FINAL

2003 LETTER REPORT

FOR THE

FEASIBILITY STUDY/REMEDIAL DESIGN

AT THE

FORMER CHARLOTTE ARMY MISSLE PLANT (CAMP), MECKLENBURG COUNTY CHARLOTTE, NORTH CAROLINA

Prepared for

US Army Corps of Engineers®

SAVANNAH DISTRICT

CONTRACT NO. DACA21-95-D-0022
DELIVERY ORDER 0070

June 20, 2003

SAIC

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June 20, 2003

James R. Romer, P.E. SAIC Engineering of North Carolina, Inc., Project Manager	6/23/03 Date

NORTH CAROLINA PROFESSIONAL SEAL 25830 ENGINEER JAMES R. ROMER

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June 20, 2003

An Employee-Owned Company

Mr. Zainul Kidwai
U.S. Army Corps of Engineers
Savannah District
ATTN: CESAS-PM-H (Mr. Zanuil Kidwai)
100 West Oglethorpe Avenue
Savannah, Georgia, 31401-3640

Reference: **U.S. Army Corps of Engineers Contract DACA21-95-D-0022, Delivery Order No. 0070**

Subject: **Transmittal of the Final 2003 Letter Report for the 2003 Field Activities, Feasibility Study/Remedial Design (FS/RD) at the Charlotte Army Missile Plant, Charlotte, North Carolina**

Dear Mr. Kidwai

Attached please find three copies of the Final 2003 Letter Report submitted to detail the field activities, which occurred at the Charlotte Army Missile Plant during January, February, and April 2003. This letter report provides a summary of all current (January, February, and April 2003) field activities in addition to specific conclusions and recommendations developed to outline the appropriate path forward for the former CAMP facility. The following Appendices are included:

- Appendix A Summary of Field Activities
- Appendix B Borehole Logs and Construction Diagrams
- Appendix C Civil Survey Data
- Appendix D Field Sampling Data Sheets
- Appendix E IDW Disposal Manifests
- Appendix F Laboratory Analytical Data

Should you have any questions, please do not hesitate to call me at 865-481-4676.

Sincerely,
SAIC ENGINEERING OF NORTH CAROLINA, INC.

James R. Romer, P.E.
Project Manger

cc w/enclosures : Paula Bond, SAIC
Central Records, SAIC
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APPENDIX A

SUMMARY OF FIELD ACTIVITIES

SUMMARY OF FIELD ACTIVITIES

1.0 INTRODUCTION

The following sections describe the field activities performed during January, February, and April 2003 at the former Charlotte Army Missile Plant (CAMP) facility in Charlotte, North Carolina. In addition, a brief discussion of the analytical results, conclusions and recommendations based on all historic and current data are presented.

Previous investigations at the former CAMP facility include the Phase I and Phase II Remedial Investigations (RI) completed by Metcalf & Eddie (M&E) in 1999 and 2000 respectively. Science Applications International Corporation (SAIC) completed additional characterization activities in 2001 based on recommendations provided in the Phase II RI (M&E 2000). In order to further define the dissolved phase volatile organic compound (VOC) plume and characterize previously identified source areas, SAIC installed and sampled 11 monitoring wells. One of these wells, Monitoring well SAIC-10, located on the east end of Building # 1 (Figure 1), was completed in the transition zone and subsequent groundwater sampling revealed the highest trichloroethene (TCE) concentration [7380 micrograms per liter (µg/L)] identified on-site to date. The 2003 characterization activities were recommended based upon evaluation of 2001 data and the available historical data. The field program was subsequently developed to meet the following objectives:

- Further characterize the extent of VOC contamination with a focus on specific hot spots;
- Collect additional natural attenuation parameter data from the new monitoring wells;
- Determine whether the contaminated groundwater is infiltrating into the shallow storm sewer in the vicinity of monitoring wells SAIC-05 and COEMW06.

In order to meet the objectives described above, *Addendum # 1 to the Final Sampling and Analysis Plan* (SAP) *for the Feasibility Study/Remedial Design at the Former Charlotte Army Missile Plant, Mecklenburg County, Charlotte, North Carolina* (SAIC 2002a) was prepared. The SAP was developed based on requirements listed in the Statement of Work (SOW) and included the following activities:

- Install seven (two shallow and five transition-zone) monitoring wells to further delineate specific areas within the groundwater plume;
- Collect one soil sample from each of the new monitoring well borings and analyze each for VOCs;
- Collect one soil sample from each of the two shallow monitoring well borings and analyze each for total organic carbon (TOC);
- Collect groundwater samples from 15 monitoring wells (8 existing wells and the 7 new wells) and analyze each for VOCs. The groundwater samples collected from the 7 new wells were additionally analyzed for Target Analyte List (TAL) metals (filtered and unfiltered) and natural attenuation parameters (ammonia, chloride, nitrate, nitrite, sulfate, and methane);

- Collect water levels from all new and existing site monitoring wells to determine current groundwater flow directions;
- Collect one storm sewer water sample in the vicinity of SAIC-05 to determine whether the groundwater is infiltrating into the shallow storm sewer; and
- Prepare a Letter Report detailing all field activities.

2.0 FIELD ACTIVITY SUMMARY

2.1 Deviations from the Workplan

All field activities were performed in accordance with the SAP addendum (SAIC 2002a).

2.2 Monitoring Well Installation

Prior to drilling activities, all proposed drilling locations were cleared for utilities by Soft Dig of North Carolina. During the field investigation, a total of seven monitoring wells (2 shallow and 5 transition zone wells) were installed across the facility (Figure 1). Each monitoring well was installed using sonic drilling methodologies with continuous core samples being collected. All transition zone monitoring wells were cored 5 ft into competent bedrock. Table 1 presents a summary of the new monitoring wells installed. The monitoring well construction diagrams and borehole logs are presented in Appendix B.

Table 1. Monitoring Well Construction Details

Well ID	Well Type	Installation Method	Total Depth (ft bgs)[a]	Screen Slot Size (inches)	Screened Interval (ft bgs)
SAIC-08	Transition	Sonic Drilling	59.5	.010	49.3-59.3
SAIC-14	Transition	Sonic Drilling	84.0	.010	73.7-83.7
SAIC-15	Transition	Sonic Drilling	83.5	.010	73.2-83.2
SAIC-16	Shallow	Sonic Drilling	30.5	.010	20.2-30.2
SAIC-17	Transition	Sonic Drilling	55.0	.010	44.7-54.7
SAIC-18	Transition	Sonic Drilling	60.55	.010	50.05-60.05
SAIC-19	Shallow	Sonic Drilling	15.35	.010	5.05-15.05

a. ft bgs = Feet below ground surface

All new monitoring wells were surveyed by a professional land surveyor registered in the State of North Carolina. All plane and vertical surveys were conducted under the supervision of an Ohio-registered land surveyor. Final coordinates were converted to a state plane coordinate system and both North American Datum (NAD) 1927 and 1983 coordinates reported. All horizontal locations were surveyed to the nearest 0.1 ft, and all elevations to the nearest 0.01 ft. The surveyors field notes and established coordinates are included in Appendix C.

During the installation of Monitoring Well SAIC-08, a void was encountered between 7 and 10 feet below ground surface (BGS). The water level in the area of the void ranged between 10.35 and 11.75 ft BGS. Due to safety precautions, the void was not investigated further and the level of potential to act as a preferential flow path remains unknown.

2.3 Monitoring Well Development

All newly installed monitoring wells were developed using Grundfos Redi-Flo II® submersible pumps. With the exception of SAIC-19, a minimum of three well volumes were removed from each well during development while monitoring water quality parameter (pH, temperature, turbidity, and specific conductivity) stabilization. SAIC-19 was purged dry several times. A lower flow pumping method (low flow bladder pump) was then introduced to try and maintain a consistent flow rate. Water quality parameters were stable, turbidity was less than 10 NTUs, and two well volumes had been removed when development of SAIC-19 was considered complete.

2.4 Soil Sampling

During the installation of each monitoring well, the entire soil column was screened for organic vapors using a photo-ionization detector (PID). All organic vapor screening results were recorded on the soil boring logs (Appendix B). Based on the results of the organic vapor screening, a minimum of one confirmatory soil sample was collected from each boring. Confirmatory soil samples were analyzed for VOCs. In addition, one soil sample each was collected from shallow monitoring well borings SAIC-16 and SAIC-19 and analyzed for TOC.

Soil samples were collected using either 5-gram Encore® samplers or a 5-gram pre-preserved sample kit. The samples were retrieved from the inner portion of the 4-inch diameter soil core, labeled and stored on ice until picked up by the analytical lab. Table 2 presents a summary of the soil samples collected during the 2003 field effort.

Table 2 Soil Sampling Summary

Soil Boring	Sampling Depth (ft bgs)	Analysis
SAIC-8	24	VOCs
SAIC-14	34	VOCs
SAIC-15	18	VOCs
SAIC-16	18	VOCs, TOC
SAIC-17	20	VOCs
SAIC-17	38	VOCs
SAIC-18	6	VOCs
SAIC-19	6	VOCs, TOC

2.5 Groundwater Sampling

Groundwater samples were collected from each of the 7 newly installed monitoring wells and 8 existing monitoring wells. Table 3 lists all wells sampled during the 2003 groundwater sampling event.

Table 3. Monitoring Wells Sampled (Feb. 2003)

New Wells	Existing Wells
SAIC-08	COEMW02
SAIC-14	COEMW06
SAIC-15	COEMW07
SAIC-16	COEMW13
SAIC-17	COEMW14
SAIC-18	COEMW25
SAIC-19	COEMW29
	MW04

Groundwater quality parameters measured during the purge cycle of each well, included pH, specific conductivity, turbidity, dissolved oxygen, oxidation reduction potential (ORP) and temperature. Low flow purging techniques in conjunction with the use of a flow-through cell during the measurement of parameters increased the degree of confidence in sample representativeness and groundwater quality results. Groundwater samples collected from the 8 existing monitoring wells were analyzed for VOCs only, while samples collected from the newly installed monitoring wells were analyzed for VOCs, TAL metals, and natural attenuation parameters. Copies of the field sampling data sheets are included as Appendix D.

2.6 Water Level Measurements

Groundwater level measurements were collected from all wells on-site as described in the SAP (SAIC 2000). Potentiometric surface maps are included for the shallow, transition, and bedrock zones as Figures 2, 3, and 4 respectively. The current groundwater flow is to the north-northwest, which is consistent with that reported by M&E in the Phase I and Phase II RI Reports and in the 2002 Final Letter Report prepared by SAIC (SAIC 2002b). All water level measurements are presented on Table 4 located in Attachment A of Appendix A.

2.7 Free Product Measurement

Monitoring well COEMW04 is located just south of Building #1 (Figure 1). This well was described (Metcalf & Eddie, 1999 and 2000) as containing free product when measured in 1999 and in 2000. In 1999, the well reportedly contained approximately 2.5 feet of floating free product. Using a product/water interface probe, SAIC attempted to measure free product in monitoring well COEMW04 during 2001 and 2003; however, free product was not identified during either investigation. COEMW04 will continue to be monitored for free product during future water level measurement events.

2.8 Storm Sewer Sampling

In order to collect storm sewer samples, the rainfall criteria proposed in the Final Letter Report (SAIC 2002b) must have been met. These criteria consisted of receiving less than 1 inch of rain in the past 7 days and no rain in the past 48 hours. Subsequent to continuous observation of the Charlotte area rainfall data, the above criteria were met and one storm sewer sample was collected on April 29, 2003. The storm sewer sample was collected from the manhole located just south of monitoring wells SAIC-5 and SAIC-12 (Figure 5). Water flow through the storm drain was observed to be approximately ¼ inch deep an flow velocity was unable to be determined by

the naked eye. The water sample was obtained by removing the manhole cover, extending a sampling rod equipped with the decontaminated collection jar approximately 7.0 ft below ground surface (BGS) into the water stream, and then allowing the sample jar to fill with water. The individual sample containers were then filled from the collection jar, sealed and labeled prior to delivery to the analytical laboratory. Evaluation of the storm sewer sample consisted of VOC analysis.

2.9 Investigation Derived Waste Disposal

IDW generated during the field investigation included solids and liquids consisting of drill cuttings, well development water, and well sampling purge water. IDW wastes were contained in a total of 42, 55-gallon drums. Characterization of generated IDW revealed all drummed waters and one drum of soil (38 drums) were considered *hazardous* based on TCE concentrations. On April 24, 2003, Barry Hodges of the USACE Savannah was on-site to sign all manifests for the transporting and disposal of all generated hazardous and non-hazardous IDW. The IDW was removed from the site by a licensed waste hauler (American Environmental Services, Inc. of South Carolina) and transported to approved disposal facilities. Copies of all manifests and a table listing all IDW drums are included as Appendix E.

3.0 ANALYTICAL RESULTS SUMMARY

3.1 Storm Sewer Characterization

One storm sewer sample was collected from the zone identified as vulnerable to impact based on the depth to water in the area and the depth of the storm sewer system (Figure 5). The water sample was analyzed for VOCs with only TCE detected (310 µg/L). The reported concentration exceeds Title 15A, Section 02B of the North Carolina Administrative Code (NCAC) established surface water criteria of 92.4 µg/L.

3.2 Soil Characterization

During removal of all soil cores from the sampler, the complete length was screened for organic vapors using a photoionization detector (PID). Based on those field screening results, a minimum of one soil sample was collected from each monitoring well boring and analyzed for VOCs. Table 5 presents a summary of all organic constituents identified in the subsurface soils associated with the new monitoring wells.

Table 5. Soil Analytical Data Summary

Station ID	Date Collected	Depth (ft bgs)[a]	Analyte (µg/kg)[b]		
			TCE	2-Butanone	2-Hexanone
NC " Contained In" Soil Criteria[c]			**18**	**690**	**560000[d]**
SAIC-08	1/27/2003	24	**240[e]**	N/D[f]	N/D
SAIC-14	1/25/2003	34	**280**	N/D	N/D
SAIC-15	1/24/2003	18	**470**	N/D	N/D
SAIC-16	1/23/2003	18	8.9	N/D	N/D
SAIC-17	1/22/2003	20	N/D	N/D	N/D
SAIC-17	1/22/2003	38	N/D	47	42
SAIC-18	1/29/2003	6	**1000**	N/D	N/D
SAIC-19	1/29/2003	6	N/D	N/D	N/D

a. Depths are feet below ground surface.
b. All analyte concentrations are reported in micrograms per kilogram.
c. *North Carolina Hazardous Waste Section (NCHWS) "Contained-in" Policy for Soil Contaminated with Listed Hazardous Waste* (NCHWS 2002). Criteria based on unrestricted land use soils.
d. NCHWS "Contained-in" policy for soils based on disposal in a municipal land fill. There is no established criteria for 2-hexanone in the unrestricted category.
e. Bolded values represent those exceeding their respective "contained-in criteria".
f. N/D = not detected above the laboratory method detection limit.

For comparative purposes, all soil analytical results were compared to the "contained-in" criteria established in the *North Carolina Hazardous Waste Section (NCHWS) "Contained-in" Policy for Soil Contaminated with Listed Hazardous Waste* (NCHWS 2002). The NCHWS criteria were used, as they are more conservative than the EPA Region 9 preliminary remediation goals (PRGs) (EPA 2002). As indicated in Table 5, TCE was detected in soils associated with five of the new monitoring wells. The highest concentration [1000 micrograms per kilogram (µg/kg)] was identified in association with monitoring well boring SAIC-18. The organic compounds 2-butanone and 2-hexanone were detected in the soil sample collected from SAIC-17. However, based on the low frequency of detection, the low reported concentrations, the lack of other organic constituents identified in the sample, and the fact that 2-butanone is typically considered a laboratory contaminant, the occurrences appear to be isolated and are therefore considered outliers. No other VOCs were detected above the laboratory method detection limit (LMDL).

Two samples (SAIC-16 and SAIC-19) were also analyzed for TOC. TOC was not reported at concentrations above the LMDL. The comprehensive analytical data sheets provided by Prism Laboratory are presented in Appendix F.

3.3 Groundwater Characterization

All newly installed monitoring wells were sampled and analyzed for VOCs, TAL metals, and natural attenuation parameters. Existing wells were sampled and analyzed for VOCs only. The following discussion includes analytical data for VOCs and TAL metals. The natural attenuation parameters will be evaluated and discussed fully within the appropriate chapters of the Feasibility Study (FS). However, the Table 6 presents a summary of the groundwater natural attenuation parameters identified in the seven new monitoring wells during the 2003 field investigation.

Table 6. Natural Attenuation Parameters (2003)

Station ID	Date Collected	Ammonia as Nitrogen	Chloride	Methane	Nitrate	Nitrite	Sulfate	DO[a]	ORP[b]
Units		mg/L[c]	mg/L	µg/L[d]	mg/L	mg/L	mg/L	mg/L	mV[e]
SAIC-8	02/27/03	N/D[f]	32	N/D	1.2	0.1	24	1.98	-250
SAIC-14	02/28/03	N/D	24	N/D	1.7	ND	16	2.92	29
SAIC-15	02/27/03	N/D	48	N/D	0.73	ND	12	1.75	-78
SAIC-16	02/27/03	N/D	20	N/D	1.7	ND	11	7.49	2
SAIC-17	02/28/03	N/D	22	N/D	2.1	ND	14	4.12	101
SAIC-18	02/27/03	N/D	23	N/D	1.9	ND	11	6.40	145
SAIC-19	02/24/03	N/D	8.3	N/D	1.7	ND	22	3.49	188

a. DO = Dissolved Oxygen.
b. ORP = Oxidation Reduction Potential.
c. mg/L= Milligrams Per Liter.
d. µg/L = Micrograms Per Liter.
e. mV = Millivolts.
f. N/D = Non-detect.

The analytical data sheets for all groundwater analysis provided by Prism Laboratories, Inc. are presented in Appendix F.

Groundwater analyte concentrations have been compared to the 15A NCAC 2L North Carolina Groundwater Quality Standards (NCGQS). Based on historical groundwater data and current analytical results (Tables 6 and 7 in Attachment A), the primary groundwater contaminant of concern is TCE. Comparison of current results to historical data indicates TCE concentrations are generally decreasing or remaining relatively consistent across the site. Analytical data generated from the down-gradient monitoring wells indicate a decreasing TCE trend to the northwest (consistent with the groundwater flow direction) in the unconsolidated and bedrock zones. However, TCE was detected in all down-gradient monitoring wells at concentrations above the NCGQS of 2.8 µg/L (Figures 6, 7 and 8).

3.3.1 Shallow Monitoring Wells

Volatile Organic Compounds

In general, the TCE concentrations detected in the shallow zone have remained relatively constant or show a slight decreasing trend across the site as previously described. The shallow zone TCE concentrations ranged from 48 µg/L in COEMW13 to 3800 µg/L in SAIC-16 (Figure 6). The TCE concentrations in existing and newly installed shallow zone monitoring wells are presented in Table 8 below and illustrated in Figure 6.

Table 8. Shallow Well TCE Concentrations (Feb. 2003)

Well ID	Result (µg/l)
MW04	780
COEMW02	1200
COEMW06	3400
COEMW07	140
COEMW13	48
COEMW14	130
SAIC-16	3800
SAIC-19	89

As shown in Table 8, the highest TCE concentration identified in the shallow zone was reported in monitoring well SAIC-16, which is located in the loading bay area east of Building No. 1 (Figure 6). The reported TCE concentration is consistent with the loading bay area being identified as the primary source area for the TCE groundwater impact at the former CAMP facility.

Specific shallow zone hot spot areas characterized during this investigation included those associated with COEMW02 and COEMW06. Previous sampling of monitoring well COEMW10, which is a transition zone well paired with shallow monitoring well COEMW02, did not reveal TCE in the transition zone groundwater in that area; therefore, shallow well SAIC-19 was installed down gradient of the well pair to evaluate the migration of TCE in the shallow zone.

In order to evaluate the migration of TCE from the shallow groundwater zone monitored by COEMW06, into the transition zone, SAIC installed transition zone monitoring well SAIC-18 near COWMW06. Table 9 summarizes the TCE concentrations in groundwater for the areas described above.

Table 9. Hot Spot Characterization TCE Concentrations

Well ID	Zone Monitored	Date Sampled	Result (µg/L)
COEMW02	Shallow	02/24/03	1200
		05/17/01	1050
		03/03/00	1600
SAIC-19	Shallow	02/24/03	89
COEMW06	Shallow	02/25/03	3400
		05/17/01	3510
		03/03/00	660
SAIC-18	Transition	02/27/03	2500

As shown in Table 9, TCE appears to be migrating in the shallow zone in the area of COEMW02 and SAIC-19, although at limited concentrations. Comparison of the well pair COEMW06 and SAIC-18 indicates that TCE has migrated into to the transition zone at elevated concentrations.

Metals

During the 2003 groundwater investigation, monitoring wells SAIC-16 and SAIC-19 were the only shallow monitoring wells sampled and analyzed for inorganic parameters. Iron and manganese were the only constituents detected in the shallow groundwater at concentrations exceeding their respective NCGQSs. The following table provides a summary of aluminum, iron and manganese concentrations detected in the shallow groundwater:

Table 10. Analytical Summary of Iron and Manganese in the Shallow Groundwater

Station ID	Filtered	Iron	Manganese	Aluminum
NCGQS[a]		**300**	**0.05**	**200[b]**
Background[c]		**50,700**	**786**	**28,620**
Units		**µg/L[d]**	**µg/L**	**µg/L**
SAIC-16	F	300	320	3600
SAIC-16	UF	3100	360	
SAIC-19	F	N/D	82	1000
SAIC-19	UF	1200	83	

a. North Carolina Groundwater Quality Standards
b. There is no established NGGQS for aluminum. The comparative value is the Primary Drinking Water Standard.
c. Inorganic background concentrations established in the Baseline Human Health Risk Assessment for the former CAMP facility (M&E 1999).
d. µg/L = micrograms per liter.

Although concentrations of aluminum, iron, and manganese exceeded their respective NCGQSs, the concentrations did not exceed the background concentrations established in the Baseline Human Health Risk Assessment (BHHRA) performed by Metcalf and Eddie (M&E 1999 and 2000).

3.3.2 Transition Zone Monitoring Wells

Volatile Organic Compounds

In the transition zone TCE concentrations ranged from 700 µg/L in SAIC-15 to 7500 µg/L in SAIC-08 and SAIC-17. All transition zone wells sampled exhibited TCE concentrations greater than the NCGQS established criteria of 2.8 µg/L. The transition zone groundwater TCE concentrations are presented in Table 11 and illustrated on Figure 7.

Table 11. Transition Well TCE Concentrations (Feb. 2003)

Well ID	Result (µg/l)
COEMW25	170
SAIC-08	7500
SAIC-14	6300
SAIC-15	700
SAIC-17	7500
SAIC-18	2500

Based on the evaluation of all historical and current data, the transition zone appears to be the primary zone of TCE impact at the former CAMP facility. The areas exhibiting significant TCE concentrations are the loading bay areas east of Building # 1 and the area south of Building # 2 near monitoring well SAIC-18 (Figure 7).

With the exception of SAIC-08, all transition zone wells exceeded the NCGQSs for chloroform (0.19 µg/L) while SAIC-14 and SAIC-08 exceeded the NCGQS for Tetrachloroethene (0.7 µg/L). As no NCGQS exists for 1,1,2- TCE, the reported values were compared against the federal primary drinking water maximum contaminant levels. Monitoring wells SAIC-08, SAIC-14, and SAIC-17 exceeded the MCL for 1,1,2-TCE (5 µg/L) with concentrations of 11 µg/L, 10 µg/L, and 12 µg/L respectively.

Metals

During the 2003 groundwater investigation, the transition zone monitoring wells SAIC-08, SAIC-14, SAIC-15, SAIC-17 and SAIC-18 were sampled and analyzed for inorganic parameters. Copper, silver, manganese, and iron were reported at concentrations exceeding their respective NCGQS. Table 12 provides a summary of the detected concentrations of copper, silver, manganese, and iron within the transition zone.

Table 12. Analytical Summary for Copper, Silver, Iron, and Manganese in the Transition Zone Groundwater

Station ID	Filtered	Copper	Silver	Iron	Manganese	Aluminum
NCGQS[a]		**1000**	**18**	**300**	**0.05**	**200[b]**
Background[c]		**149**	**N/A**	**50,700**	**786**	**28,620**
Units		**µg/L[d]**	**µg/L**	**µg/L**	**µg/L**	**µg/L**
SAIC-08	F	N/D	N/D	470	160	
SAIC-08	UF	12	N/D	1600	170	1500
SAIC-14	F	N/D	N/D	2100	120	
SAIC-14	UF	**1400**	**73**	N/D	190	50
SAIC-15	F	N/D	N/D	N/D	150	
SAIC-15	UF	**400**	**49**	7100	300	12000
SAIC-17	F	N/D	N/D	N/D	100	
SAIC-17	UF	**1800**	**20**	1700	140	1300
SAIC-18	F	N/D	N/D	N/D	42	
SAIC-18	UF	N/D	N/D	3700	97	1000

a. North Carolina Groundwater Quality Standards
b. There is no established NGGQS for aluminum. The comparative value is the Primary Drinking Water Standard.
c. Inorganic background concentrations established in the Baseline Human Health Risk Assessment for the former CAMP facility (M&E 1999).
d. µg/L = micrograms per liter.

Although concentrations of aluminum, iron, and manganese exceeded their respective NCGQSs, the concentrations did not exceed the background concentrations established in the BHHRA (M&E 199 and 2000). Copper and silver were identified at concentrations exceeding their respective NCGQSs; however, the elevated values were reported only in the unfiltered samples for each analyte. The corresponding filtered sample results were either non-detect or below the established criteria.

3.3.3 Bedrock Monitoring Wells

Volatile Organic Compounds

One bedrock monitoring well (COEMW29) was sampled during the 2003 field characterization effort. Monitoring well COEMW29, which was completed with two distinct screened intervals, was identified in the Phase II RI (M&E 2000) as the location exhibiting the highest TCE concentrations in the bedrock zone as well as the highest TCE concentrations identified on site. The abandonment of the lower-most screen in 2001 was performed to ensure future sample representativeness and eliminate result variability based on inconsistent sampling methods and techniques. Subsequent to abandoning the lower portion of COEMW29, the well was purged and sampled for VOCs. The current and historical TCE analytical data for monitoring well COEMW29 is presented in Table 13 and illustrated on Figure 8.

Table 13. COEMW29 TCE Concentrations

Well ID	Depth Monitored	Date Sampled	Result (µg/l)
COEMW29	92.5 – 97.5	02/26/03	5000
	92.5 – 97.5	05/21/01	2980
	92.5 – 97.5	03/02/00	1700
	112.5 – 117.5	03/02/00	4100

During the 2003 investigation, COEMW29 exhibited a TCE concentration of 5000 µg/L, an increase of 59% over the reported values from 2001.

Metals

There were no bedrock groundwater samples analyzed for metals during the 2003 groundwater investigation.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The water sample collected from the storm sewer system contained TCE at a concentration of 310 µg/kg, exceeding the TCE criteria of 92.4 µg/L established in 15 NCAC 02b. Further characterization of the storm sewer system appears necessary to determine the extent of groundwater impact to the storm sewer system both on and off-site.

Soil samples collected during the installation of the monitoring wells indicate the presence of TCE in five of seven samples. The highest concentration (1000 µg/kg) was reported in the soil sample collected from monitoring well boring SAIC-18. The elevated soil concentration and the elevated TCE concentration identified in the shallow groundwater at this location indicate a localized release. The soil samples collected from the loading bay areas east of Building No. 1 do not appear to represent a TCE source. The lack of organic constituents detected in the subsurface soil indicates the source may have been depleted over time or possibly removed/reworked during past site activities. The source may also be small and located in an area not investigated by SAIC (i.e. between monitoring wells). However, with the number of monitoring wells located in the loading bay area and the determined groundwater flow direction, additional investigation of the site soils is not recommended

The supplemental data collected from the monitoring wells installed during the 2003 field event further refined the dissolved phase TCE groundwater plume in the loading bay area east of Building No. 1. Based on the TCE concentrations identified within the loading bay, this area does appear to be close to the original release point. The remaining mass is unknown, however concentrations to not indicate the presence of DNAPL. As discussed above, the lack of an identified point source area could be related to a depleted, removed, or uninvestigated source. In addition, data gathered from areas of concern near COEMW06 and COEMW02 represent two additional hot spots, which appear to be localized and of limited extent. Inorganic groundwater analytical data indicate no potential contaminants of concern to be addressed at this time.

Based on the results of the cumulative characterization efforts at the former CAMP facility, SAIC recommends the following:

The storm sewer system at the former CAMP facility has been identified as containing TCE at a concentration exceeding the 15A NCAC 02B, established surface water criteria of 92.4 µg/L. Therefore, SAIC recommends further characterization of this system as it represents a potential exposure pathway and a preferential flow path for constituents exiting the site. In addition, to further characterize the storm sewer system, SAIC recommends collecting storm sewer samples from the following locations:

- The storm drain manhole located adjacent to Monitoring Wells COEMW06 and SAIC-18 to characterize the potential infiltration into the storm sewer system.
- Up-gradient, along Statesville Avenue to determine potential interference from off-site sources;
- Down-gradient along Statesville Avenue to characterize constituents being discharged to the main storm drain from the former CAMP facility and either eliminate or identify potential contributors from North Statesville Avenue or Woodward Avenue; and
- The unnamed stream to which the storm sewer discharges to characterize waters being released to the surface waters of North Carolina.

All proposed storm sewer sampling locations are illustrated on Figure 9. The rainfall criteria established in the Final Letter Report (SAIC 2002b) will remain the precursor for all storm sewer and surface water sampling events. It is recommended that each storm sewer sample be sent to an analytical laboratory for VOC analysis.

Based on a thorough evaluation of all organic and inorganic data, the TCE groundwater plume has been delineated to the extent necessary to proceed with the assessment of potential remedial alternatives for the site. In addition, the hydrogeologic (slug tests and geophysical) data collected by Metcalf an Eddie (M&E 1999 and 2000) in conjunction with the flow data collected by SAIC during well development and the geophysical survey is sufficient to quantify the key technical elements (i.e. hydraulic conductivity, groundwater flow direction, gradients and velocities) necessary to appropriately evaluate the remedial path forward for the site. Therefore, SAIC recommends moving forward with a FS scoping meeting for the former CAMP facility. The FS scoping meeting will be used as a forum to present, discuss, and obtain approval from the NCDENR Project Manager and the USACE Project Manager on the path forward approach presented.

5.0 REFERENCES

Metcalf & Eddie, Inc. 1999. *Final Phase I Remedial Investigation Report for the Former Charlotte Army Missile Plant, Mecklenburg County, Charlotte, North Carolina*, prepared by Metcalf & Eddie, Inc., April.

Metcalf & Eddie, Inc. 2000. *Final Phase II Remedial Investigation Report for the Former Charlotte Army Missile Plant, Mecklenburg County, Charlotte, North Carolina*, prepared by Metcalf & Eddie, Inc., October.

North Carolina Hazardous Waste Section (NCHWS) 2002. *North Carolina Hazardous Waste Section "Contained-in" Policy for Soil Contaminated with Listed Hazardous Waste,* prepared by the NCHWS, May , 2002.

SAIC (Science Applications International Corporation) 2000. *Sampling and Analysis Plan for the Feasibility Study/Remedial Design at the Former Charlotte Army Missile Plant, Mecklenburg County, Charlotte, North Carolina*, prepared by SAIC, May.

SAIC 2002a. *Sampling and Analysis Plan for the Feasibility Study/Remedial Design at the Former Charlotte Army Missile Plant, Mecklenburg County, Charlotte, North Carolina*, prepared by SAIC, November.

SAIC 2002b. *Final Letter Report for the Feasibility Study/Remedial Design at the Former Charlotte Army Missile Plan, Mecklenburg County, Charlotte North Carolina*, prepared by SAIC August 2002.

ATTACHMENT A

TABLES

Table 4. 2003 Water Level Measurements

Station ID	Well Type	Depth to Bedrock (FBGS)[1]	Screen Interval (FBGS)	Water Level (FBTOC)[3]	Groundwater Elevation (AMSL)[4]	Total Depth (FBGS)	Date Sampled
MW01	S	--	5 - 20	12.2	725.39	20.00	25-Feb-03
				13.55	724.04		17-May-01
				12.67	724.92		02-Mar-00
				11.66	725.93		17-Aug-97
MW02	S	--	5 - 20	11.73	727.03	20.00	25-Feb-03
				12	726.76		29-May-01
				12.58	726.18		03-Mar-00
				11.6	727.16		17-Aug-97
MW03	S	--	4 - 19	11.86	725.49	19.00	25-Feb-03
				12.19	725.16		29-May-01
				12.35	725.00		01-Mar-00
				11.35	726.00		17-Aug-97
MW04	S	--	4 - 19	13.78	724.90	19.00	26-Feb-03
				14.14	724.54		29-May-01
				14.22	724.46		02-Mar-00
				13.32	725.36		17-Aug-97
MW06	S	--	5 - 20	12.46	726.88	20.00	25-Feb-03
				12.6	726.74		29-May-01
				12.95	726.39		04-Mar-00
				11.49	727.85		17-Aug-97
MW07	S	--	10 - 25	17.44	727.65	25.00	25-Feb-03
				16.94	728.15		29-May-01
				17.94	727.15		05-Mar-00
				16.38	728.71		17-Aug-97
MW1A	T	N/A	57 - 62	12.31	725.47	62.00	25-Feb-03
				12.66	725.12		17-May-01
				12.75	725.03		04-Mar-00
				11.58	726.20		17-Aug-97
COEMW1	S	--	7.5 - 17.5	7.52	718.33	17.50	26-Feb-03
				8.33	717.52		18-May-01
				7.22	718.63		29-Feb-00
				7.04	718.81		17-Aug-97
COEMW2	S	--	5.5 - 15.5	5.46	723.39	15.50	24-Feb-03
				5.62	723.23		17-May-01
				6.68	722.17		03-Mar-00
				6.75	722.1		17-Aug-97
COEMW3	S	--	15.5 - 25.5	20.71	727.67	26.00	26-Feb-03
				20.22	728.16		29-May-01
				21.23	727.15		03-Mar-00
				19.22	729.16		17-Aug-97
COEMW4	S	--	10 - 20	10.92	729.06	20.00	25-Feb-03
				12.89	727.09		17-May-01
				10.67	729.31		17-Aug-97
COEMW5	S	--	4.75 - 14.75	7.08	722.02	14.25	26-Feb-03
				7.48	721.62		29-May-01
				7.43	721.67		29-Feb-00
				7.36	721.74		17-Aug-97
COEMW6	S	--	5.75 - 15.75	4.78	720.85	15.75	25-Feb-03
				4.77	720.86		17-May-01
				4.91	720.72		03-Mar-00
				4.84	720.79		17-Aug-97

Table 4. 2003 Water Level Measurements

Station ID	Well Type	Depth to Bedrock (FBGS)[1]	Screen Interval (FBGS)	Water Level (FBTOC)[3]	Groundwater Elevation (AMSL)[4]	Total Depth (FBGS)	Date Sampled
COEMW7	S	--	18.3 - 28.3	17.77	725.56	28.30	28-Feb-03
				18.42	724.91		29-May-01
				18.3	725.03		05-Mar-00
				17.34	725.99		17-Aug-97
COEMW8	S	--	15.3 -25.3	16.87	726.98	25.30	26-Feb-03
				18.18	725.67		17-May-01
				17.69	726.16		29-Feb-00
				17.57	726.28		17-Aug-01
COEMW9	T	>75	65 - 75	17.93	725.54	75.00	26-Feb-03
				18.64	724.83		29-May-01
				18.31	725.16		29-Feb-00
				17.85	725.62		17-Aug-97
COEMW10	T	>59	49.1 - 59.1	18.01	726.19	59.10	26-Feb-03
				17.94	726.26		21-May-01
				18.46	725.74		04-Mar-00
				16.9	727.3		17-Aug-97
COEMW11	T	>64	54 - 64	18.35	719.31	64.00	25-Feb-03
				18.94	718.72		21-May-01
				18.74	718.92		02-Mar-00
				17.78	719.88		17-Aug-97
COEMW12	S	--	5 - 15	8.15	717.2	15.00	26-Feb-03
				8.42	716.93		17-May-01
				8.07	717.28		01-Mar-00
				7.25	718.1		17-Aug-97
COEMW13	S	--	10 - 20	13.15	727.09	20.00	25-Feb-03
				13.61	726.63		29-May-01
				13.56	726.68		05-Mar-00
COEMW14	S	--	11 - 21	11.28	727.01	21.00	25-Feb-03
				11.56	726.73		29-May-01
				11.77	726.52		04-Mar-00
COEMW15	S	--	13 - 23	14.78	723.09	23.00	25-Feb-03
				15.57	722.3		29-May-01
				14.85	723.02		02-Mar-00
COEMW16	S	--	17 - 27	21.41	725.89	27.00	26-Feb-03
				22.27	725.03		29-May-01
				21.95	725.35		29-Feb-00
COEMW17	S	--	5 - 15	3.85	721.38	15.00	26-Feb-03
				4.06	721.17		17-May-01
				4.1	721.13		01-Mar-00
COEMW18	S	--	8 - 18	7.85	717.36	18.00	26-Feb-03
				8.27	716.94		17-May-01
				8.41	716.8		01-Mar-00
COEMW19	S	--	8 - 18	13.43	711.37	18.00	26-Feb-03
				13.43	711.37		29-May-01
				13.45	711.35		01-Mar-00
COEMW20	S	--	17.5 - 27.5	16.56	718.55	27.5	25-Feb-03
				17.39	717.72		29-May-01
				16.47	718.64		02-Mar-00
COEMW21	T	43.9	38.9 - 48.9	11.78	726.81	43.90	25-Feb-03
				11.78	726.81		18-May-01
				12.08	726.51		05-Mar-00

Table 4. 2003 Water Level Measurements

Station ID	Well Type	Depth to Bedrock (FBGS)[1]	Screen Interval (FBGS)	Water Level (FBTOC)[3]	Groundwater Elevation (AMSL)[4]	Total Depth (FBGS)	Date Sampled
COEMW22	T	47.1	41.8 - 46.8	20.98	727.65	46.80	26-Feb-03
				20.46	728.17		30-May-01
				22.43	726.2		01-Mar-00
COEMW23	T	72.8	62.5 - 72.5	17.04	725.25	72.80	25-Feb-03
				17.63	724.66		29-May-01
				19.05	723.24		03-Mar-00
COEMW24	T	47	42.2 - 47.2	15.18	724.51	47.50	25-Feb-03
				15.38	724.31		21-May-01
				18.06	721.63		03-Mar-00
COEMW25	T	73	61.4 - 71.4	4.15	722.14	71.40	27-Feb-03
				4.2	722.09		29-May-01
				4.8	721.49		03-Mar-00
COEMW26	T	72.3	62 - 72	5.13	723.77	72.00	26-Feb-03
				5.55	723.35		18-May-01
				5.71	723.19		03-Mar-00
COEMW27	T	67.3	57.1 - 67.1	8.67	716.58	67.10	26-Feb-03
				8.68	716.57		29-May-01
				8.3	716.95		01-Mar-00
COEMW28	SB	78.5	90 - 95	18.03	725.29	95.00	26-Feb-03
				18.72	724.6		29-May-01
				18.16	725.16		29-Feb-00
COEMW29	SB	74.5	92.5 - 97.5	15.76	722.12	117.50	26-Feb-03
	SB		92.5 - 97.5	16.16	721.72		21-May-01
	SB		92.5-97.5	16.63	721.25		02-Mar-00
	DB		112.5-117.5	16.63	721.25		02-Mar-00
COEMW30	B	65.5	68 - 73	9.02	716.41	73.00	26-Feb-03
				9.02	716.41		18-May-01
				8.6	716.83		01-Mar-00
SAIC-01	S	--	29 - 39	20.29	727.8	39.26	26-Feb-03
				20.73	727.36		30-May-01
SAIC-02	T	27	16.1 -26.1	20.17	728.98	26.34	26-Feb-30
				20.51	728.64		30-May-01
SAIC-03	SB	49.5	73.2 - 83.2	21.54	727.57	84.75	26-Feb-03
				21.63	727.48		01-Jun-01
SAIC-04	T	45	34.1 - 44.1	12.91	727.54	44.15	25-Feb-03
				13.54	726.91		31-May-01
SAIC-05	T	84	73.77 - 83.77	9.52	716.56	83.63	26-Feb-03
				10.44	715.64		31-May-01
SAIC-06	T	63.5	53.1 - 63.1	9.05	716.7	62.71	26-Feb-03
				9.25	716.5		01-Jun-01
SAIC-07	T	90.6	75 - 85	16.07	722.11	88.83	25-Feb-03
				16.66	721.52		31-May-01
SAIC-08	T	56	49.3-59.3	18.4	719.31	59.50	27-Feb-03
SAIC-09	T	41	31.17 - 41.17	12.44	726.42	40.26	25-Feb-03
				12.75	726.11		01-Jun-01
SAIC-10	T	41	30.17 - 40.17	13.17	727.13	40.23	25-Feb-03
				13.61	726.69		01-Jun-01
SAIC-11	DB	39	116.97 - 126.97	23.07	726.49	127.30	26-Feb-03
				40.87	708.69		31-May-01
SAIC-12	SB	94	108 - 118	9.59	716.49	118.00	26-Feb-03
				10.48	715.6		31-May-01

Table 4. 2003 Water Level Measurements

Station ID	Well Type	Depth to Bedrock (FBGS)[1]	Screen Interval (FBGS)	Water Level (FBTOC)[3]	Groundwater Elevation (AMSL)[4]	Total Depth (FBGS)	Date Sampled
SAIC-13	SB	88	95.67 - 105.67	16.53	721.85	105.93	25-Feb-03
				17.11	721.27		31-May-01
SAIC-14	T	79	73.7-83.7	10.7	726.18	83.7	28-Feb-03
SAIC-15	T	83	73.2-83.2	10.74	725.95	83.5	27-Feb-03
SAIC-16	S	--	20.2-30.2	9.69	727.15	30.5	27-Feb-03
SAIC-17	T	50	44.7-54.7	9.51	727.2	55	28-Feb-03
SAIC-18	T	58.5	50.05-60.05	2.57	722.52	60.55	27-Feb-03
SAIC-19	S	--	5.05-15.05	6.97	722.01	15.35	24-Feb-03

1. FBGS - Feet Below Ground Surface
2. TOC = Top of Casing
3. FBTOC = Feet Below Top of Casing
4. AMSL = Feet Above Mean Sea Level

Table 6. Volatile Organics Analytical Results for the Formerv CAMP Facility

Station ID	Well Type	Depth to Bedrock (FBGS)[1]	Screen Interval (FBGS)	Water Level (FBTOC)[3]	Ground-water Elevation (AMSL)[4]	Total Depth (FBGS)	Date Sampled	1,1,1-Trichloroethane	1,1,2-Trichloroethane	1,1-Dichloroethene	1,2-cis-Dichloroethene	Trichloroethene	Tetrachloroethene	Acetone	Carbon Tetrachloride	Bromodichloromethane	Chloroform	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	Naphthalene
North Carolina Groundwater Quality Standards (µg/L)[5]								200	n/a[6]	7	70	2.8	0.7	700	0.3	n/a	0.19	1	1000	29	530	200	21
Federal Primary Drinking Water Standards (MCLs) (µg/L)[7]								200	5	7	70	5	5	n/a	5	n/a	n/a	5	1000	700	10000	n/a	n/a
MW01	S	--	5 - 20	12.2	725.39	20.00	25-Feb-03	WL															
				13.55	724.04		17-May-01	<1.0	1.2	<1.0	0.48	1050	14.2	<10	<1.0	<1.0	3.3	4.1	1.1	1.7	0.83J	N/A	N/A
				12.67	724.92		02-Mar-00	<10	<10	3.4	<1.0	720	4.6	<250	0.97	<10	4.6	5	3.7	4.6	4.8	<100	10
				11.66	725.93		17-Aug-97	WL[8]															
				N/A			18-Mar-93	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	160	13	21	20	31	N/A
				N/A			17-Jun-91	ND[9]	ND	ND	ND	1500	ND	ND	ND	ND	ND	330	ND	ND	240	ND	N/A
MW02	S	--	5 - 20	11.73	727.03	20.00	25-Feb-03	WL															
				12	726.76		29-May-01	WL															
				12.58	726.18		03-Mar-00	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<25	<1.0	<1.0	1	0.2	<1.0	0.16	<2.0	<10	0.47
				11.6	727.16		17-Aug-97	WL															
				N/A			18-Mar-93	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	ND	ND	ND	ND	N/A
				N/A			22-Oct-91	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1100	ND	N/A
MW03	S	--	4 - 19	11.86	725.49	19.00	25-Feb-03	WL															
				12.19	725.16		29-May-01	WL															
				12.35	725.00		01-Mar-00	<1.0	<1.0	<1.0	<1.0	11	<1.0	<25	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<1.0	0.92
				11.35	726.00		17-Aug-97	WL															
				N/A			18-Mar-93	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	ND	ND	ND	ND	N/A
				N/A			22-Oct-91	ND	ND	ND	ND	490	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	N/A
MW04	S	--	4 - 19	13.78	724.90	19.00	26-Feb-03	<1.0	2.0	<1.0	<1.0	780	2.9	<10	<1.0	<1.0	5.7	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				14.14	724.54		29-May-01	WL															
				14.22	724.46		02-Mar-00	<250	78	<250	<250	3500	<250	<6200	<250	<250	35	<250	<250	<250	<500	<2500	<250
				13.32	725.36		17-Aug-97	WL															
				N/A			18-Mar-93	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	ND	ND	ND	ND	N/A
				N/A			22-Oct-91	ND	ND	ND	ND	1600	ND	ND	ND	ND	ND	16	ND	ND	ND	ND	ND
MW05	S	--		N/A			18-Mar-93	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	0.81	ND	0.59	ND	N/A
				N/A			22-Oct-91	ND	ND	ND	ND	3.4	ND	ND	ND	ND	ND	ND	ND	ND	1.7	ND	N/A
MW06	S	--	5 - 20	12.46	726.88	20.00	25-Feb-03	WL															
				12.6	726.74		29-May-01	WL															
				12.95	726.39		04-Mar-00	<1.0	<1.0	<1.0	<1.0	11	<1.0	<25	<1.0	<1.0	0.36	<1.0	<1.0	0.11	<2.0	<10	0.91
				11.49	727.85		17-Aug-97	WL															
				N/A			16-Jun-93	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	ND	ND	ND	2	N/A
MW07	S	--	10 - 25	17.44	727.65	25.00	25-Feb-03	WL															
				16.94	728.15		29-May-01	WL															
				17.94	727.15		05-Mar-00	<1.0	<1.0	<1.0	<1.0	15	<1.0	<25	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<10	0.16
				16.38	728.71		17-Aug-97	WL															
				N/A			16-Jun-93	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	ND	ND	ND	ND	ND	N/A
MW1A	T	N/A	57 - 62	12.31	725.47	62.00	25-Feb-03	WL															
				12.66	725.12		17-May-01	<1.0	6.9	<1.0	0.94	4630	11.5	<10	0.35	<1.0	4	<1.0	0.24	<1.0	<2.0	N/A	N/A
				12.75	725.03		04-Mar-00	<250	<250	<250	<250	5800	<250	<6200	<250	<250	39	<6200	<250	<250	<500	<2500	<250
				11.58	726.20		17-Aug-97	WL															
				N/A			28-Jul-93	ND	ND	ND	ND	8400	ND	N/A	N/A	N/A	N/A	ND	ND	ND	ND	ND	N/A
COEMW1	S	--	7.5 - 17.5	7.52	718.33	17.50	26-Feb-03	WL															
				8.33	717.52		18-May-01	<1.0	<1.0	<1.0	<1.0	0.78	<1.0	<10	<1.0	<1.0	1.8	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				7.22	718.63		29-Feb-00	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<25	<1.0	0.42	4.3	<1.0	<1.0	<1.0	<1.0	<10	<1.0
				7.04	718.81		17-Aug-97	WL															

Table 6. Volatile Organics Analytical Results for the Formerv CAMP Facility

Station ID	Well Type	Depth to Bedrock (FBGS)[1]	Screen Interval (FBGS)	Water Level (FBTOC)[3]	Ground-water Elevation (AMSL)[4]	Total Depth (FBGS)	Date Sampled	1,1,1-Trichloroethane	1,1,2-Trichloroethane	1,1-Dichloroethene	1,2-cis-Dichloroethene	Trichloroethene	Tetrachloroethene	Acetone	Carbon Tetrachloride	Bromodichloromethane	Chloroform	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	Naphthalene
COEMW2	S	--	5.5 - 15.5	5.46	723.39	15.50	24-Feb-03	<1.0	<1.0	1.9	15.0	1200	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				5.62	723.23		17-May-01	<1.0	<1.0	0.72	8.9	1050	0.46	<10	<1.0	<1.0	0.46	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				6.68	722.17		03-Mar-00	<50	<50	11	<50	1600	<50	1200	<50	<50	7.1	<50	<50	<50	<100	<500	22
				6.75	722.1		17-Aug-97	WL															
COEMW3	S	--	15.5 - 25.5	20.71	727.67	26.00	26-Feb-03	WL															
				20.22	728.16		29-May-01	WL															
				21.23	727.15		03-Mar-00	<1.0	<1.0	0.56	<1.0	2.1	0.65	<25	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.81	<10	1.4
				19.22	729.16		17-Aug-97	WL															
COEMW4	S	--	10 - 20	10.92	729.06	20.00	25-Feb-03	WL															
				12.89	727.09		17-May-01	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	0.32	<1.0	1.8	N/A	N/A
				10.67	729.31		17-Aug-97	WL															
COEMW5	S	--	4.75 - 14.75	7.08	722.02	14.25	26-Feb-03	WL															
				7.48	721.62		29-May-01	WL															
				7.43	721.67		29-Feb-00	<2.5	0.63	<2.5	<2.5	68	<25	<62	<2.5	<2.5	2	<2.5	<2.5	<2.5	<2.5	<25	<2.5
				7.36	721.74		17-Aug-97	WL															
COEMW6	S	--	5.75 - 15.75	4.78	720.85	15.75	25-Feb-03	<1.0	4.1	<1.0	<1.0	3400	5.5	<10	<1.0	<1.0	13	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				4.77	720.86		17-May-01	<1.0	4	<1.0	0.37	3510	1	<10	0.32	<1.0	8.2	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				4.91	720.72		03-Mar-00	3	<10	2.3	<10	660	<10	<250	<10	<10	2.2	<250	<10	<10	<20	<100	2.4
				4.84	720.79		17-Aug-97	WL															
COEMW7	S	--	18.3 - 28.3	17.77	725.56	28.30	28-Feb-03	<1.0	<1.0	<1.0	<1.0	140	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				18.42	724.91		29-May-01	WL															
				18.3	725.03		05-Mar-00	<5	<5	<5	<5	140	<5	<120	<5	<5	1.3	<5	<5	<5	<10	<50	6.1
				17.34	725.99		17-Aug-97	WL															
COEMW8	S	--	15.3 -25.3	16.87	726.98	25.30	26-Feb-03	WL															
				18.18	725.67		17-May-01	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				17.69	726.16		29-Feb-00	<1.0	<1.0	0.26	<1.0	<1.0	<1.0	<25	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	0.25
				17.57	726.28		17-Aug-01	WL															
COEMW9	T	>75	65 - 75	17.93	725.54	75.00	26-Feb-03	WL															
				18.64	724.83		29-May-01	WL															
				18.31	725.16		29-Feb-00	<1.0	<1.0	0.2	<1.0	<1.0	<1.0	36	<1.0	<1.0	0.61	<1.0	<1.0	<1.0	<1.0	<10	0.23
				17.85	725.62		17-Aug-97	WL															
COEMW10	T	>59	49.1 - 59.1	18.01	726.19	59.10	26-Feb-03	WL															
				17.94	726.26		21-May-01	<1.0	<1.0	<1.0	<1.0	122	<1.0	<10	<1.0	<1.0	14.6	<1.0	1	<1.0	<2.0	N/A	N/A
				18.46	725.74		04-Mar-00	<10	<10	<10	<10	390	<10	<250	<10	<10	20	<10	<10	1.1	<20	<100	5.9
				16.9	727.3		17-Aug-97	WL															
COEMW11	T	>64	54 - 64	18.35	719.31	64.00	25-Feb-03	WL															
				18.94	718.72		21-May-01	<1.0	<1.0	<1.0	<1.0	3.2	<1.0	<10	2.1	<1.0	1.8	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				18.74	718.92		02-Mar-00	<1.0	<1.0	>1.0	<1.0	4.5	<1.0	34	3.1	<1.0	2.3	<1.0	<1.0	<1.0	<2.0	<10	0.36
				17.78	719.88		17-Aug-97	WL															
COEMW12	S	--	5 - 15	8.15	717.2	15.00	26-Feb-03	WL															
				8.42	716.93		17-May-01	<1.0	<1.0	<1.0	<1.0	10.7	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				8.07	717.28		01-Mar-00	<1.0	<1.0	<1.0	<1.0	18	<1.0	<25	<1.0	<1.0	0.21	<1.0	<1.0	<1.0	<1.0	<10	<1.0
				7.25	718.1		17-Aug-97	WL															
COEMW13	S	--	10 - 20	13.15	727.09	20.00	25-Feb-03	<1.0	<1.0	<1.0	<1.0	48	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				13.61	726.63		29-May-01	WL												<1.0	<2.0		
				13.56	726.68		05-Mar-00	<10	<10	<10	<10	390	<10	<250	<10	<10	19	<10	<10	<10	<20	<100	4.4
COEMW14	S	--	11 - 21	11.28	727.01	21.00	25-Feb-03	<1.0	<1.0	<1.0	<1.0	130	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				11.56	726.73		29-May-01	WL															
				11.77	726.52		04-Mar-00	<10	<10	<10	<10	360	<10	<250	<10	<10	<10	<10	<10	<10	<20	<100	2.2

Table 6. Volatile Organics Analytical Results for the Formerly CAMP Facility

Station ID	Well Type	Depth to Bedrock (FBGS)[1]	Screen Interval (FBGS)	Water Level (FBTOC)[3]	Ground-water Elevation (AMSL)[4]	Total Depth (FBGS)	Date Sampled	1,1,1-Trichloroethane	1,1,2-Trichloroethane	1,1-Dichloroethene	1,2-cis-Dichloroethene	Trichloroethene	Tetrachloroethene	Acetone	Carbon Tetrachloride	Bromodichloromethane	Chloroform	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	Naphthalene
COEMW15	S	--	13 - 23	14.78	723.09	23.00	25-Feb-03	WL															
				15.57	722.3		29-May-01	WL															
				14.85	723.02		02-Mar-00	<1.0	<1.0	0.23	<1.0	7.5	<1	<25	0.72	<1.0	0.89	<1.0	<1.0	<1.0	<2.0	<10	0.48
COEMW16	S	--	17 - 27	21.41	725.89	27.00	26-Feb-03	WL															
				22.27	725.03		29-May-01	WL															
				21.95	725.35		29-Feb-00	<1.0	<1.0	<1.0	0.52	0.95	<1.0	<25	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<10	<1.0
COEMW17	S	--	5 - 15	3.85	721.38	15.00	26-Feb-03	WL															
				4.06	721.17		17-May-01	<1.0	<1.0	<1.0	<1.0	31.6	<1.0	<10	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				4.1	721.13		01-Mar-00	<1.0	<1.0	<1.0	<1.0	58	<1.0	16	<1.0	<1.0	2.3	<1.0	<1.0	<1.0	<2.0	<10	1.1
COEMW18	S	--	8 - 18	7.85	717.36	18.00	26-Feb-03	WL															
				8.27	716.94		17-May-01	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	10	9	<1.0	3.6	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				8.41	716.8		01-Mar-00	<1.0	<1.0	<1.0	<1.0	0.6	<1.0	<25	6.2	<1.0	4.5	<1.0	<1.0	<1.0	<1.0	<10	<1.0
COEMW19	S	--	8 - 18	13.43	711.37	18.00	26-Feb-03	WL															
				13.43	711.37		29-May-01	WL															
				13.45	711.35		01-Mar-00	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<25	<1.0	<1.0	0.26	<1.0	<1.0	<1.0	<1.0	<10	<1.0
COEMW20	S	--	17.5 - 27.5	16.56	718.55	27.5	25-Feb-03	WL															
				17.39	717.72		29-May-01	WL															
				16.47	718.64		02-Mar-00	<1.0	<1.0	<1.0	<1.0	0.98	<1.0	<25	<1.0	<1.0	0.45	0.25	<1.0	<1.0	<2.0	<10	1.4
COEMW21	T	43.9	38.9 - 48.9	11.78	726.81	43.90	25-Feb-03	WL															
				11.78	726.81		18-May-01	<1.0	1.6	<1.0	<1.0	1490	0.42	<10	<1.0	<1.0	13.8	<1.0	0.56	<1.0	<2.0	N/A	N/A
				12.08	726.51		05-Mar-00	<25	<25	<25	<25	1600	<25	<620	<25	<25	12	<25	7.3	<25	<50	<250	<25
COEMW22	T	47.1	41.8 - 46.8	20.98	727.65	46.80	26-Feb-03	WL															
				20.46	728.17		30-May-01	<1.0	<1.0	<1.0	<1.0	61.5	<1.0	<10	<1.0	<1.0	18.7	<1.0	1	<1.0	<2.0	N/A	N/A
				22.43	726.2		01-Mar-00	<2.5	0.73	<2.5	<2.5	170	<2.5	88	<2.5	<2.5	10	<2.5	<2.5	<2.5	<5	<25	0.75
COEMW23	T	72.8	62.5 - 72.5	17.04	725.25	72.80	25-Feb-03	WL															
				17.63	724.66		29-May-01	WL															
				19.05	723.24		03-Mar-00	<1.0	0.34	<1.0	<1.0	30	<1.0	<25	<1.0	1.6	16	<1.0	<1.0	<1.0	<1.0	<10	0.63
COEMW24	T	47	42.2 - 47.2	15.18	724.51	47.50	25-Feb-03	WL															
				15.38	724.31		21-May-01	<1.0	0.43	<1.0	<1.0	190	<1.0	<10	<1.0	<1.0	5.9	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				18.06	721.63		03-Mar-00	<2.5	<2.5	<2.5	<2.5	120	<2.5	33	<2.5	<2.5	7.6	<2.5	0.89	<2.5	<5	<25	0.99
COEMW25	T	73	61.4 - 71.4	4.15	722.14	71.40	27-Feb-03	<1.0	1	<1.0	<1.0	170	<1.0	<10	<1.0	<1.0	4	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				4.2	722.09		29-May-01	WL															
				4.8	721.49		03-Mar-00	<5.0	1.5	<5.0	<5.0	300	<5	63	<5.0	<5.0	5.4	<5	<5	<5	<10	<50	1.8
COEMW26	T	72.3	62 - 72	5.13	723.77	72.00	26-Feb-03	WL															
				5.55	723.35		18-May-01	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	0.45	<1.0	<1.0	<1.0	<2.0	N/A	N/A
				5.71	723.19		03-Mar-00	<1.0	<1.0	<1.0	<1.0	3.2	<1.0	<25	<1.0	2.1	20	<1.0	<1.0	<1.0	<2.0	<10	0.29
COEMW27	T	67.3	57.1 - 67.1	8.67	716.58	67.10	26-Feb-03	WL															
				8.68	716.57		29-May-01	WL															
				8.3	716.95		01-Mar-00	<1.0	0.37	<1.0	<1.0	60	<1.0	12	0.13	0.52	7.5	<1.0	<1.0	<1.0	<2.0	<10	<1.0
COEMW28	SB	78.5	90 - 95	18.03	725.29	95.00	26-Feb-03	WL															
				18.72	724.6		29-May-01	WL															
				18.16	725.16		29-Feb-00	<1.0	<1.0	<1.0	<1.0	0.22	<1.0	97	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	0.11
COEMW29	SB	74.5	92.5 - 97.5	15.76	722.12	117.50	26-Feb-03	<1.0	7.2	<1.0	1.3	5000	11	<10	<1.0	<1.0	4.3	<1.0	<1.0	<1.0	<2.0	N/A	N/A
	SB		92.5 - 97.5	16.16	721.72		21-May-01	<1.0	4.2	<1.0	0.75	2980	6.6	<10	0.26	<1.0	3	<1.0	0.33	<1.0	<2.0	N/A	N/A
	SB		92.5-97.5	16.63	721.25		02-Mar-00	250	<100	280	<100	1700	<100	<2500	<100	<100	16	<100	<100	<100	<200	<1000	33
	DB		112.5-117.5	16.63	721.25		02-Mar-00	<250	<250	<250	<250	4100	<250	<6200	<250	<250	<250	<250	<250	<250	<500	<2500	100
COEMW30	B	65.5	68 - 73	9.02	716.41	73.00	26-Feb-03	WL															
				9.02	716.41		18-May-01	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	0.57	<1.0	<2.0	N/A	N/A
				8.6	716.83		01-Mar-00	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	18	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	0.29

Table 6. Volatile Organics Analytical Results for the Formerv CAMP Facility

Station ID	Well Type	Depth to Bedrock (FBGS)[1]	Screen Interval (FBGS)	Water Level (FBTOC)[3]	Ground-water Elevation (AMSL)[4]	Total Depth (FBGS)	Date Sampled	1,1,1-Trichloroethane	1,1,2-Trichloroethane	1,1-Dichloroethene	1,2-cis-Dichloroethene	Trichloroethene	Tetrachloroethene	Acetone	Carbon Tetrachloride	Bromodichloromethane	Chloroform	Benzene	Toluene	Ethylbenzene	Total Xylenes	MTBE	Naphthalene
SAIC-01	S	--	29 - 39	20.29	727.8	39.26	26-Feb-03	WL															
				20.73	727.36		30-May-01	<1.0	<1.0	<1.0	<1.0	**2.2**	<1.0	<10	<1.0	<1.0	**0.83**	<1.0	**1**	<1.0	<2.0	N/A	N/A
SAIC-02	T	27	16.1 -26.1	20.17	728.98	26.34	26-Feb-30	WL															
				20.51	728.64		30-May-01	<1.0	<1.0	<1.0	<1.0	**1**	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**1**	<1.0	<2.0	N/A	N/A
SAIC-03	SB	49.5	73.2 - 83.2	21.54	727.57	84.75	26-Feb-03	WL															
				21.63	727.48		01-Jun-01	<1.0	**1.2**	<1.0	<1.0	**285**	<1.0	<10	<1.0	<1.0	**12.2**	<1.0	<1.0	<1.0	<2.0	N/A	N/A
SAIC-04	T	45	34.1 - 44.1	12.91	727.54	44.15	25-Feb-03	WL															
				13.54	726.91		31-May-01	<1.0	**0.23**	<1.0	<1.0	**416**	<1.0	<10	**4.2**	<1.0	**1**	<1.0	<1.0	<1.0	<2.0	N/A	N/A
SAIC-05	T	84	73.77 - 83.77	9.52	716.56	83.63	26-Feb-03	WL															
				10.44	715.64		31-May-01	<1.0	<1.0	<1.0	<1.0	**3.3**	<1.0	<10	**4.5**	<1.0	**2.2**	<1.0	<1.0	<1.0	<2.0	N/A	N/A
SAIC-06	T	63.5	53.1 - 63.1	9.05	716.7	62.71	26-Feb-03	WL															
				9.25	716.5		01-Jun-01	<1.0	<1.0	<1.0	<1.0	<1.0	**0.38**	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	N/A	N/A
SAIC-07	T	90.6	75 - 85	16.07	722.11	88.83	25-Feb-03	WL															
				16.66	721.52		31-May-01	<1.0	**0.54**	<1.0	<1.0	**483**	**0.39**	<10	**2.6**	<1.0	**3.2**	<1.0	<1.0	<1.0	<2.0	N/A	N/A
SAIC-08	T	56	49.3-59.3	18.4	719.31	59.50	27-Feb-03	<1.0	**11**	<1.0	**10**	**7500**	**18**	**28**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	N/A	N/A
SAIC-09	T	41	31.17 - 41.17	12.44	726.42	40.26	25-Feb-03	WL															
				12.75	726.11		01-Jun-01	<1.0	**0.99**	<1.0	<1.0	**982**	**0.22**	<10	<1.0	<1.0	**18.3**	<1.0	<1.0	<1.0	<2.0	N/A	N/A
SAIC-10	T	41	30.17 - 40.17	13.17	727.13	40.23	25-Feb-03	WL															
				13.61	726.69		01-Jun-01	<1.0	**10.5**	<1.0	**1.7**	**7380**	**5.6**	<10	**0.58**	<1.0	**4.5**	<1.0	<1.0	<1.0	<2.0	N/A	N/A
SAIC-11	DB	39	116.97 - 126.97	23.07	726.49	127.30	26-Feb-03	WL															
				40.87	708.69		31-May-01	<1.0	<1.0	<1.0	<1.0	**4.5**	<1.0	**3**	<1.0	<1.0	**0.98**	<1.0	<1.0	<1.0	<2.0	N/A	N/A
SAIC-12	SB	94	108 - 118	9.59	716.49	118.00	26-Feb-03	WL															
				10.48	715.6		31-May-01	<1.0	<1.0	<1.0	<1.0	**4.2**	<1.0	<10	**3.8**	<1.0	**2.1**	<1.0	**1**	<1.0	<2.0	N/A	N/A
SAIC-13	SB	88	95.67 - 105.67	16.53	721.85	105.93	25-Feb-03	WL															
				17.11	721.27		31-May-01	<1.0	<1.0	<1.0	<1.0	**71.8**	<1.0	<10	**3.7**	<1.0	**2.2**	<1.0	<1.0	<1.0	<2.0	N/A	N/A
SAIC-14	T	79	73.7-83.7	10.7	726.18	83.7	28-Feb-03	<1.0	**10**	<1.0	**1.6**	**6300**	**10**	<10	<1.0	<1.0	**5**	<1.0	<1.0	<1.0	<2.0	N/A	N/A
SAIC-15	T	83	73.2-83.2	10.74	725.95	83.5	27-Feb-03	<1.0	**1.2**	<1.0	<1.0	**700**	<1.0	<10	<1.0	<1.0	**2.7**	<1.0	<1.0	<1.0	<2.0	N/A	N/A
SAIC-16	S	--	20.2-30.2	9.69	727.15	30.5	27-Feb-03	<1.0	**8.2**	<1.0	**1.6**	**3800**	**4.5**	**14**	<1.0	<1.0	**4.2**	<1.0	<1.0	<1.0	<2.0	N/A	N/A
SAIC-17	T	50	44.7-54.7	9.51	727.2	55	28-Feb-03	<1.0	**12**	<1.0	**1.7**	**7500**	10	<10	<1.0	<1.0	**6.2**	**1**	<1.0	<1.0	<2.0	N/A	N/A
SAIC-18	T	58.5	50.05-60.05	2.57	722.52	60.55	27-Feb-03	<1.0	**3.4**	<1.0	<1.0	**2500**	**2.6**	<10	<1.0	<1.0	**18**	<1.0	<1.0	<1.0	<2.0	N/A	N/A
SAIC-19	S	--	5.05-15.05	6.97	722.01	15.35	24-Feb-03	<1.0	**1**	<1.0	<1.0	**89**	<1.0	<10	<1.0	<1.0	**5.5**	<1.0	<1.0	<1.0	<2.0	N/A	N/A

1. FBGS - Feet Below Ground Surface
2. TOC = Top of Casing
3. FBTOC = Feet Below Top of Casing
4. AMSL = Feet Above Mean Sea Level
5. North Carolina Department of Environmental Protection Groundwater Quality Standards Subchapter 2L, Section 0.022.
6. N/A = Not Applicable or Not Analyzed
7. National Primary Drinking Water Standards - Maximum Contaminant Levels
8. WL = Water levels were collected on the date specified, however, groundwater samples were not collected.
9. ND = Non-detect

ADDITIONAL NOTES:

- Historical data was collected from the Phase I and Phase II Remedial Investigation Reports issued by Metcalf & Eddie April 1999 and October 2000 respectively.
- As historical data was not presented with data qualifiers, no data qualifiers have been used in the presentation of current data to maintain consistency throughout the table.
- All concentrations are reported in micograms per liter (µg/L).
- Bolded values indicate concentrations detected above the laboratory method detection limit.
- Shaded values indicate concentrations detected above the regulatory criteria.

Table 7. Inorganic Analytical Results for the Former CAMP Facility (Unfiltered Results, ug/L)

Station ID	Well Type	Depth to Bedrock (FBGS)[1]	Screened Interval (FBGS)	Elevation (TOC)[2]	Water Level (FBTOC)[3]	Ground-water Elevation (AMSL)[4]	Total Depth (FBGS)	Date Sampled	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead
North Carolina Groundwater Quality Standards (µg/L)[1]									**NA**	**NA**	**10**	**2000**	**NA**	**5**	**NA**	**50**	**NA**	**1000**	**300**	**15**
MCLs (µg/L)[2]									**200[3]**	**6**	**10**	**200**	**4**	**5**	**NA**	**100**	**NA**	**1300**	**300[3]**	**15**
SAIC-01	S	--	29 - 39	748.09	20.73	727.36	39.26	30-May-01	267	<0.153	<2.06	43.8	0.032	<0.129	117000	<4.45	0.864	0.905	255	0.091
SAIC-02	T	27	16.1 -26.1	749.15	20.51	728.64	26.34	30-May-01	1030	<0.153	4.37	63.7	0.09	<0.15	4110	<7.63	14.3	5.64	1450	0.27
SAIC-03	SB	49.5	73.2 - 83.2	749.11	21.63	727.48	84.75	01-Jun-01	780	<0.153	<3.85	55.9	0.037	<0.17	26400	<7.72	0.443	1.5	533	0.067
SAIC-04	T	45	34.1 - 44.1	740.45	13.54	726.91	44.15	31-May-01	766	<0.153	<2.58	38.2	<0.012	<0.109	8030	<5.84	0.558	2.13	665	0.172
SAIC-05	T	84	73.77 - 83.77	726.08	10.44	715.64	83.63	31-May-01	88.5	<0.153	<3.02	20.5	<0.012	<0.125	16600	<3.09	0.211	0.315	96.9	<0.037
SAIC-06	T	63.5	53.1 - 63.1	725.75	9.25	716.5	62.71	01-Jun-01	50	0.161	<1.96	13.8	<0.012	<0.145	6780	<3.69	0.032	0.212	<58.5	<0.037
SAIC-07	T	90.6	75 - 85	738.18	16.66	721.52	88.83	31-May-01	240	<0.153	<2.83	25.8	<0.012	<0.118	13100	<4.11	0.454	0.994	347	0.079
SAIC-08	T	56	49.3-59.3	737.71	11.75	725.96	59.50	27-Feb-03	1500	<5	<3	44	<1	<1	28000	<5	<5	12	1600	<2
SAIC-09	T	41	31.17 - 41.17	738.86	12.75	726.11	40.26	01-Jun-01	1290	0.257	<2.52	46.5	0.301	<0.36	11000	50.6	1.14	3.71	1280	0.407
SAIC-10	T	41	30.17 - 40.17	740.3	13.61	726.69	40.23	01-Jun-01	110	<0.153	<3.22	91	<0.012	<0.155	13600	<2.16	1.77	0.45	87.1	<0.037
SAIC-11	DB	39	16.97 - 126.9	749.56	40.87	708.69	127.30	31-May-01	40600	<0.263	<5.68	553	1.05	1.37	53200	124	39.6	111	42400	7.28
SAIC-12	SB	94	108 - 118	726.08	10.48	715.6	118.00	31-May-01	43.8	<0.153	<3.98	13.3	<0.012	<0.146	23200	<3.81	0.099	0.378	<2.69	<0.037
SAIC-13	SB	88	95.67 - 105.67	738.38	17.11	721.27	105.93	31-May-01	108	<0.153	<3.92	25.8	0.018	0.313	21000	<6.84	2.14	4.95	168	0.112
SAIC-14	T	79	73.7-83.7	736.88	11.3	725.58	83.7	28-Feb-03	50	<5	<3	82	<1	<1	15000	<5	12	1400	<100	<2
SAIC-15	T	83	73.2-83.2	736.69	10.68	726.01	83.5	27-Feb-03	12000	<5	<3	110	<1	<1	36000	6	<5	400	7100	3
SAIC-16	S	--	20.2-30.2	736.84	10.64	726.2	30.5	27-Feb-03	36000	<5	<3	78	<1	<1	21000	<5	<5	<10	33100	<2
SAIC-17	T	50	44.7-54.7	736.71	10.68	726.03	55	28-Feb-03	11300	<5	<3	90	<1	<1	17000	<5	<5	1800	1700	<2
SAIC-18	T	58.5	50.05-60.05	725.09	3.3	721.79	60.55	27-Feb-03	4100	<5	<3	62	<1	<1	14000	14	<5	<10	2700	<2
SAIC-19	S	--	5.05-15.05	728.98	1.52	727.46	15.35	24-Feb-03	1000	<5	<3	34	<1	<1	13000	<5	<5	<10	1200	<2

1. North Carolina Department of Environmental Protection Groundwater Quality Standards Subchapter 2L, Section 0.022. Standards are reported in micrograms per liter (µg/L)
2. National Primary Drinking Water Standards - Maximum Contaminant Levels
3. National Secondary Drinking Water Standard

N/A = Not Applicable or Not Analyzed

< not detected above laboratory method detection limit

To remain consistant with historical data analytical qualifiers are not included

Shaded values indicate concentrations above the North Carolina Groundwater Quality Standards if available otherwise MCLs are used.

Table 7. Inorganic Analytical Results for the Former CAMP Facility (Unfiltered Results, ug/L)

Station ID	Well Type	Depth to Bedrock (FBGS)[1]	Screened Interval (FBGS)	Elevation (TOC)[2]	Water Level (FBTOC)[3]	Ground-water Elevation (AMSL)[4]	Total Depth (FBGS)	Date Sampled	Magnesium	Manganese	Mercury	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
North Carolina Groundwater Quality Standards (µg/L)[1]									**NA**	**50**	**1.1**	**100**	**NA**	**50**	**18**	**NA**	**NA**	**NA**	**2100**
MCLs (µg/L)[2]									**NA**	**50[3]**	**2**	**NA**	**NA**	**50**	**100[3]**	**NA**	**2**	**NA**	**5000[3]**
SAIC-01	S	--	29 - 39	748.09	20.73	727.36	39.26	30-May-01	5610	73	<0.057	1.86	1760	<0.307	<0.497	6310	0.659	<6.42	6.22
SAIC-02	T	27	16.1 -26.1	749.15	20.51	728.64	26.34	30-May-01	2190	264	<0.057	5.9	1360	<0.307	<0.477	2650	<0.235	<12.4	6.78
SAIC-03	SB	49.5	73.2 - 83.2	749.11	21.63	727.48	84.75	01-Jun-01	7560	69.6	<0.2	1.45	4320	0.838	<0.336	8680	0.182	<14.5	2.22
SAIC-04	T	45	34.1 - 44.1	740.45	13.54	726.91	44.15	31-May-01	3420	51.3	<0.057	2.71	1750	<0.767	<0.468	5780	<0.293	<12.5	2.52
SAIC-05	T	84	73.77 - 83.77	726.08	10.44	715.64	83.63	31-May-01	7470	103	<0.057	1.78	5210	<0.307	<0.476	11400	<0.085	<12.3	0.732
SAIC-06	T	63.5	53.1 - 63.1	725.75	9.25	716.5	62.71	01-Jun-01	3190	53.8	<0.2	0.851	814	<0.307	<0.388	4970	<0.077	<7.67	<0.973
SAIC-07	T	90.6	75 - 85	738.18	16.66	721.52	88.83	31-May-01	5490	42.1	<0.057	0.765	1980	<0.307	<0.499	8460	<0.684	<12.3	2.63
SAIC-08	T	56	49.3-59.3	737.71	11.75	725.96	59.50	27-Feb-03	7700	170	<0.2	<10	9400	<3	<5	20000	<3	<10	<10
SAIC-09	T	41	31.17 - 41.17	738.86	12.75	726.11	40.26	01-Jun-01	4610	42	<0.2	2.46	1740	<0.307	<0.555	7540	0.312	<12.4	3.77
SAIC-10	T	41	30.17 - 40.17	740.3	13.61	726.69	40.23	01-Jun-01	5220	231	<0.2	2.6	5190	0.529	<0.138	8120	<0.077	<7.24	<0.916
SAIC-11	DB	39	16.97 - 126.9	749.56	40.87	708.69	127.30	31-May-01	23600	1060	<0.057	92.7	39400	<0.307	<0.705	16800	<0.257	146	130
SAIC-12	SB	94	108 - 118	726.08	10.48	715.6	118.00	31-May-01	7520	9.52	<0.057	0.767	7010	<0.307	<0.47	10800	<0.187	<14.2	1.76
SAIC-13	SB	88	95.67 - 105.6	738.38	17.11	721.27	105.93	31-May-01	7470	11.6	<0.057	2.94	6750	<0.307	<0.486	8580	<0.413	<11.2	3.79
SAIC-14	T	79	73.7-83.7	736.88	11.3	725.58	83.7	28-Feb-03	7800	190	<0.2	<10	5200	<3	73	14000	<3	<10	<10
SAIC-15	T	83	73.2-83.2	736.69	10.68	726.01	83.5	27-Feb-03	12000	300	<0.2	<10	9100	<3	49	14000	<3	25	16
SAIC-16	S	--	20.2-30.2	736.84	10.64	726.2	30.5	27-Feb-03	6800	360	<0.2	<10	5100	<3	<5	11000	<3	11	23
SAIC-17	T	50	44.7-54.7	736.71	10.68	726.03	55	28-Feb-03	8000	140	<0.2	<10	4600	<3	20	12000	<3	6	<10
SAIC-18	T	58.5	50.05-60.05	725.09	3.3	721.79	60.55	27-Feb-03	6500	97	<0.2	<10	3400	<3	<5	11000	<3	11	<10
SAIC-19	S	--	5.05-15.05	728.98	1.52	727.46	15.35	24-Feb-03	4600	83	<0.2	<10	1800	<3	<5	9500	<3	<10	<10

1. North Carolina Department of Environmental Protection Groundwater Quality Standards Subchapter 2L, Sectior
2. National Primary Drinking Water Standards - Maximum Contaminant Levels
3. National Secondary Drinking Water Standard

N/A = Not Applicable or Not Analyzed

< not detected above laboratory method detection limit

To remain consistant with historical data analytical qualifiers are not included

Shaded values indicate concentrations above the North Carolina Groundwater Quality Standards if availabl

ATTACHMENT B

FIGURES

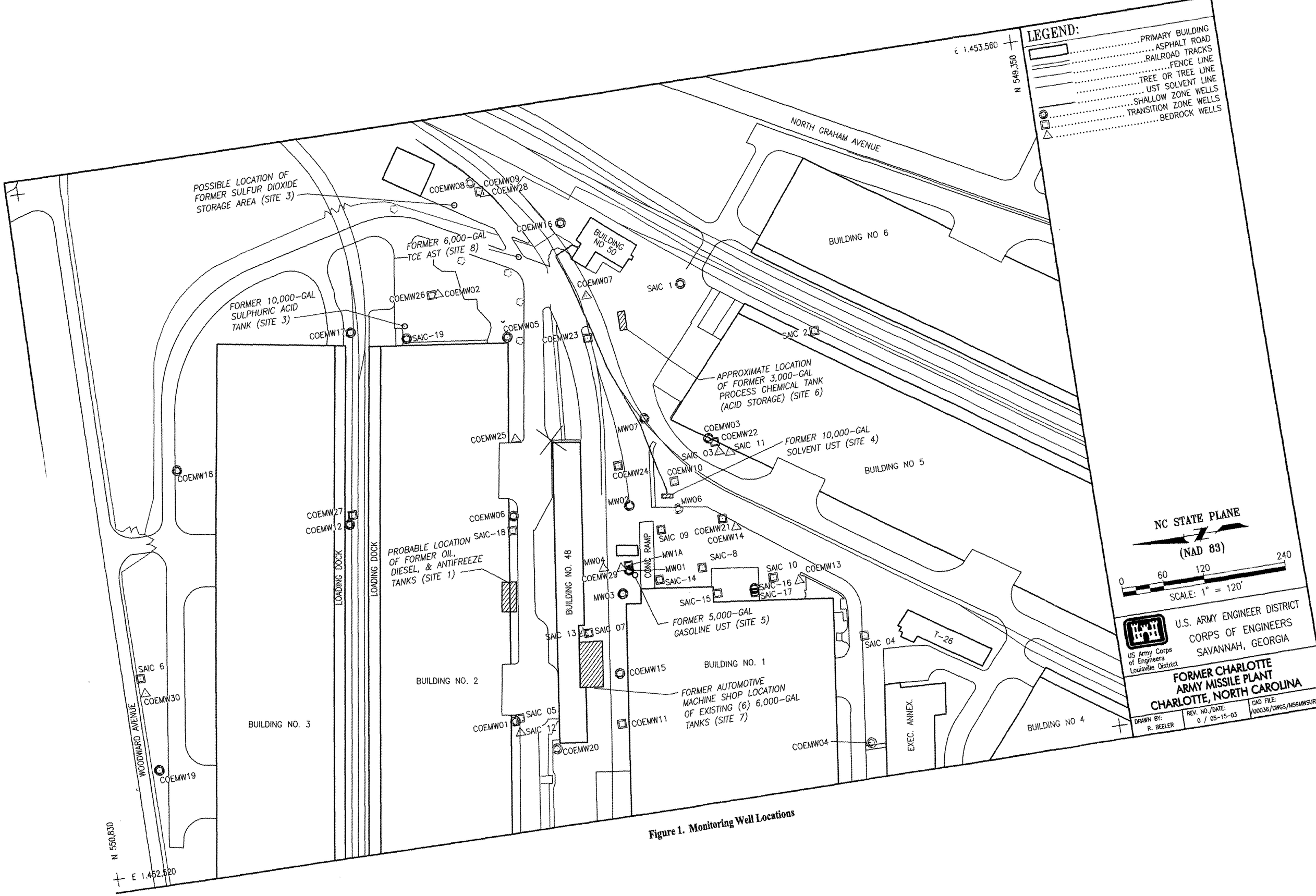


Figure 1. Monitoring Well Locations

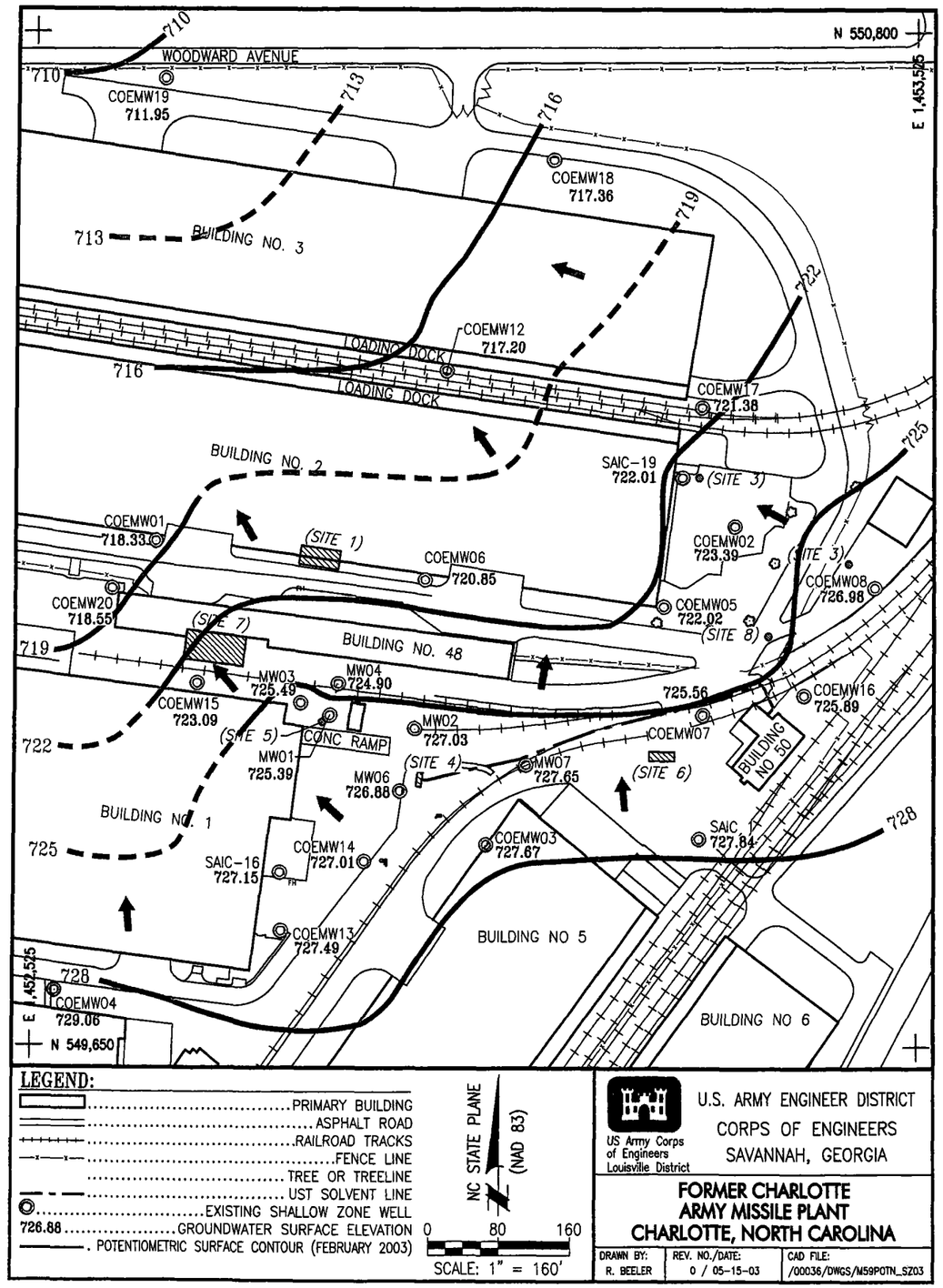


Figure 2. Shallow Zone Potentiometric Surface, February 2003

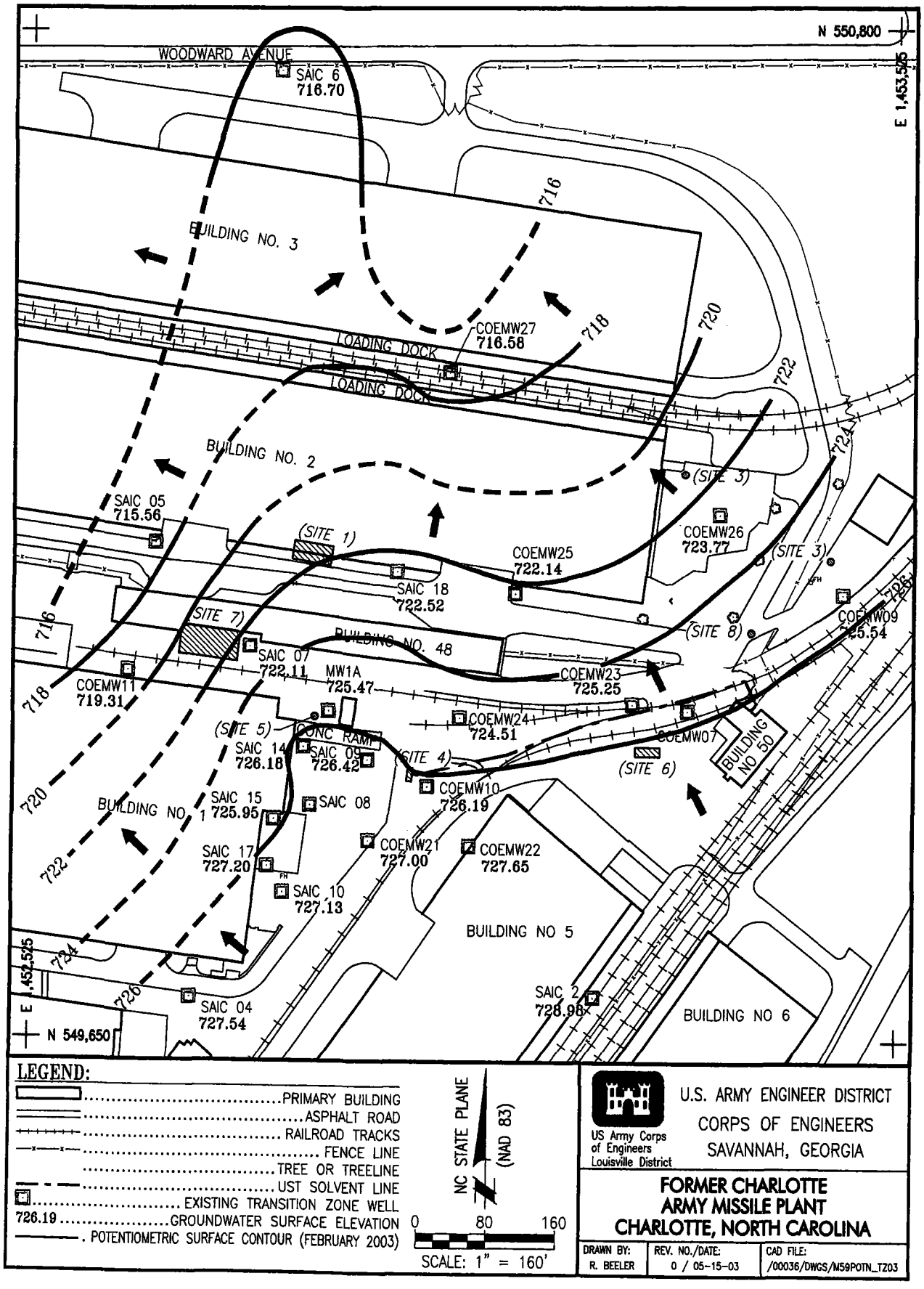


Figure 3. Transition Zone Potentiometric Surface, February 2003

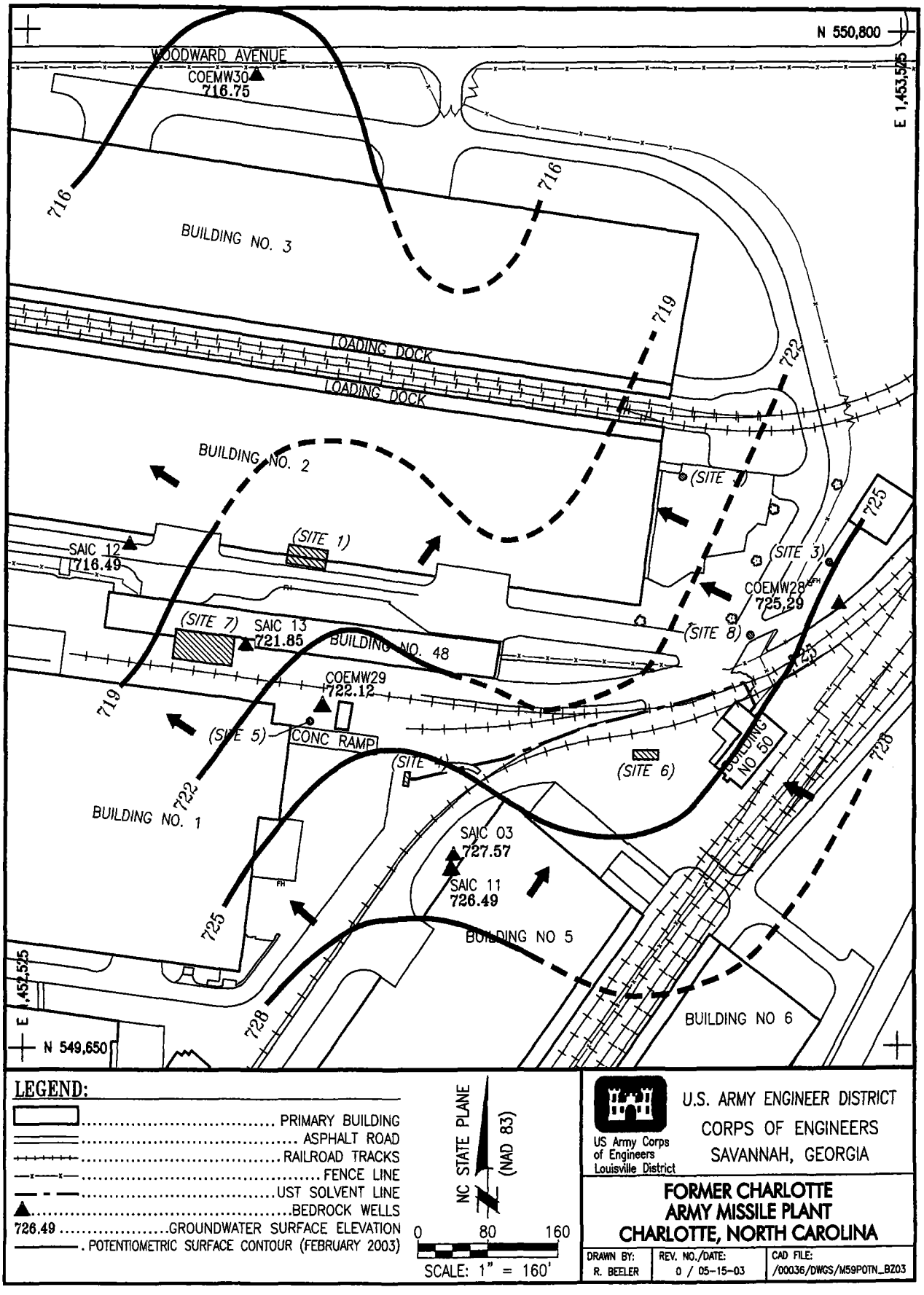


Figure 4. Bedrock Wells Potentiometric Surface, February 2003

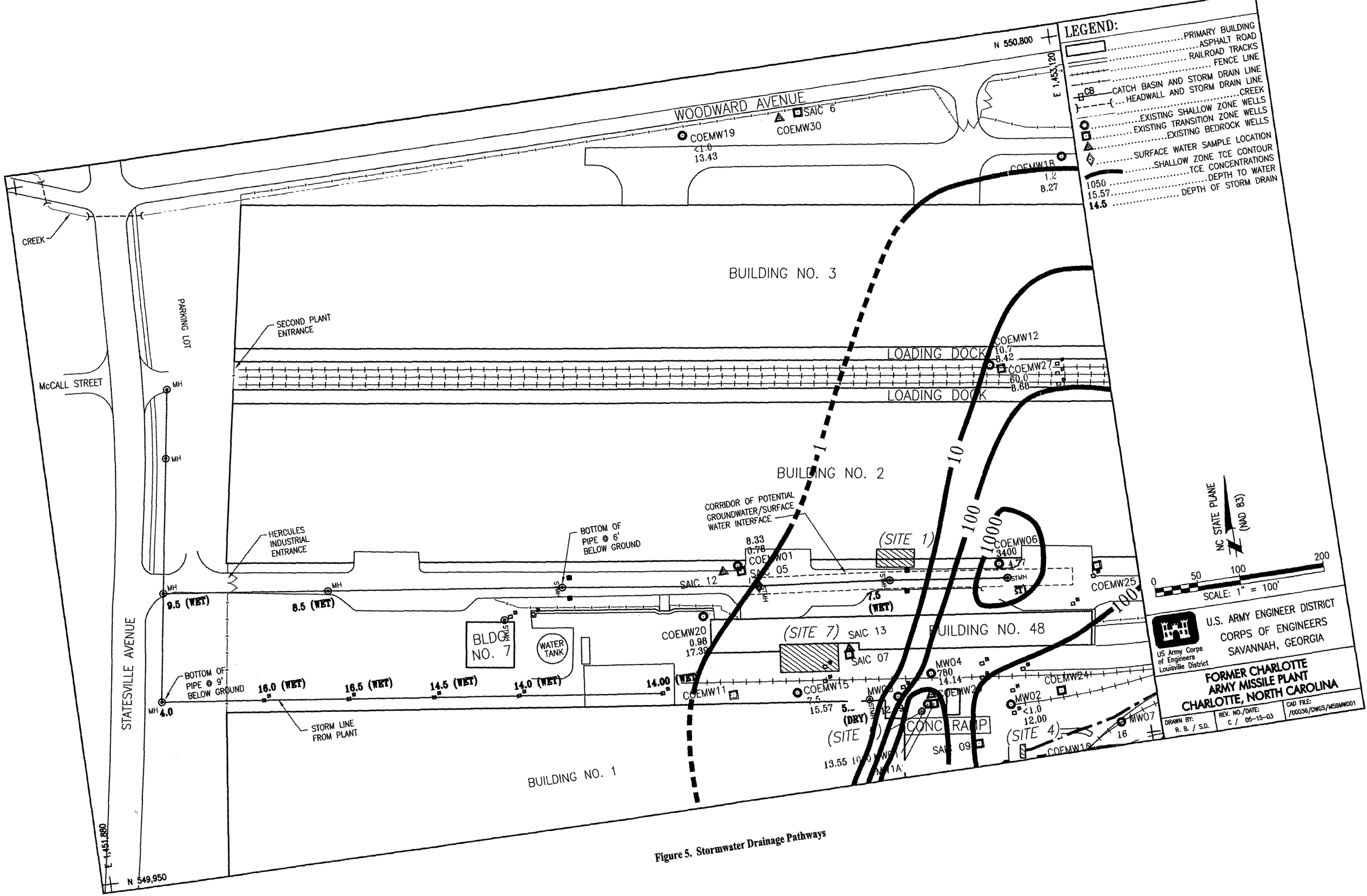


Figure 5. Stormwater Drainage Pathways

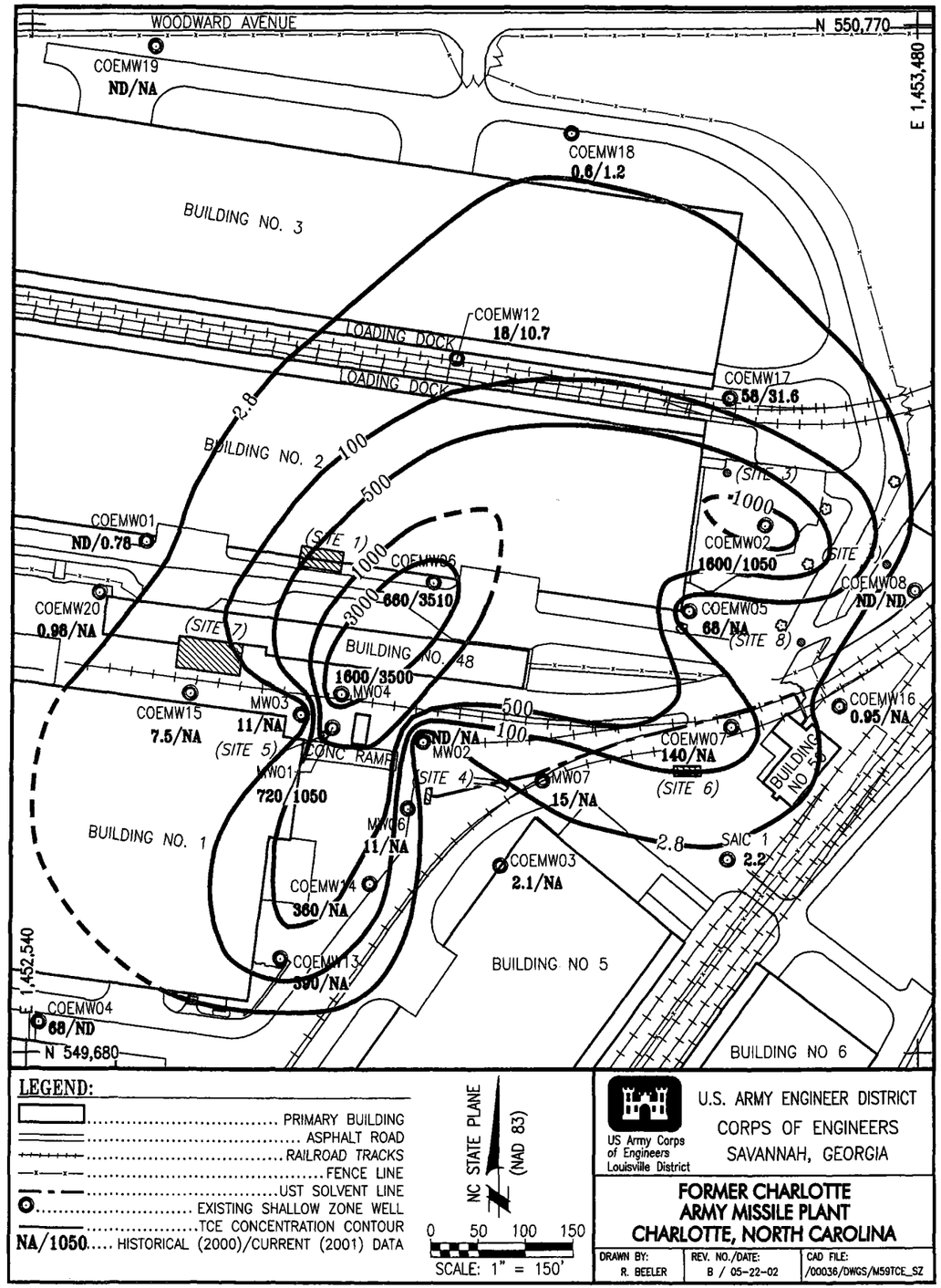


Figure 6. TCE Concentrations in Shallow Zone Wells

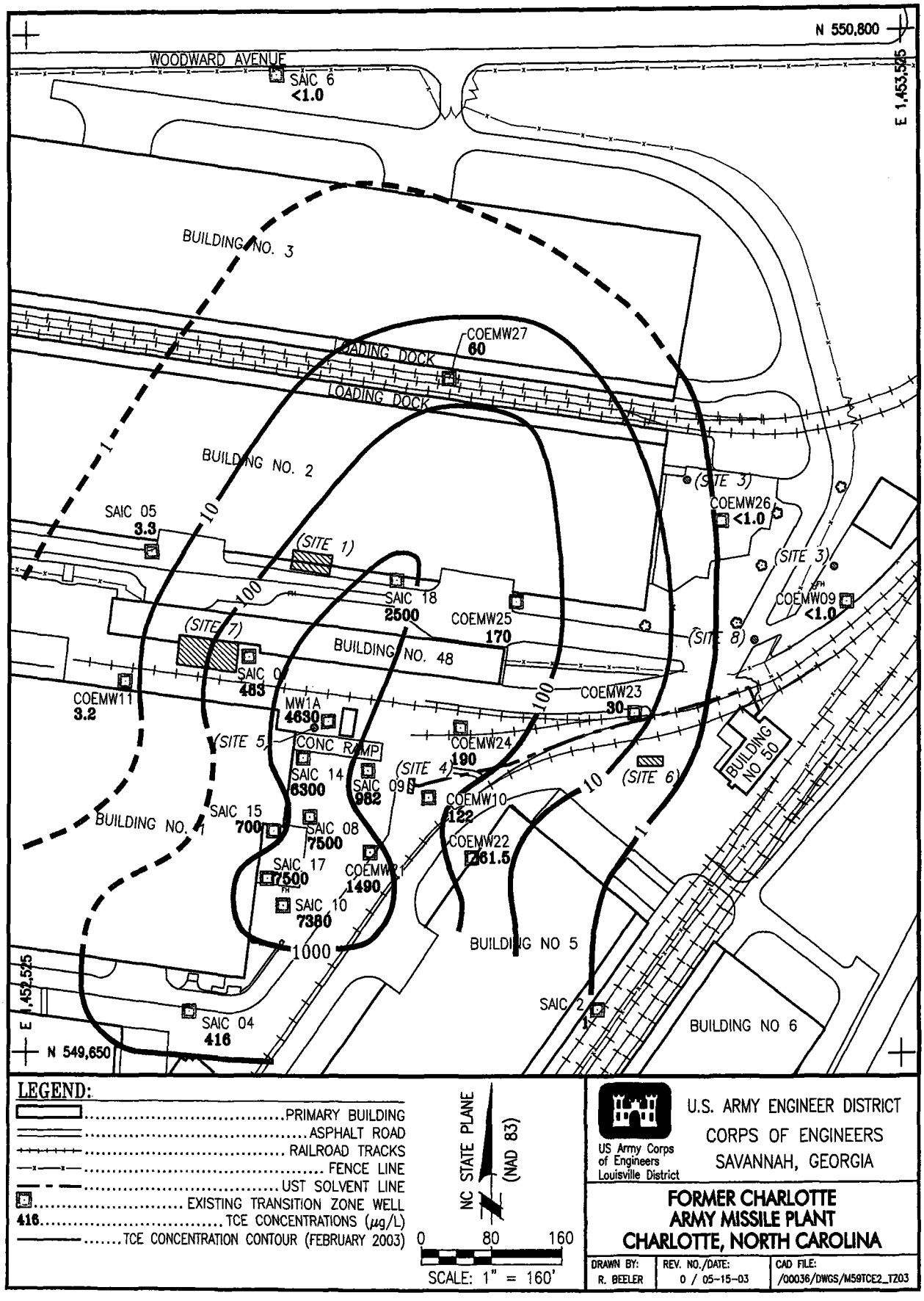


Figure 7. TCE Concentrations inTransition Zone Wells, February, 2003

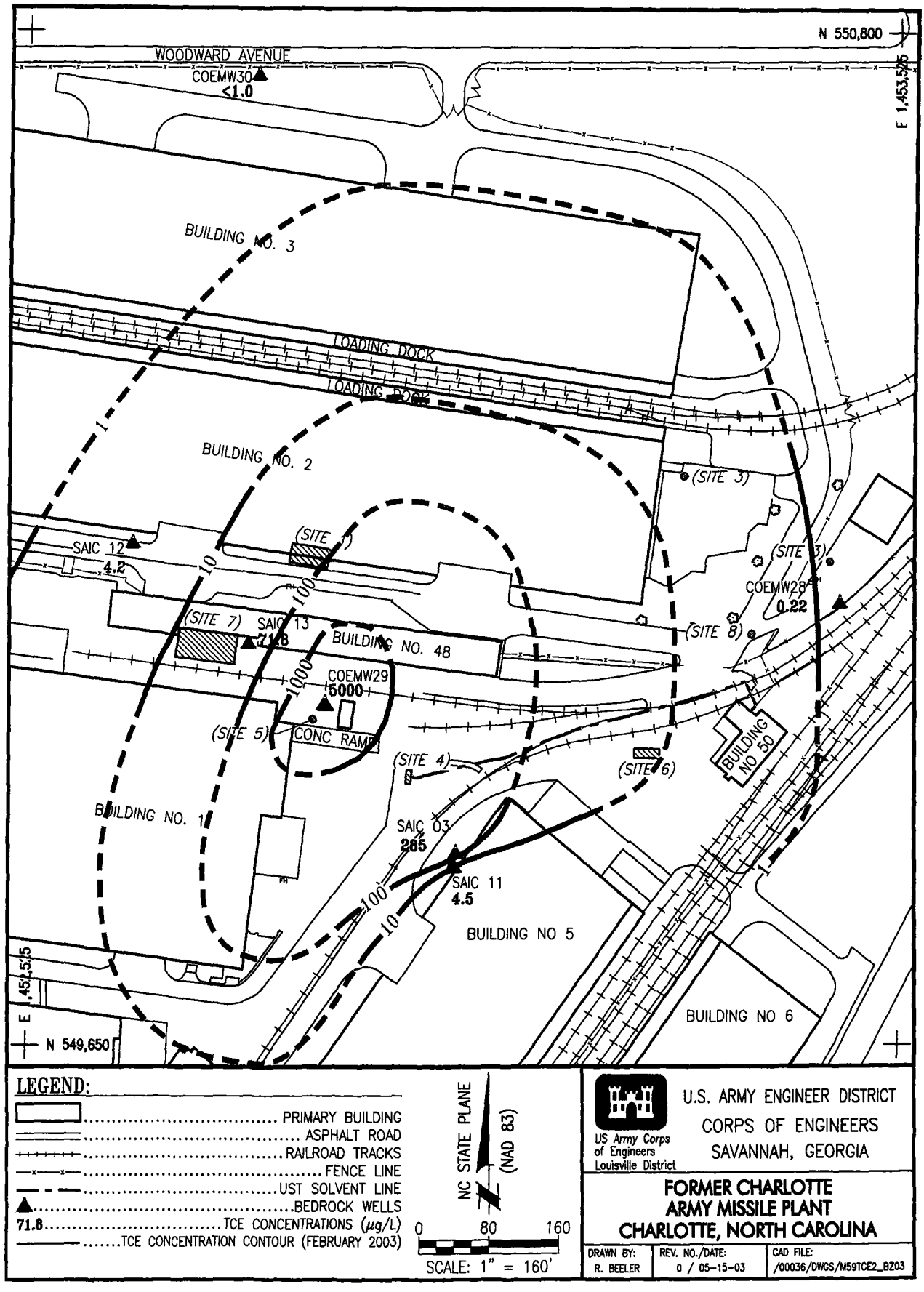


Figure 8. TCE Concentrations in Bedrock Wells, February, 2003

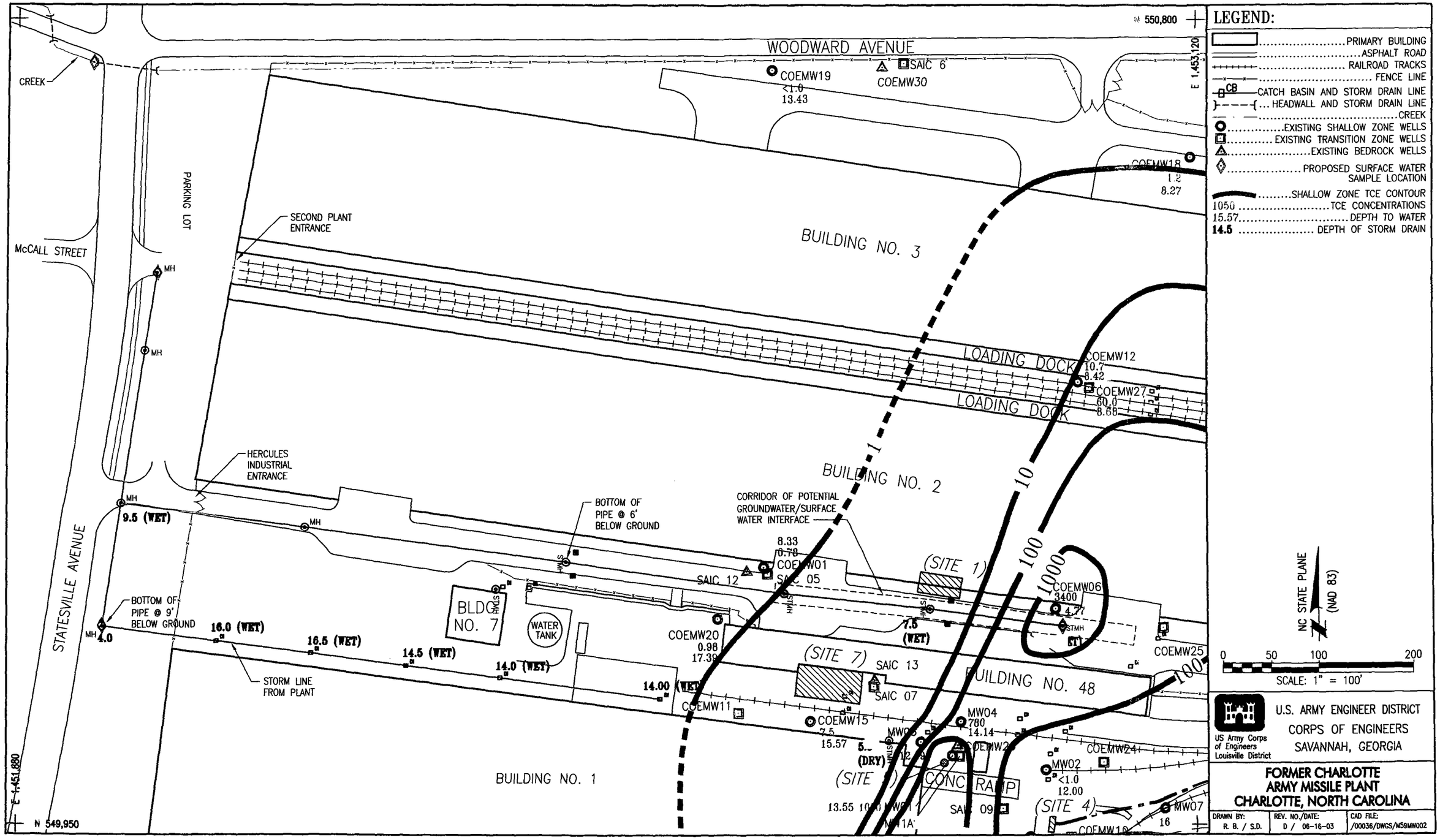


Figure 9. Stormwater Drainage Pathways

APPENDIX B

BOREHOLE LOGS AND CONSTRUCTION DIAGRAMS

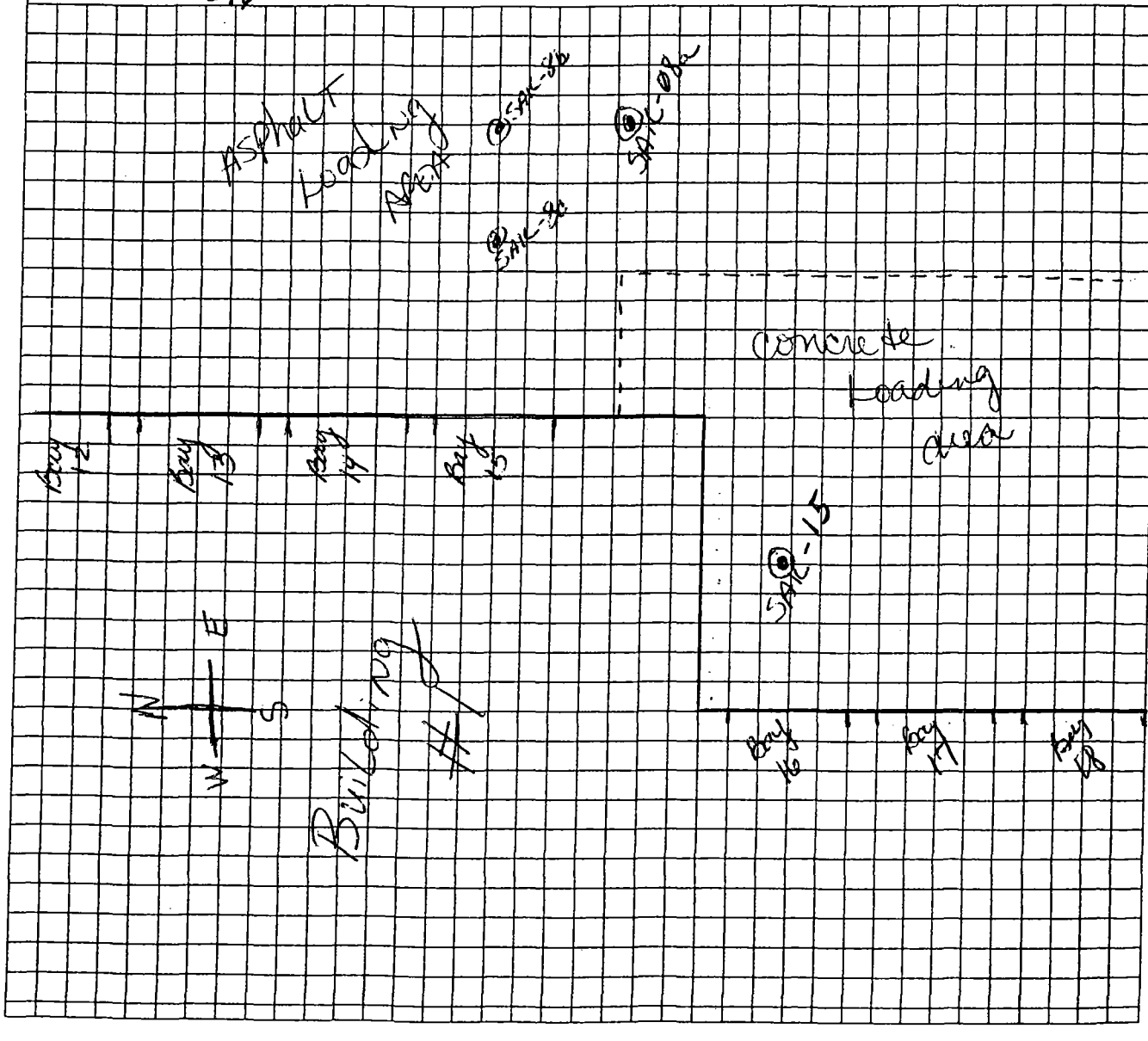
BORING LOG

Project Name: **Former Charlotte Army Missile Plant (CAMP)**		Borehole ID: SAIC-08
On-Site Geologist: **Chuck McNulty**	On-Site Driller: LARRY GROTBERG	Page 1 of 11
Drilling Sub-Contractor: **Boart Longyear**		Drill Rig Type: Drilling Method: **Sonic**
Diameter of Borehole: 6-inch	Borehole Location: AREA between Bay 15 and 16 of Building #1 at ECKERD	
Date Started: 1-26-03	Depth Water Encountered: Not Recorded.	Total Depth of Boring: 60 ft
Date Finished: 1/28/03	Northing: 549915.65	Easting: 1452850.01
Depth to Bedrock: 56 ft	Elevation: 737.59	Datum: Top of Casing
Monitoring Well Installed: YES Diameter: 2-inch	Total Depth of well: 59.5 ft	Screen Type/Diameter/Slot Size/Length: **PVC/2-inch/0.010-inch/10-ft**

Well Completion Type: _____ Stick-up X Flushmount

Ground surface: 737.75

Scale: 1" = 10'



DRILLING LOG

HOLE NUMBER: SAIC-08 32

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 2 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		ASPHALT				SONIC Drilling METHOD 4-inch sample Barrell inside 6-inch casing
	1					
	2					
	3					
	4					
	5					
	6					
	7					
	8					
	9					
	10					

DRILLING LOG

HOLE NUMBER: [illegible]

33

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty [illegible] | SHEET 3 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D) ppm	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
			2.4			
	11					
	12		6.7			
	13					
	14		10.1			
ML	15	SILT - Saprolite w/clay 10YR 4/6 Dark yellowish Brown Material appears saturated No water used during drilling. Mica flakes visible throughout				15 - 24 10YR [illegible]
	16		4.2			
	17					
	18	weathering decreases to sand size minerals w/ all Silty Sand. 10YR 5/8 yellowish Brown Brownish sub sand to sub angular. Color change to 10YR 4/2 dark yellowish Brown. Material is less sand	6.1			Silty Sand poorly sorted fine to coarse grained
SM	19					
	20		11.4			

34

DRILLING LOG

HOLE NUMBER: 3AIC-8

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 4 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS (D)	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
Sm		Silty Sand same as previous	0.0			2p 75 1p70 Excavy
	21					
	22		.2			
	23					
ML		Silt w/ clay. Saprolite Rock of granite 2.5Y 5/3 Light olive Brown some iron staining. Very compact and difficult to break w/ hand pressure. ~~Mineral~~ weathered minerals remain in place and resemble parent rock. Moist.				
	24		3.7		NC #811	
	25					
	26		16.2			
	27					
	28		4.7			
	29					
	30					

DRILLING LOG

HOLE NUMBER: SAK-8

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 5 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
ML		Saprolite - Same as previous	2.4		N/A	30-35 100% Recovery
	31					
	32		6.9			
	33	Weathering decreases slightly with some minerals remaining sand size fine to coarse w/ sub angular edges. matrix is still silt/clay.				
	34		12.4			
ft	35	DIORITE				35-40 100% Recovery
ML		Saprolite. Silt w/ clay 10YR4/1 Dark Gray intermingled w/ 10YR4/3 Brown material contains some gravel size ~~particles~~ Rock VERY COMPACT, STIFF, and tough. Slow dilatance when water added. MOIST.				
	36		8.1			
	37					
	38		5.2			
	39					
	40		1.3			

36

DRILLING LOG

HOLE NUMBER: SAK-8

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 6 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS ppm	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
ML/CL		SILT/Clay mixture. 2.5Y 5/2 Grayish Brown moist. Contains some mica flakes and Rock fragments of Granite/and Diorite (1cm) when water added quick dilatance. Low plasticity.			N/A	40-45 Hard Drilling
	41					
	42		11.4			
ML		Material Grades into less weathered Diorite saprolite some weathered minerals are sand size. 2.5Y 4/4 Brown. Lots of iron staining throughout. Very Dense. Hard to break by hand pressure. moist				
	43					
	44		22			
		Contains some larger (5cm) pieces of Quartz and dark Rock fragments (weathered).				
	45					45-50' Drill Rig "Chattering" 14 minutes to drill 5'
ML/CL		SILT + Clay mixture (Hue 1 4/1 Dark Greenish Gray. Moist, stiff low plasticity. When water added Quick Dilatance Diorite Gravel, cobbles, and Boulders.				
	46		11.2			
	47					
	48		2.2			
		DIORITE				
	49					
VR		Saprolite (Diorite) 10YR 5/4 Yellowish Brown weathered Feldspars are Gray-1 5/1, white contains mica				
	50		1.8			

DRILLING LOG

HOLE NUMBER: SAIC-8

37

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | Paula Bond | SHEET 7 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
SM	51	SILTY Sand Clay - 1 4/1 Dark Greenish Gray. Very Fine to fine grained Sand well sorted Predominantly QUARTZ and Feldspars and micas. Loose, moist			N/A	Sp 55'
MCL	52	SILT Clay mixture Gley-1 4/1 Dark Greenish Gray. Moist, Low plasticity Contains gravel size weathered fragments of Diorite. When water added slow to quick dilatance.	8.3			
	53					
	54		4.7			
	55			Loss	Loss	55-57'
RX	56	Diorite.				Drilling very chattery. Driller is having to use water to cut Rock. We are getting full return on all drill water added. 57-60' 100% Recovery
	57					
	58					
	59					
	60					

End of borehole: 60.0 ft.

Well volume calculation sheet

Date 1-30-03 Time 1020
Well ID Num SAIC-8
Well Location Building #1 loading Bay 15

Total depth of well (ft BTOC) ~~11.95~~ 59.5
Depth to water (ft BTOC) 11.75
Height of water column (ft) (Hc) ~~59.5~~ 47.75

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc (.006) .9 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30) (.05 - .008)
**note ** use length of screen if Hc > length of screen
= .47 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft) (1.37)
= 10.24 gal.

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing .09 (ft)
Hc = height of water column 47.75 (ft)
Rf = radius of filter pack .25 (ft)
Rc = radius of inside casing .08 (ft)

WELL DEVELOPMENT SUMMARY

PROJECT NAME: CAMP

DELIVERY ORDER NO: 0070

WELL NUMBER: SAIC-8 Well volume: 10.24 gallons WL = 11.75

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (STANDARD UNITS)	TURBIDITY (NTU)	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
1-30-03	1045	0	14.31	.179	9.14	7999	0	0	5.83 -205 1057-purged Dry
	1133	15	16.99	.246	7.82	7999	15	1.5	3.78 -231 WL=32.1
	1225	4.0	17.10	.272	7.74	7999	19	1.9	2.99 -164 WL=31.8
	1320	10	14.99	.267	7.34	7999	29	2.8	4.29 -89 WL=40.3
	1429	2	9.96	.284	7.25	51	32	3.1	7.55 2 WL=25.[illegible]
	1435	1	11.49	0.290	7.14	110	33	3.2	7.49 -23 WL 43.80
	1440	1	11.25	0.288	7.23	97.9	34	3.3	7.33 -23 WL:43.2
	1450	1	11.76	0.289	7.20	50.2	35	3.4	6.84 -26 WL:43.3
	1500	1	12.13	0.285	7.16	34.3	36	3.5	6.47 -33 WL: 43.4
	1510	1	12.20	0.288	7.11	21.3	37	3.6	5.75 -43 WL: 43.45
	1527	2	12.22	0.295	7.18	10.0	39	3.8	6.71 -37 WL=43.45

RECORDED BY: [signature]

QA CHECKED BY: [signature]

E

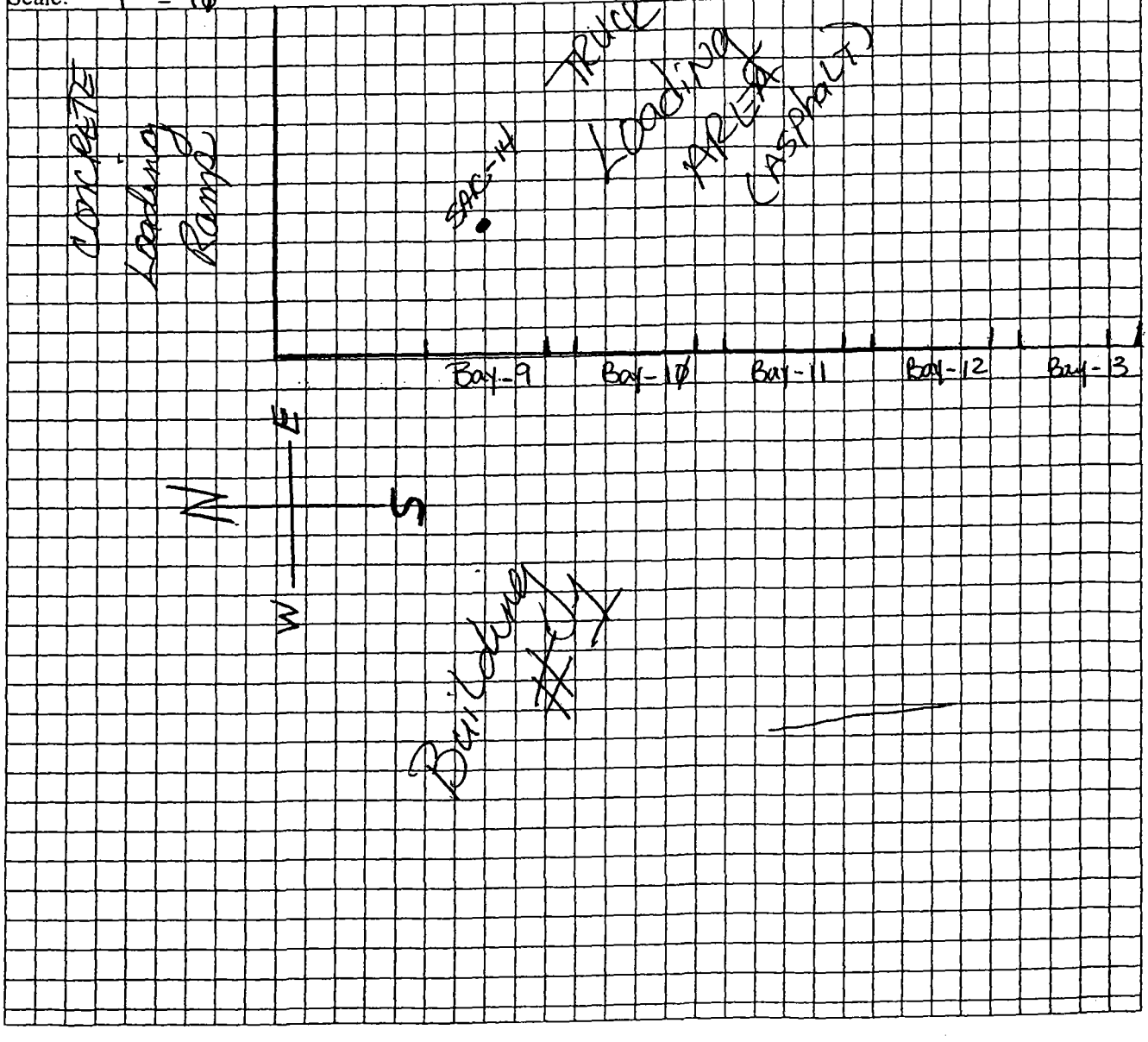
BORING LOG

Project Name: **Former Charlotte Army Missile Plant (CAMP)**		Borehole ID: SAIC-14
On-Site Geologist: **Chuck McNulty**	On-Site Driller: Larry Grotberg	Page 1 of 11
Drilling Sub-Contractor: **Boart Longyear**		Drill Rig Type: Drilling Method: **Sonic**
Diameter of Borehole: 6-inch	Borehole Location: Bay-9 of Bldg #1 ECKERD Distribution Facility	
Date Started: 1-25-03	Depth Water Encountered: 25 ft	Total Depth of Boring: 85.0'
Date Finished:	Northing: 549982.06	Easting: 1452842.00
Depth to Bedrock: 79.0'	Elevation: 736.88 ft	Datum: Top of Casing
Monitoring Well Installed: YES Diameter: 2-inch	Total Depth of well: 83 ft	Screen Type/Diameter/Slot Size/Length: **PVC/2-inch/0.010-inch/10-ft**

Well Completion Type: _____ Stick-up _X_ Flushmount

Ground surface = 737.09 ft

Scale: 1" = 10'



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DRILLING LOG

HOLE NUMBER: SAIC-14

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 2 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		~~Conc~~ Asphalt			N/A	Sonic Drilling 6-inch w/ 4-inch sample Barrell
ML	1	Silt w/clay 10YR 5/6 Yellowish Brown. Moist. Quick Dilatancy. Non-plastic. Crumbles w/hand pressure Mica Flakes throughout	Ø.Ø			Ø-5' 100% Recovery
	2	Some sand size weathered minerals (Feldspars) Some iron staining and also some weathered darker material				
	3	10YR 2/2 very dark Brown. Saprolite	Ø.Ø			
	4					
ML	5	Saprolite. Silt w/clay. 10YR 5/6 Yellowish Brown. Moist Quick to slow dilatancy. Low plasticity. Material is distinctly saprolite				easy Drilling w/ good Recovery
	6	appearing w/ mineral colors in fact weathered Feldspars are 10YR 8/3 very pale Brown w/ darker constituents of 10YR 2/2 very dark Brown.	Ø.Ø			
	7	Fine (silt) mica Flakes throughout Parent material either granite or Diorite				
	8		2.5			
	9					
	10		1.7			

DRILLING LOG

HOLE NUMBER: SAIC-14 | 11

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bonk | SHEET 3 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		Saprolite. Same as previous			N/A	14 5-15'
	11					
	12		1.8			
	13					
	14		7.5			
	15					15-25' 100% Recovery
	16		0.0			material is very compacted. making water level Determination very difficult
	17					
	18		1.6			
	19					
	20		4.6			

DRILLING LOG

HOLE NUMBER SAIC-14 | 2

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 4 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		Saprolite same as previous.			N/A	15-25' 100% Recovery
	21					
	22		17.1			
	23					
	24	Some sand size particles appearing @ 24'. Weathered bedrock minerals (Feldspars)	20.2			
	25	Material appears saturated @ 25'	▽			Fumes from Rig entering Building. 25-35' 100% Recovery
	26		2.4			
	27					
	28	Density increases as clay content decreases.	1.1			
	29	Less moisture. More dense				
	30		18.7			

13

DRILLING LOG

HOLE NUMBER:

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | SHEET 5 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		Saprolite same as previous				25-35' 100% Recovery
	31	material becomes more compact and dense. Lower moisture content.				harder Drilling
	32		22.6			
	33					
	34	material is very crumbly and dry smaller mineral size more	29.6		N21411 1645 VOC's + % solids	
ML	35	SILT. 10YR 5/8 Yellowish Brown. Very densely compacted Dry. can be broken w/ Firm hand pressure. Color is relatively consistent throughout with no discernable weathered minerals except mica does however appear occasionally.				35-45 100% Recovery very difficult Drilling
	36		20.4			
	37	Density increases w/ Depth Non-plastic. Very tough.				
	38		18.3			
	39					
	40					

DRILLING LOG

HOLE NUMBER:

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | SHEET 6 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		SILT- Same as Previous	2.4		N/A	35-45' 100% Recovery
	41					
	42	Some Remnant Fracture patterns.	1.5			
						Difficult/slow Drilling
	43					
	44		27			
	45	Some 1 to 2cm angular weathered rock 10YR7/1 Black Crushes w/ Firm hand Pressure				45-50' 100% Recovery
	46		15.4			
	47	material grades back into distinct silicate saprolite. Same as Previous. Very Dry and Crumbly				
	48		25			
	49					
	50		29			

DRILLING LOG

HOLE NUMBER: SAIC-14

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 7 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS ppm	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		Saprolite same as previous.			N/A	50-55
	51					
	52		28.3			
	53					
	54	Individual minerals have weathered to only sand size particles and silt size 10YR 3/6 Dark Yellowish Brown. Drilling method crushed material to silty sand consistency. Moist to dry. Appears loose.	30.3			
	55					55-60
ML		Silt w/clay 2.5Y 4/3 Olive Brown. Dry, Densely compacted. Crushes w/ very firm hand pressure. Minor amounts of very fine grained mica and weathered feldspars. Some iron staining. Uniform color throughout				
	56		8.4			very hard to drill.
	57					
	58		3.2			
	59					
	60		53.4			

DRILLING LOG

HOLE NUMBER: SAIC-14

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 8 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		SAME AS PREVIOUS			N/A	60-65 100% Recovery
	61					Drillers using no water so far during drilling
ML	62	Distinctly Diorite/Granite saprolite. 2.5Y 5/4 light olive Brown intermingled w/ 2.5Y 8/2 Pale Yellow (feldspars) and 10YR 2/1 Black (other minerals). Very dry and crumbly. Very firm hand pressure breaks material. Non-plastic. When water added quick dilatence. Weathered minerals	15.2			Water is used to help push sample out of sampler.
	63					
	64		7.8			
	65	material appears as weathered Diorite/Granite, but weathered only to sand and silt size particles. the distinct mineral zones are color				65-70' 100% Recovery
	66	7.5YR 4/4 Brown in a matrix of 2.5Y 5/3 Light olive Brown silt. the weathering of of two seperate materials	4.6			Drill Rate increasing
	67	gives the appearance of Banding or Fingering the weathered Diorite/Granite has some iron staining				
	68	Moist material grades back to saprolite as described above. Very dry and friable.	9.2			
	69					
SM		Silty Sand 2.5Y 4/2 Dark Grayish Brown. Fine grained, subangular loose moist.	10.7			Silty Sand
	70					

DRILLING LOG

HOLE NUMBER: SAIC-14

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 9 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
CL		Clay. 2.5Y 4/4 olive Brown Dry to slightly moist. Low plasticity - Very stiff and tough. Contains some silts.			N/A	70-75'
	71					
	72					
		some Rock Fragments				
	73					
		moisture decreases to very Dry and compact. can not be broken w/ hand pressure but will crush w/ hammer blow. some mica Flakes present				
	74					
CL	75	Clay w/ silt and Rock. 2.5Y 5/2 Grayish Brown. Moist Low plasticity. Rock Fragment are Angular				75-79'
	76					
	77					
	78					
RX	79	Dicrite				
	80					

DRILLING LOG

HOLE NUMBER: SMC-14

18

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bord | SHEET 10 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		Diorite	0.0	x	N/A	79-85'
				x		
				x		
	81			x		
				x		
				x		
	82		0.0			
				x		
				x		
	83			x		
				x		mon. tower well will be set @ 35.0'
	84		0.0	x		
				x		
				x x		
	85	E.O.B. 85.0'				
	86					
	87					
	88					
	89					
	90					

Well volume calculation sheet

Date 1/29/03 Time 1530
Well ID Num 3AIC-14
Well Location CAMP; Bay #9 Bldg. #1

Total depth of well (ft BTOC) 82.70
Depth to water (ft BTOC) 11.30
Height of water column (ft) (Hc) 71.40

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 1.62 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 0.49 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 15.8 gal.

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing 0.1 (ft)
Hc = height of water column 71.40 (ft)
Rf = radius of filter pack 0.25 (ft)
Rc = radius of inside casing 0.085 (ft)

WELL DEVELOPMENT SUMMARY

PROJECT NAME: CAMP

DELIVERY ORDER NO: 0070

WELL NUMBER: SAIC-14

Well Volume: 15.8 Gallons

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY ~~(µMHOS/CM)~~ mS/cm	pH (STANDARD UNITS)	TURBIDITY (NTU)	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS DO	ORP
1/29/03	1552	0	14.97	0.198	7.06	999	0	0	3.42 mg/L	-98 mV
	1607	10	18.43	0.184	6.86	999	10	0.6	4.12	-122
	1632	8	16.10	0.205	7.01	826	18	1.1	4.02	-151
	1644	4	16.84	0.262	6.97	344	22	1.4	4.46	-100
	1657	6	18.03	0.280	6.81	173	28	1.8	3.98	-148
	1704	4	18.42	0.300	6.80	112	32	2.0	3.37	-139
	1714	4	18.32	0.295	6.74	172	36	2.3	4.04	-121
	1744	14	17.28	0.273	6.66	76.6	50	3.2	4.62	-83
	1806	10	16.82	0.270	6.72	111	60	3.8	3.90	-65
	1830	4	16.83	0.265	6.70	110	64	4.1	4.63	-37
	1843	4	17.92	0.259	6.78	56.8	68	4.3	4.37	-39
	1907	7	17.88	0.258	6.75	81.3	75	4.7	4.26	-43
									Development complete	
					TSC					

RECORDED BY: [signature]

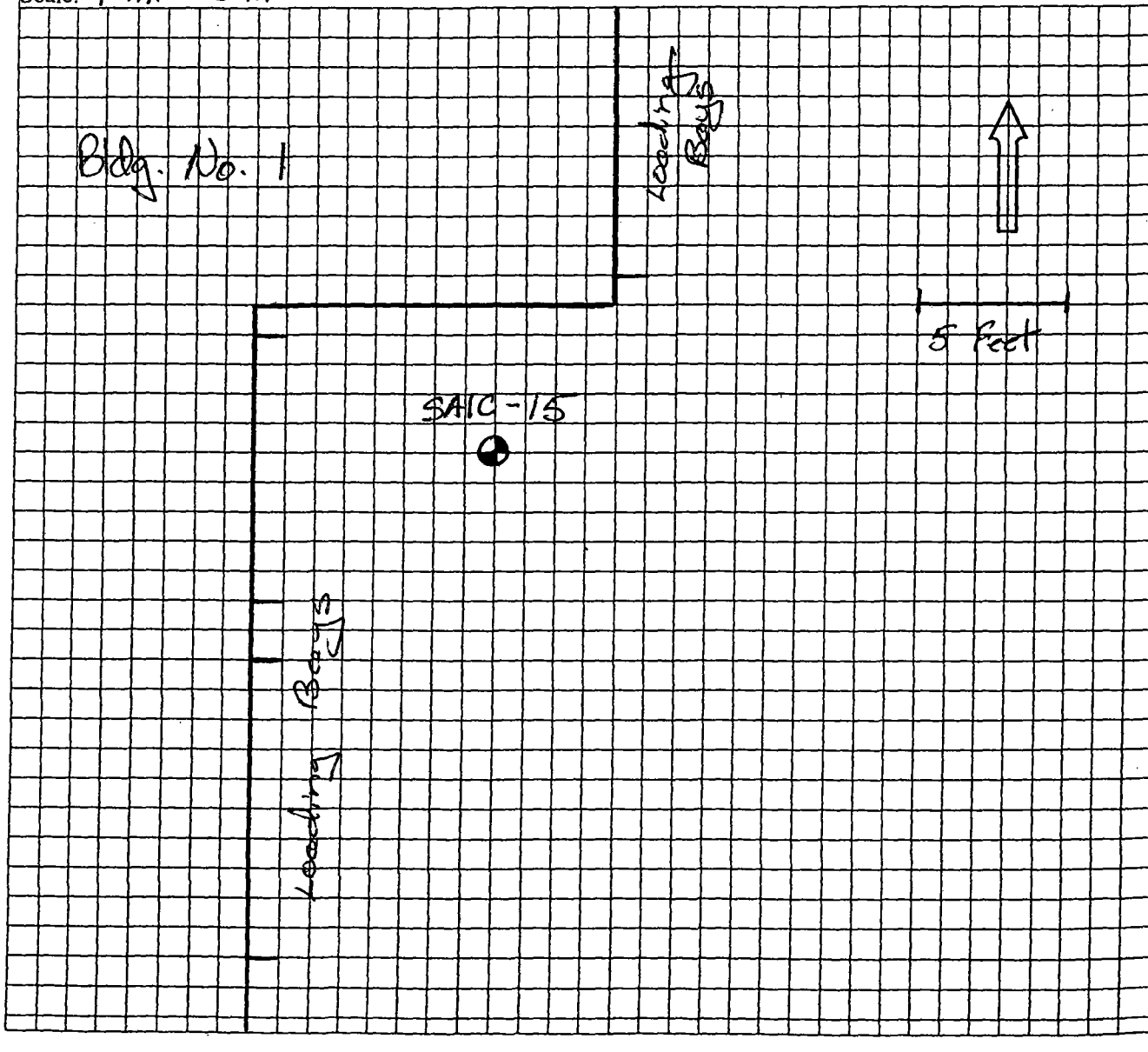
QA CHECKED BY: _____

BORING LOG

Project Name: **Former Charlotte Army Missile Plant (CAMP)**		Borehole ID: SAIC-15
On-Site Geologist: **Chuck McNulty**	On-Site Driller: Larry Grotberg	Page 1 of 11
Drilling Sub-Contractor: **Boart Longyear**		Drill Rig Type: Drilling Method: **Sonic**
Diameter of Borehole: 6"	Borehole Location: ~~West~~ EAST Side of Building #1 ECKERD Facility	
Date Started: 1-24-03	Depth Water Encountered: Not Recorded.	Total Depth of Boring: 89 ft
Date Finished: 1-25-03	Northing: 549899.48	Easting: 1452808.85
Depth to Bedrock: 83 ft	Elevation: 736.80	Datum: Ground Surface
Monitoring Well Installed: Yes Diameter: 2-inch	Total Depth of well: 83.5 ft	Screen Type/Diameter/Slot Size/Length: **PVC/2-inch/0.010-inch/10-ft**

Well Completion Type: _____ Stick-up X Flushmount

Scale: 1-in. = 5 ft



DRILLING LOG

HOLE NUMBER: SAK-15

54

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | Paul Bond | SHEET 2 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		Concrete	Ø.Ø	NO RECOVERY	N/A	Ø-5' Ø% Recovery
		GRAVEL				
	1					
	2					
	3					
	4					
N/A	5	Saprolite. M/F SM-SC-ML Yellowish Brown. ~~Clay~~ Clay w/silt size particles. Moist, ØØ Non-Plastic. Quick dilative. Formerly granite. Minerals are still visible in material. Form. Mica flakes throughout				5-1Ø' 1ØØ% Recovery Easier drilling
	6					
	7					
	8					
	9					
	10					

DRILLING LOG

HOLE NUMBER SMC-15 55

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 3 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		Clay w/silt and gravel. 2.5Y 6/4 Light Yellowish Brown. Saprolite				10-15' 100% Recovery
	11	Same as previous w/ granules to 2mm w/ rounded edges to angular. Moist. Tough. Little to no dilatance				
	12					
	13					
17L		Silt w/clay Same as previous Material becoming tougher, drier and harder to drill.				
	14					
	15			LOST		15-25'
	16					
	17					
	18				MA511 18' VOC's & Solids	VOC sample preserved in Methanol of 1330
3L		Sand. 10YR 3/1 Very Dark Gray, Medium Grained, Moist				
1ML	19	Saprolite Same as previous				
	20					

DRILLING LOG

Paula Bond

HOLE NUMBER: SAIC-15

56

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | SHEET 4 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
ML	21	Saprolite. Soil w/ Clay some as previous 10YR 5/4 Yellowish Brown material is dry and densely compacted crumbles with pressure w/ sand			N/A	15-25'
	22					Hand Drilling
	23					
	24					
ML	25	Silt w/ sand. 2.5Y 4/2 Dark grayish Brown material is saturated. Sand is fine to med. Sub round to sub-angular. Mica.				25-30'
	26					
ML	27	Silt 2.5Y 6/3 Light Yellowish Brown material is very Dry and densely compacted. Does not appear to be remnant granite. No discernible minerals. Very Fine and powdery when crushed by strong hand pressure				
	28					
ML	29	Silt w/ Clay Granite Saprolite. Dry. 2.5Y 5/4 Light olive Brown. Dry. Dense. mica flakes throughout. mineral remnants visible usually as rock structure.				
	30					

57

DRILLING LOG

HOLE NUMBER SA1C-15

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 5 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
ML		Saprolite Same as Previous			N/A	30-35 100% Recovery
	31					
	32					Easier Drilling
	33					
	34					
ML	35	Silt w/clay. 2.5Y 5/3 Light olive Brown. Moist Quick dilatancy. Material is uniform in color w/ no specific mineral composition evident except mica flakes. No large, granite-like crystals noted. Low plasticity				
	36					
	37					
	38					
	39					
	40					

58

DRILLING LOG

HOLE NUMBER: SHK-15

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | SHEET 6 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		SILT W/clay SAME AS PREVIOUS			N/A	
	41					
	42					
ML		GRANITE Saprolite. 2.5Y 5/4 Light Olive Brown. mineral and structural components remain from Remnant Parent Rock. material is very dry and very dense can not be broken by hand pressure alone. Can be crushed w/ hammer.				
	43					
	44					
ML		Cemented / DENSE SILT, 2.5Y 7/2 Light Gray. Very Dry. material may be weathered Bedrock Not of granite Composition. Very Fine grained and densely Compacted. Barely crushed w/ hammer Blow. Some iron staining throughout.				Sample Appears as Powdered Rock w/ nodules of Cemented Soils
	45					
	46					
ML		SILT w/clay 2.5Y 5/3 Light olive Brown. Contains some Rock fragment. Angular to 3cm. Moist. Very Tough and dense. IRON staining throughout. Material is very fine grained and DRY. Crumbles w/ heavy hand pressure.				VERY Dry and difficult to Drill
	47					very hard to Drill.
	48					
	49	color changed @ 49.0' to 2.5Y 5/4 Light Olive Brown				
	50					

DRILLING LOG

HOLE NUMBER: SAIC-15

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty

SHEET 7 OF 11

59

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
nL		Same as Previous Silt w/clay. Very Dry Very Dense.			N/A	50-53' 100% Recovery
	51					
	52					
	53	Clay w/silt and sand Clay 1 5/1 Greenish Gray. Low plasticity Moist, tough. Contains some large gravels w/rounded edges				53-55' 5 minutes to Drill 2' Difficult to advance casing.
	54	Granite				
nL	55	Silt 2.5Y 7/2 Light Gray. Very Dry. Very Dense cemented silts. Crush w/hammer blow only.				1515-1520 5 minutes to Drill 2'.
	56	Color change to 2.5Y 7/4 Light olive Brown @ 56'. Material is less dense crumbles w/hand pressure				55-57
	57	Gravel w/sand 2.5Y 5/2 Grayish Brown. Cobbles Consistency				57-62 4' Recovery
	58	Sand size particles consist of weathered granite grains. Saturated. Also contains some clay.				
	59					
	60					

DRILLING LOG

HOLE NUMBER: SAIC-15 (66)

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 8 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
					N/A	
		SAME AS PREVIOUS				
	61					
		Clay & silt saprolite-grain Moist, Plastic, tough				
Y	62					
Rx		GRANITE PB Cobbles DIORITE				to 2' - 70'
	63					a cobble Blocked ~~Br~~ sampling tube @ 63.8' Drilling became easier/smooth to 70' Blockage pushed soil/ clay? out the way to 70.
	64					
	65					
	66					
	67					
	68					
	69					
	70					

DRILLING LOG

HOLE NUMBER: SAIC-15 (61)

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | Paula Bond | SHEET 9 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
SP		Sand 2.5Y 5/2 Grayish Brown. Fine grained Loose to dense. Moist but not saturated.			N/A	70-75 100% Return
	71					
	72					
	73	sand grades to coarse to med grained - Diorite grains. Contains Diorite cobbles				
	74					0.145 - 4.800 75-83 Recovery = 0 All material fell out of sampler. Drillers will try to Retrieve. Driller states "drilled like rock"
	75			LOSS		
	76					
	77					
	78					
RX		Diorite.				
ML	79	silt w/clay and sand 2.5Y 4/2 Dark grayish Brown intermingled w/ 10YR 5/4 Yellowish Brown				
	80					

DRILLING LOG

HOLE NUMBER:

62

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | SHEET 10 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
	81	Moist. Quick dilatence. Sand grains appear as weathered Diorite minerals. Very Stiff/Dense/Non plastic Silt and Clay Fraction appear as Dioritic Saprolite. Mica Flakes Present throughout	Ø.Ø		N/A	Very hard Drilling
	82					
R4	83	Diorite. Weathered slightly, but solid. Some Iron staining on Fracture Surfaces. Very Hard. Salt + Pepper texture. Gley 8/1 Light greenish gray w/ Gley 5G2.5/1 Greenish Black. Contains Pyrite crystals on Fracture surfaces as well as Quartz? Filling.				Ø85Ø – Ø915
	84					
	85					
	86					
	87					
	88					
	89	E.O.B. @ 89Ø'				
	90					

Well volume calculation sheet

Date 1/30/03 Time 1020
Well ID Num SAIC-15
Well Location CAMP, Bldg. #1, Bay 16

Total depth of well (ft BTOC) 83.55
Depth to water (ft BTOC) 10.68
Height of water column (ft) (Hc) 72.87

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 1.65 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 0.49 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 16.0 gal.

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing 0.1 (ft)
Hc = height of water column 72.87 (ft)
Rf = radius of filter pack 0.25 (ft)
Rc = radius of inside casing 0.085 (ft)

WELL DEVELOPMENT SUMMARY

PROJECT NAME: CAMP

DELIVERY ORDER NO: 0070

WELL NUMBER: SAIC-15

well volume = 16.0 gallons

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY ~~(µMHOS/CM)~~ mS/cm	pH (STANDARD UNITS)	TURBIDITY (NTU)	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	DO	COMMENTS ORP
1/30/03	1030	0	12.54	0.145	6.93	888	0	0	8.46 mg/L	96 mV
	1034	8	15.24	0.248	7.93	953	8	0.5	3.90	-115
	1057	9	15.87	0.279	7.33	534	17	1.1	3.01	-111
	1121	9	14.74	0.308	7.18	130	26	1.6	4.17	-61
	1140	14	16.11	0.315	7.48	204	40	2.5	1.75	-54
	1157	9	15.81	0.320	7.15	43.7	49	3.1	3.11	-27
	1214	9	15.41	0.322	7.09	33.1	58	3.6	3.71	-9
	1229	7	16.39	0.317	7.14	22.1	65	4.1	2.55	-15
	1247	10	14.98	0.320	7.08	14.9	75	4.7	3.68	3
									Development complete	

TSC

RECORDED BY: [signature]

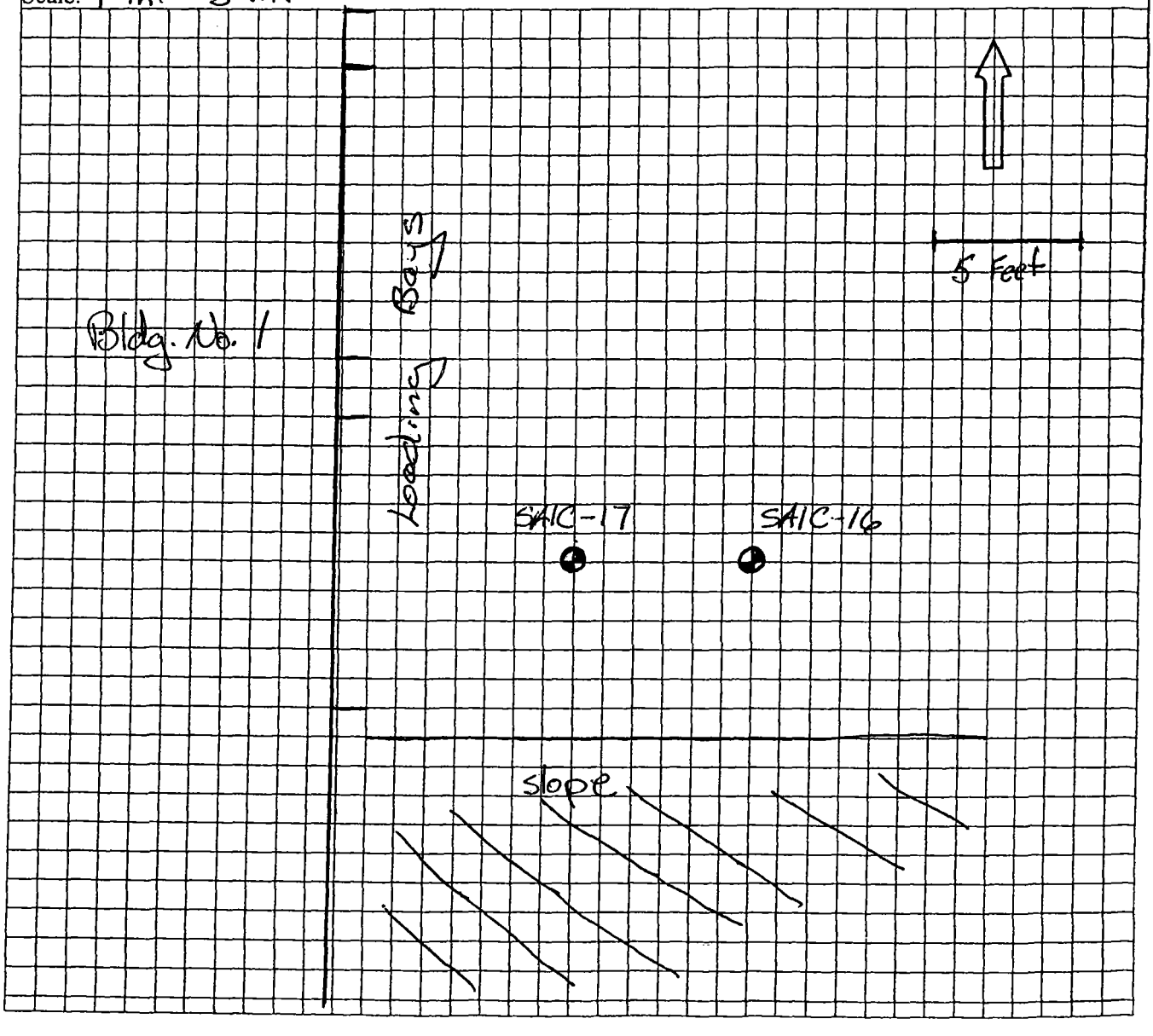
QA CHECKED BY: _____

BORING LOG

Project Name: **Former Charlotte Army Missile Plant (CAMP)**		Borehole ID: SAIC-16
On-Site Geologist: **Chuck McNulty**	On-Site Driller: Larry Grotberg	Page 1 of 11
Drilling Sub-Contractor: **Boart Longyear**		Drill Rig Type: Drilling Method: **Sonic**
Diameter of Borehole: 6-in.	Borehole Location: Loading bay area on east side of Bldg. No. 1.	
Date Started: 1/23/03	Depth Water Encountered: 21 ft	Total Depth of Boring: 31 ft
Date Finished: 1/23/03	Northing: 549845.38	Easting: 1452807.41
Depth to Bedrock: N/A	Elevation: 737.06	Datum: Ground Surface.
Monitoring Well Installed: Yes Diameter: 2-in.	Total Depth of well: 31 ft	Screen Type/Diameter/Slot Size/Length: **PVC/2-inch/0.010-inch/10-ft**

Well Completion Type: _____ Stick-up __X__ Flushmount

Scale: 1-in. = 5 ft.



DRILLING LOG

HOLE NUMBER: SAC-16 | 32

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | SHEET 2 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		Ø - 1 ft no recovery concrete plug	Ø.Ø			Run Ø-1Ø ft
	1	2 - 3.5 ft 1ØYR 5/8 yellowish brown lean clayey silt with some gravel @ 2' decreasing with depth, soft, wet	ØØ			
	2					
	3					
	4	3.5 - 5 ft 2.5Y 5/4 light olive brown, saprolite clay, sand sized grains break easily interspersed, moist	Ø.Ø			
	5	5 - 1Ø ft 2.5Y 4/3 olive brown Saprolite, varying degrees of cohesion from fine granular silts to cobble sized concretions very hard, dry	Ø.Ø			
	6					
	7					
	8		Ø.Ø			
	9		Ø.Ø			
	10					

DRILLING LOG

HOLE NUMBER SAIC-16 | 33

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | SHEET 3 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		10-15 ft Same as previous	0.0			Run 10-15 ft
	11					
	12		0.0			
	13		0.3			
	14					
	15		10.6			
		15-16 ft 2.5Y 5/3 light olive brown soft medium plastic gravelly clay grand particles broken easily moist				
	16		6.8			
		16-18 ft 10YR 5/8 yellowish brown saprolite, soft, dry				
	17		42.7			
	18					
		18-20 ft 2.5 Y 6/2 light brownish gray, brittle to hard saprolite, most pieces break easily	50.8	soil sample collected		
	19					
	20		15.2			

DRILLING LOG

HOLE NUMBER: SMC-16 | 34

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | SHEET 4 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		20-22.5				Run 20-25 ft
		2.5Y 6/4 light yellowish brown, saturated saprolite silt, gravelly/sandy feel but these break easily with finger pressure, no cohesion	6.6			21' driller hits water
	21					
	22					
		2.5Y 4/2 dark grayish brown, medium consistency clay with saprolite sands/gravels, wet	0.0			
	23					
		2.5Y 5/2 grayish brown dry saprolite little cohesion to powdery	12.2			
	24					
		25-30 ft				Run 25-31 ft
		2.5Y 6/1 gray, dry clay, med consistency when wet, this section dry except top 6" and 6" section @ ~ 27.5'	0.0			
	25					
			2.6			
	26					
	27					
	28					
	29					
	30		1.2			

35

DRILLING LOG

HOLE NUMBER: SAIC-16

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | SHEET 5 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		N2 gray granite outside color, inside pink + gray/black very hard, poss Fe staining to light colored minerals		X		
	31	Bottom of Hole 31 feet				
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					

Well volume calculation sheet

Date 1/29/03 Time 1255
Well ID Num SAIC-16
Well Location Bay 21 Bldg. #1 CAMP

Total depth of well (ft BTOC) 29.90
Depth to water (ft BTOC) 10.64
Height of water column (ft) (Hc) 19.26

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 0.43 cu. ft.

.0525

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 0.49 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft) .92
= 6.9 gal.

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing 0.1 (ft)
Hc = height of water column 19.26 (ft)
Rf = radius of filter pack 0.25 (ft)
Rc = radius of inside casing 0.065 (ft)

WELL DEVELOPMENT SUMMARY

PROJECT NAME: CAMP

DELIVERY ORDER NO: 0070

WELL NUMBER: SAIC-16

Well Volume = 6.9 gallons

DATE	TIME	GALLONS REMOVED	TEMP (C)	mS/cm SPECIFIC CONDUCTIVITY (~~µMHOS/CM~~)	pH (STANDARD UNITS)	TURBIDITY (NTU)	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
1/29/03	1253	0	11.21	0.398	7.23	21.1	0	0	Initial.
	1302	9	17.89	0.191	7.07	999	9	1.3	WL: 21.90 Rt 15TOC
	1310	8	18.25	0.199	7.01	200	17	2.5	DO: 5.95 mg/L ORP: -33
	1315	5	18.35	0.195	6.78	123	23	3.3	DO: 4.89 ORP: -28
	1324	9	17.89	0.195	6.70	253	32	4.6	DO: 9.04 ORP: -11
	1330	6	17.93	0.196	6.62	758	38	5.5	DO: 5.72 ORP: 3
	1335	5	18.03	0.202	6.59	48	43	6.2	DO: 5.93 ORP: 15 mV
	1345	10	17.39	0.197	6.56	27.9	53	7.7	DO: 5.74 ORP: 26 mV
	1355	10	17.47	0.199	6.52	10.2	63	9.1	DO: 6.14 ORP: 44
	1400	5	17.98	0.195	6.55	5.7	68	9.9	DO: 6.04 ORP: 42 mV
						TJC			

RECORDED BY: [signature]

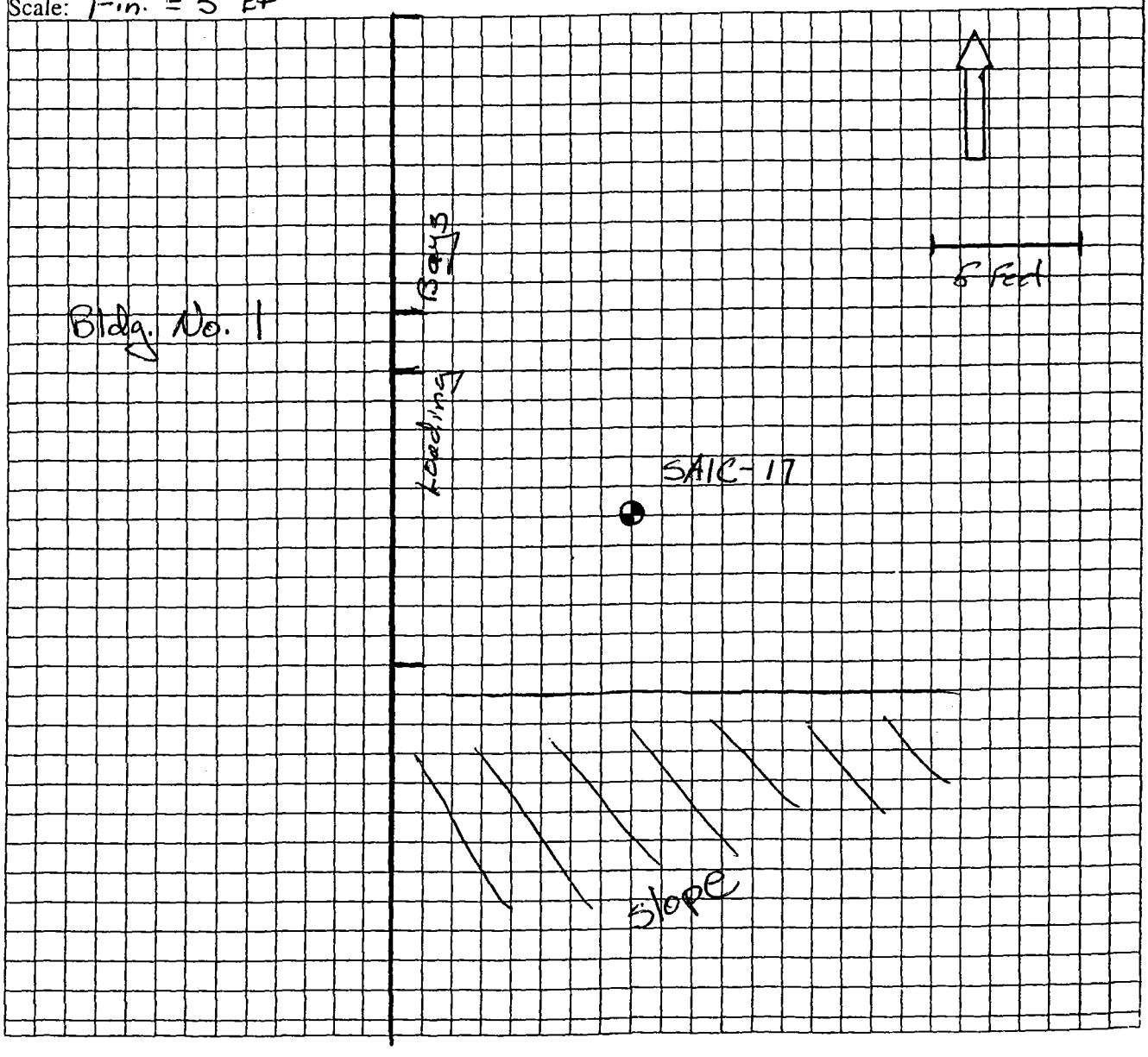
QA CHECKED BY: _____

BORING LOG

Project Name: **Former Charlotte Army Missile Plant (CAMP)**		Borehole ID: SAIC-17
On-Site Geologist: **Chuck McNulty**	On-Site Driller: Larry Grotberg	Page 1 of 11
Drilling Sub-Contractor: **Boart Longyear**		Drill Rig Type: Drilling Method: **Sonic**
Diameter of Borehole: 6-inches	Borehole Location: Loading bay area on east side of Bldg. No. 1.	
Date Started: 1/21/03	Depth Water Encountered: Approx. 20 ft.	Total Depth of Boring: 55 ft
Date Finished: 1/22/03	Northing: 649846.02	Easting: 1452801.43
Depth to Bedrock: 50 ft	Elevation: 736.94	Datum: Ground Surface.
Monitoring Well Installed: Yes Diameter: 2-in.	Total Depth of well: 55 ft.	Screen Type/Diameter/Slot Size/Length: **PVC/2-inch/0.010-inch/10-ft**

Well Completion Type: _____ Stick-up X Flushmount

Scale: 1-in. = 5 ft



DRILLING LOG

HOLE NUMBER: SAK-17

SHEET 2 OF 11

PROJECT: Former CAMP Charlotte, NC

INSPECTOR: Chuck McNulty

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
						Run 1 0-5' NO Recovery
	1					
	2					
	3					
	4					
	5	5-9 ft Gravel fill material		2.9		Run 2 5-10'
	6			10.2		
	7			13.9		
	8			47		
	9	9-10 Ft 10 YR 5/8 dark yellowish brown, soft clay, moist, CH some strong brown silts				
	10			1.2		

10

DRILLING LOG

HOLE NUMBER: SAIC-17

SHEET 3 OF 11

PROJECT: Former CAMP Charlotte, NC

INSPECTOR: Chuck McNulty

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		2.5Y 5/3 light olive brown saprolite, occ boulder size hard nodules dry		9.7		Run #3 ~~10-15ft~~ 10-15ft
	11			8.3		
	12			12.1		
	13			10.8		
	14					
	15	15-17ft 2.5Y 5/3 light olive brown clay wet, v. soft micaceous		42.8 16.9		Run #4 15-20ft
	16			14.9		
	17	17-20ft 2.5Y 6/2 light brownish gray saprolite, dry some mod stiff cobble size pieces		20.8 ~~10.8~~		
	18			9.8		
	19					
	20			53.4 ~~10.8~~		

DRILLING LOG

HOLE NUMBER: 54IC-17

12

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | SHEET 4 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		2.5Y 6/3 light yellowish brown saturated, sandy silty clayey saprolite	no screening taken 20-22			Run #5 20-25 ft water
	21	2.5Y 5/2 grayish brown silty, sandy clay, biotite rich, v wet	17.6			
	22	2.5Y 6/6 olive yellow non-cohesive to cohesive saprolite, clayey/silty				
	23	2.5Y 6/6 olive yellow clayey saprolite, soft moist	25.5			
	24					
	25		21.1			
		5Y 6/3 pale olive moderately graded rounded silty-clayey sand, wet SW-SC	17.0			Run #6 25-~~30~~ 29 ft 26' Hard drilling
	26	5Y 5/2 olive gray, wet hard sandy clay CL	3.9			
	27	5Y 6/1 gray dry saprolite, varying degrees of weak to strong cementation, strong pieces to 3"	13.8			
	28		22.5			
		Same as above but wet				
	29	5Y 4/2 olive gray sandy silt MH, wet, weak	83.5			Run 29-35 ft slow drilling
	30					

DRILLING LOG

HOLE NUMBER: SAIC-17

13

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | SHEET 5 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		29-35 same as previous page	40.8			cont from Run 29-35ft
	31					
	32		68.6			
	33					
	34		130.9			
	35	5Y 4/3 olive, wet silty clay, some to less than wet-moist, soft to hard, v little to no sand	13.8			Run 35-40ft
	36		16.2			
	37		>1257			
		5Y 4/1 dark gray dry non-cohesive to hard some to cobble size pcs, saprolite				
	38	same color but moist to saturated, saprolite silts and clays soft to hard	308			
	39					
	40		71257			

DRILLING LOG

HOLE NUMBER: 541C-17

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty | SHEET 6 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		5Y 5/3 olive, weathered saprolite with sand sized biotite, qtz, feldspars, hornblende, some fines, occasional cobble sized consolidated, obvious weathering when broken apart easily saturated	30.0ppm			40-45' Rec: 3.0'
	41					
		5Y4/1 dark gray rock fragments sand to coarse gravel size, angular saturated with some fines				
	42					
	43	Lost return		LOSS		
	44					
	45	45-50 ft no recovery or loss is fractured rock and sand		LOSS		Run 45-55
	46					
	47					
	48					
	49					Driller hit TOR @ 50'
	50					

DRILLING LOG

HOLE NUMBER: SA10-17

SHEET 7 OF 11

15

PROJECT: Former CAMP Charlotte, NC

INSPECTOR: Chuck McNulty

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		50-55ft				TOR ≈ 50ft
		N2 Dark gray wet grano-diorite with fractured rock @ 50ft, greater competency @ 55ft, 2.5cm vein 60° to horizontal tight fracturing sub horizontal to 45°, brown mud and iron staining ~50ft-51ft.	high			
	51					
	52					
	53					
		highly fractured pieces sand to coarse gravel size, wet				
	54					
	55	Bottom of Hole				
	56					
	57					
	58					
	59					
	60					

Well volume calculation sheet

Date 1/29/03 Time 1140
Well ID Num SAIC-17
Well Location Bay 21

Total depth of well (ft BTOC) 55.10
Depth to water (ft BTOC) 10.66
Height of water column (ft) (Hc) 44.42

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 1.008 cu. ft.

.0625-.01

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 0.49 cu. ft.

.0525

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 11.2 gal.

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing ~~0.2~~ 0.1 (ft)
Hc = height of water column 44.42 (ft)
Rf = radius of filter pack 0.25 (ft)
Rc = radius of inside casing ~~0.17~~ 0.085 (ft)

6-in = .5 = .25

WELL DEVELOPMENT SUMMARY

PROJECT NAME: CAMP

DELIVERY ORDER NO: 0070

WELL NUMBER: SAIC-17

Well Volume = 11.2 gallons.

DATE	TIME	GALLONS REMOVED	TEMP (C)	mS/cm SPECIFIC CONDUCTIVITY ~~(µMHOS/CM)~~	pH (STANDARD UNITS)	TURBIDITY (NTU)	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS
1/29/03	1142	0	18.95	0.692	6.86	26.4	0	0	Initial.
	1156	14	17.10	0.252	7.02	265	14	1.3	WL: 11.80 ft BTOC
	1202	6	18.23	0.223	6.62	61.8	20	1.8	
	1210	8	18.73	0.218	6.63	673	28	2.5	WL: 11.75 ft BTOC
	1220	10	18.41	0.212	6.61	33.7	38	3.4	
	1226	6	18.42	0.204	6.58	16.8	44	3.9	WL: 11.75 ft BTOC
	1232	6	18.43	0.208	6.58	8.8	50	4.5	
									Well stick-up = 0.31 ft

RECORDED BY: [signature]

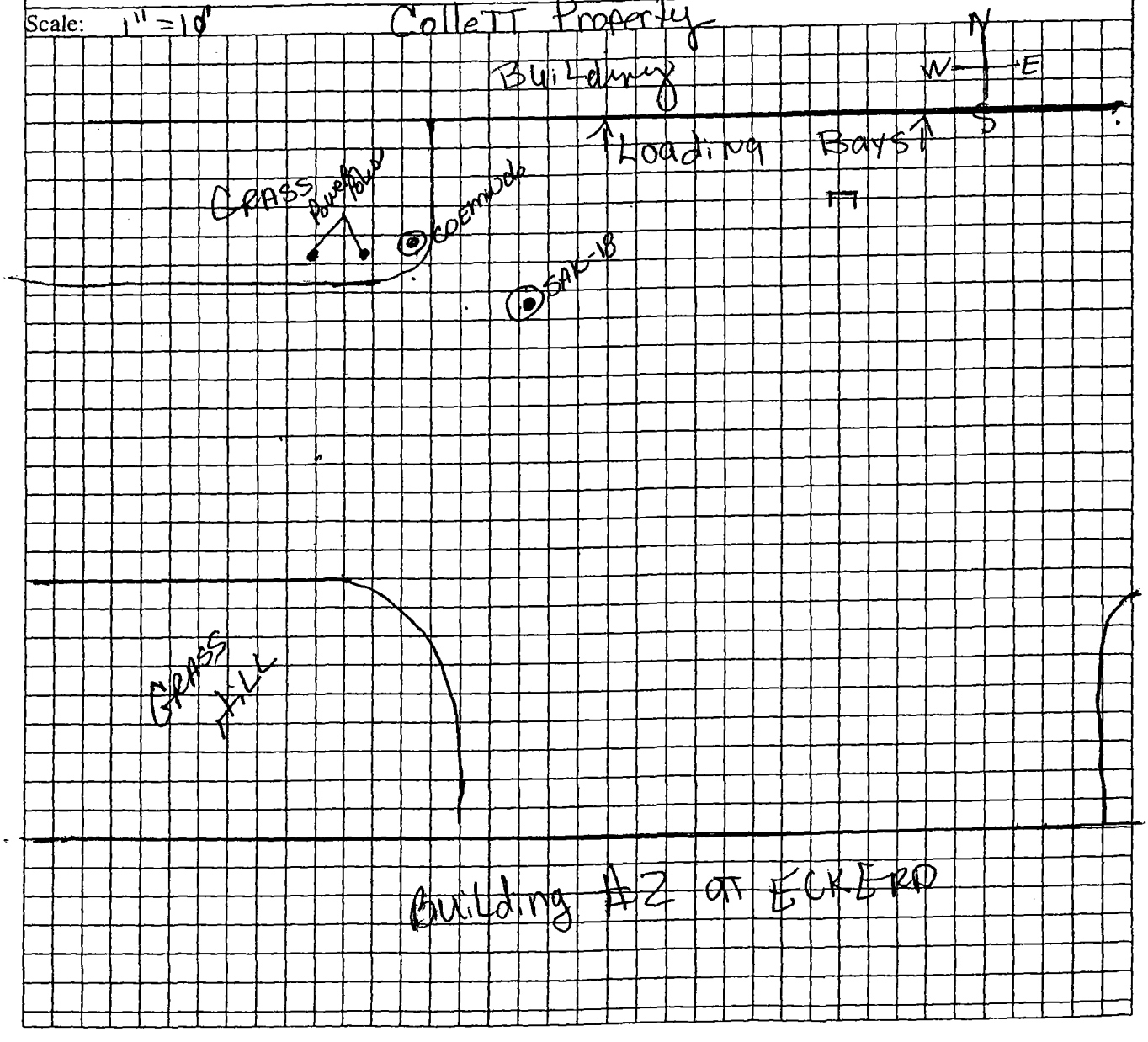
QA CHECKED BY: _____

BORING LOG

Project Name: **Former Charlotte Army Missile Plant (CAMP)**		Borehole ID: SAIC-18
On-Site Geologist: **Chuck McNulty**	On-Site Driller: Larry Grotburg	Page 1 of 11
Drilling Sub-Contractor: **Boart Longyear**		Drill Rig Type: Drilling Method: **Sonic**
Diameter of Borehole: 6-inch	Borehole Location: Collett Property Next (North) to Eckerd Property	
Date Started: 1-28-03	Depth Water Encountered: 4.5'	Total Depth of Boring: 62.0'
Date Finished: 1/29/03	Northing: 650214.70	Easting: 1452668.78
Depth to Bedrock: 58.5'	Elevation: 725.09	Datum: TOP OF CASING
Monitoring Well Installed: YES Diameter: 2-inch	Total Depth of well:	Screen Type/Diameter/Slot Size/Length: **PVC/2-inch/0.010-inch/10-ft**

Well Completion Type: _____ Stick-up X Flushmount Ground surface: 725.44 ft

Scale: 1" = 10'



DRILLING LOG

HOLE NUMBER SAK-18 54

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 2 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		Concrete				0-5' 100% Recovery
		Gravel Sub Base				
NL	1	Clay. 2.5YR 4/8 Red VERY STIFF MOIST. Med. Plasticity, Tough. Mica Flakes throughout, Fill material.				
	2		0.0			
	3					
	4		0.0	Grab		
NL	5	Silt w/clay Saprolite 10YR 5/6 Yellowish Brown Granite/Diorite saprolite moist. Quick dilatence when water added. mica usually as well as weathered feldspars and other dark minerals.				5-15' 100% Recovery
	6		4.8	N	N21811	
	7					
	8		10.3			
	9					
	10		6.2			

DRILLING LOG

HOLE NUMBER: SHC-18 35

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 3 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		Saprolite. Same as previous			N/A	
	11					
	12		2.4			
	13					
	14		0.6			
	15					15-25'
	16		3.3			
	17	color change to 2.5Y 5/4 Light olive Brown				
	18		4.2			
	19					
	20		1.4			

DRILLING LOG

HOLE NUMBER: SAIC-18 | 56

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Brand | SHEET 4 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		SAPROLITE. SAME AS PREVIOUS			N/A	VERY quick Drilling
	21					
	22		3.1			
	23					
	24		ϕ.3			
	25					25-35' 1ϕϕ% RECOVERY
	26		ϕ.ϕ			
	27					
	28		ϕ.3			
	29					
	30		3.4			

DRILLING LOG

HOLE NUMBER: SAIC-18 5

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 5 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
					N/A	
	31	Density increases with depth				
	32		1.2			
	33	material is less weathered w/ some sand size particles appearing in a zone from 33' to 34.5'				
	34	Lots of iron staining	0.5			
	35					35-45' 100% Recovery
	36		4.7			
	37					
	38		8.9			
	39					
	40		10.1			

58

DRILLING LOG

HOLE NUMBER SAC-18

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 6 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		SAPROLITE. SAME AS Previous.			N/A	35-45 100% Recovery
	41					
		Density increases and moisture content decreases w/ Depth				
	42		9.6			
	43					
ML	44	Silt w/clay and Sand. Weathering of some minerals is complete 10YR 5/6 Yellowish Brown, while others remains sand size particles. Some km diorite fragments present hard to crush w/ hand pressure. Iron staining throughout. Dry.	7.3			
	45					45-55 ~~100%~~ 85% Recovery
SM	46	Silty Sand 10YR 5/3 Brown very fine grained, moist, medium dense. quartzose sub Round to sub angular. weathered granite/diorite.	5.2			
ML-CL	47	Silt/clay mixture w/ sand 10YR 5/4 yellowish Brown sand size particles are fine to coarse weathered minerals scattered throughout Quick dilatance. Contains some weathered Rock fragments Moist to saturated iron staining throughout				
	48		1.6			
	49					
		material becomes very dense with little moisture and hard diorite				
	50		2.9			

DRILLING LOG

HOLE NUMBER: SAIC-18 | 59

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 7 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		SAME AS PREVIOUS			N/A	4/5 55' 50% Recovery
	51			LOSS		
	52		0.0			
	53			LOSS		
	54		2.1			
	55					55-59' 100% Recovery
WEL		Clay and silt mixture Gley-1 4/1 Dark greenish gray. Slow to no dilatence. Mod plasticity. STIFF. Tough moist. contains some weathered Rock Fragments and GRAVELS (7cm)				
	56		3.2			
WL	57	SILT. VERY DRY Gley-1 5/1 greenish gray. material appears as powder in sample w/ some small pieces (4cm) material crushes w/ hand pressure. No moisture				VERY Hard chattery Drilling
	58		1.0			
RX		Weathered Diorite				
	59					59-62 100% Recovery
	60		0.6			

DRILLING LOG

HOLE NUMBER: SAIC-18 60

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 8 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS ppm	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
4		DIORITE.			N/A	59-62' 100% RECOVERY
	61					
	62		0.0			
		END OF BORING @ 62.0				
	63					
	64					
	65					
	66					
	67					
	68					
	69					
	70					

Well volume calculation sheet

Date 1/30/03 Time 0755
Well ID Num SAIC-18
Well Location CAMP; S. side Bldg. #2

Total depth of well (ft BTOC) 60.40
Depth to water (ft BTOC) 3.30
Height of water column (ft) (Hc) 57.1

Well Volume Calculation

Vc = 3.142(Rc^2)*Hc 1.30 cu. ft.

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
**note ** use length of screen if Hc > length of screen
= 0.49 cu. ft.

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 13.4 gal.

Where:
Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing 0.1 (ft)
Hc = height of water column 57.1 (ft)
Rf = radius of filter pack 0.25 (ft)
Rc = radius of inside casing 0.085 (ft)

WELL DEVELOPMENT SUMMARY

PROJECT NAME: CAMP

DELIVERY ORDER NO: 0070

WELL NUMBER: SAIC-18

Well Volume: 13.4 gallons.

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY ~~(µMHOS/CM)~~ mS/cm	pH (STANDARD UNITS)	TURBIDITY (NTU)	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS DO	ORP
1/30/03	0811	0	7.30	0.170	6.87	511	0	0	10.80 mg/L,	81 mV
	0838	18	13.16	0.181	6.53	906	18	1.3	7.07	-51
	0852	9	13.31	0.181	6.27	66.6	27	2.0	7.92	-11
	0905	9	12.85	0.181	6.31	35	36	2.7	7.88	8
	0918	14	17.80	0.181	6.37	17.8	50	3.7	7.24	14
	0930	18	15.91	0.182	6.70	8.8	68	5.1	6.31	-18
									Development complete	
					EC					

RECORDED BY: Timothy Jeffery

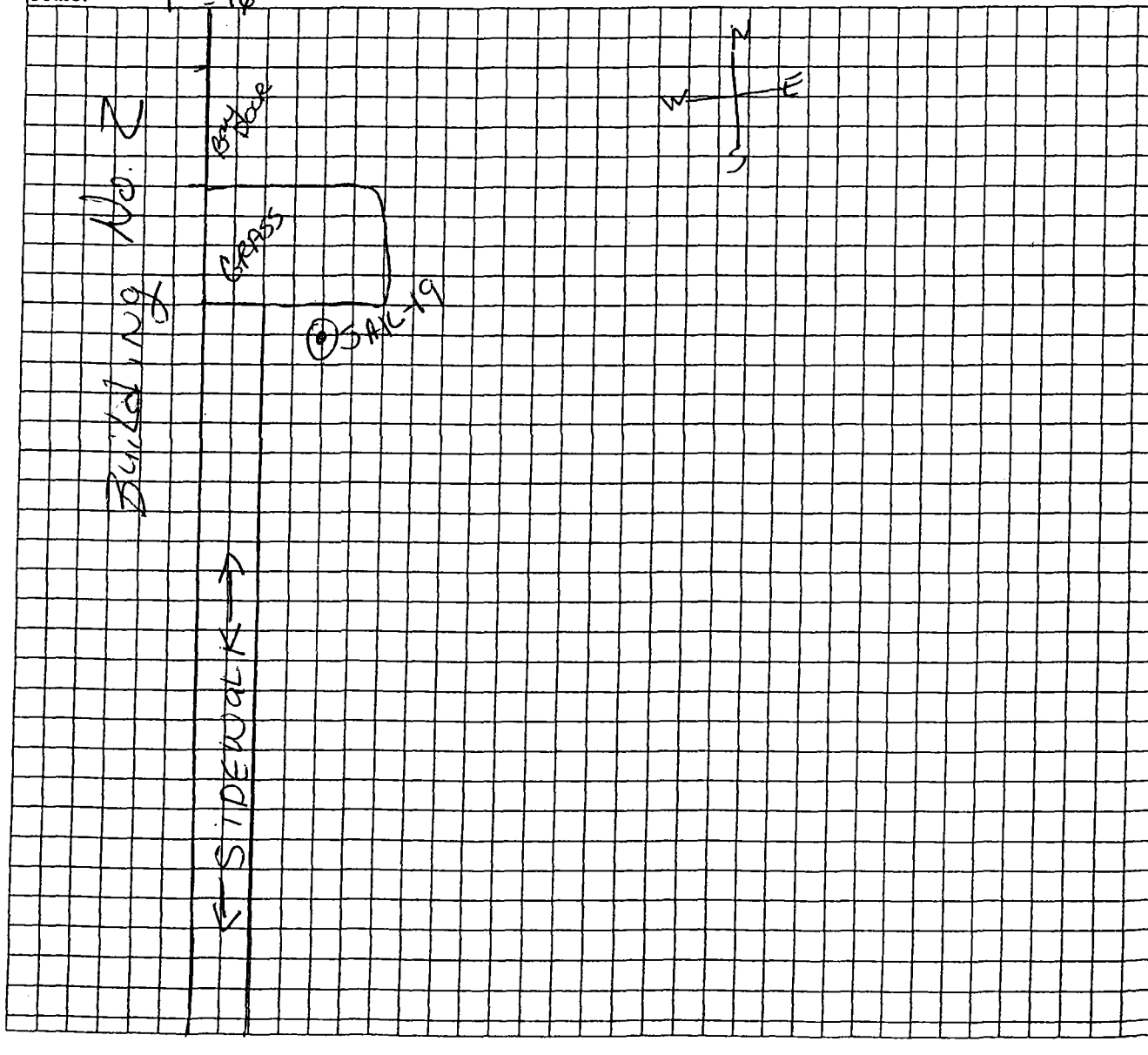
QA CHECKED BY: _____

66

BORING LOG

Project Name: **Former Charlotte Army Missile Plant (CAMP)**		Borehole ID: SAIC-19
On-Site Geologist: **Chuck McNulty**	On-Site Driller: Larry Greathouse	Page 1 of 11
Drilling Sub-Contractor: **Boart Longyear**		Drill Rig Type: Drilling Method: **Sonic**
Diameter of Borehole: 6-inch	Borehole Location: Collett Property North of Eckerd Property	
Date Started: 1-29-03	Depth Water Encountered: 5.5'	Total Depth of Boring: 15.0'
Date Finished: 1/29/03	Northing: 550295.18	Easting: 1453260.53
Depth to Bedrock: N/A	Elevation: 729.15	Datum: Ground surface,
Monitoring Well Installed: YES Diameter: 2-inch	Total Depth of well: 15 ft	Screen Type/Diameter/Slot Size/Length: **PVC/2-inch/0.010-inch/10-ft**
Well Completion Type: _____Stick-up X Flushmount		

Scale: 1" = 10'



DRILLING LOG

HOLE NUMBER: SAIC-19 7b

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 2 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
a		Fill. Clay. moist. Mod. Plasticity. VERY STIFF. Mica Flakes throughout. IRON staining throughout.				Ø.5' 100% Recovery
	1					
	2		Ø.Ø			
	3					
	4		Ø.Ø			Quick Drilling
AL-CL ▽	5	Saprolite. Silt and clay mixture.			N21911 5.Ø' 1540	5 15' 100% Recovery
	6		Ø.Ø			
	7					
	8		Ø.Ø			
	9					
	10		1.2			

DRILLING LOG

HOLE NUMBER: SAC-19 77

PROJECT: Former CAMP Charlotte, NC | INSPECTOR: Chuck McNulty Paula Bond | SHEET 3 OF 11

ELEV. (A)	DEPTH (B)	DESCRIPTION OF MATERIALS (C)	FIELD SCREENING RESULTS	SAMPLE INTERVAL (E)	ANALYTICAL SAMPLE NO. (F)	REMARKS (G)
		Saprolite, Same As Previous, Saturated.			N/A	5-15' 100% Recovery
	11					
	12		.8			
	13					
	14		1.2			
	15	E.O.B 15 0'				
	16					
	17					
	18					
	19					
	20					

Well volume calculation sheet

Date 1-30-03 Time 0730
Well ID Num SAK-19
Well Location Collett Deeper East of Buildings

2/24/03

Total depth of well (ft BTOC) ~~1.52~~ 15.35 — 15.05
Depth to water (ft BTOC) 1.52 — 6.97
Height of water column (Hc) 13.83 — 8.08

Well Volume Calculation

.006 .02 13.83

Vc = 3.142(Rc^2)*Hc .26 cu. ft. — 0.16

.03

.06 .03 13.83

Vf = 3.142[(Rf^2)-(Ro^2)]*(Hc or length of screen)*(0.30)
note use length of screen if Hc > length of screen
= .39 ~~.130~~ cu. ft. — 0.20

Vt = (Vc+Vf)*(7.48 gal/cu ft)
= 4.9 gal. — 2.69

Where:

Vc = Volume of casing (ft^3)
Vf = Volume of filter pack (ft^3)
Vt = Total volume
Ro = outside radius of casing .19 (ft)
Hc = height of water column 13.83 (ft) — 8.08
Rf = radius of filter pack .25 (ft)
Rc = radius of inside casing .02 (ft)

WELL DEVELOPMENT SUMMARY

PROJECT NAME: CAMP

DELIVERY ORDER NO: 0070

WELL NUMBER: SAIC-19

2/24/02 well volume = 2.69

1/30/02 Well volume = 4.9 gallons

DATE	TIME	GALLONS REMOVED	TEMP (C)	SPECIFIC CONDUCTIVITY (µMHOS/CM)	pH (STANDARD UNITS)	TURBIDITY (NTU)	TOTAL GALLONS REMOVED	WELL VOLUMES REMOVED	COMMENTS DO	ORP		WL
1-30-02	0732	0	6.2[illegible]	0.290	5.86	7999	0	0	10.77	171	DRY	1.5 bgs
	0810	3.5	5.95	.129	6.83	7999	3.5	0.7	12.29 DRY - after - Dry again 39	98		
	0846	1.0 ~~4.5~~	5.96	.135	6.62	7999	4.5	0.9	12.29	90		9.67
	0948	N/A	6.05	.136	6.65	7999	N/A	N/A	14.25 11.5	112 121	DRY	
				0.27	7.50	7999			3.64			
2/24/02	1123	—	15.73	0.209	6.05	50.1	—	—	13.5	201	Initial reading	6.9
	1138	0.25	15.9	0.201	5.82	77.7	0.25	0.1	11.9	196	flow rate = 100 ml/min	7.25
	1153	0.5	15.52	0.198	5.86	73.2	0.5	0.2	2.69	190		7.27
	1208	0.75	16.24	0.196	5.76	65.3	0.75	0.27	10.81	191		7.98
	1223	1.0	16.36	0.201	5.80	20.3	1.0	0.37	10.06	191		8.65
	1241	1.3	16.64	0.203	5.89	22.9	1.3	0.48	3.07	191		9.3
	1300	2	16.78	0.201	5.91	18.4	2	0.74	3.05	190		9.7
	1315	2.~~5~~ 7	17.12	0.201	5.87	16.9	2.7	~~0.95~~ 1.0	3.27	188		10.3
	1330	3.0	17.20	0.199	5.95	JMS ~~19.~~ 10.1	3.0	1.1	3.43	187		10.6
	1345	3.3	17.23	0.190	5.96	5.7	3.3	1.22	3.49	188		11.0

RECORDED BY: Paula Bond

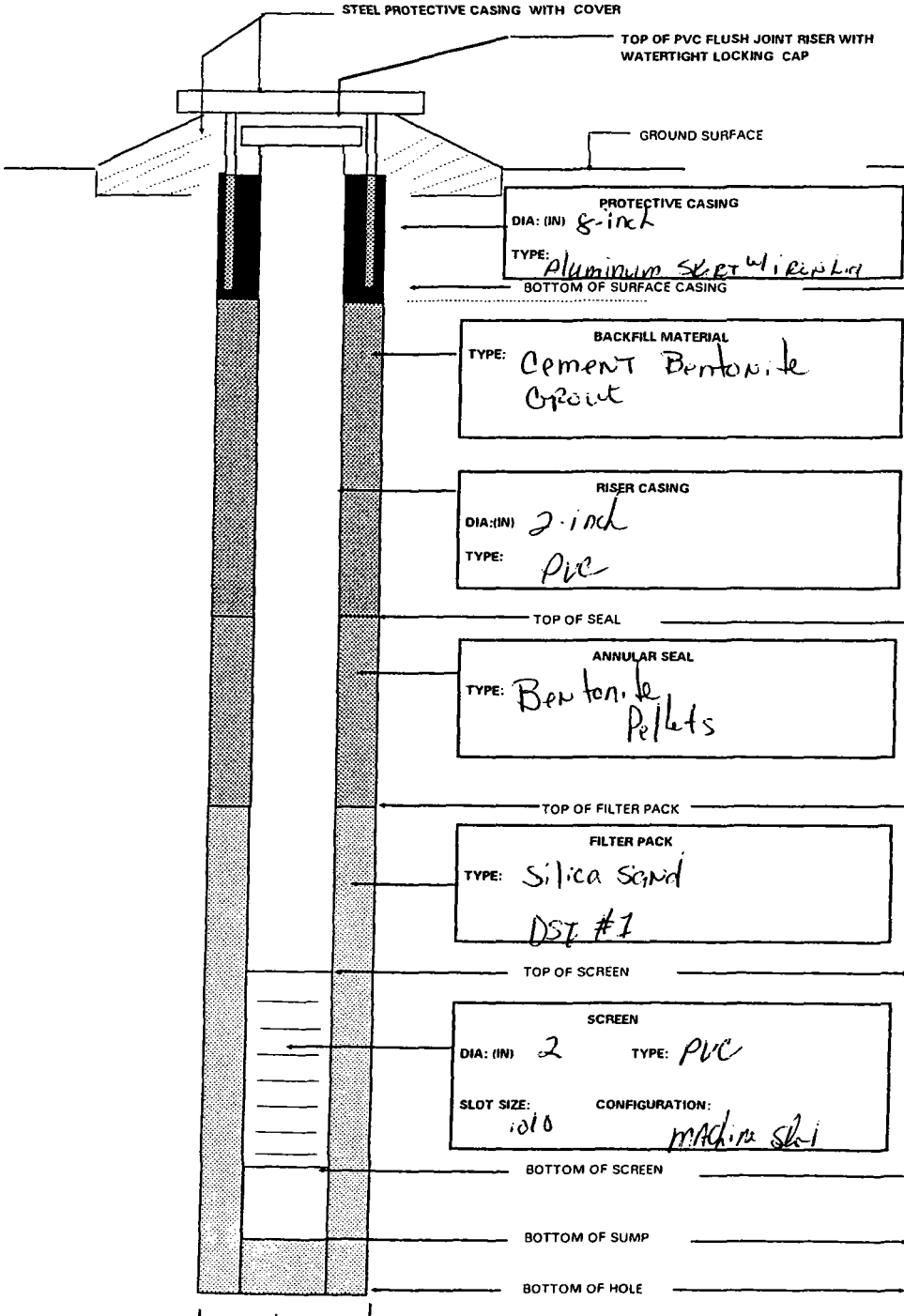
QA CHECKED BY: [signature]

MONITORING WELL

PROJECT: CAMP

DELIVERY ORDER NO: 0070

WELL NUMBER: SAIC-8	BEGIN: 1-26-02	END: 1/28/03
COORDINATES: N: 549915.65 E: 1452850.01	REFERENCE POINT: Top of Casing	ELEVATION: 737.59 ft



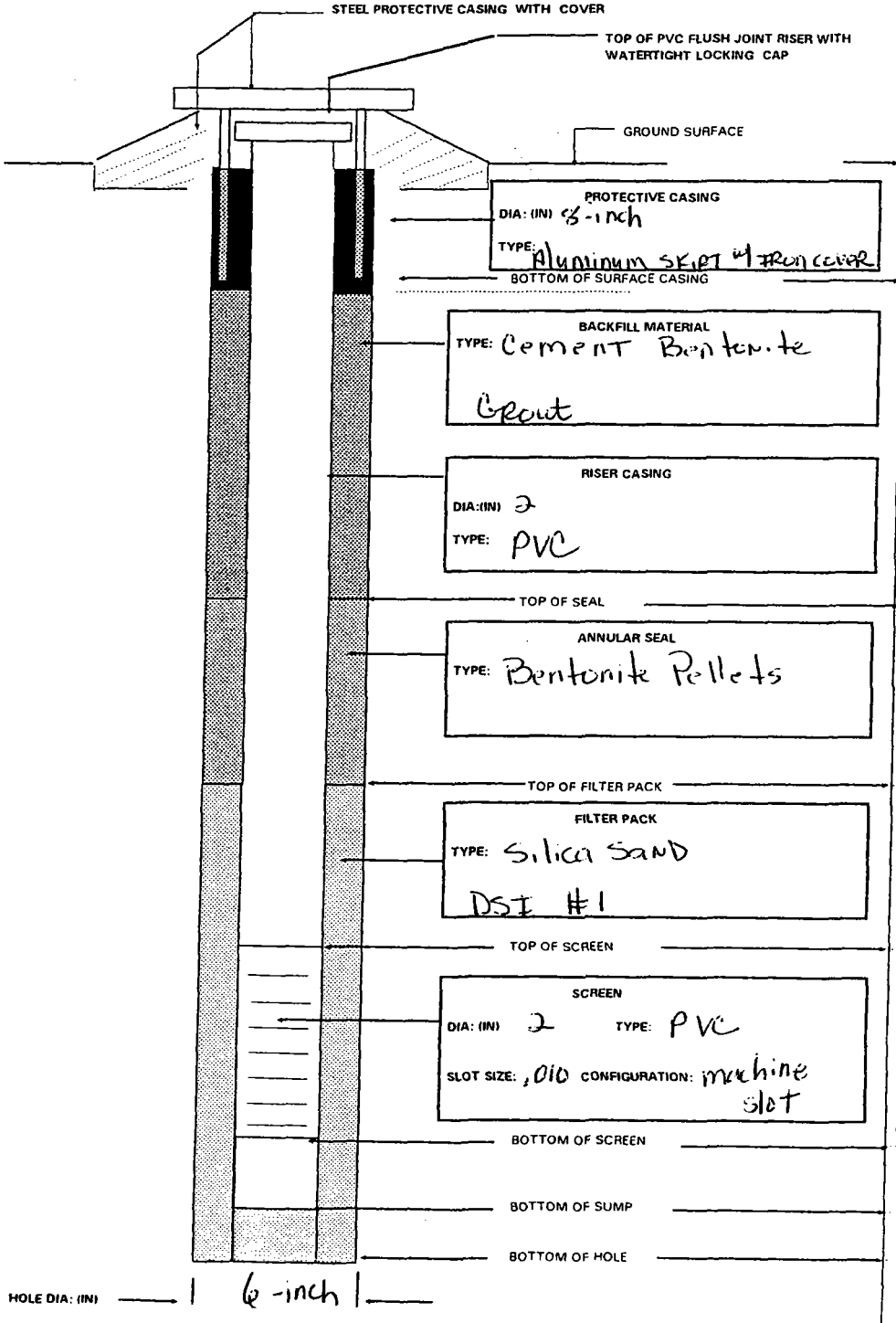
	DEPTH (BGS)	ELEV
GROUND SURFACE	0	737.75
BOTTOM OF SURFACE CASING	.66	737.09
TOP OF SEAL	45.0	692.75
TOP OF FILTER PACK	47.1	690.65
TOP OF SCREEN	49.3	688.45
BOTTOM OF SCREEN	59.3	678.45
BOTTOM OF SUMP	59.5	678.25
BOTTOM OF HOLE	60	677.75

MONITORING WELL

PROJECT: CAMP

DELIVERY ORDER NO: 0070

WELL NUMBER: SAIC-14	BEGIN: 1-25-03	END: 1/26/03
COORDINATES: N: 549982.06 E: 1452842.06	REFERENCE POINT: Top of Casing	ELEVATION: 736.88 ft



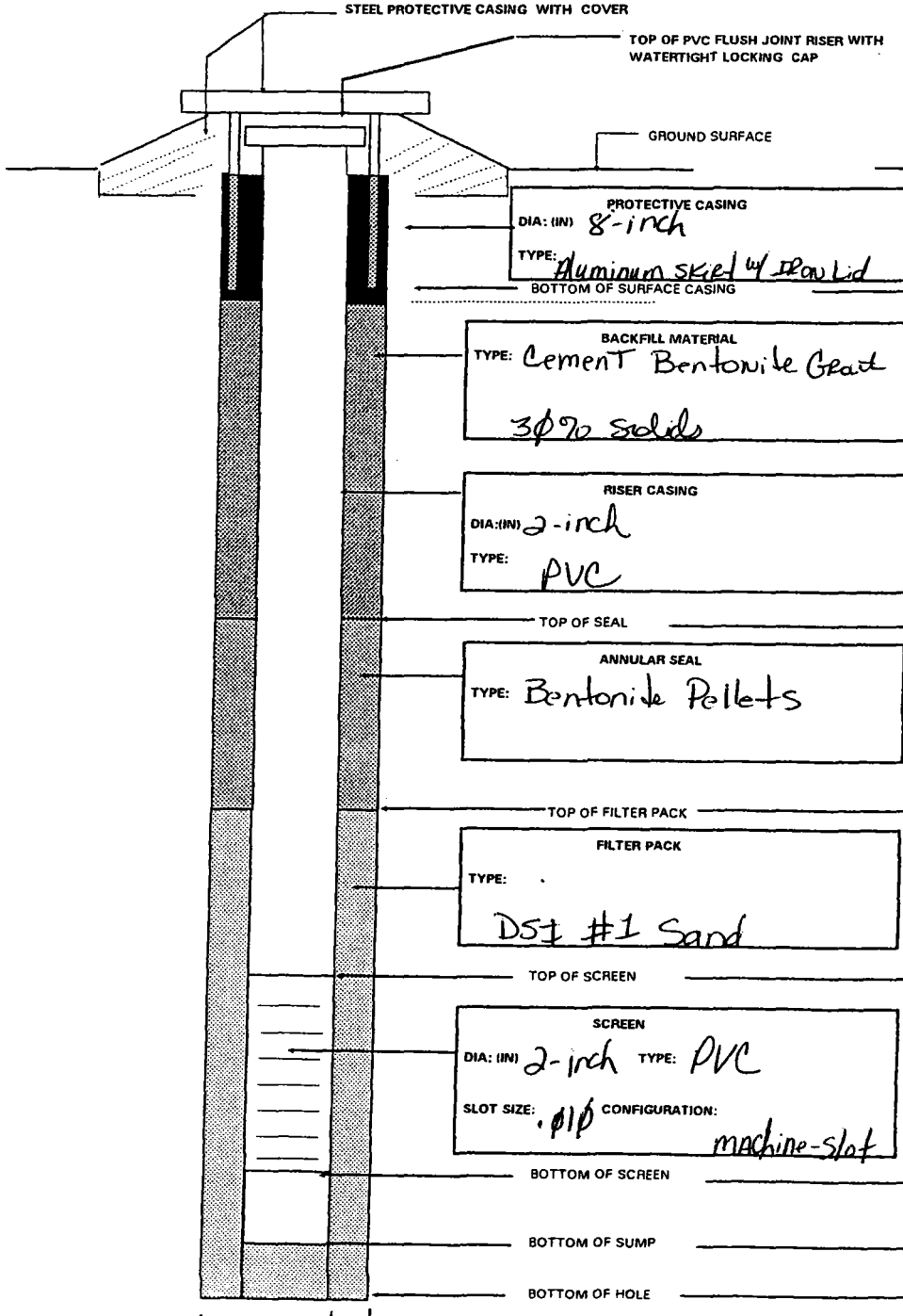
	DEPTH (BGS)	ELEV
	0	737.09
BOTTOM OF SURFACE CASING	.66	736.43
TOP OF SEAL	68.6	668.49
TOP OF FILTER PACK	71.4	665.69
TOP OF SCREEN	73.7	663.39
BOTTOM OF SCREEN	83.7	653.39
BOTTOM OF SUMP	84.0	653.09
BOTTOM OF HOLE	85.0	652.09

MONITORING WELL

PROJECT: CAMP

DELIVERY ORDER NO: 0070

WELL NUMBER: SAIC-15	BEGIN: 1-24-03	END: 1-25-03
COORDINATES: N: 549899.48 E: 1452808.85	REFERENCE POINT: Top of Casing	ELEVATION: 736.69 ft



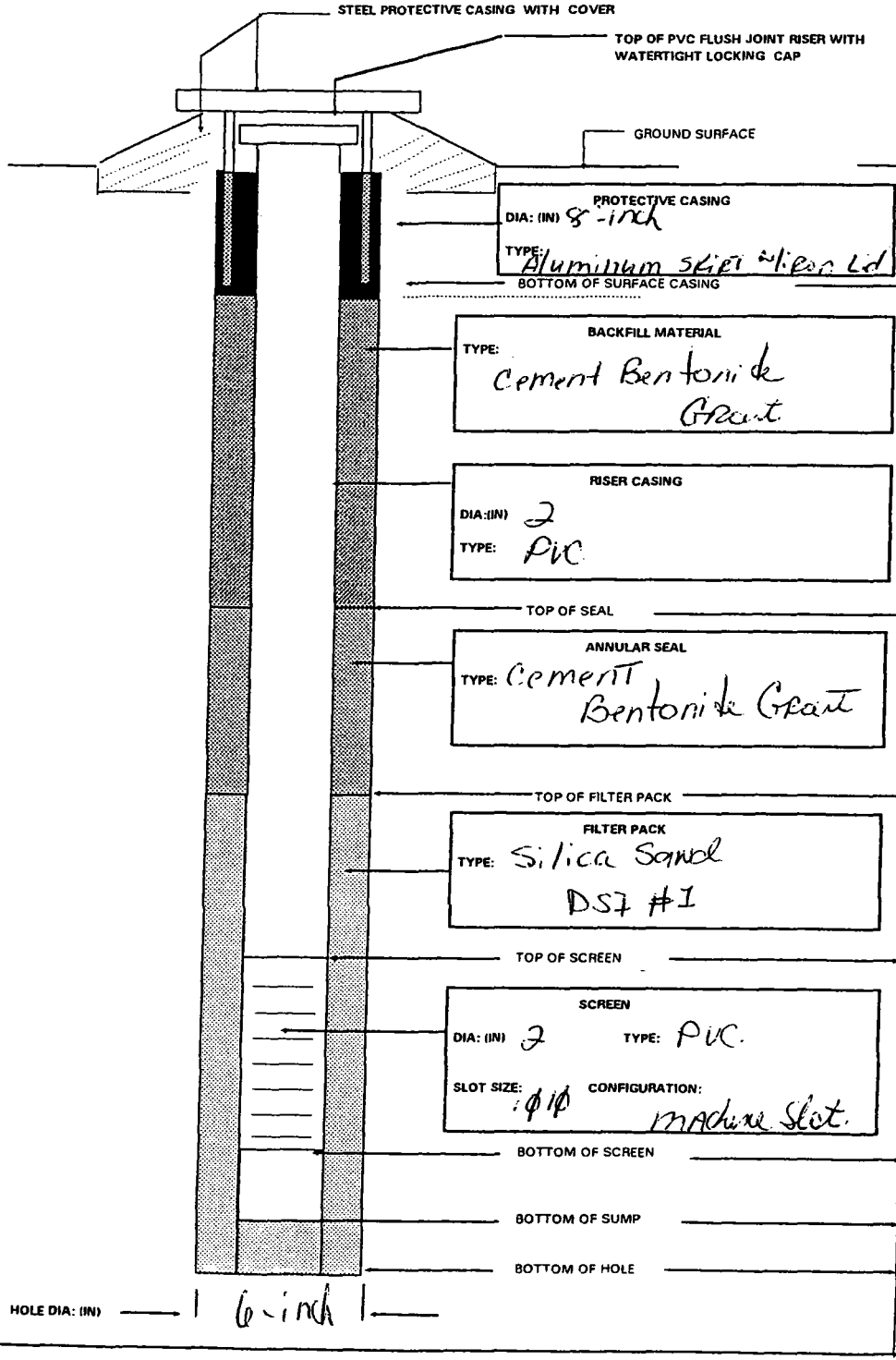
	DEPTH (BGS)	ELEV
GROUND SURFACE	0	736.80
BOTTOM OF SURFACE CASING	.66	736.14
TOP OF SEAL	68.8	668.00
TOP OF FILTER PACK	71.1	665.70
TOP OF SCREEN	73.2	663.60
BOTTOM OF SCREEN	83.2	653.60
BOTTOM OF SUMP	83.5	653.30
BOTTOM OF HOLE	89.0	647.80

MONITORING WELL

PROJECT: CAMP

DELIVERY ORDER NO: 0070

WELL NUMBER: SAIC-16	BEGIN: 1/23/03	END: 1/23/03
COORDINATES: N: 549845.38 E: 1452807.41	REFERENCE POINT: Top of Casing	ELEVATION: 736.84 ft



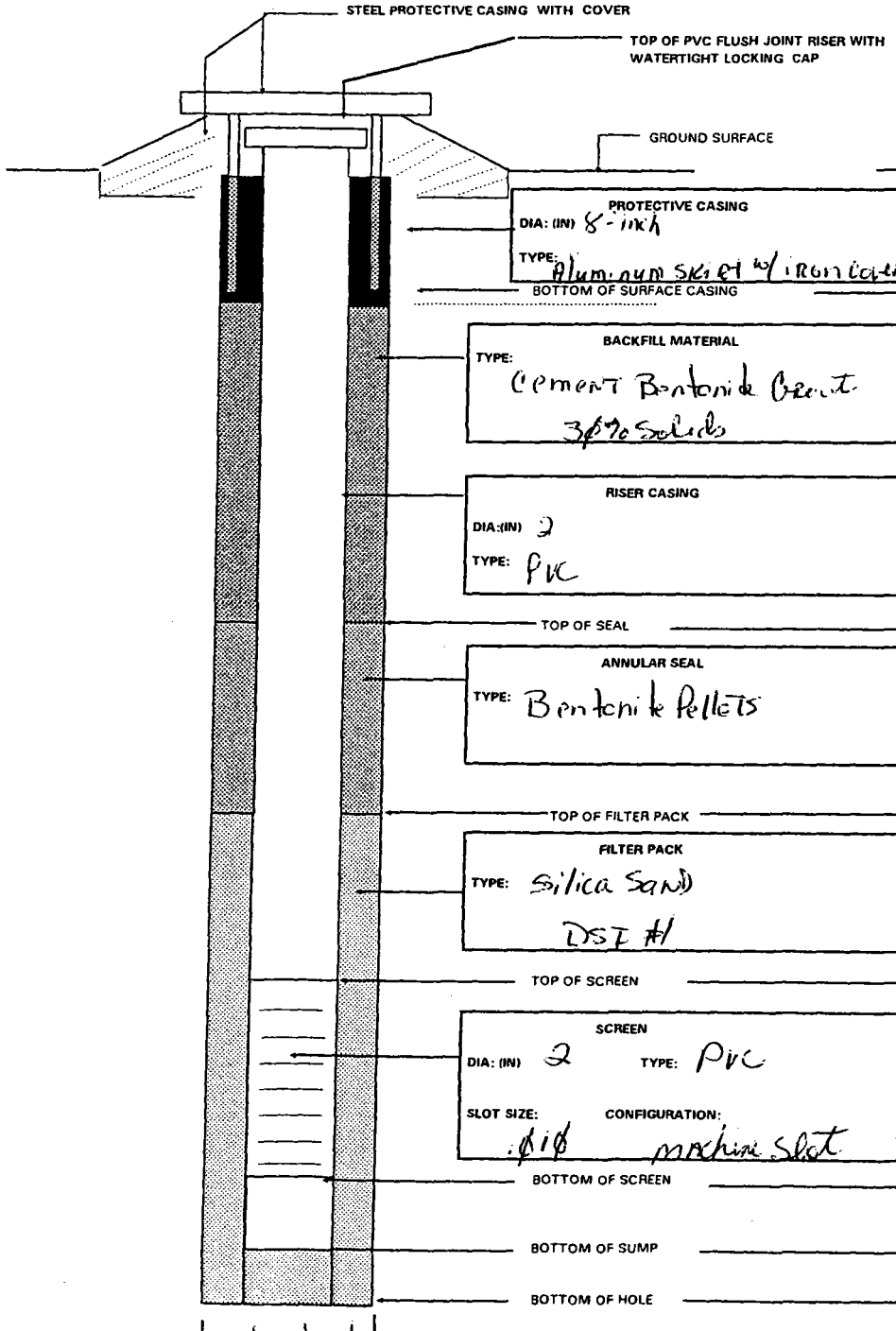
	DEPTH (BGS)	ELEV
GROUND SURFACE	0	737.06
BOTTOM OF SURFACE CASING	.66	736.40
TOP OF SEAL	15.0	722.06
TOP OF FILTER PACK	18.0	719.06
TOP OF SCREEN	20.2	716.86
BOTTOM OF SCREEN	30.2	706.86
BOTTOM OF SUMP	30.5	706.56
BOTTOM OF HOLE	31.0	706.06

MONITORING WELL

PROJECT: CAMP

DELIVERY ORDER NO: 0070

WELL NUMBER: SAIC-17	BEGIN: 1/21/03	END: 1/22/03
COORDINATES: N: 549846.02 E: 1452801.43	REFERENCE POINT: Top of Casing	ELEVATION: 736.71 ft



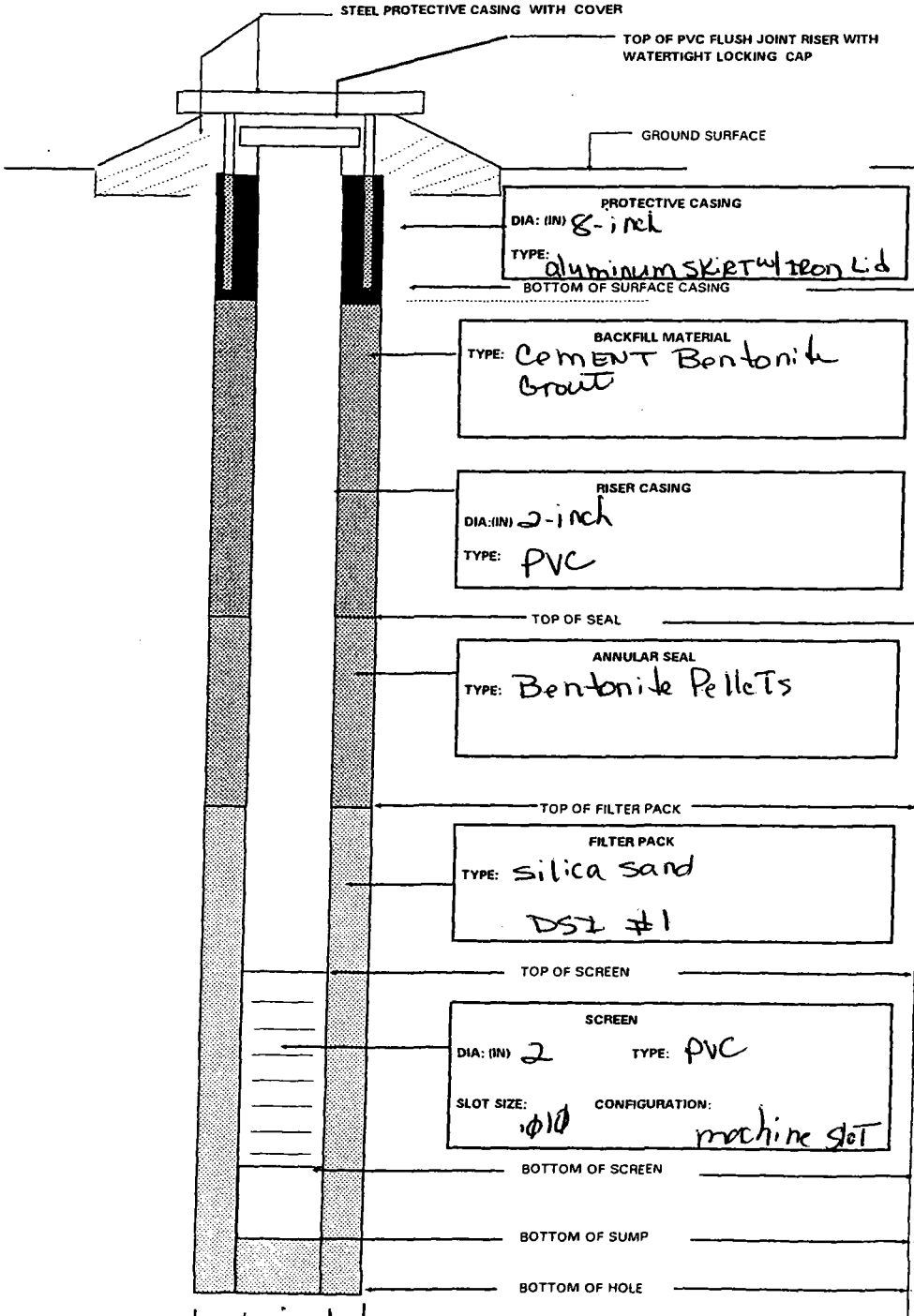
	DEPTH (BGS)	ELEV
	0	736.94
	.66	736.28
	39.0	697.94
	41.7	695.24
	44.7	692.24
	54.7	682.24
	55.0	681.94
	55.0	681.94

MONITORING WELL

PROJECT: CAMP

DELIVERY ORDER NO: 0070

WELL NUMBER: SAIC-18	BEGIN: 1-29-03	END: 1/29/03
COORDINATES: N: 550214.70 E: 1452668.78	REFERENCE POINT: Top of Casing	ELEVATION: 725.09 ft



	DEPTH (BGS)	ELEV
GROUND SURFACE	0	725.44
BOTTOM OF SURFACE CASING	.66	724.78
TOP OF SEAL	45.2	680.24
TOP OF FILTER PACK	48.5	676.94
TOP OF SCREEN	50.05	675.39
BOTTOM OF SCREEN	60.05	665.39
BOTTOM OF SUMP	60.55	664.89
BOTTOM OF HOLE	62.0	663.44

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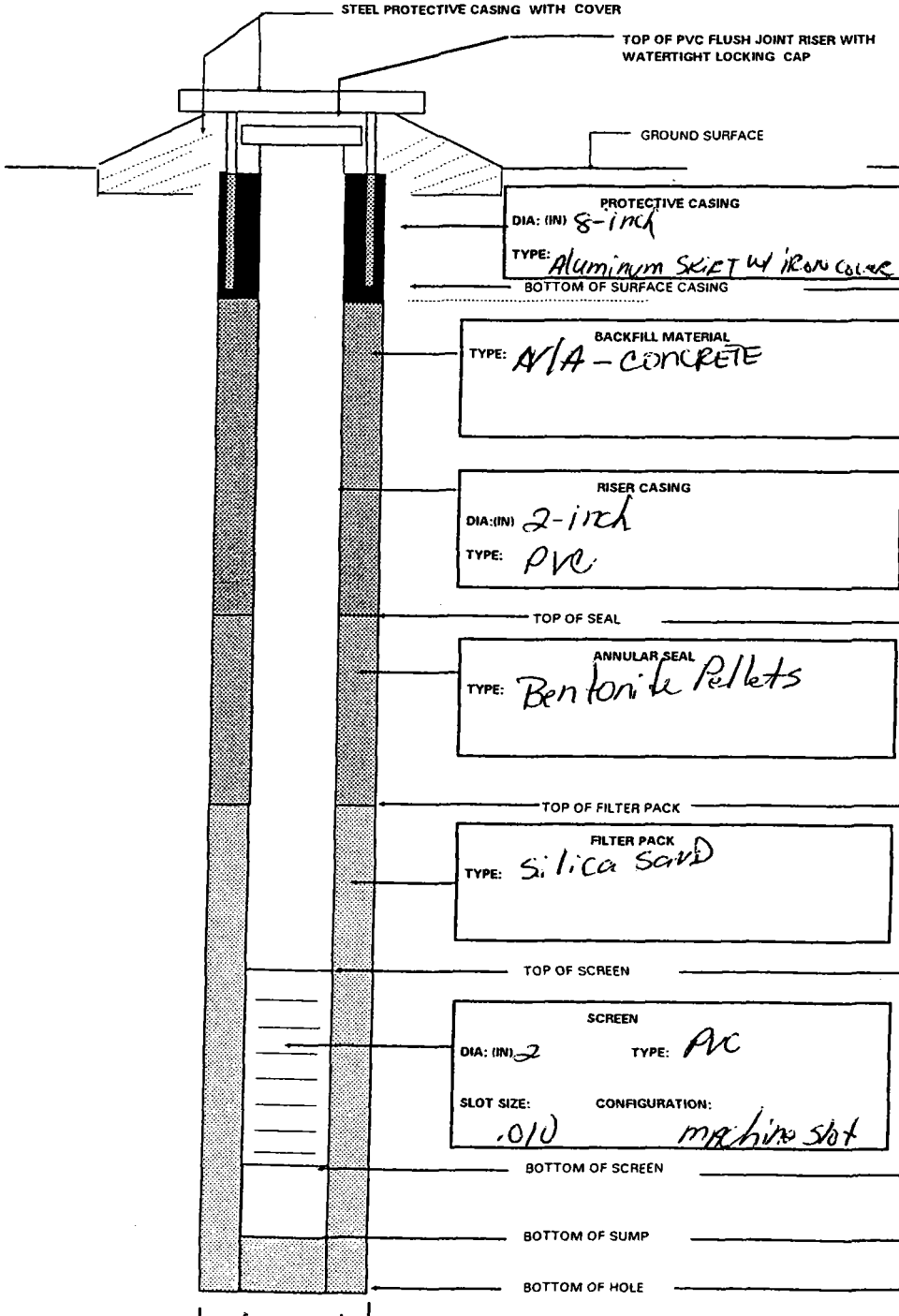
MONITORING WELL

PROJECT: CAMP

DELIVERY ORDER NO: 0070

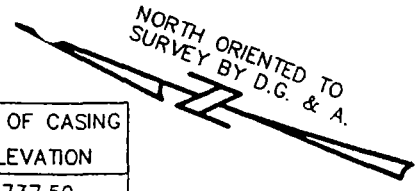
WELL NUMBER: SAIC-19	BEGIN: 1-29-03	END: 1/29/03
COORDINATES: N: 550295.18 E: 1453260.53	REFERENCE POINT: Top of Casing	ELEVATION: 728.98



	DEPTH (BGS)	ELEV
GROUND SURFACE	0	729.15
BOTTOM OF SURFACE CASING	.66	728.49
TOP OF SEAL	2.0	727.15
TOP OF FILTER PACK	3.0	726.15
TOP OF SCREEN	5.05	724.10
BOTTOM OF SCREEN	15.05	714.10
BOTTOM OF SUMP	15.35	713.80
BOTTOM OF HOLE	15.0	714.15

APPENDIX C

CIVIL SURVEY DATA



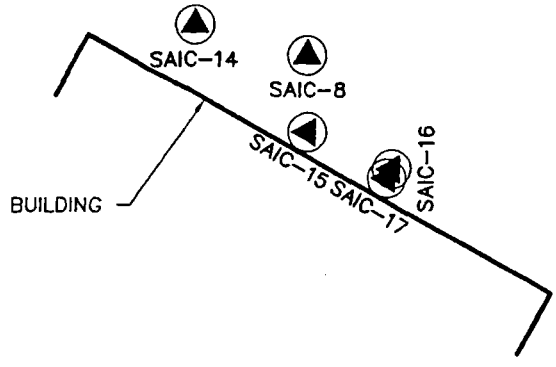
SAIC–19

MONITORING WELL	NORTHING	EASTING	GROUND ELEVATION	TOP OF CASING ELEVATION
SAIC–8	549915.65	1452850.01	737.75	737.59
SAIC–16	549845.38	1452807.41	737.06	736.84
SAIC–17	549846.02	1452801.43	736.94	736.71
SAIC–15	549899.48	1452808.85	736.80	736.69
SAIC–14	549982.06	1452842.00	737.09	736.88
SAIC–18	550214.70	1452668.78	725.44	725.09
SAIC–19	550295.18	1453260.53	729.15	728.98

BENCHMARK	NORTHING	EASTING	ELEVATION
#5 REBAR	549976.90	1452952.24	739.57

SAIC–18

BENCHMARK –
#5 REBAR AT
CORNER OF
BACK OF CURB
AND SIDEWALK
ELEVATION = 739.57



MONITORING WELL LOCATION

FORMER ARMY MISSILE SITE

CHARLOTTE, MECK. CO., NC

SYMBOL LEGEND	
SAIC–X	MONITORING WELL – NUMBER
	BENCHMARK

BAR SCALE 1"=100'

0 25 50 100 200

NOTES

THIS IS NOT A BOUNDARY SURVEY AND IS NOT INTENDED TO BE USED FOR RECORDATION, CONVEYANCES OR SALES.

BENCHMARK AND NORTH ORIENTATION BASED ON SURVEY BY DONALDSON, GARRETT, AND ASSOCIATES, INC., DATED 06–18–01

DATE OF SURVEY: 02–24–03

WELLS SURVEYED BY:
ESP ASSOCIATES, PA
PO BOX 7030
CHARLOTTE, NC 28241
(704) 583–4949

JCB #: RB02.001

0227030208CAP

MONITORING WELL LOCATION
FORMER ARMY MISSILE SITE
CHARLOTTE, MECK. CO., NC

ESP ASSOCIATES, PA
PO BOX 7030
CHARLOTTE, NC 28241
(704) 583-4949

MONITORING WELL	NORTHING	EASTING	GROUND ELEVATION	TOP OF CASING ELEVATION
SAIC-8	549915.65	1452850.01	737.75	737.59
SAIC-16	549845.38	1452807.41	737.06	736.84
SAIC-17	549846.02	1452801.43	736.94	736.71
SAIC-15	549899.48	1452808.85	736.80	736.69
SAIC-14	549982.06	1452842.00	737.09	736.88
SAIC-18	550214.70	1452668.78	725.44	725.09
SAIC-19	550295.18	1453260.53	729.15	728.98

BENCHMARK	NORTHING	EASTING	ELEVATION
#5 REBAR	549976.90	1452952.24	739.57

JOB #: RB02.001

0227030209CAP

ESP ASSOCIATES, PA
Proj RB02.001
Operat S Hamilton
Date 2-18-03

Sta	IH
100	5.44

BS	HAref
22	223.0046

Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
31		5.10				-0.030	-0.010	-8.015	10.1629
Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
3		5.10				-0.010	-0.100	-7.970	10.1837

Sta	IH
100	5.44

BS	HAref
31	223.0046

Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
3		5.10				0.000	-0.070	0.000	10.2021
Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
19		2.44				-0.070	0.020	-0.020	10.2212
Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
16		5.10				-0.020	0.090	-0.005	10.2327
Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
1		5.10				-0.080	-0.040	-0.050	10.2605
Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
16		5.10				-0.040	0.020	-0.015	10.3637
Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
1000	SAIC-8 TC	5.10	260.0352	92.4211	114.370				10.3845
Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
1001	SAIC-16 TC	14.30	239.5308	89.0020	179.370				10.4348
Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
1002	SAIC-17 TC	14.30	240.5927	89.0408	184.250				10.4438
Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
1003	SAIC-15 TC	0.45	256.5138	93.5908	158.210				10.4844
Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
1004	SAIC-14 TC	7.30	291.1042	91.4234	129.320				10.5025

Sta	IH
100	5.44

BS	HAref
31	223.0046

Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
2		5.10				-0.160	0.000	-0.035	10.5707

Sta	IH
2	5.58

BS	HAref
100	245.3644

02260302.MCAP

Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
100		5.10				0.020	0.050	0.015	11.0847
Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
1005	SAIC-18 TC	5.65	283.3223	91.2639	611.440				11.2129

Sta	IH
101	5.64

BS	HAref
2	175.5040

Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
2		5.10				0.020	-0.010	-0.010	15.1914
Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
1006	SAIC-19 TC	5.10	7.3716	89.5352	67.120				15.2529

0226030211CAP

ESP ASSOCIATES, PA
Proj RB02.001
Operat S Hamilton
Date 2-24-03

Sta	IH
2	5.72

BS	HAref
1	248.2530

Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
1		5.10				0.010	-0.010	-0.025	11.3414
Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
1000	BM	5.35	253.0319	90.2655	324.910				11.3756
Pno	Pcode	ROD HT	HA	VA	SD	d N	d E	d ELEV	Time
1001	SAIC-18 LID	5.10	288.5757	93.2404	285.810				11.5559

022703021 2CAP

RB-02.001

02-18-03

FORMER ARMY MISSLE SITE

STA	+	HI	−	ELEV.	
		745.04		738.86	
SAIC-09	6.18	~~743.04~~		~~736.86~~	RISER
		745.23		736.88	
SAIC-14	8.35	~~743.23~~	8.16	~~734.88~~	
		745.27		737.59	
SAIC-08	7.68	~~743.27~~	7.64	~~735.59~~	
		744.33		736.69	
SAIC-15	7.64	~~742.33~~	8.58	~~734.69~~	
		743.62		739.78	
TP	3.84	~~741.62~~	4.55	~~737.78~~	
		743.77		736.84	
SAIC-16	6.93	~~741.77~~	6.78	~~734.84~~	
		743.64		736.71	
SAIC-17	6.93	~~741.64~~	7.06	~~734.71~~	
				738.88	
SAIC-09			4.76	~~736.88~~	

022703021B CAP

RB-02.001

STA	+	HI	-	ELEV.	
PT. #2 DEI-2	0.97	742.74		741.77	
TP@CB	3.92	730.06	16.60	726.14	
SAIC-18	4.17	730.24	3.99	726.07	RISER
TP@CB	8.41	734.56	4.09	726.15	
SAIC-19	13.40	742.38	5.58	728.98	RISER
PT#2 DEI-2			0.59	741.79	+0.02

02-18-03

FORMER ARMY MISSLE SITE

02270302 14CAP

RB-02.001

STA	+	HI	−	ELEV −	
		744.62		738.86	
SAIC-09	5.76	~~742.62~~		~~736.86~~	RISER
		744.32		739.57	
Bm#5	4.75	~~742.32~~	5.05	~~739.57~~	
REBAR					
				738.86	
SAIC-09			5.46	~~736.86~~	

02-18-03
FORMER ARMY MISSILE SITE

02270302 15CAP

MONITORING WELL	NORTHING	EA
SAIC-8	549915.65	1457
SAIC-16	549845.38	145
SAIC-17	549846.02	1452
SAIC-15	549899.48	145
SAIC-14	549982.06	145
SAIC-18	550214.70	1452
SAIC-19	550295.18	145

SAIC-19

2-24-03

STA	+	HI	-	ELEV. -
CB RIM	5.155	731.29		726.14
SAIC-18	6.00	731.09	6.20	725.09
CB RIM			4.95	726.14

RB-02.001
FORMER ARMY MISSILE SITE
SAIC

Notes/ S. HAMILTON
TT T. HELTEN

022703021GCAP

APPENDIX D

FIELD SAMPLING DATA SHEETS

COMPREHENSIVE WATER LEVEL MEASUREMENTS

PROJECT NAME: CAMP FS/RD DELIVERY ORDER NO.: 0070

WELL NUMBER	DATE	DEPTH TO WATER (ft BTOC)	DEPTH TO WATER (ft BTOC)	INSTRUMENT	SERIAL NO.	REMARKS
SAIC-19	2/25/03	6.97		Solinst WL Meter	22333	sample
COEMW02	"	5.46		"	"	sample
SAIC-18	"	2.57		Solinst WL Meter	22333	sample
COEMW06		4.78		"	22333	sample
COEMW ~~10~~ 13		13.15		"	22333	sample
COEMW04		10.92		Solinst Interface probe	064171	standing water, rust + stained + sheen
PZ3		10.47				Piezo not on map standing water on sheen
SAIC04		12.91				
SAIC10		13.17				
COEMW14		11.28				sample standing water - cloudy slight film on
MW02		11.73				pass product 11.72
MW06		12.46				
SAIC09		12.44				
COEMW21		11.59				well broken below mortar collar
MW03		11.86				
MW01		12.20				

* All measurements from V-notch top of casing

RECORDED BY: 2/25/03
(Signature and Date)

QA CHECK BY: 4/2/03
(Signature and Date)

COMPREHENSIVE WATER LEVEL MEASUREMENTS

PROJECT NAME: CAMP FS/RD DELIVERY ORDER NO. 0070

WELL NUMBER	DATE	DEPTH TO WATER (ft BTOC)	DEPTH TO WATER (ft BTOC)	INSTRUMENT	SERIAL NO.	REMARKS
MW1A	2/25/03	12.31		solinst interface probe	064171	standing water well casing broken to motor collar, sample
COEMW29		15.76				
MW04		13.78				no product, sample
SAIC07		16.07				
SAIC13		16.53				steel casing
COEMW15		14.78				
COEMW11		18.35				
COEMW20		16.56				
COEMW24		15.18				
COEMW23		17.04				
MW07		17.44				
COEM01	2/26/03	7.52				
SAIC12		9.59				
SAIC05		9.52				
COEMW27		8.67				
COEMW12		8.15				

* All measurements from V-notch top of casing

RECORDED BY: CS 2/25/03
(Signature and Date)

QA CHECK BY: [signature] 4/2/03
(Signature and Date)

COMPREHENSIVE WATER LEVEL MEASUREMENTS

PROJECT NAME: CAMP FS/RD DELIVERY ORDER NO.: 0070

WELL NUMBER	DATE	DEPTH TO WATER (ft BTOC)	DEPTH TO WATER (ft BTOC)	INSTRUMENT	SERIAL NO.	REMARKS
COEMW38	2/26/03	8.68		Solinst Interface Probe	064171	
COEMW19		12.85				
SAIC6		9.05				
COEMW18		7.85				7.84 poss product (v. weak)
COEMW25		4.15				sample
COEMW05		7.08				
COEMW17		3.85				
COEMW26		5.13				
COEMW08		16.87				
COEMW09		17.93				
COEMW28		18.03				
COEMW16		21.41				
COEMW07		17.77				sample - protective casing cover detached, raining - water covered
SAIC1	2/26/03	20.29				cover (protective casing) completely broken - detached
SAIC2		20.17				
COEMW10		18.01				

* All measurements from V-notch top of casing

RECORDED BY: 2/26/03
(Signature and Date)

QA CHECK BY: 4/2/03
(Signature and Date)

COMPREHENSIVE WATER LEVEL MEASUREMENTS

PROJECT NAME: CAMP FS/RD DELIVERY ORDER NO: 0070

WELL NUMBER	DATE	DEPTH TO WATER (ft BTOC)	DEPTH TO WATER (ft BTOC)	INSTRUMENT	SERIAL NO.	REMARKS
SAIC03	2/26/03	21.54		Solinst Interface Probe	064171	
COEMW03		20.71				
COEMW22		20.98				
SAIC11		23.07				
SAIC14		10.70				sample
SAIC-8		18.40				sample
SAIC15		10.74				sample
~~COEM~~ SAIC16		9.69				sample
SAIC17		9.51				sample

EC

* All measurements from V-notch top of casing

RECORDED BY: 2/26/03
(Signature and Date)

QA CHECK BY: 4/2/03
(Signature and Date)

GROUND WATER MICRO PURGE SHEET

PROJECT NAME: CAMP FS/RD DELIVERY ORDER NO: 0070

DATE (mm/dd/yy): 7/24/03 TIME: 15 : 40

WELL ID NUMBER: COEMW02 WELL LOCATION: Charlotte Camp

DEPTH OF SCREENED INTERVAL(toc notch): _____ ft. to _____ ft.

INNER CASING: TYPE (PVC) ID: 2 inches

PURGE SAVER ID: na

WATER LEVEL INDICATOR ID: Ø64171

TURBIDITY ID: N/A

DEPTH TO WATER: 5.4 FT FROM MEASURE POINT BTOC

DEPTH TO TOP OF SCREEN: N/A FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE: N/A FT FROM MEASURE POINT

PURGE/SAMPLE METHOD: [ ] Bailer [X] Bladder Pump [ ] Pump Type QED PUMP ID: n/a

PURGE START TIME: 1430 PURGE END TIME: 1520

TOTAL VOLUME PURGED 4.75L

SITE CONDITIONS DURING PURGING: nothing remarkable

NOTE: IF WELL HAS A DEDICATED PUMP, IT IS TO BE USED.

FIELD OBSERVATIONS: good flow

S&A PLAN SAMPLING PROCEDURE FOLLOWED: [✓] YES [ ] NO IF NO, WHY WAS A DEVIATION NECESSARY: _____

RECORDED BY: _____ (Signature) QA CHECKED BY: _____ (Signature)

8

GROUND WATER MICRO PURGE LOG

WELL ID: [illegible]

PROJECT NAME: CAMP FS/RD

DELIVERY ORDER NO: 0070

2/24/03 TIME	L REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (C)	pH (s.u.)	COND (µmho/cm)	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS DO
1430	NA	90	222	19.40	5.96	0.222	5.14	-1.3	5.40	~~1.18~~
1440	0.9	100	210	18.59	5.51	0.203	1.40	0.1	5.82	~~1.56~~
1450	1.9	100	200	18.03	5.70	0.206	1.20	0.0	5.83	~~1.22~~
1500	2.9	100	192	18.00	5.91	0.208	1.20	0.0	5.84	
1505	3.4	100	191	18.03	5.85	0.208	1.17	0.1	5.85	
1510	3.85	90	183	18.08	5.98	0.207	1.19	0.2	5.85	
1515	4.30	90	185	18.18	5.90	0.207	1.18	0.0	5.85	
1520	4.75	90	190	18.18	5.91	0.205	0.98	0.1	5.86	
1545	5.20	90	186	18.32	5.98	0.206	1.09	0.0	5.85	post sampling

2/25/03

GROUND WATER MICRO PURGE SHEET

PROJECT NAME: CAMP FS/RD DELIVERY ORDER NO: 0070

DATE (mm/dd/yy): 04/26/03 TIME: 10:41

WELL ID NUMBER: MW04 WELL LOCATION: CAMP

DEPTH OF SCREENED INTERVAL(toc notch): 9 ft. to 19 ft.

INNER CASING: TYPE PVC ID: 2 inches

PURGE SAVER ID: ——

WATER LEVEL INDICATOR ID: 22333 Hazco

TURBIDITY ID: 056927 Horiba

DEPTH TO WATER: 13.81' FT FROM MEASURE POINT

DEPTH TO TOP OF SCREEN: 9' FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE: ~~14~~ 16.25' FT FROM MEASURE POINT

PURGE/SAMPLE METHOD: [ ] Bailer [X] Bladder Pump [ ] Pump Type SamplePro PUMP ID: QED

PURGE START TIME: 1115 PURGE END TIME: 1258

TOTAL VOLUME PURGED 7.1 liters

SITE CONDITIONS DURING PURGING: Well is in a high traffic area

NOTE: IF WELL HAS A DEDICATED PUMP, IT IS TO BE USED.

FIELD OBSERVATIONS: MW04 is turbid

S&A PLAN SAMPLING PROCEDURE FOLLOWED: [✓] YES [ ] NO IF NO, WHY WAS A DEVIATION NECESSARY:

RECORDED BY: (Signature) QA CHECKED BY: (Signature)

GROUND WATER MICRO PURGE LOG

WELL ID: MW 04

PROJECT NAME: CAMP FS/RD

DELIVERY ORDER NO: 0070

TIME	L REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (C)	pH (s.u.)	COND (µmho/cm)	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
1129	—	~~120~~ 80	201	16.66	6.21	0.193	9.84	16.4	13.81	Initial reading
1145	1.2	80	198	16.38	6.30	0.184	10.46	300.0	13.81	
1200	2.4	80	191	15.67	6.51	0.179	10.55	128.0	13.81	
1215	3.6	80	195	15.78	6.39	0.180	8.65	60.0	13.82	
1230	4.8	80	199	16.36	6.41	0.176	10.13	25.6	13.81	
1245	6.0	80	199	16.33	6.37	0.182	8.59	14.7	13.81	
1248	6.2	80	202	16.15	6.41	0.174	11.37	9.5	13.81	
1250	6.4	80	202	16.31	6.40	0.176	10.11	8.5	13.81	
1252	6.6	80	201	16.37	6.39	0.182	8.77	7.7	13.81	Begin Sampling
1258	7.1	80	203	15.68	6.37	0.182	9.41	8.1	13.81	End purging
						EC				

GROUND WATER MICRO PURGE SHEET

PROJECT NAME: CAMP FS/RD DELIVERY ORDER NO: 0070

DATE (mm/dd/yy): 02/25/03 TIME: 10:15

WELL ID NUMBER: COEMW06 WELL LOCATION: CAMP

DEPTH OF SCREENED INTERVAL(toc notch): 5 ft. to 15 ft.

INNER CASING: TYPE PVC ID: 2 inches

PURGE SAVER ID: N/A

WATER LEVEL INDICATOR ID: 22333 Hazco

TURBIDITY ID: 056927 Horiba

DEPTH TO WATER: 4.78 FT FROM MEASURE POINT

DEPTH TO TOP OF SCREEN: 5 FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE: 10 FT FROM MEASURE POINT

PURGE/SAMPLE METHOD: [ ] Bailer [X] Bladder Pump [ ] Pump Type SamplePro PUMP ID: QED

PURGE START TIME: 1010 PURGE END TIME: 1110

TOTAL VOLUME PURGED 6.0 Liters

SITE CONDITIONS DURING PURGING: Turbidity cleared very quickly.

NOTE: IF WELL HAS A DEDICATED PUMP, IT IS TO BE USED.

FIELD OBSERVATIONS: Well COEMW06 is located near a high traffic area.

S&A PLAN SAMPLING PROCEDURE FOLLOWED: [X] YES [ ] NO IF NO, WHY WAS A DEVIATION NECESSARY:

RECORDED BY: (Signature) QA CHECKED BY: (Signature)

2

GROUND WATER MICRO PURGE LOG

WELL ID: CP5MW06

PROJECT NAME: CAMP FS/RD

DELIVERY ORDER NO.: 0070

TIME	L REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (C)	pH (s.u.)	COND (µmho/cm)	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS DO
1010	0.5	87	250	16.11	6.31	0.218	14.38	1.9	5.04	14.38
1025	1.8	87	235	15.67	6.14	0.201	10.18	0	5.14	
1033	2.4	100	231	15.68	6.13	0.200	9.91	110.0	5.09	
1042	3.3	100	227	15.72	6.13	0.200	9.78	104.0	5.1	
1050	4.1	100	227	15.63	6.13	0.199	8.04	1.0	5.14	
1055	4.6	100	227	15.81	6.10	0.198	6.54	0.4	5.14	
1100	5.1	100	224	15.69	6.10	0.199	6.53	0	5.15	
1102	5.3	100	224	15.58	6.10	0.199	6.50	0.0	5.15	
1109	6.0	100	221	15.91	6.14	0.197	6.16	0.0	5.14	
							TAC			

GROUND WATER MICRO PURGE SHEET

PROJECT NAME: CAMP FS/RD DELIVERY ORDER NO: 0070

DATE (mm/dd/yy): 02/27/03 TIME: 11 : 27

WELL ID NUMBER: COEMW07 WELL LOCATION: CAMP

DEPTH OF SCREENED INTERVAL(toc notch): 17.7 ft. to 27.7 ft.

INNER CASING: TYPE PVC ID: 2 inches

PURGE SAVER ID: ——

WATER LEVEL INDICATOR ID: 22333 Hazco

TURBIDITY ID: 056927

DEPTH TO WATER: 17.77 FT FROM MEASURE POINT

DEPTH TO TOP OF SCREEN: 17.7 FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE: 27.7 FT FROM MEASURE POINT

PURGE/SAMPLE METHOD: [ ] Bailer [X] Bladder Pump [ ] Pump Type Sample Pro PUMP ID: QED

PURGE START TIME: 1122 PURGE END TIME: 1153

TOTAL VOLUME PURGED 13 liters

SITE CONDITIONS DURING PURGING: Well vault and casing cap are in a serious need of repair

NOTE: IF WELL HAS A DEDICATED PUMP, IT IS TO BE USED.

FIELD OBSERVATIONS: Turbidity cleared up very quickly

S&A PLAN SAMPLING PROCEDURE FOLLOWED: [✓] YES [ ] NO IF NO, WHY WAS A DEVIATION NECESSARY:

RECORDED BY: (Signature) QA CHECKED BY: (Signature)

GROUND WATER MICRO PURGE LOG

WELL ID: 625-MW07

PROJECT NAME: CAMP FS/RD

DELIVERY ORDER NO.: 0070

TIME	L REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (C)	pH (s.u.)	COND (µmho/cm)	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
1122	—	400	256	19.79	4.73	0.119	2.57	81.3	17.77	Initial
1125	1	400	270	19.74	4.69	0.120	1.41	25.3	17.77	
1131	4	400	281	20.00	4.70	0.125	0.89	8.2	17.9	
1133	5	400	283	20.00	4.65	0.128	0.83	6.2	17.9	
1135	6	400	286	20.08	4.66	0.132	0.83	3.8	17.9	
1142	9	400	289	19.91	4.67	0.135	1.02	1.9	17.9	
1145	10	400	287	19.90	4.69	0.135	1.05	1.7	17.9	
1147	11	400	287	19.90	4.68	0.134	1.09	1.6	18.0	Begin sampling
1153	13	400	286	19.87	4.72	0.127	3.14	0	18.0	End purging
							TXC			

3c

GROUND WATER MICRO PURGE SHEET

PROJECT NAME: CAMP FS/RD DELIVERY ORDER NO: 0070

DATE (mm/dd/yy): 02/25/03 TIME: 02:25

WELL ID NUMBER: COEMW13 WELL LOCATION: CAMP

DEPTH OF SCREENED INTERVAL(toc notch): 10 ft. to 20 ft.

INNER CASING: TYPE PVC ID: 2 inches

PURGE SAVER ID: ——

WATER LEVEL INDICATOR ID: 22333 Hazco

TURBIDITY ID: 056927 Horiba

DEPTH TO WATER: ~~4.98~~ 13.15 FT FROM MEASURE POINT

DEPTH TO TOP OF SCREEN: 10 FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE: 15 FT FROM MEASURE POINT

PURGE/SAMPLE METHOD: [ ] Bailer [X] Bladder Pump [ ] Pump Type Sample Pro PUMP ID: QED

PURGE START TIME: 1250 PURGE END TIME: 1342

TOTAL VOLUME PURGED 4-7 liters

SITE CONDITIONS DURING PURGING: Trailers parked near well; fire covering up COEMW10

NOTE: IF WELL HAS A DEDICATED PUMP, IT IS TO BE USED.

FIELD OBSERVATIONS: Good recovery, low turbidity

S&A PLAN SAMPLING PROCEDURE FOLLOWED: [✓] YES [ ] NO IF NO, WHY WAS A DEVIATION NECESSARY: ——

RECORDED BY: (Signature) QA CHECKED BY: (Signature)

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GROUND WATER MICRO PURGE LOG

WELL ID: CO-MW-13

PROJECT NAME: CAMP FS/RD

DELIVERY ORDER NO.: 0070

TIME	L REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (C)	pH (s.u.)	COND (µmho/cm)	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
1255	—	100	247	17.28	5.08	0.117	8.41	16.6	13.25	
1310	1.5	100	268	17.76	4.99	0.118	7.91	7.5	13.3	
1315	2.0	100	274	17.82	4.97	0.118	7.93	5.7	13.31	
1321	2.6	100	283	17.61	4.93	0.119	8.52	0	13.31	
1324	2.9	100	283	17.63	4.94	0.119	7.96	0	13.32	
1327	3.2	100	286	17.76	4.83	0.118	7.85	0	13.31	
1328	3.3	100	290	17.79	4.86	0.118	7.83	0	13.32	
1330	3.5	100	285	17.83	4.84	0.119	7.85	0	13.33	Begin sampling
1342	4.7	100	295	17.41	4.88	0.123	10.85	0	13.33	End ~~sampling~~ purging
								TKC		

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GROUND WATER MICRO PURGE SHEET

PROJECT NAME: CAMP FSIRD DELIVERY ORDER NO: 0070

DATE (mm/dd/yy): 02/25/03 TIME: 15:25

WELL ID NUMBER: COEMW14 WELL LOCATION: CAMP

DEPTH OF SCREENED INTERVAL(toc notch): 10.75 ft. to 20.75 ft.

INNER CASING: TYPE PVC ID: 2 inches

PURGE SAVER ID: ——

WATER LEVEL INDICATOR ID: 22333 Hazco

TURBIDITY ID: 056927 Horiba

DEPTH TO WATER: 11.28' FT FROM MEASURE POINT

DEPTH TO TOP OF SCREEN: 10.75 FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE: 15.75 FT FROM MEASURE POINT

PURGE/SAMPLE METHOD: [ ] Bailer [X] Bladder Pump [ ] Pump Type SamplePro PUMP ID: QED

PURGE START TIME: 1541 PURGE END TIME: 1801

TOTAL VOLUME PURGED 15.3 liters

SITE CONDITIONS DURING PURGING: Well mount is full of water; Near truck loading dock

NOTE: IF WELL HAS A DEDICATED PUMP, IT IS TO BE USED.

FIELD OBSERVATIONS: well has high turbidity

S&A PLAN SAMPLING PROCEDURE FOLLOWED: [✓] YES [ ] NO IF NO, WHY WAS A DEVIATION NECESSARY: ——

RECORDED BY: (Signature) QA CHECKED BY: (Signature)

GROUND WATER MICRO PURGE LOG

WELL ID: [illegible]

PROJECT NAME: CAMP FS/RD

DELIVERY ORDER NO: 0070

TIME	L REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (C)	pH (s.u.)	COND (µmho/cm)	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
1545	—	120 ~~100~~ ins	253	16.76	5.73	0.174	10.11	25.0	11.3	Initial reading
1552	1.32	120	255	18.02	5.61	0.178	9.20	150.0	11.3	
1608	3.0	100	250	18.18	5.69	0.180	8.96	106.0	11.3	
1618	4.0	120	253	18.52	5.63	0.179	8.79	102.0	11.3	
1628	5.2	120	252	18.03	5.70	0.179	9.33	77.6	11.31	
1638	6.4	120	253	17.91	5.66	0.179	8.76	55.0	11.31	
1648	7.6	100	255	18.21	5.66	0.182	8.96	37.5	11.31	
1658	8.6	100	256	17.89	5.73	0.174	10.55	29.8	11.31	
1708	9.6	100	254	17.90	5.71	0.179	8.88	30.9	11.31	
1718	10.6	100	254	17.88	5.69	0.180	8.76	20.6	11.32	
1728	container estimation 12.0	100	252	17.48	5.72	0.180	8.79	18.8	11.32	
1738	13.0	100	252	17.3	5.72	0.181	8.86	13.9	11.32	
1743	13.5	100	253	17.62	5.68	0.179	9.38	11.1	11.32	
1747	13.9	100	254	17.40	5.69	0.180	8.75	10.5	11.32	
1749	14.1	100	252	17.44	5.70	0.180	8.73	9.5	11.32	

GROUND WATER MICRO PURGE LOG

WELL ID: [illegible]

PROJECT NAME: CAMP FS/RD

DELIVERY ORDER NO: 0070

TIME	L REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (C)	pH (s.u.)	COND (µmho/cm)	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
1756	14.8	100	256	17.58	5.69	0.179	8.91	6.9	11.32	Begin sampling
1801	15.3	100	254	17.14	5.71	0.180	8.91	8.8	11.32	End purging

GROUND WATER MICRO PURGE SHEET

PROJECT NAME: CAMP FS/RD DELIVERY ORDER NO: 0070

DATE (mm/dd/yy): 02/27/03 TIME: 09:45

WELL ID NUMBER: COEMW25 WELL LOCATION: CAMP

DEPTH OF SCREENED INTERVAL(toc notch): 62 ft. to 72 ft.

INNER CASING: TYPE PVC ID: 2 inches

PURGE SAVER ID: —

WATER LEVEL INDICATOR ID: 064171

TURBIDITY ID: 063861

DEPTH TO WATER: 4.15 FT FROM MEASURE POINT

DEPTH TO TOP OF SCREEN: 62 FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE: 67 FT FROM MEASURE POINT

PURGE/SAMPLE METHOD: [ ] Bailer [X] Bladder Pump [ ] Pump Type SamplePro PUMP ID: QED

PURGE START TIME: 0945 PURGE END TIME: 1202

TOTAL VOLUME PURGED 22 liter

SITE CONDITIONS DURING PURGING: Well is near a loading dock that is infrequently used.

NOTE: IF WELL HAS A DEDICATED PUMP, IT IS TO BE USED.

FIELD OBSERVATIONS: The well has high turbidity. The pumping rate was increased to try to get rid of the fines, but this did not work. The turbidity stabilized some as the pumping rate was decreased.

S&A PLAN SAMPLING PROCEDURE FOLLOWED: [✓] YES [ ] NO IF NO, WHY WAS A DEVIATION NECESSARY: _____

RECORDED BY: _____ (Signature) QA CHECKED BY: _____ (Signature)

GROUND WATER MICRO PURGE LOG

WELL ID: CPBMW25

PROJECT NAME: CAMP FS/RD

DELIVERY ORDER NO: 0070

TIME	L REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (C)	pH (s.u.)	COND (µmho/cm)	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
0948	—	100	216	12.13	6.41	0.213	4.67	0.5	43.8 (ms)	Initial reading
1000	1	50	200	9.59	6.35	0.212	3.328	4.3	43.5 (ms)	
1005	1.25	50	200	7.53	6.33	0.221	3.41	4.0	43.5 (ms)	
1015	1.7	50	200	6.79	6.33	0.216	3.28	6.7	4.3	
1051	4.0	150	230	14.51	6.03	0.208	3.15	107.0	5.25	
1059	8.0	250	190	15.31	6.45	0.206	2.90	135.0	5.3	
1111	10.0	1000	181	15.39	6.35	0.198	3.89	152.0	5.6	
1123	20.0	50	189	15.43	6.47	0.209	3.44	144.0	5.6	
1128	20.25	50	201	13.46	6.41	0.203	3.66	149.0	5.6	
1133	20.50	50	203	13.3	6.35	0.200	3.81	158.0	5.5	
1138	20.75	50	206	13.04	6.35	0.200	3.85	145.0	5.4	
1143	21.00	50	207	12.68	6.37	0.200	4.00	137.0	5.4	
1144	21.1	50	~~2.13~~ 213 (ms)	12.84	6.37	0.199	3.82	130.0	5.4	
1149	21.35	50	210	12.95	6.30	0.196	3.90	115.0	4.5	
1156	21.50	50	216	12.85	6.33	0.194	5.00	116.0	4.4	Begin Sampling

GROUND WATER MICRO PURGE LOG

WELL ID: [redacted]

PROJECT NAME: CAMP FS/RD

DELIVERY ORDER NO.: 0070

TIME	L REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (C)	pH (s.u.)	COND (µmho/cm)	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
1202	22	50	220	12.45	6.41	0.194	9.39	111.0	4.3	End purging

GROUND WATER MICRO PURGE SHEET

PROJECT NAME: CAMP FS/RD DELIVERY ORDER NO: 0070

DATE (mm/dd/yy): 02/26/03 TIME: 14 : 28

WELL ID NUMBER: COEMW29 WELL LOCATION: CAMP

DEPTH OF SCREENED INTERVAL(toc notch): 92.5 ft. to 97.5 ft.

INNER CASING: TYPE PVC ID: 2 inches

PURGE SAVER ID: ——

WATER LEVEL INDICATOR ID: 22333 Hazco

TURBIDITY ID: 056927 Horiba

DEPTH TO WATER: 15.76' FT FROM MEASURE POINT

DEPTH TO TOP OF SCREEN: 92.5 FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE: 95.0 FT FROM MEASURE POINT

PURGE/SAMPLE METHOD: [ ] Bailer [X] Bladder Pump [ ] Pump Type SamplePro PUMP ID: QED

PURGE START TIME: 1425 PURGE END TIME: 1732

TOTAL VOLUME PURGED 14 Liters

SITE CONDITIONS DURING PURGING: Rainy

NOTE: IF WELL HAS A DEDICATED PUMP, IT IS TO BE USED.

FIELD OBSERVATIONS: Well turbidity stabilized at 50 NTUs.

S&A PLAN SAMPLING PROCEDURE FOLLOWED: [✓] YES [ ] NO IF NO, WHY WAS A DEVIATION NECESSARY:

RECORDED BY: (Signature) QA CHECKED BY: (Signature)

GROUND WATER MICRO PURGE LOG

WELL ID: COEMW29

PROJECT NAME: CAMP FS/RD

DELIVERY ORDER NO: 0070

TIME	L REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (C)	pH (s.u.)	COND (μmho/cm)	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
1433	—	50	188	7.43	6.73	0.282	12.32	0.1	15.2	Initial reading
1440	0.350	140	190	12.08	6.72	0.279	4.98	1.0	16.19	
1445	1.0	100	179	11.96	6.80	0.307	3.53	2.0	16.7	
1450	1.5	50	176	10.18	6.85	0.304	3.36	4.9	16.8	
1456	1.8	50	176	7.50	6.83	0.303	3.36	10.9	16.8	
1459	2.0	50	176	8.57	6.80	0.297	3.15	7.3	16.8	
1515	2.8	50	181	8.86	6.81	0.298	4.35	13.0	16.8	
1530	3.5	50	190	8.09	6.78	0.302	8.46	27.0	16.8	
1550	4.5	50	184	9.10	6.83	0.299	2.89	25.8	16.85	
1600	5.0	~~140~~ 250	182	8.05	6.86	0.301	3.03	34.9	16.90	
1618	9.5	50	177	10.97	6.86	0.298	2.94	47.7	17.5	
1637	10.5	50	181	6.07	6.88	0.298	3.02	95.6	17.3	
1653	12.1	50	182	7.19	6.82	0.294	2.67	65.8	16.9	
1725	13.7	50	198	7.29	6.60	0.344	3.02	51.4	16.9	
1726	13.8	50	198	7.19	6.61	0.340	2.98	50.6	16.9	

Horiba inside [illegible] due to [illegible] during sampling [illegible] heated and increased temperature. SMS

GROUND WATER MICRO PURGE LOG

WELL ID: COE MW 39

PROJECT NAME: CAMP FS/RD

DELIVERY ORDER NO: 0070

TIME	L REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (C)	pH (s.u.)	COND (µmho/cm)	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
1727	13.9	50	197	7.12	6.62	0.340	3.00	51.7	16.9	Begin Sampling
1732	14.0	50	197	8.43	6.59	0.318	3.22	50.3	16.9	End purging

GROUND WATER MICRO PURGE SHEET

PROJECT NAME: CAMP FS/RD DELIVERY ORDER NO: 0070

DATE (mm/dd/yy): 02/27/03 TIME: 13:27

WELL ID NUMBER: SA1C08 WELL LOCATION: CAMP

DEPTH OF SCREENED INTERVAL(toc notch): 49.3 ft. to 59.3 ft.

INNER CASING: TYPE PVC ID: 2 inches

PURGE SAVER ID: —

WATER LEVEL INDICATOR ID: 064171

TURBIDITY ID: 063861

DEPTH TO WATER: 18.4 FT FROM MEASURE POINT

DEPTH TO TOP OF SCREEN: 49.3 FT FROM MEASURE POINT

DEPTH TO PUMP INTAKE: 55.0 FT FROM MEASURE POINT

PURGE/SAMPLE METHOD: [ ] Bailer [X] Bladder Pump [ ] Pump Type Sample Pro PUMP ID: QED

PURGE START TIME: 1413 PURGE END TIME: 1712

TOTAL VOLUME PURGED 6.5 liters

SITE CONDITIONS DURING PURGING: Well located in "parking space" for trailer at loading dock

NOTE: IF WELL HAS A DEDICATED PUMP, IT IS TO BE USED.

FIELD OBSERVATIONS: Water level changes significantly after removing well cap

S&A PLAN SAMPLING PROCEDURE FOLLOWED: [✓] YES [ ] NO IF NO, WHY WAS A DEVIATION NECESSARY:

RECORDED BY: (Signature) QA CHECKED BY: (Signature)

GROUND WATER MICRO PURGE LOG

WELL ID: [illegible]

PROJECT NAME: CAMP FS/RD

DELIVERY ORDER NO: 0070

TIME	L REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (C)	pH (s.u.)	COND (µmho/cm)	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
1413	—	200	-300	16.77	8.10	0.356	2.97	140.0	15.0	Initial
1428	3.0	200	-329	17.03	7.99	0.324	1.05	275.0	16.5	
1608	3.0	200	-300	16.61	7.82	0.329	2.99	63.0	13.0	Resume purging
1616	5.0	100	-316	15.76	7.65	0.331	8.78	22.9	13.6	
1623	5.7	50	-307	14.90	7.48	0.328	0.88	48.5	13.5	
1635	6.0	30	-279	13.19	7.39	0.327	2.61	14.1	13.5	
1637	6.1	30	-280	13.25	7.37	0.326	1.72	14.4	13.5	
1639	6.2	30	-275	13.14	7.36	0.326	1.52	15.0	13.5	
1641	6.25	30	-279	13.15	7.36	0.326	1.45	14.8	13.5	Begin Sampling
1712	6.5	30	-250	13.10	7.23	0.324	1.98	15.5	13.5	End purging
							TIC			

GROUND WATER MICRO PURGE SHEET

PROJECT NAME: CAMP FS/RD DELIVERY ORDER NO: 0070

DATE (mm/dd/yy): 2/28/03 TIME: 14:45

WELL ID NUMBER: SAC-14 WELL LOCATION: Charlotte CAMP

DEPTH OF SCREENED INTERVAL(toc notch): 73.7 ft. to 83.7 ft.

INNER CASING: TYPE PVC ID: 2 inches

PURGE SAVER ID: na

WATER LEVEL INDICATOR ID: 22333

TURBIDITY ID: 056927

DEPTH TO WATER: 10.7 FT FROM MEASURE POINT

DEPTH TO TOP OF SCREEN: 73.7 FT FROM MEASURE POINT TOC

DEPTH TO PUMP INTAKE: 78.7 FT FROM MEASURE POINT TOC

PURGE/SAMPLE METHOD: [ ] Bailer [X] Bladder Pump [ ] Pump Type Sample Pro PUMP ID: QED

PURGE START TIME: 1225 PURGE END TIME: 1410

TOTAL VOLUME PURGED 14.3 L

SITE CONDITIONS DURING PURGING: n/a

NOTE: IF WELL HAS A DEDICATED PUMP, IT IS TO BE USED.

FIELD OBSERVATIONS: Turbidity fell from >999 to ~20 NTU and stabilized there

S&A PLAN SAMPLING PROCEDURE FOLLOWED: [✓] YES [ ] NO IF NO, WHY WAS A DEVIATION NECESSARY:

RECORDED BY: 2/28/03 (Signature) QA CHECKED BY: (Signature)

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GROUND WATER MICRO PURGE LOG

WELL ID: [illegible]

PROJECT NAME: CAMP FS/RD

DELIVERY ORDER NO.: 0070

2/28/03 TIME	L REMOVED	PURGE RATE (mL/min)	ORP (mv)	TEMP (C)	pH (s.u.)	COND ~~(µmho/cm)~~ mS/cm	DO (mg/L)	TURBIDITY (NTU)	DEPTH TO WATER (FT BTOC)	COMMENTS
1225	na	120	-1	15.92	6.50	2.266	3.18	>999	10.7	initial
1235	1.2	120	5	16.16	6.54	0.254	2.09	181	12.71	
1245	2.4	120	44	15.61	6.44	0.244	4.71	31.6	11.65	
1255	3.8	140	36	16.85	6.52	0.261	3.09	30.8	11.58	
1305	5.2	140	37	16.34	6.50	0.265	5.08	23.7	11.58	
1330	8.7	140	27	16.78	6.46	0.268	2.18	26.0	11.38	
1340	10.1	140	24	17.22	6.45	0.266	2.20	24.9	11.43	
1350	11.5	140	5	16.70	6.50	0.262	2.06	25.8	11.38	
1400	12.9	140	-2	16.70	6.51	0.259	2.18	23.6	11.30	
1405	13.6	140	0	16.73	6.51	0.261	2.27	23.4	11.30	
1410	14.3	140	7	16.70	6.49	0.263	2.38	22.8	11.30	
1440	✓	✓	29	17.54	6.49	0.256	2.92	16.8	11.24	Post Sampling

2/28/03