UNDERGROUND STORAGE TANK
CLOSURE AND SOIL EXCAVATION REPORT
FOR THE WILCO #211 STORE, RALEIGH, NORTH CAROLINA
GROUNDWATER INCIDENT #7708

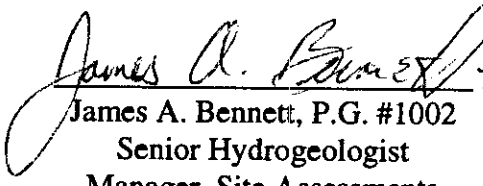
RECEIVED
JUN 10 1993
DEHNR-RAL RO

Prepared for:
A. T. Williams Oil Company
Arthur T. Williams, III
5446 University Parkway
Winston-Salem, NC 27109

Prepared by:

ESE Biosciences, Inc.
Raleigh, North Carolina

Submitted by:



James A. Bennett, P.G. #1002
Senior Hydrogeologist
Manager, Site Assessments

June 1993
Project No. J320-3

Confidentiality Statement

1.0 INTRODUCTION

1.1 Purpose and Scope-of-Work

This report summarizes the results of an underground storage tank (UST) closure and soil removal activities conducted at the Wilco #211 store located at 850 Capital Boulevard, Raleigh, NC (Figure 1). The tank closure was prompted by the need to upgrade the product storage and distribution system to comply with the requirements referenced in 15A NCAC 2N, "Criteria and Standards Applicable to Underground Storage Tanks." Additionally, as part of the Corrective Action Plan (CAP) for this property, seven underground storage tanks (USTs) were removed and contaminated soils from the tank excavation, beneath the fuel dispensing lines, and below the pump islands were removed. The new product storage system was installed on the south edge of the property (Figure 2).

The scope-of-work outlined for the tank and line removal consisted of removing six 4,000 gallon gasoline USTs and one 4,000 gallon diesel UST. Soil sampling within the tank pit was limited to the area under the diesel UST due to time and site constraints. The sampling was performed to characterize the soil for disposal at the Cherokee Environmental Group (Cherokee) brick manufacturing facility in Moncure, NC. Additional sampling was performed to determine the extent of contamination along Capital Boulevard adjacent to the former fuel dispensing area and within the former tank hold. The original plan for soil excavation, based on the CAP, consisted of removing approximately 900 cubic yards or 1260 tons of soil from the tank hold area and beneath the product lines and dispensers.

In preparation for these tasks, ESE Biosciences, Inc. (**EBIO**) completed a Notice of Intent: UST Permanent Closure form and a Notice of Intent to Install Underground Storage Tank(s) form. These forms were submitted to the North Carolina Department of Environment, Health, and Natural Resources (NC DEHNR) 30 days prior to closure as required by law (Appendix A).

1.2 Site Status

Presently the Wilco #211 store is active and the construction of the new building and fuel dispensing system is complete. The food store and fuel refilling re-opened the first week in April.

2.0 TANK CLOSURE

2.1 Tank Excavation and Removal

The tanks were positioned in an east/west orientation with three tanks at the eastern end and four tanks at the western end of the excavation (Figure 3). All product supply lines were backflushed into the tanks and the remaining petroleum was removed from the USTs prior to excavation. All lines were cut and plugged prior to vapor purging. Prior to removal, all explosive vapors were purged from each UST using a combination of dry ice and forced ventilation. An explosimeter was used to determine if the vapors within the USTs were below the lower explosive limit (LEL). The excavation and removal of one 4,000 gallon diesel UST was performed on February 21, 1993. The remaining six 4,000 gallon gasoline USTs were excavated and removed on February 22, 1993. All excavation and removal activities were performed using a trackhoe by Custom Turf of Raleigh, NC. All tanks were taken offsite for disposal. All tanks had been re-lined in approximately 1988 and appeared intact with no visible holes present. The complete "Site Investigation Report for Permanent Closure of U.S.T." is included in Appendix B.

2.2 Soil Sample Collection and Results

One soil sample, labeled T1, was taken from beneath the diesel tank at approximately 6 feet (ft) below land surface (bls) and analyzed via EPA Methods 8020, 8010, 5030, 3550/8015, and 8 RCRA metals via TCLP extraction methods. An additional sample was sent to Cherokee Environmental Group for sieve analysis and material identification. The samples were collected following **EBIO**, State, and EPA protocol and transported on ice under chain-of-custody control to the **EBIO** laboratory located in Raleigh. The chain-of-custody records are included in Appendix C.

The analytical results obtained from this sample, collected from the tank pit, are presented in Table 1. Extensive sampling of the tank pit was not required since the tank closure was performed in conjunction with a corrective action plan already approved by NC DEHNR. This special consideration was approved by Jay Zimmerman during a meeting with representatives of **EBIO** on February 24, 1993. An undetermined amount of product (estimated at less than 10 gallons) was present on the water table within the excavation area upon UST removal. The product was black in color and appeared to be from an old release. This product was removed to a holding tank using a pneumatic pump and taken offsite by the tank excavation contractor for disposal the following day.

3.0 SOIL EXCAVATION AND REMOVAL

3.1 Excavation of Contaminated Soil

The more heavily contaminated soils in the tank pit area were excavated and hauled to the Cherokee facility in Moncure, NC for low temperature thermal destruction. The soil manifests are found in Appendix D. The certificates of soil disposal are included in Appendix E. Approximately 838 tons of contaminated soil were removed from the tank pit area which measured approximately 55 ft by 25 ft (Figure 3). The tank pit was excavated to a depth of 11.5 ft at the western end and 6.5 ft at the eastern end. Rock refusal was encountered at approximately 8 ft bls near the center of the pit with a large area of rock encountered at the southeastern edge of the pit. Excavation halted when rock or the water table was encountered. The area of severe contamination was limited to the western end of the pit.

Soil excavation was also performed along the Capital Boulevard right-of-way to remove contaminated soils beneath the former fuel dispensing lines and pump islands. Soil was removed from the tank pit area southward until contamination was deemed minor. This excavation measured approximately 30 ft by 90 ft, as shown in Figure 4, and was completed to a depth of 5 ft bls. This resulted in the removal of approximately 880 additional tons of soil.

3.2 Soil Sample Collection and Results

To confirm that sufficient contaminated soils had been removed from the former tank hold and the area under the pump islands and fuel distribution lines, a total of 15 grab samples were obtained for field screening purposes. These soil samples were screened for the presence of volatile organic compounds using an organic vapor analyzer (OVA). Screening was accomplished by placing each soil sample in a ziplock plastic bag and allowed to equilibrate to ambient temperature for approximately 20 minutes. The calibrated OVA was then used to measure the soil gas vapors within the sample bag.

The results obtained from the soil samples collected from the western end of the former tank pit (samples 1A and 2B) were 1000 parts per million (ppm) and 350 ppm, respectively. The soil samples obtained from the partially weathered rock near the eastern edge of the tank pit (samples 3C and 4D) were 24 and 3 ppm, respectively. Five samples (samples 1 through 5) were taken from the area along the western edge of the property, near the Capital Boulevard right-of-way, at depths of 3 to 4 ft bls. These samples were obtained by advancing hand augers to the target depth. The results ranged from 0.5 to 60 ppm. Five test pits were dug with a backhoe to a depth of 5 ft bls in the area to the south and east of the excavation under the former fuel dispensing lines and pump islands (Figure 4). Soil samples were collected from each pit to confirm that sufficient soil had been

excavated to the east. Soil samples labeled TP2, TP3, TP4, and TP5 were screened on site with the OVA. The field screening results were 25, 2, 190, and 150 ppm, respectively. No sample was obtained from TP1. This test pit was utilized for visual confirmation of contaminants only. All field screening measurements were recorded on the field sample records included in Appendix F. These values are summarized in Table 2. All samples collected for laboratory analysis were placed in pre-cleaned sample jars with teflon-lined lids and placed on ice in coolers for transportation. All samples were transported under chain-of-custody control (Appendix C).

To confirm the results of the field screenings, three grab samples were obtained from test pits TP2, TP4, and TP5. These soil samples were analyzed in the laboratory for gasoline and diesel fuel fractions via EPA Methods 5030 and 3550, respectively. Results ranged from 0.78 at TP5 to 50 ppm at TP4 for EPA Method 5030 and below the method detection limit (BDL) at TP5 to 72 ppm at TP4 for EPA Method 3550. These results are summarized in Table 1. The complete analytical report is included as Appendix G.

3.3 Infiltration Gallery Construction

Once soil excavation was complete, the bottom of the former tank pit was graded to obtain a level surface so that an infiltration gallery could be built. In general, this consisted of backfilling and tamping #57 washed stone in layers below and above the infiltration lateral lines to the surface. To prevent soil from filtering into the stone backfill, a geotextile fabric was placed on top of the final layer of stone prior to placing fill soil to grade level. This area is now referred to as Gallery A, as shown in Figure 4. Galleries B, C, and D were constructed in a similar manner in the areas of the former dispensing lines and pump islands.

4.0 SUMMARY AND CONCLUSIONS

The initial soil sample (T1) taken from the former tank pit revealed measurable concentrations of both gasoline and diesel fuel constituents. None of the eight RCRA metals were detected above regulatory limits using the TCLP methodology. Upon completion of the tank pit excavation, field screened samples from the eastern end of the tank pit revealed low concentrations of PHCs. However, samples collected from the western end of the tank pit showed high soil gas readings. Physical and disposal constraints limited the amount of soil removal performed in this area. The disposal constraints were based on soil excavation limitations imposed on this site by the CAP recommendations and the NC DEHNR. The remaining contaminants in the tank pit should be addressed by a remediation system employing Infiltration Gallery A. It is expected that the contaminants remaining in these soils will be flushed into the groundwater and recaptured or treated in place. The test pits excavated in the area east of galleries B, C, and D showed concentrations below the target cleanup levels established in the site sensitivity evaluation (SSE) results as shown in Table 1. The target cleanup level for gasoline and diesel fuel constituents is 60 and 240 ppm, respectively. Field screening in the area under galleries B, C, and D revealed low OVA readings at 3 to 4 ft bls. Therefore, it is apparent that the soils under the former fuel distribution and dispensing islands were contaminated due to line leaks or overspills. These soils were excavated and hauled from the site for disposal by low temperature thermal destruction. Again, it is expected that the remaining contaminants in the soils adjacent to and beneath galleries B, C, and D will be flushed into the groundwater and recaptured or treated in place.

In conclusion, the USTs, product lines, and dispensing system removal and the related soil excavation was a successful process. The main source of environmental impact: the tanks, lines, and fuel dispensing system, and the secondary source: the contaminated soils beneath and adjacent to the main source, have been removed. However, some soil contamination still remains but can be treated by an *in situ* remediation system.

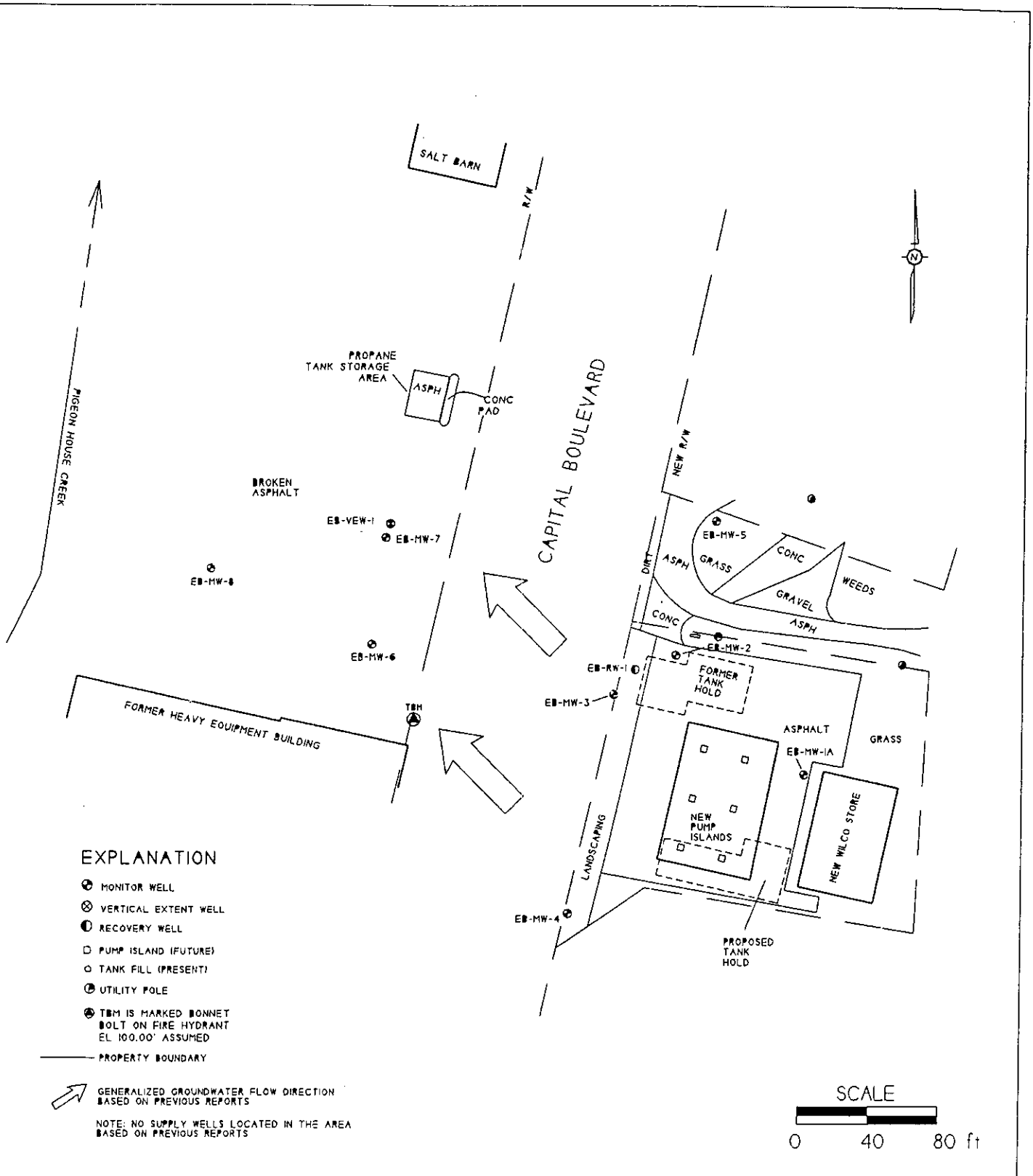


FIGURE 2. GENERAL SITE MAP

SOURCE: ESE BIOSCIENCES, INC., 1993.

ESE BIOSCIENCES, INC. RALEIGH, NC

DRAWN BY: LDL
CHECKED BY: JAB
PROJ. MGR.: JAB
PROJ. NO.: J320-3
SCALE: 1" = 80'
DATE: 1/5/93

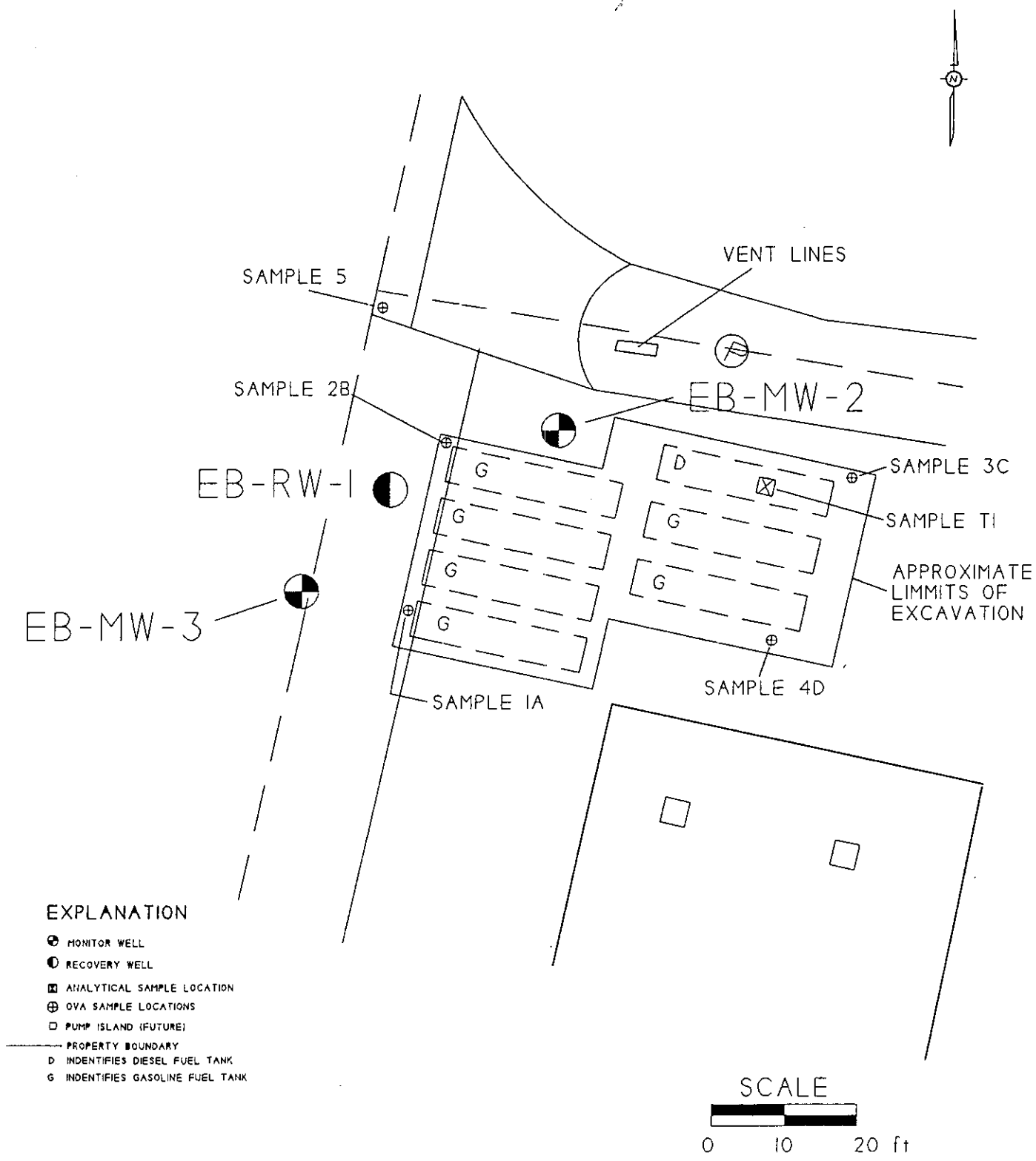
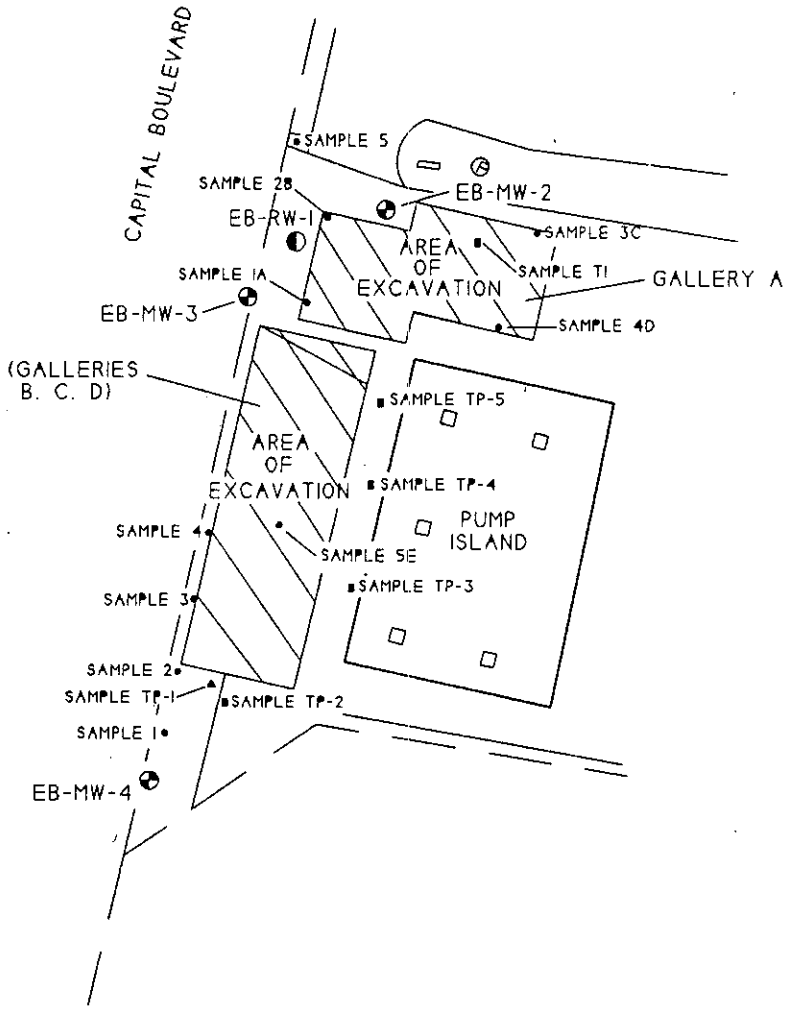


FIGURE 3. EXCAVATION MAP OF FORMER TANK HOLD

SOURCE: ESE BIOSCIENCES. INC., 1993

ESE BIOSCIENCES. INC. RALEIGH, NC

DRAWN BY: LDL
CHECKED BY: JAB
PROJ. MGR.: JAB
PROJ. NO.: J320-3
SCALE: 1" = 20'
DATE: 3/31/93



EXPLANATION

- MONITOR WELL
- RECOVERY WELL
- ANALYTICAL SAMPLES
- OVA SAMPLES
- HAND SAMPLE
- PUMP ISLAND (FUTURE)
- UTILITY POLE
- PROPERTY BOUNDARY

SCALE

0 25 50 ft

FIGURE 4. SOIL EXCAVATION AND SAMPLE LOCATION MAP

SOURCE: ESE BIOSCIENCES, INC., 1993

ESE BIOSCIENCES, INC. RALEIGH, NC

DRAWN BY:	LDL
CHECKED BY:	JAB
PROJ. MGR.:	JAB
PROJ. NO.:	J320-3
SCALE:	1" = 50'
DATE:	4/5/93

Table 1. Soil Analytical Results (Project No. J320-3)

Method/Constituent	Sample Location and Depth				Regulatory Limit (Soils)*
	T1 (6 ft bls)	TP2 (4 ft bls)	TP4 (4 ft bls)	TP5 (4 ft bls)	
EPA Method 5030					
lbp-PHC	7900	19	50	0.78	60
EPA Method 3550					
hbp-PHC	2700	3.3	72	BDL	240
EPA Method 8020**					
Toluene	25000	N/A	N/A	N/A	NL
Chlorobenzene	18000	N/A	N/A	N/A	100
Ethylbenzene	60000	N/A	N/A	N/A	NL
Total Xylenes	211000	N/A	N/A	N/A	NL
1,4-Dichlorobenzene	16000	N/A	N/A	N/A	7.5
1,2-Dichlorobenzene	93000	N/A	N/A	N/A	NL
TCLP Metals					
Barium	1.22	N/A	N/A	N/A	10.0

Notes:

*regulatory limits based on site sensitivity evaluation (SSE)

**concentrations for constituents analyzed via EPA Method 8020 listed in parts per billion (ppb); all other results listed are in parts per million (ppm).

lbp-PHC = low-boiling point petroleum hydrocarbons. Quantification based on non-aged gasoline standard.

hbp-PHC = high-boiling point petroleum hydrocarbons. Quantification based on non-aged diesel fuel standard.

N/A = no analysis performed

NL = no limit established

Table 2. Soil Gas Readings (Project No. J320-3)

Sample	Date	Location	OVA Reading (ppm)
1A	2/24/93	Tank Pit, SW Corner	1000+
2B	"	Tank Pit, NW Corner	350
3C	"	Tank Pit, NE Corner	24
4D	"	Tank Pit, SE Corner	3
5E	"	Gallery D Area-surface	1000+
1	2/25/93	Gallery D, 3 to 4 ft bls	0.5
2	"	Gallery C-D, 3 to 4 ft bls	60
3	"	Gallery C, 3 to 4 ft bls	50
4	"	Gallery B, 3 to 4 ft bls	45
5	"	North of EB-RW-1	4.5
TP1[a]	3/2/93	5 ft bls	PHC odor
TP2	"	3 to 4 ft bls	25
TP3	"	3 to 4 ft bls	2
TP4	"	3 to 4 ft bls	190
TP5	"	3 to 4 ft bls	50

Notes:

ppm = parts per million of total volatile organics utilizing head space methods with an organic vapor analyzer

[a]visual observation, no OVA reading was taken