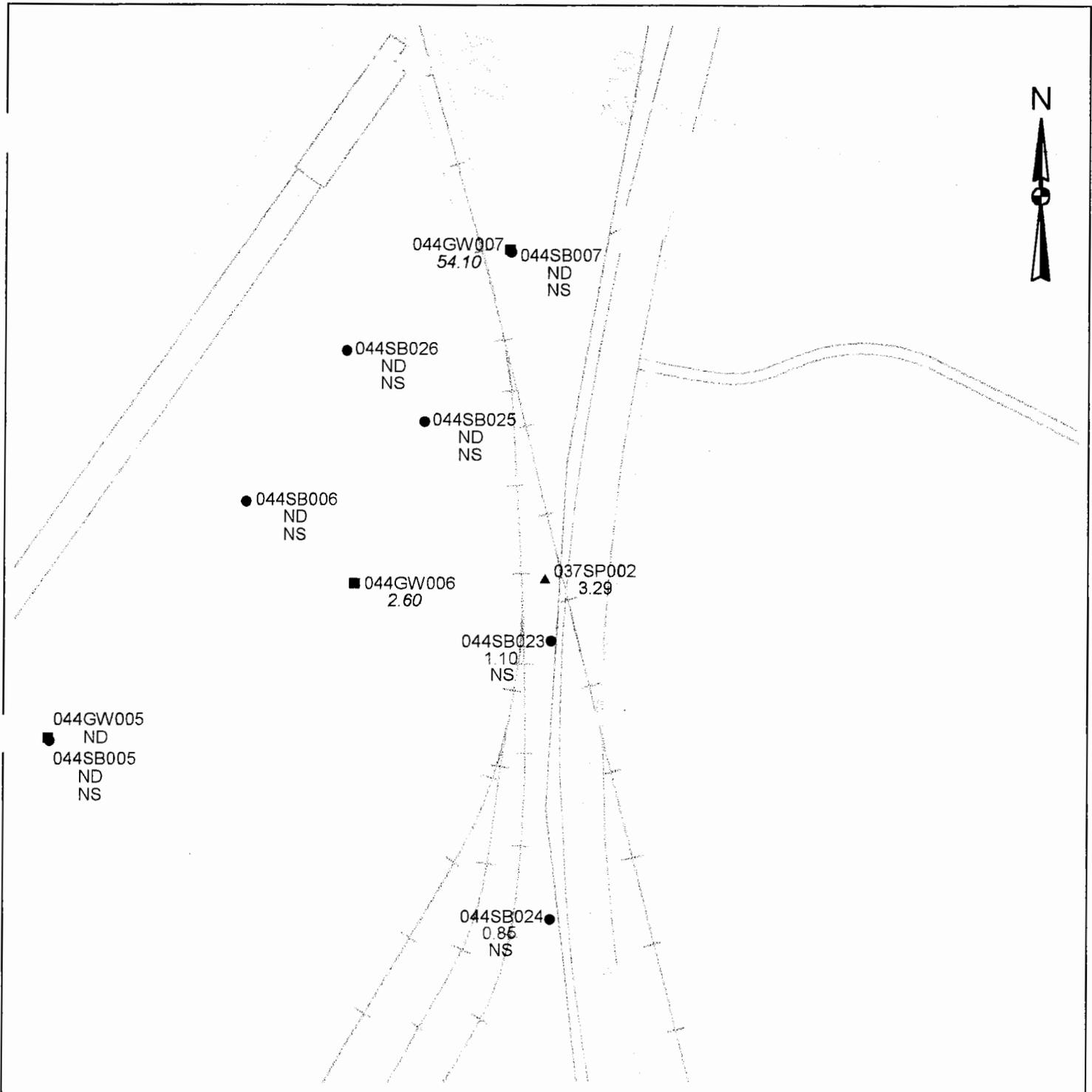
100 0 100 200 Feet



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

FIGURE 10.2.13  
ZONE L - SUBZONE B  
AROCOR-1254  
ZONE L EXCEEDANCES WITH ZONES B AND C  
SOIL AND GW CONCENTRATIONS

RBC = 32.0 ug/kg SSL = 1000 ug/kg MCL = 0.50 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 B OR C SOIL BORING LOCATION
- 12.30 ZONE B OR C SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE B OR C SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

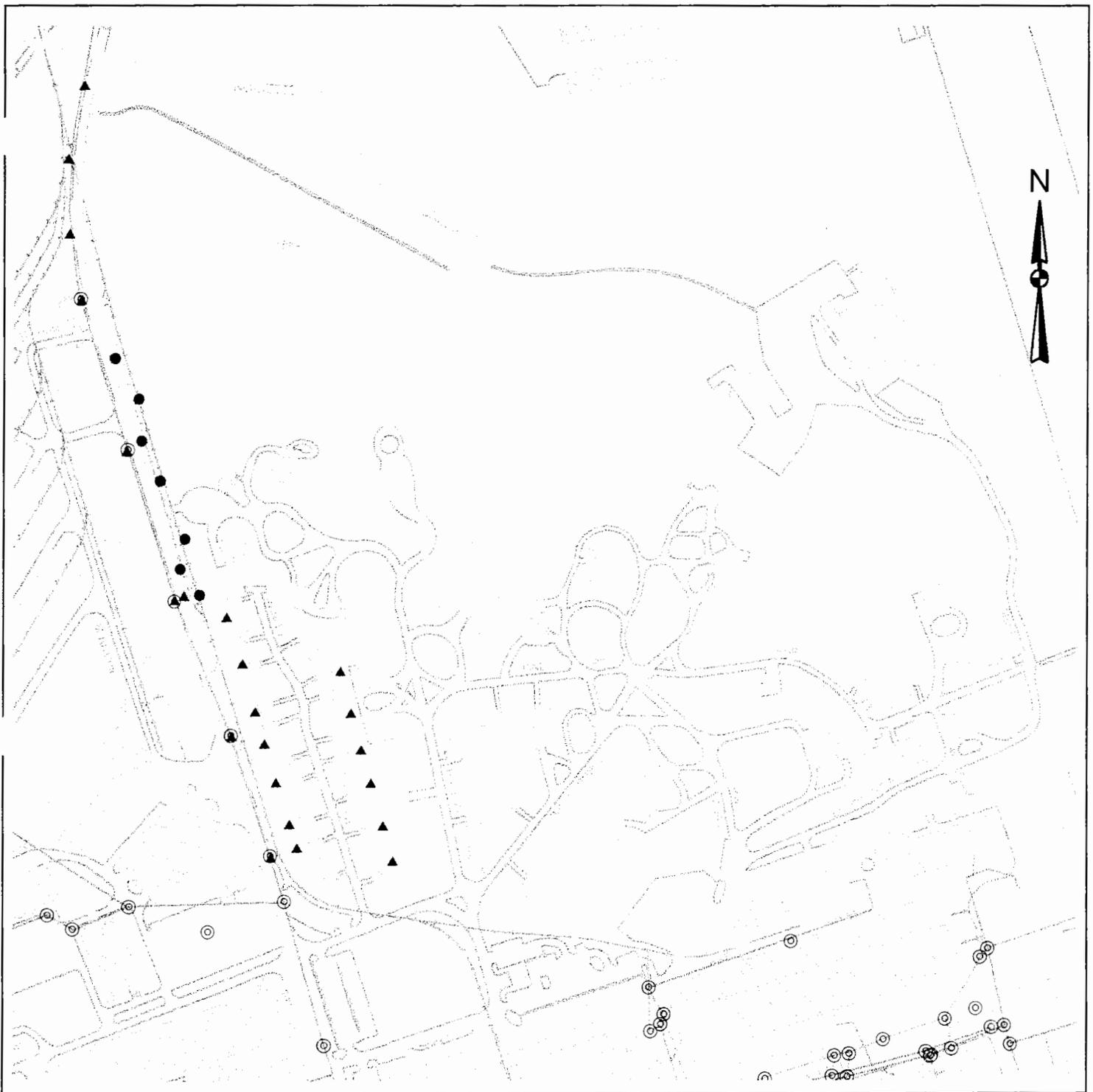
80 0 80 160 Feet



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

FIGURE 10.2.14  
ZONE L - SUBZONE B  
ANTIMONY  
ZONE L EXCEEDANCES WITH ZONES B AND C  
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

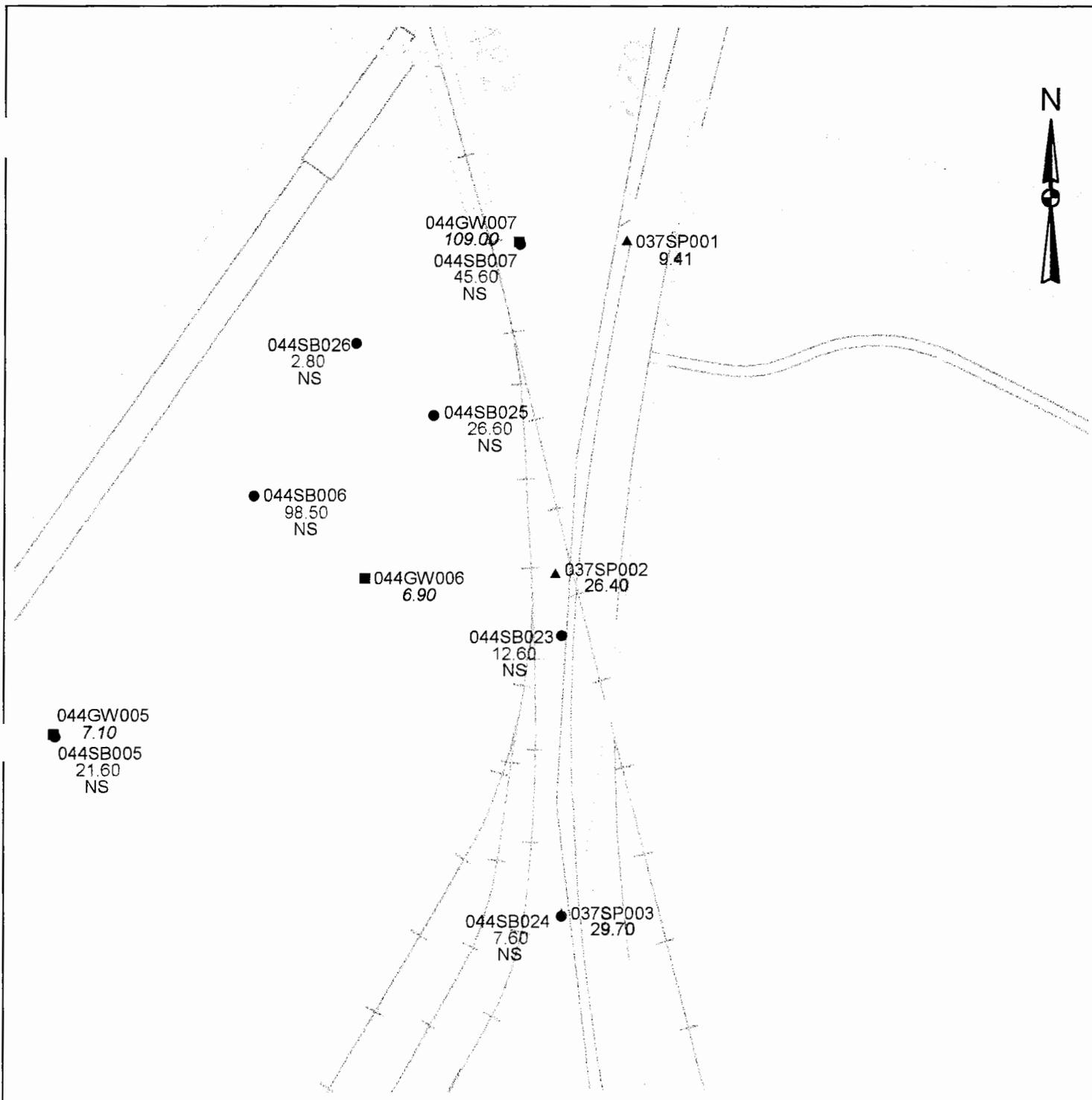
300    0    300    600 Feet



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

FIGURE 10.2.15  
 ZONE L - SUBZONE B  
 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 B OR C SOIL BORING LOCATION
- 12.30 ZONE B OR C SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE B OR C SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

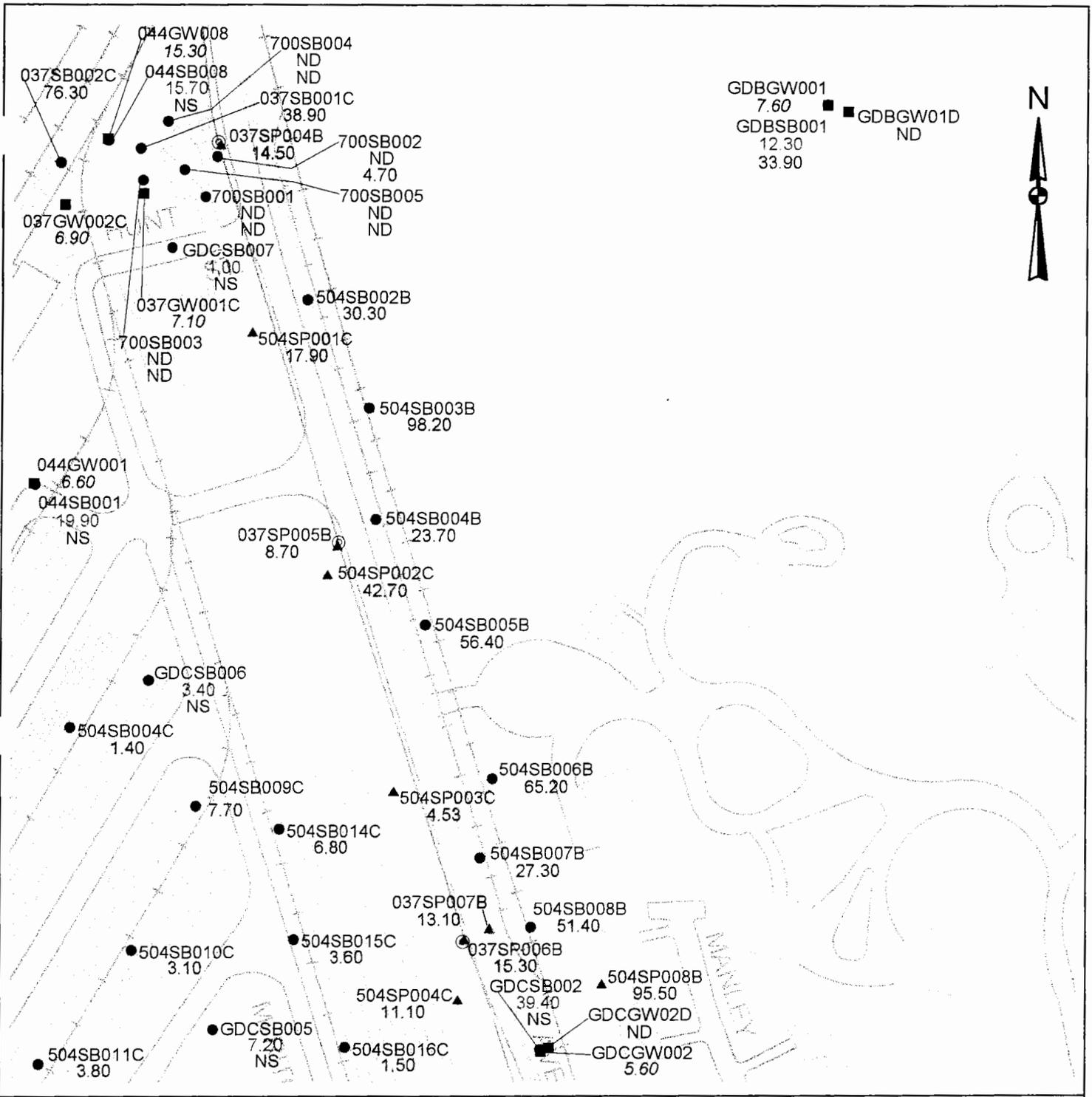


ZONE L - RCRA  
FACILITY INVESTIGATION  
NAVAL BASE CHARLESTON  
CHARLESTON, SC

FIGURE 10.2.16  
ZONE L - SUBZONE B  
ARSENIC  
ZONE L EXCEEDANCES WITH ZONES B AND C  
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 B OR C SOIL BORING LOCATION
- 12.30 ZONE B OR C SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE B OR C SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

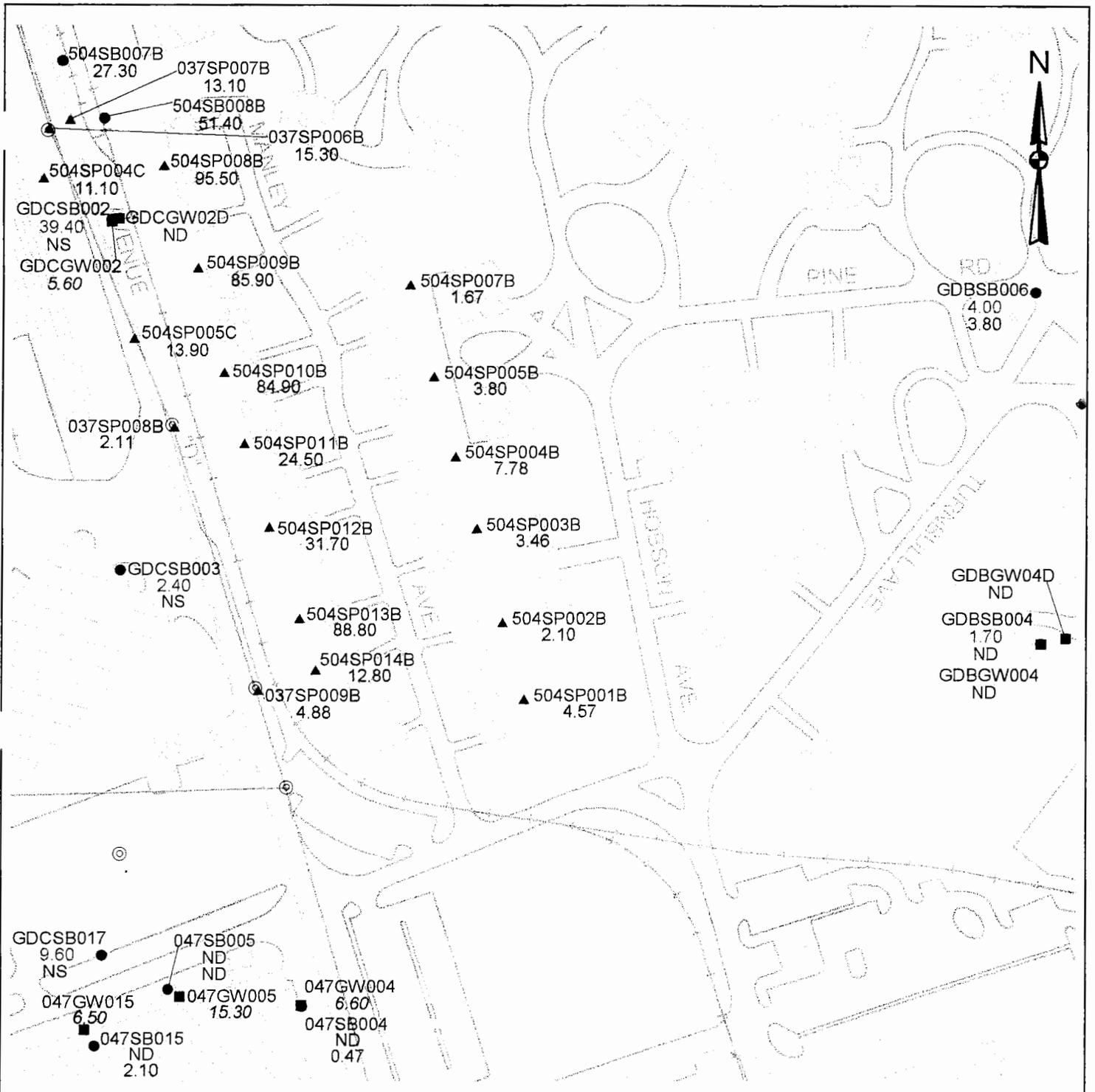
100 0 100 200 Feet



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

FIGURE 10.2.17  
ZONE L - SUBZONE B  
ARSENIC  
ZONE L EXCEEDANCES WITH ZONES B AND C  
SOIL AND GW CONCENTRATIONS

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



**LEGEND**

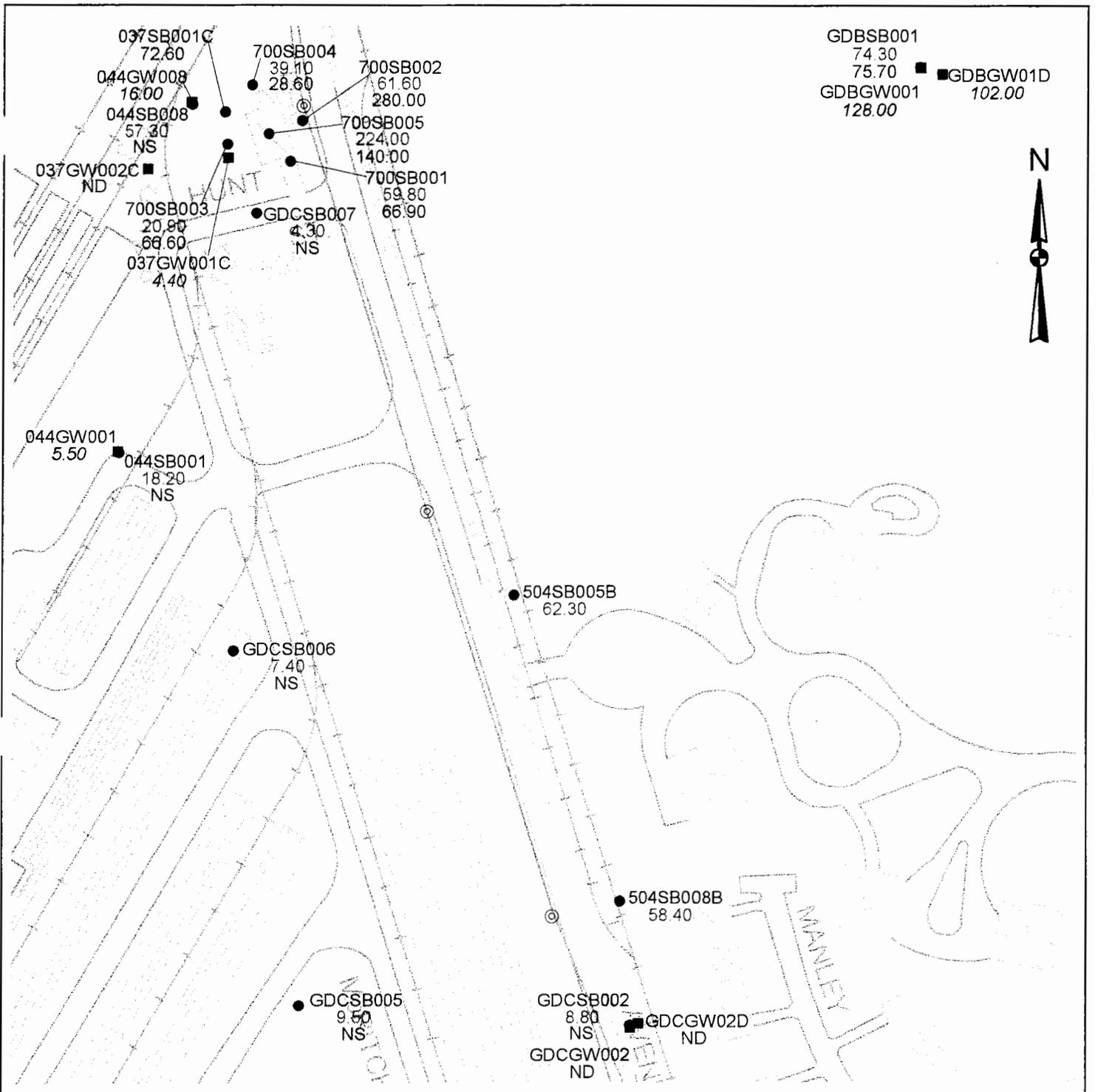
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE B OR C SOIL BORING LOCATION
- 12.30 ZONE B OR C SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE B OR C 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 10.2.18  
ZONE L - SUBZONE B  
ARSENIC  
ZONE L EXCEEDANCES WITH ZONES B AND C  
SOIL AND GW CONCENTRATIONS

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



**LEGEND**

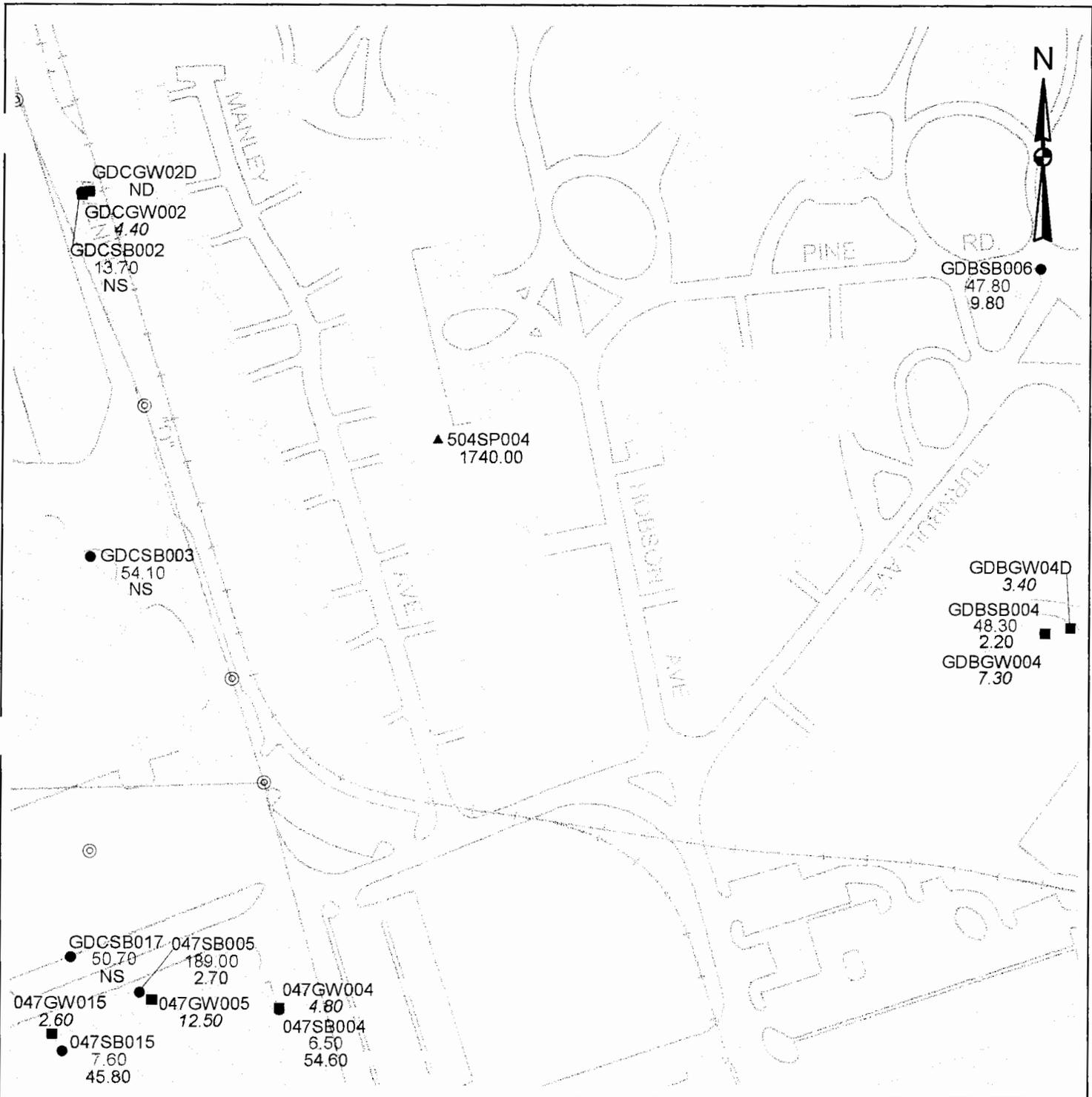
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE B OR C SOIL BORING LOCATION
- 12.30 ZONE B OR C SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE B OR C 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 10.2.19  
ZONE L - SUBZONE B  
CHROMIUM  
ZONE L EXCEEDANCES WITH ZONES B AND C  
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 B OR C SOIL BORING LOCATION
- 12.30 ZONE B OR C SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE B OR C SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN

SUBZONE BOUNDARY    RAILROAD    © MANHOLE  
 SANITARY SEWER LINE    STORM SEWER LINE

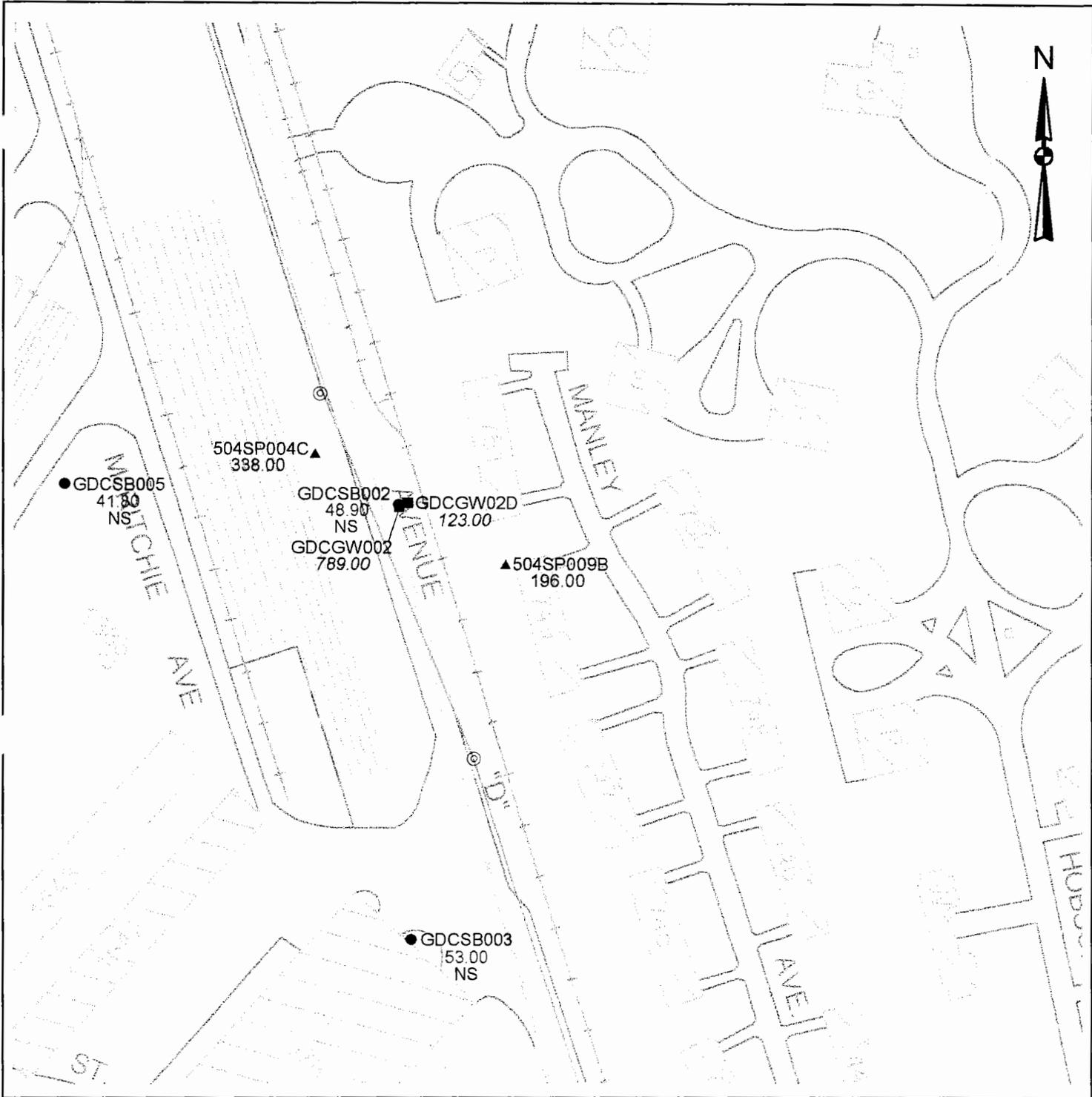
150      0      150      300 Feet



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

FIGURE 10.2.20  
 ZONE L - SUBZONE B  
 LEAD  
 ZONE L EXCEEDANCES WITH ZONES B AND C  
 SOIL AND GW CONCENTRATIONS

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



**LEGEND**

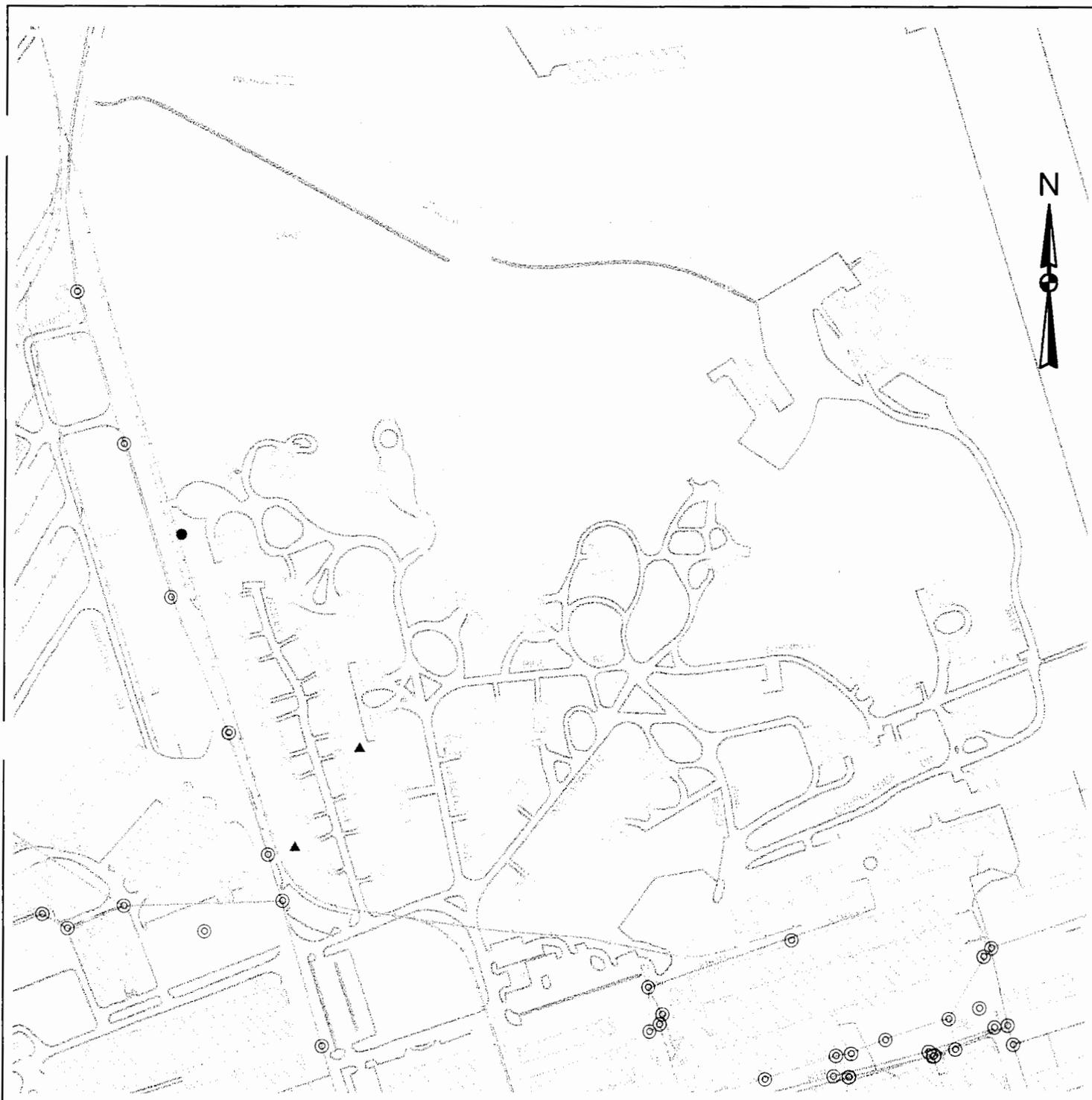
- ▲ ZONE L DPT SOIL LOCATION
- ZONE L SOIL BORING LOCATION
- 12.30 ZONE L DPT OR SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE L SUBSURFACE SOIL CONC. (mg/kg)
- MONITORING WELL LOCATION
- 12.30 MAXIMUM QUARTERLY GW CONC. (ug/L)
- ZONE B OR C SOIL BORING LOCATION
- 12.30 ZONE B OR C SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE B OR C 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 10.2.21  
ZONE L - SUBZONE B  
MANGANESE  
ZONE L EXCEEDANCES WITH ZONES B AND C  
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

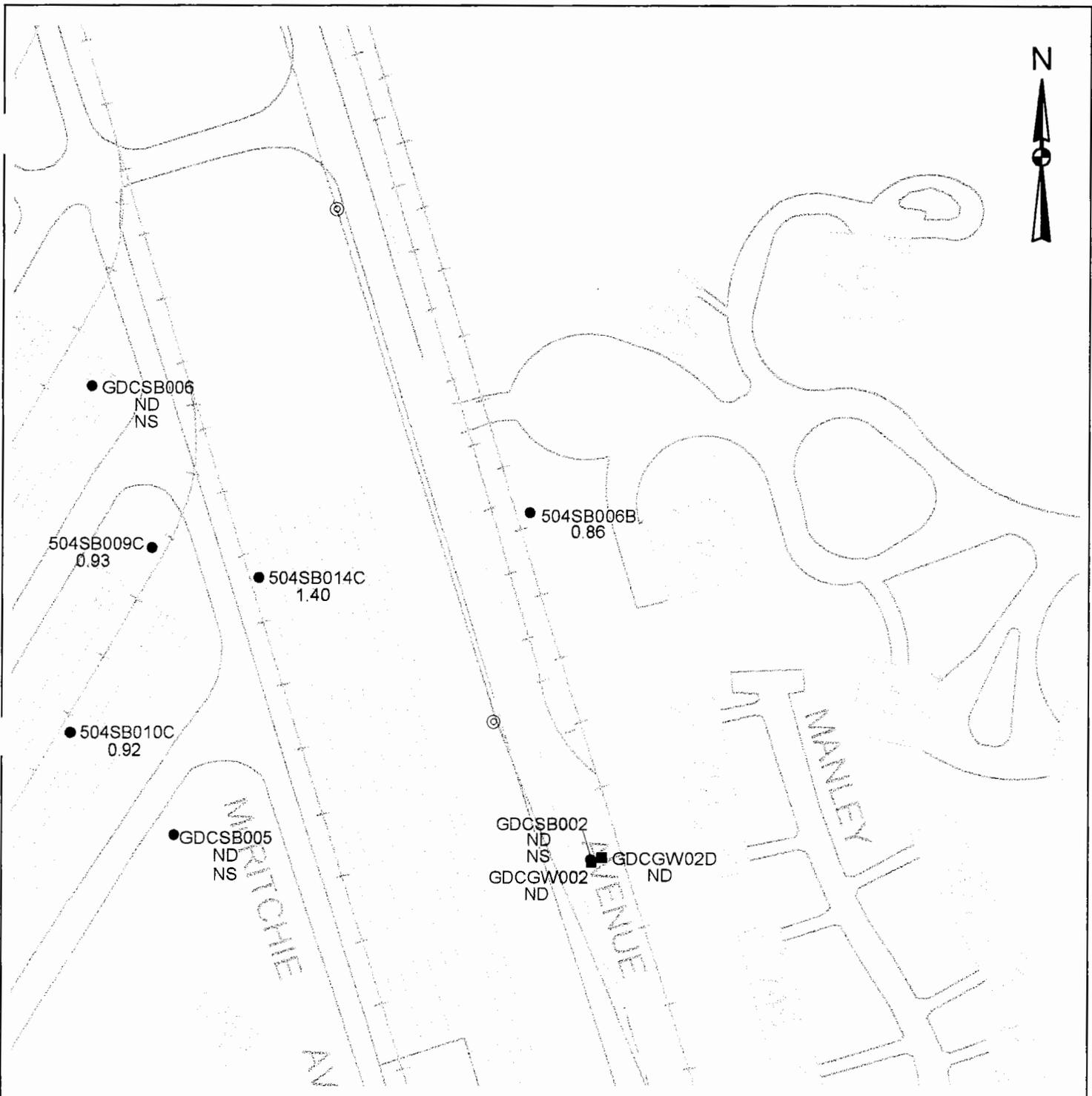
SUBZONE BOUNDARY	RAILROAD	MANHOLE
SANITARY SEWER LINE	STORM SEWER LINE	



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

FIGURE 10.2.22  
 ZONE L - SUBZONE B  
 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 B OR C SOIL BORING LOCATION
- 12.30 ZONE B OR C SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE B OR C SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

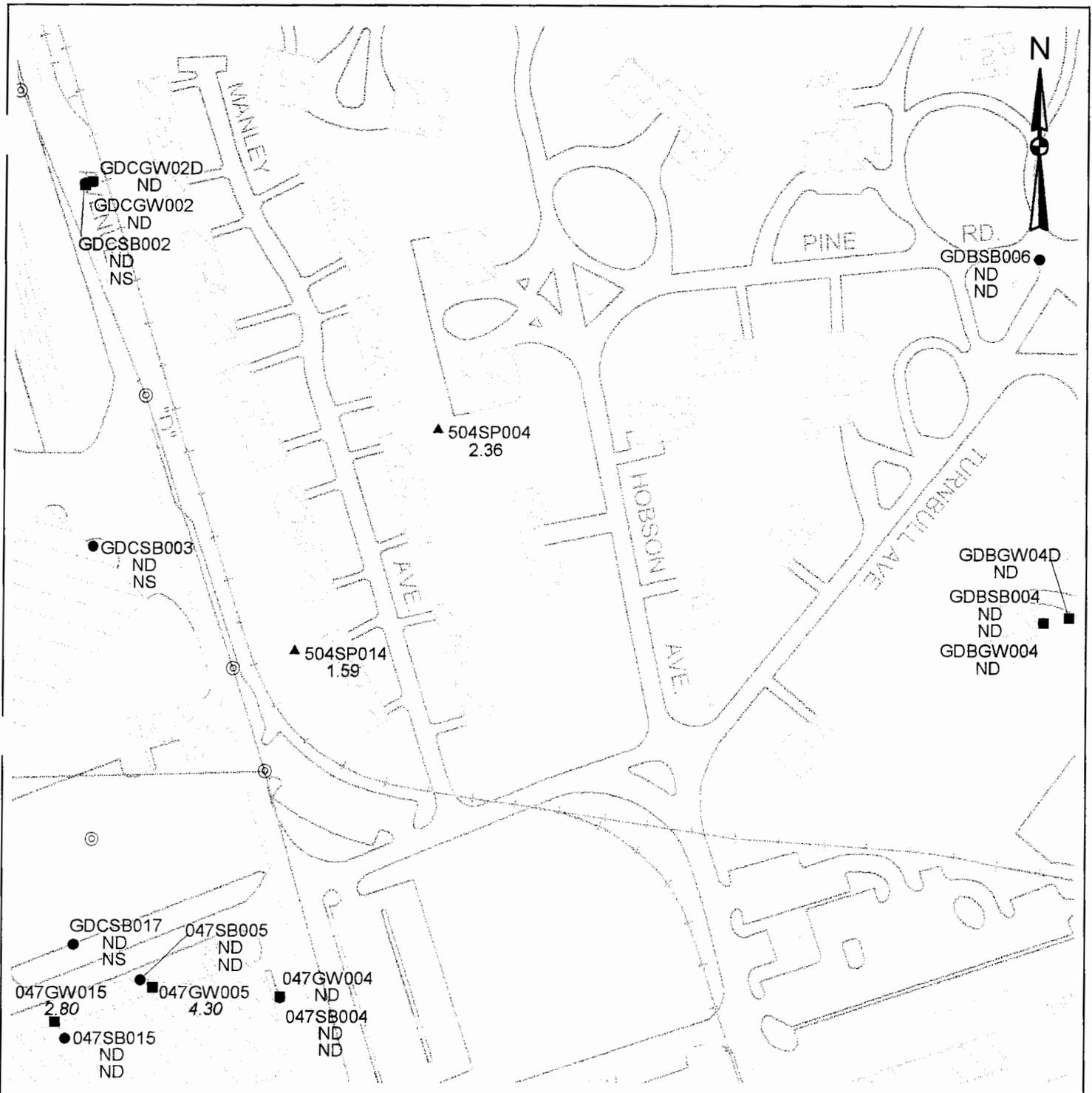


ZONE L - RCRA  
 FACILITY INVESTIGATION  
 NAVAL BASE CHARLESTON  
 CHARLESTON, SC

FIGURE 10.2.23  
 ZONE L - SUBZONE B  
 THALLIUM  
 ZONE L EXCEEDANCES WITH ZONES B AND C  
 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 B OR C SOIL BORING LOCATION
- 12.30 ZONE B OR C SURFACE SOIL CONC. (mg/kg)
- 12.30 ZONE B OR C SUBSURFACE SOIL CONC. (mg/kg)
- ND NOT DETECTED
- NS NO SAMPLE TAKEN
- SUBZONE BOUNDARY
- RAILROAD
- ⊙ MANHOLE
- SANITARY SEWER LINE
- STORM SEWER LINE

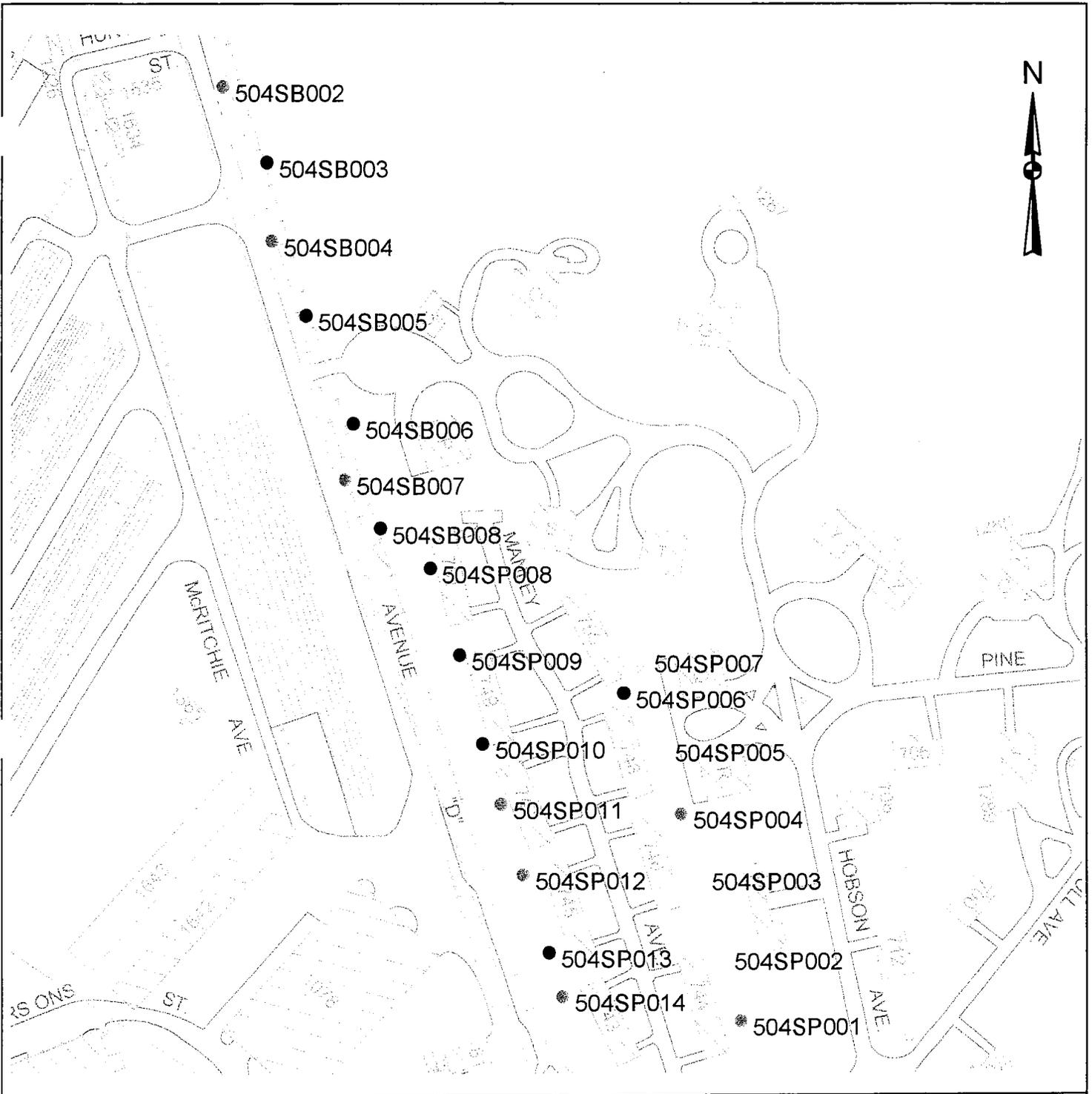
150 0 150 300 Feet



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

FIGURE 10.24  
ZONE L - SUBZONE B  
THALLIUM  
ZONE L EXCEEDANCES WITH ZONES B AND C  
SOIL AND GW CONCENTRATIONS

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



**LEGEND**

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

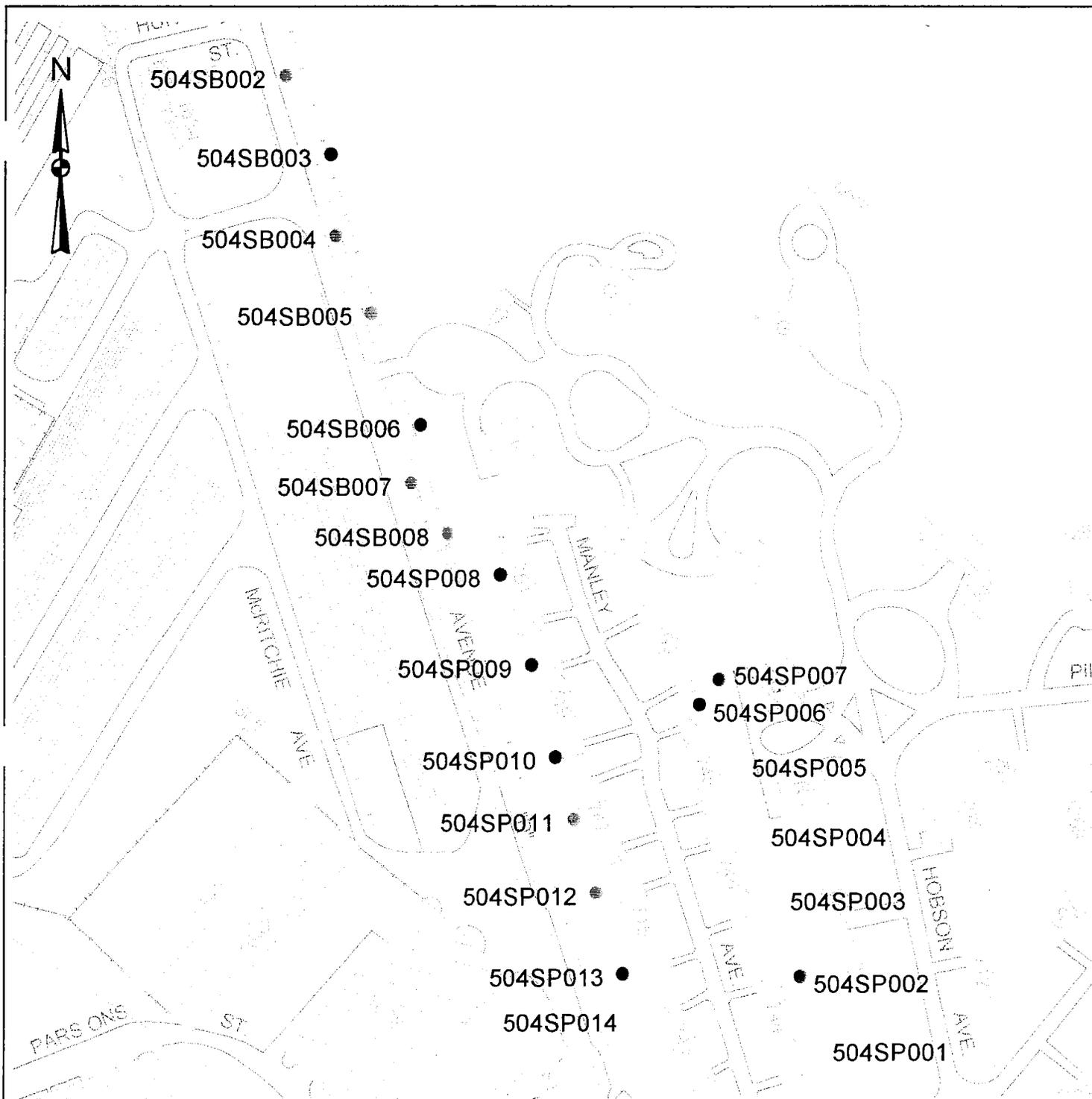


ZONE L - RCRA  
 FACILITY INVESTIGATION  
 NAVAL BASE CHARLESTON  
 CHARLESTON, SC

FIGURE 10.2.25  
 ZONE L - SUBZONE B  
 AOC 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

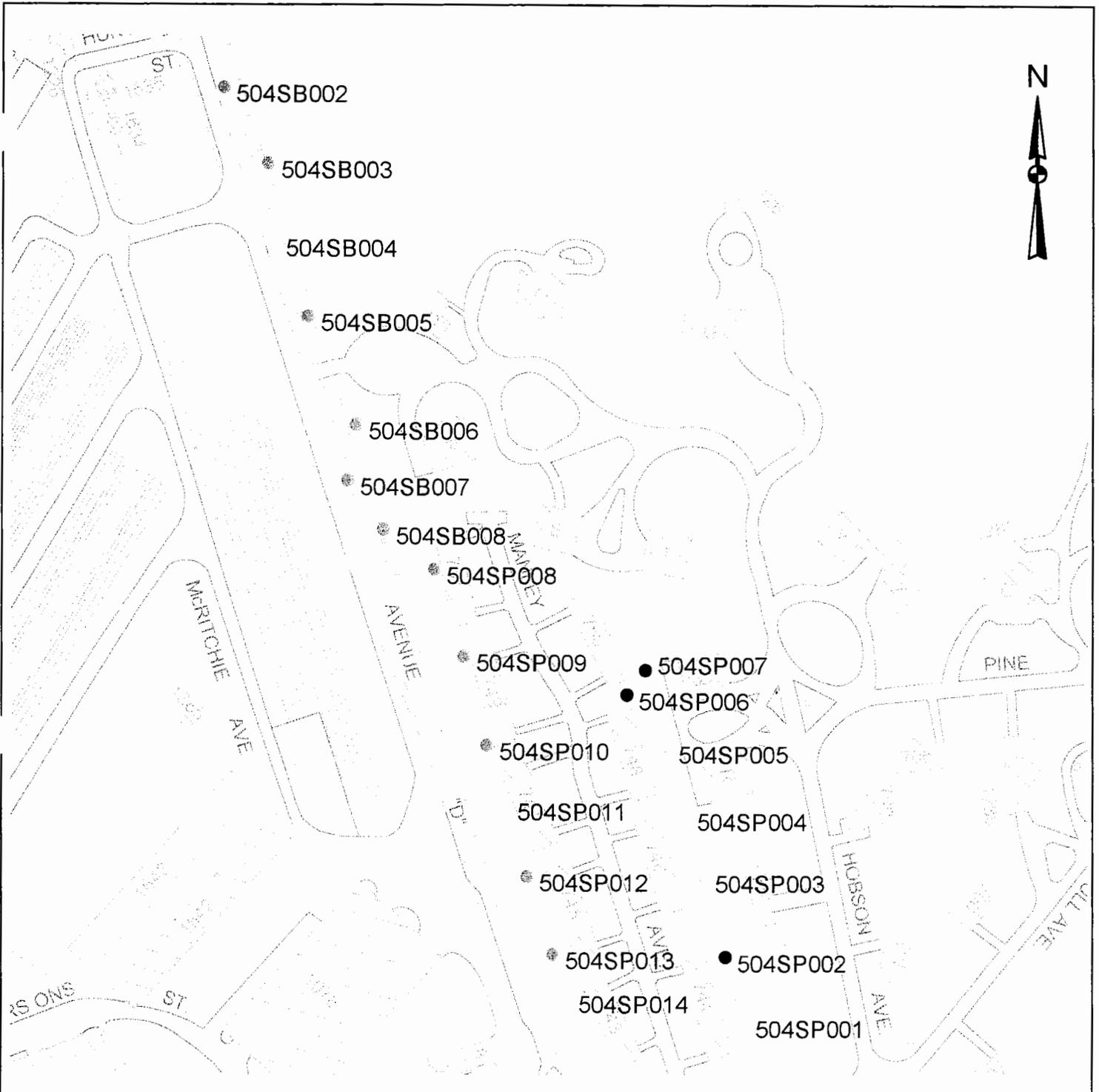


ZONE L - RCRA  
 FACILITY INVESTIGATION  
 NAVAL BASE CHARLESTON  
 CHARLESTON, SC

FIGURE 10.2.26  
 ZONE L - SUBZONE B  
 AOC 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

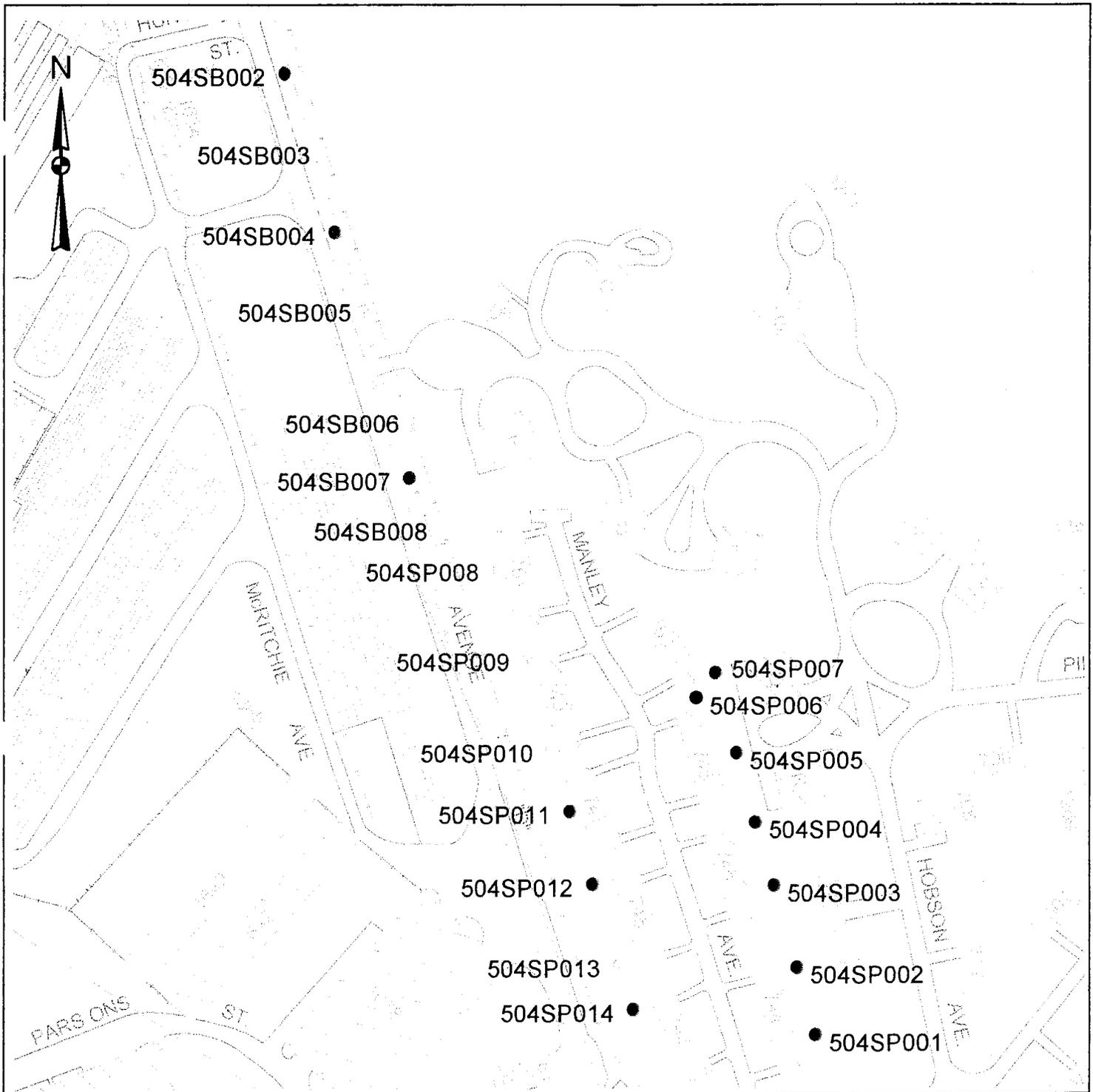


ZONE L - RCRA  
 FACILITY INVESTIGATION  
 NAVAL BASE CHARLESTON  
 CHARLESTON, SC

FIGURE 10.2.27  
 ZONE L - SUBZONE B  
 AOC 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

200 0 200 400 Feet



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

FIGURE 10.2.28  
 ZONE L - SUBZONE B  
 AOC 504

SOIL HAZARD INDEX  
 INDUSTRIAL SCENARIO