FINAL

ADDENDUM #4 TO THE SAMPLING AND ANALYSIS PLAN

FORSCOM

3d Inf Div (Mech)

FOR THE

Corrective Action Plan Part A and B Investigations for Former Underground Storage Tanks, Hunter Army Airfield, Georgia

Prepared for

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT

Contract No. DACA21-95-D-0022
Delivery Order 0061

February 2001

SAIC®

DOCUMENT 14

FINAL

ADDENDUM #4
TO THE
SAMPLING AND ANALYSIS PLAN
FOR THE
CORRECTIVE ACTION PLAN PART A AND B INVESTIGATIONS
FOR
FORMER UNDERGROUND STORAGE TANKS,
HUNTER ARMY AIRFIELD, GEORGIA

Prepared for

U.S. Army Corps of Engineers
Savannah District
Under Contract Number DACA21-95-D-0022
Delivery Order 0061

Prepared by

Science Applications International Corporation
800 Oak Ridge Turnpike
Oak Ridge, Tennessee 37830

February 2001

APPROVALS

ADDENDUM #4
TO THE
SAMPLING AND ANALYSIS PLAN
FOR THE
CORRECTIVE ACTION PLAN PART A AND B INVESTIGATIONS
FOR
FORMER UNDERGROUND STORAGE TANKS,
HUNTER ARMY AIRFIELD, GEORGIA

Bruce King, Deputy Program Manager — Date: 2-2-01

Patricia A. Stoll, Project Manager — Date: 2/2/01

TABLE OF CONTENTS

List of Abbreviations and Acronyms

BTEX	benzene, toluene, ethylbenzene, and xylenes
CAP	Corrective Action Plan
DAACG	Departure/Arrival Air Control Group
GAEPD	Georgia Environmental Protection Department
PAH	polyaromatic hydrocarbons
QA	quality assurance
QC	quality control
UST	underground storage tank
USTMP	Underground Storage Tank Management Program

1.0 INTRODUCTION

This addendum supplements the *Sampling and Analysis Plan for the Corrective Action Plan – Part A and B Investigations for Former Underground Storage Tanks at Hunter Army Airfield, Georgia* (SAIC 1998). It presents changes to the Sampling and Analysis Plan and the specific sampling requirements for performing additional CAP-Part B investigations. The investigations are required at the Pumphouse #1/Departure/Arrival Air Control Group (DAACG) site upon review of the Corrective Action Plan-Part B submitted to the Georgia Environmental Protection Department (GA EPD) to complete the delineation of the extent of contamination. Table 1 identifies general site-specific information and presents the proposed activities for each site. In addition, Chapter 4.0 clarifies the well installation activities at Underground Storage Tanks (USTs) 25 & 26, which have previously been described in *Addendum # 11 to the Work Plan for Preliminary Groundwater and Corrective Action Plan–Part A/Part B Investigations at Former Underground Storage Tank Sites, Fort Stewart, Georgia* (SAIC 2000).

2.0 PROJECT ORGANIZATION

The organizational chart for the Part B Investigation is presented in Addendum #2 (SAIC 1999).

3.0 DAACG FIELD ACTIVITIES

Field activities for the Pumphouse #1/DAACG site will consist of the installation of 11 4-inch monitoring wells. One soil sample will be collected from each boring during installation and sent to the lab for benzene, toluene, ethylbenzene, total xylenes (BTEX) and polyaromatic hydrocarbons (PAHs) analysis. After installation the wells will be developed, allowed to equilibrate for 14 days and then sampled for BTEX. The free-phase product thickness will be evaluated in three of the newly installed wells and absorbent socks will be installed in any wells that contain product. The proposed sampling locations for the site are presented in Appendix A. Table 2 presents the sample numbering system that will be used for this investigation. Table 3 presents a summary of the field and quality control (QC) soil and groundwater samples to be collected during the investigations.

3.1 MONITORING WELL INSTALLATION

A total of 11 monitoring wells will be installed using the hollow stem auger drilling method. The procedures and methodology for hollow stem auger drilling are presented in the Sampling and Analysis Plan (SAIC 1998).

3.1.1 Sample Selection During Well Installation

One soil sample will be collected from each borehole. Sample selection will be based on the following criteria:

- In cases where no contamination is detected by field headspace gas analysis in any of the borehole intervals, one soil sample from the 2.5-foot interval prior to encountering the water table will be selected for lab analysis.

- In cases where contamination is detected by field headspace gas analysis in one or more of the borehole intervals, one soil sample from the 2.5-foot interval exhibiting the highest detected organic vapor concentration will be selected for lab analysis.

For each site, the soil will be sent to an off-site analytical laboratory and analyzed for BTEX and PAH. In addition, one soil sample from each borehole will be analyzed for lead to determine disposal requirements. A summary of the number of soil and QC soil samples for the site is presented in Table 3.

Soil samples designated for BTEX analysis will be collected using Encore™ sampling devices. Three Encore™ samples will be collected from each 2.5-foot interval. The analytical methods listed in Table 3 have been revised to reflect the May 1998 changes in the state regulations regarding USTs.

The monitoring wells will be developed according to the procedures and methodology presented in the Sampling and Analysis Plan (SAIC 1998). Groundwater field measurements performed during the CAP-Part B investigations will include pH, specific conductance, and temperature.

3.2 GROUNDWATER SAMPLING

Groundwater samples will be collected from each of the 11 newly installed wells and from 20 existing wells using low-flow sampling techniques. Field measurements performed during the investigation will include pH, specific conductance and temperature. Procedures and equipment for measurement of pH, specific conductance, and temperature are presented in the Sampling and Analysis Plan (SAIC 1998). The proposed locations for well sampling are presented in Appendix A.

3.3 WATER LEVEL MEASUREMENT

A complete set of water level measurements will be collected from all wells prior to leaving the site. Procedures and equipment for water level measurements are presented in the Sampling and Analysis Plan (SAIC 1998).

3.4 FREE-PHASE PRODUCT THICKNESS EVALUATION

To determine the actual amount of product on the groundwater surface at the site, a free-phase product thickness evaluation will be conducted using the field bail-out test method (Gruszczenski). Free-phase product and groundwater level measurements will be taken using an oil/water interface probe, which detects product and water by different conductivity values. The test method includes the following steps:

- Measure the static product surface level and groundwater surface to determine the thickness of the product and the depth to groundwater in the well. A free-phase product level will be recorded as the interface probe is lowered into the well.

- Remove the free-phase product and groundwater from the well using a disposable top-filling bailer (or peristaltic pump). All measurable free-phase product will be extracted from the groundwater

surface in each well. The interface probe will be lowered into the screened interval or near the bottom of the well to confirm the removal of the product.

- Measure the volume of product and groundwater extracted from the well and record the results.

- Measure the free-phase product surface and groundwater surface levels in each well and record the results at 10-minute intervals for the first hour and periodically thereafter while recovery from purging is occurring in the well (maximum duration of 48 hours). The extracted free-phase product and water will be placed in containers for later disposal.

The results of the free-phase product testing using the field bail-out method are similar to a rising-head slug-test. The results of the test yield two basic curve types, depending on the amount of free-phase product accumulation in the well. A Type I curve is associated with free-phase product accumulations of less than 12 inches and includes a one-to-one correspondence between the measured and actual formation free-phase product thickness. Type II curves are associated with free-phase product accumulations greater than 12 inches and result in interpretation of an inflection prior to stabilization of water and free-phase product levels. This inflection point will be used to interpret the measured and actual formation of free-phase product thickness.

Graphs of the water/free-phase product levels versus time will be generated to observe the slope of the water/free-phase product interface and to determine inflection points. The actual product thickness is determined by measuring the difference between the product line and the water/free-phase product interface line at the inflection point. The difference between the water/free-phase product interface level at the time of inflection and the stabilization top of the free-phase product level is the sum of the actual product thickness and capillary fringe. The height of the capillary fringe is determined by subtracting this difference from the actual product thickness measured at the inflection point. Graphs will be generated with a depth measurement on the y axis and the time of the test along the x axis. The graphs will indicate the top of the free-phase product and the top of the water table. These curves will be used to generate and determine the apparent product thickness on the groundwater as a sum of the actual thickness and capillary fringe.

The Gruszczenski test bail-out method can reasonably determine the actual free-phase product thickness in any particular formation. The procedure uses principles similar to the bail-out slug test and interpretation of the groundwater surface as affected by free-phase product accumulation. The information is used to determine the thickness of the free-phase product.

The results of the free-phase product testing will be combined with existing site data to evaluate remedial alternatives. The corrective action recommendations will be summarized in a CAP-Part B Addendum Report that will be submitted to GA EPD Underground Storage Tank Management Group (USTMP) for review ands approval.

3.5 PRODUCT RECOVERY

Absorbent socks will be installed in the seven existing wells that contain product at this site (D-M11, D-MW2, D-MW6, D-MW8, D-MW11, D-MW13, and D-MW15). Absorbent socks will also be installed in any of the new wells that contain free product.

4.0 USTS 25 & 26 FIELD ACTIVITIES

As discussed in *Addendum #11 to the Work Plan for Preliminary Groundwater and Corrective Action Plan–Part A/Part B Investigations at Former Underground Storage Tank Sites, Fort Stewart, Georgia* (SAIC 2000), 10 deep monitoring wells were to be installed at the USTs 25 & 26 site. The locations and screened intervals are dependent on the groundwater screening results from the vertical-profile borings installed in December 2000. Upon review of the groundwater screening results, the number of wells was increased to 11. The screened intervals for wells AF-53 through AF-63 are presented in Table 4, and the well locations are shown in Figure A-2. The specifics regarding installation and sampling are the same as those described in Addendum #11.

5.0 REFERENCES

SAIC (Science Applications International Corporation)1998. *Sampling and Analysis Plan for the Corrective Action Plan-Part A and B Investigations for Former Underground Storage Tanks at Hunter Army Airfield, Georgia.*

SAIC 1999. *Addendum #2 to the Sampling and Analysis Plan for the Corrective Action Plan-Part A and B Investigations for Former Underground Storage Tanks at Hunter Army Airfield, Georgia.*

SAIC 2000. *Addendum # 11 to the Work Plan for Preliminary Groundwater and Corrective Action Plan–Part A/Part B Investigations at Former Underground Storage Tank Sites, Fort Stewart, Georgia.*

Table 1. Proposed Field Activities at the Pumphouse #1/DAACG Site

Site	Facility ID	Building	Type of Tank	Well Installation	Well Sampling
Pumphouse #1 DAACG	9-025085	8060	JP-8	D-MW-33, D-MW-34, D-MW-35, D-MW-36, D-MW-37, D-MW-38, D-MW-39, D-MW-40, D-MW-41, D-MW-42, D-MW-43	D-MW-01, D-MW-02, D-MW-03, D-MW-08, D-MW-09, D-MW-11, D-MW-12, D-MW-13, D-MW-14, D-MW-17, D-MW-18, D-MW-19, D-MW-20, D-MW-21, D-MW-22, P1-MW-13, P1-MW-14, P1-MW-15, P1-MW-16, P1-MW-42

Table 2. Sample Number System for the Field Activities

Sample Identification: XX##NT	
XX = Area Designator	<u>Examples</u> AK = INV-AK (DAACG) AN = INV-AN (Pumphouse #1)
## = Sample Location	Sample locations will be consecutive starting from the last sample location. <u>Examples</u> 05 = Soil Borehole 05
N = Sample Depth	Sample depth will be represented by a number for each laboratory sample. <u>Examples</u> 1 = First Interval 2 = Second Interval
T = Sample Type	<u>Examples</u> 1 = Soil Sample 2 = Groundwater Sample 3 = Soil Duplicate 4 = Groundwater Duplicate 5 = Rinsate Blank (Soil Equipment) 6 = Rinsate Blank (Groundwater Equipment) 7 = Soil QA Split Sample 8 = Groundwater QA Split Sample 9 = Surface Water Sample 0 = Sediment Sample
All trip blank samples used during the project will be consecutively identified.	

Table 3. Summary of Soil and Groundwater Samples To Be Collected during Addendum #4 Investigations, Hunter Army Airfield, Georgia

Investigation	Matrix	Analysis	Analytical Procedures	No. Field Smpls	QC Dups[a]	Field Rnsts[b]	QC Trip Blnks	Total Smpls	Holding Time	Preservation Requirements	Sample Containers
Pumphouse #1 DAACG	Groundwater	BTEX	EPA 8260B	31	3	1	10	45	14 days	Cool 4°C[c] HCl pH <2	2, 40 mL GSV
	Soil	BTEX	EPA 5035/8260B	11	1	0	0	12	48 hours	Cool 4°C	3 Encores™
		PAH	EPA 8270	11	1	0	0	12	14/40 days	Cool 4°C	1, 8 oz. CWM
		TCLP Lead	EPA 6010/7000	11	0	0	0	11	180 days	Cool 4°C	1, 8 oz. CWM

CWM Clear, wide mouth glass jar
GSV Glass septa vial
(This table is in conformance with EM200-1-3).

[a] The number of QC duplicate samples represents a 10-percent distribution between the different types of investigations to be conducted. However, the actual number of duplicates collected for each investigation type might vary slightly from the distribution presented.

[b] The number of QC rinsate blank samples represents a 5-percent distribution between the different types of investigations to be conducted. However, the actual number of blanks collected for each investigation type might vary slightly from the distribution presented.

[c] Sample containers will be filled so that no headspace is present.

Table 4. Summary of USTs 25 & 26 Deep Well Construction Details

WELL	Well Material	Screened Interval (feet bgs)	Screen Length (feet)
AF-53	2-inch PVC	20 – 30	10
AF-54	2-inch PVC	33 – 43	10
AF-55	2-inch PVC	24 – 34	10
AF-56	2-inch PVC	20 – 30	10
AF-57	2-inch PVC	55 – 50	5
AF-58	2-inch PVC	10 – 20	10
AF-59	2-inch PVC	15 – 25	10
AF-60	2-inch PVC	5 – 15	10
AF-61	2-inch PVC	13 – 23	10
AF-62	2-inch PVC	17 – 27	10
AF-63	2-inch PVC	5 – 15	10

PVC = Polyvinyl chloride.

APPENDIX A

PROPOSED LOCATIONS FOR WELL INSTALLATIONS

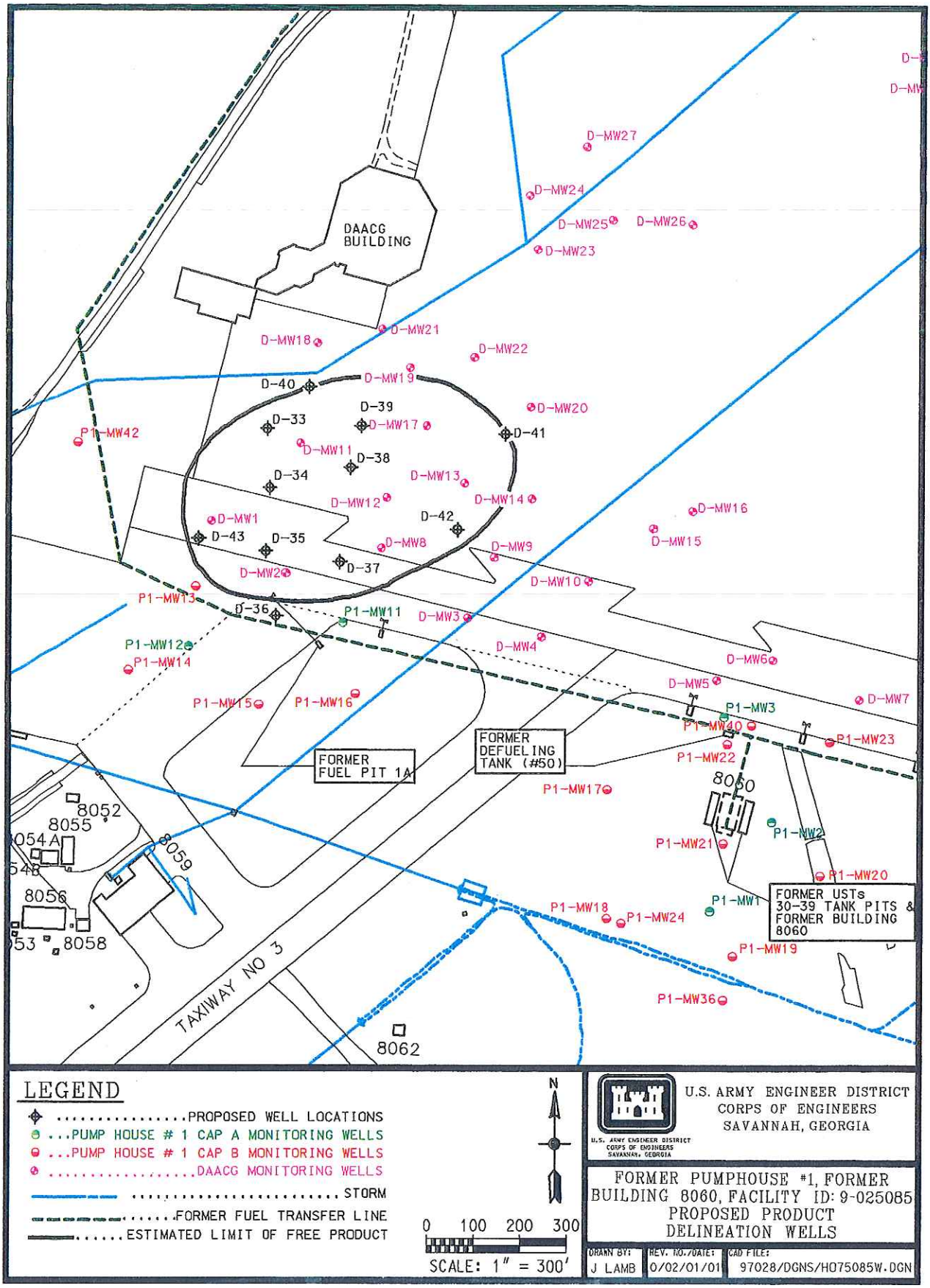

Figure A-1. Site Map for Pumphouse#1/DAACG

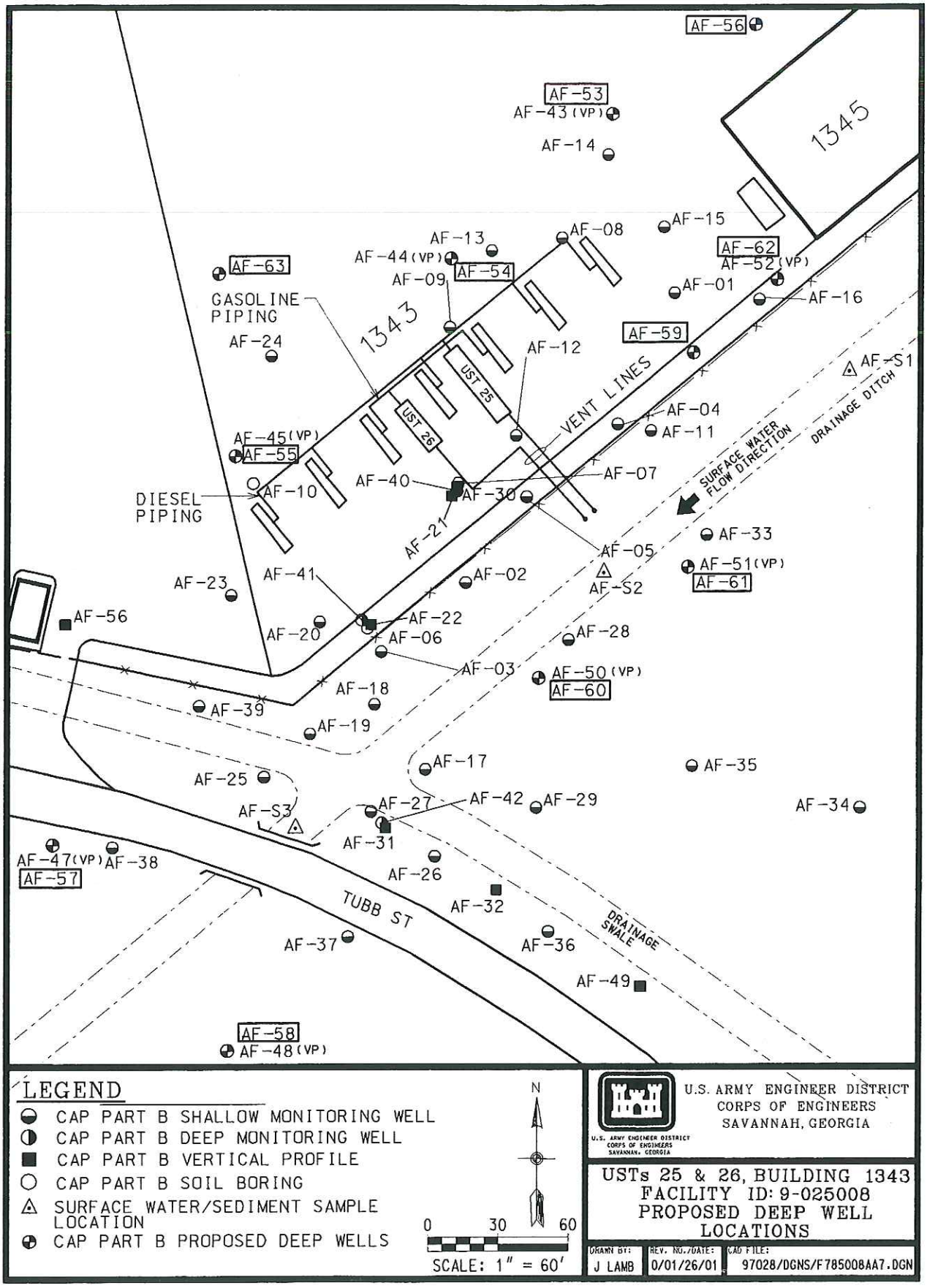

Figure A-2. Site Map for USTs 25 & 26