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SAMPLING AND ANALYSIS PLAN FOR ZONE G SITE 17 BUILDING B42 SITE IDENTIFICATION NUMBER 17780 CNC CHARLESTON SC

8/1/2000

CH2M HILL

SAMPLING AND ANALYSIS PLAN
FOR
ZONE G/ SITE 17- BUILDING B42

SITE IDENTIFICATION # 17780

Charleston Naval Complex
Charleston, South Carolina

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND

Contract Number N62467-99-C-0960

August 2000

SAMPLING AND ANALYSIS PLAN
FOR
ZONE G/ SITE 17-BUILDING B42

SITE IDENTIFICATION # 17780

Charleston Naval Complex
Charleston, South Carolina

Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
Charleston, South Carolina 29406

Submitted by:
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Contract Number: N62467-99-C-0960

August 2000

REPARED BY:

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8/30/00

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Site Superintendent
CH2M-JONES, LLC.

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ACRONYMS

AST	Aboveground Storage Tank
bls	below land surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene Isomers
CAP	Corrective Action Plan
CNC	Charleston Naval Complex
COC	Chemical of Concern
EISOPQAM	Environmental Investigations Standard Operating Procedures and Quality Assurance Manual
EPA	Environmental Protection Agency
ft	foot
mg/kg	microgram per kilogram
mg/L	microgram per liter
OVA	Organic Vapor Analyzer
QA	Quality Assurance
QC	Quality Control
RBSL	Risk-Based Screening Level
RDA	Redevelopment Authority
SAP	Sampling and Analysis Plan
SCDHEC	South Carolina Department of Health and Environmental Control
SOUTHDIV	Southern Division Naval Facilities Engineering Command
SSTL	Site-Specific Target Level
TTNUS	Tetra Tech NUS
UST	Underground Storage Tan

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) has been prepared by CH2M-JONES, LLC. The plan is designed for Zone G/ Site 17-Building B42; Underground Storage Tank (UST) B42 located at the Charleston Naval Complex (CNC), Charleston, South Carolina.

The South Carolina Department of Health and Environmental Control (SCDHEC) has designated this site as Identification Number: 17780. This SAP provides methods to further evaluate the applicability of intrinsic remediation and monitoring well abandonment as a corrective action for UST B42 in accordance with SCDHEC Corrective Action Guidance, June 1997.

1.1 General Site Description

The CNC is in the city of North Charleston, on the west bank of the Cooper River in Charleston County, South Carolina as shown in Figure 1. This installation consists of two major areas: an undeveloped dredge materials area on the east bank of the Cooper River on Daniel Island in Berkley County, and a developed area on the west bank of the Cooper River. The developed portion of the base is on the peninsula bounded on the west by the Ashley River and on the east by the Cooper River.

The area surrounding CNC is "mature urban", having long been developed with commercial, industrial, and residential land use. Commercial areas are primarily west of CNC; industrial areas are primarily to the north of the base along Shipyard Creek. A site vicinity map, which exhibits adjacent properties and structures, vicinity roads, current utilities, and vicinity surface drainage, is included as Figure 2.

Building B42 was used as a store room/boiler house for the former Green House. It was constructed over 20 years ago on previously undeveloped land. UST B42 was a 560 gallon tank which supplied heating fuel oil for the buildings boiler. The boiler was located on the southwest corner of Building B42 (see Figure 3) (Tetra Tech NUS, Inc. [TTNUS] Rapid Assessment Report [RA], 2000).

1.2 Objective

This presents the groundwater monitoring plan to further document that PAH and VOC compounds are not present. in the groundwater to support consideration of "no further action"for Building B42 at this time Details for the abandonment of monitoring wells at this site are also included in this plan.

2.0 PROPOSED REMEDIATION TECHNOLOGY

Based on the results of the RA modeling, one additional monitoring event will be performed for the site. The monitoring program will consist of sampling all monitoring wells listed in the SCDHEC letter dated 03 April 2000. The proposed monitoring program is described in detail in Sections 3.0 and 4.0 of this plan.

3.0 MONITORING WELL INSTALLATION AND ABANDONMENT

3.1 Monitoring Well Installation

No monitoring wells will be installed as part of this plan.

3.2 Monitoring Well Abandonment

Six monitoring wells will be abandoned at Building B42 following the South Carolina Well Standards and Regulations R.61-71. The well abandonment will include grouting wells, removing stick-ups and removing all guard posts.

3.3 Surveying

Because no monitoring wells will be installed at this site, a new survey will not be conducted.

3.4 Equipment Decontamination

All drilling equipment, augers, well casing and screens, and soil and groundwater sampling equipment involved in field sampling activities will be decontaminated according to the Environmental Protection Agencies (EPA) " Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM).

4.0 PROPOSED GROUNDWATER MONITORING PROGRAM

4.1 Monitoring Frequency and Reporting

The groundwater monitoring program proposed at building B42 will be performed in accordance with SCDHEC Corrective Action Guidance, June 1997, and consist of the following:

Sampling date	Monitoring Wells Sampled	Field Measures	Laboratory Analytical
Second half [1]2000	CNC17-MW-06D, MW-01, MW-02, MW-05	T°, pH, DO, Conductivity, Depth to water, Total depth, Turbidity	Naphthalene 8260 BTEX 8260 Sulfate, nitrate, total dissolved iron, alkalinity, methane

1. Second half is defined by the second half of the year (July through December).

- **Frequency:** Groundwater samples will be taken from CNC17 MW-06D, MW-01, MW-02, MW-05.

- **Reporting:** Groundwater monitoring reports will be submitted to SCDHEC after the sampling event from the second half.

Included in the reports will be field and analytical information from the certified laboratory indicating well numbers, analytical methods used, date sampled, date analyzed, and method detection limits.

Following the sampling event the analytical results will be evaluated and submitted to SCDHEC including further recommendations for the site.

- **Groundwater Sampling**

Prior to any groundwater sampling, each well will be measured for water levels and total depth and each well will be purged in accordance the EPA EISOPQAM.

4.2 Analytical Parameters

The following constituents will be analyzed for each groundwater sample:

- Naphthalene using method 8260.
- BTEX using method 8260

The following parameters will be analyzed in order to evaluate the effectiveness of intrinsic remediation:

- Nitrate (NO^{-3})
- Sulfate (SO^{-4})
- Total dissolved iron
- Methane (CH_4)
- Alkalinity

4.3 Field Measurements

The following parameters will be sampled in the field:

- Temperature
- pH
- Dissolved Oxygen
- Depth to water table
- Depth of well
- Turbidity
- Specific Conductance

Field measurements will be recorded in the field book and in field forms.

4.4 Groundwater Level Measurements

Groundwater measurements will be taken from all monitoring wells at the site during each sampling event. All water level measurements will be taken on the same day as anticipated sampling.

Measurements will be taken with an electrical water level meter or interface probe if floating product is present using the highest part of the top of the casing as a reference point for determining depths to water and total depths. Water level measurements will be recorded to the nearest 0.01-foot in the field book.

4.5 Sample Handling

Sample Handling will be conducted with the following references:

EPA EISOPQAM (EPA May, 1996).

4.6 Sample Packing and Shipping

The following forms will be completed to complete the packing/shipping process:

- Sample labels
- Chain-of-custody labels
- Appropriate labels applied to shipping coolers
- Chain-of-custody forms
- Federal express air bills

4.7 Quality Check

Quality Control (QC) samples will be collected during sampling events. QC samples may include field blanks, field duplicates, and trip blanks. Definitions of each can be found below as described by the EISOPQAM:

- **Field Blank:** a sample collected using organic-free water, which has been run over/through sample collection equipment. These samples are used to determine if contaminants have been introduced by contact of the sample medium with sampling equipment. Equipment field blanks are often associated with collecting rinse blanks of equipment that has been field cleaned.

- **Field Duplicates:** Two or more samples collected from a common source. The purpose of a duplicate sample is to estimate the variability of a given characteristic or contamination associated with a population.

- **Trip Blank:** A sample, which is prepared prior to the sampling event in the actual container and is stored with the investigative samples throughout the sampling event. They are often packaged for shipment with the other samples and submitted for analysis. At no time after their preparation are trip blanks to be opened before they reach the laboratory. Trip blanks are used to determine if samples were contaminated during storage and/or transportation back to the laboratory (a measure of sample handling variability resulting in positive bias in contaminant concentration). If samples are to be shipped, trip blanks are to be provided with each shipment but not for each cooler.

4-8 Control Limits

Analysis	Control Parameter	Control Limit	Corrective Action
Air Monitoring	Check Calibration of OVA daily	Calibrate to manufactures specifications	Recalibrate. If unable to calibrate, replace.
pH of water	Continuing calibration check of pH 7.0 buffer	pH= 7.0	Recalibrate. If unable to calibrate, replace electrode.
Specific Conductance of water	Continuing calibration check of standard solution	> 1% of standard	Recalibrate.

4.9 Record keeping

In addition to records kept in logbooks, forms will be kept on log sheets for soil and groundwater. See Appendix B.

4.10 Site Management and Base Support

Throughout the investigation activities, work on the CNC will be coordinated through SOUTHDIV and SCDHEC.

The primary contacts for each are as follows:

1. SOUTHDIV point of contact
   Gabe Magwood
   Southern Division Engineering Command
   2155 Eagle Drive
   North Charleston, SC 29406
   (843) 820-7307

2. SOUTHDIV point of contact
   Tony Hunt
   Southern Division Engineering Command
   2155 Eagle Drive
   North Charleston, SC 29406
   (843) 820-7307

3. SCDHEC point of contact
   Paul Bristol
   South Carolina Department of Health and Environmental Control
   2600 Bull Street
   Columbia, SC 29201
   (843) 898-3559

REFERENCES

South Carolina Department of Health and Environmental Control. 1997. Corrective Action Guidance.

Tetra Tech NUS, Inc.; 2000 Rapid Assessment for Site 17 (Building B42), Charleston, South Carolina.

United States Environmental Protection Agency. 1990. Code of Federal Regulations 136.

United States Environmental Protection Agency. 1988. EPA Users Guide to Contract Laboratory Program.

United States Environmental Protection Agency. 1996. EPA Environmental Investigations Standard Operating Procedures for Quality Assurance Manual.

APPENDIX A

BORING LOG

PROJECT NAME: Site 17 Bldg. B42 BORING NUMBER: CNC-17-B01
PROJECT NUMBER: ND124 Zone G DATE: 5-2
DRILLING COMPANY: GEOLOGIST: SISON
DRILLING RIG: 250 / 5400 DRILLER: COLEMAN

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	1						Asphalt, fill		Dry		n/a		
	2						fill		Dry		n/a		
	3				Dk Brown		Sandy silt, some fill		Dry	2			
	4		4		Lt Brown		" " some clay		Moist	2			
	5				Brown		Sandy silt		Moist	2			
	6				Yellow-Brown		" "		"	2			
	7				Tan		" "		"	2			
X	8		4		Tan/lt. gray		" " trace clay		Moist	2			
	9						Sandy silt		Wet	2			
	10				Med stiff		" " with clay		Moist	2			
	11				Med. stiff		" " with clay		Moist	2			
	12		4				" "		Wet	2			
	13				Lt. gray		Silty sand		Saturated	—			
	14				Lt gray		Silty sand		Saturated	—			
	15						—		—	—			
	16		2				—		—				
				EOB									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area

Remarks:

Background (ppm): X

Converted to Well: Yes ____ No X Well I.D. #: ____

BORING LOG

PROJECT NAME: Site 17 Bldg. B42
PROJECT NUMBER: N0124 Zone G
DRILLING COMPANY:
DRILLING RIG: 250 / 5200

BORING NUMBER: CNC17-B02
DATE: 5-2
GEOLOGIST: SGSCO
DRILLER: COLEMAN

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
	1						Asphalt fill		Dry				
	2						Fill		Dry				
	3					Brown	Sandy silt trace fill		Moist	2			
	4		4		"	"	" " tr. fill		Moist	2			
	5								Moist	3			
	6					Yellow Brown	" "		Moist	3			
	7					"	Sandy silt tr clay		Moist	3			
X	8		4			Lt gray	" some clay		Moist	3			
	9						Sandy silt, some clay		Moist	2			
	10						Silty sand		Wet	5			
	11						" " some clay		Moist	5			
	12		4			Gray	Silty sand		Wet	5			
	13					"	Silty sand		Saturated				
	14					Lt gray	" "		"				
	15					"	" "		"				
	16		4				" "		"				
				EOB									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 2

Remarks:

Converted to Well: Yes ____ No X Well I.D. #:

BORING LOG

PROJECT NAME: Site 17 Bldg. B42 BORING NUMBER: CNC17-BØ6
PROJECT NUMBER: N0124 Zone G DATE: 5-3
DRILLING COMPANY: GEOLOGIST: S/SCO
DRILLING RIG: 250 / 5400 DRILLER: COLEMAN

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
	1						asphalt (3")		dry				
	2			dk	brown		sandy silt		dry	2			
	3			orange			silty sand		dry	2			
	4		3.5'	orange			" "		moist	2			
	5		med.	stiff orange			silty clay trace sand		moist	3			
	6			orange			sand silt some clay		moist	3			
	7			orange			silty sand		moist	3			
	8		4'	orange w/ brown			silty clayey sand		moist	3			
X	9			mottled			silty clay		moist	3			
X	10			orange w/ olive			silty sand trace clay		moist	3			
	11						silty sand		wet	3			
	12		4'				" " tr. clay		wet	3			
	13			lt.	brown		silty sand		saturated	—			
	14			lt.	brown		" "		saturated	—			
	15						" "		saturated	—			
	16		3'	lt.	brown		" "		saturated	—			
				EOB									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area 2

Remarks:

Background (ppm): 2

Converted to Well: Yes ____ No X Well I.D. #: ____

BORING LOG

PROJECT NAME: Site 17 Bldg. B42 BORING NUMBER: CNC17-B07
PROJECT NUMBER: N0124 Zone G DATE: 5-3
DRILLING COMPANY: GEOLOGIST: SISCO
DRILLING RIG: 250 / 5400 DRILLER: COLEMAN

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	MATERIAL DESCRIPTION: Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm): Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
	1						Asphalt		Dry	✓			
	2					Brown	Silt		Dry	✓			
	3				Orange Brown		Silty sand		Dry	2			
	4		4		" "		Sandy silt		Moist	2			
	5				" "		Silty sand. tr. clay		"	2			
	6				" "		" " "		"	2			
	7				Lt. gray		Silty sand tr. clay		"	3			
	8		4		Lt. gray		Sandy silt		"	2			
X	9						Silty sand.		Moist	2			
	10						Silty clay		Wet	3			
	11						" " "		Moist	5			
	12		4				Silty sand		Wet	3			
	13						Silty sand		Saturated				
	14						" "		"				
	15						" "		"				
	16		3.5				" "		Wet				
	18												
	19												
	20												
	21												
	22												
	23												
	24												
	25												
	26												
	27												
	28												

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area

Remarks: ECB at 25 ft

Background (ppm): 2

Converted to Well: Yes X No _____ Well I.D. #: _____

BORING LOG

PROJECT NAME: Site 17 Bldg. B42 Zone G
BORING NUMBER: 17-B08
PROJECT NUMBER: N0124
DATE: 5-3
DRILLING COMPANY:
GEOLOGIST: Sisco
DRILLING RIG: 250 / 5400
DRILLER: Coleman

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS*	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
	1				—		Asphalt		Dry	✓			
	2				Dark brown		Gll & sandy silt		Dry	✓			
	3				Orange brown		Sandy silt		Moist	3			
	4		3.5		" "		" "		Moist	3			
	5				Brown		" "		"	3			
	6				Orange		" " tr. clay		"	3			
	7				Orange		" " some clay		"	3			
	8		4		Lt. Gray		Sandy silt tr. clay		Moist	3			
	9				Lt. Brown		Sandy silt		"	3			
	10				Gray		Silty clay		"	3			
	11				Gray		" "		"	3			
	12		4		Gray		Silty sand		Wet	3			
	13								Saturated				
	14								"				
	15								"				
	16		Ø						"				
	17												
	18												
	19												
	20		Ø										
				EOB									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area Background (ppm): 3

Remarks:

Converted to Well: Yes X No _____ Well I.D. #:

Pilgrim Martin

BORING LOG

PROJECT NAME: Site 17 Bldg. B42 BORING NUMBER: 17-B09
PROJECT NUMBER: N0124 Zone G DATE: 5-3
DRILLING COMPANY: GEOLOGIST: SISCO
DRILLING RIG: 250 / 5400 DRILLER: COLEMAN

Sample No. and Type or RQD	Depth (Ft.) or Run No.	Blows / 6" or RQD (%)	Sample Recovery / Sample Length	Lithology Change (Depth/Ft.) or Screened Interval	Soil Density/ Consistency or Rock Hardness	Color	Material Classification	USCS *	Remarks	PID/FID Reading (ppm) Sample	Sampler BZ	Borehole**	Driller BZ**
	0												
	1						Asphalt		Dry				
	2						fill, sandy silt		Dry				
	3						Sandy silt		Moist	3			
	4		3.5				" "		Moist	3			
	5						Sandy silt		"	3			
	6						" " some clay		"	3			
	7						Silty sand some clay		"	3			
	8		4				Silty sand		Moist	3			
	9						" " tr. clay		"	5			
	10						Silty clay		"	10+			
X	11						" "		"	50		STRONG ODOR.	
	12		4				Silty sand		Wet				
	13						Silty sand		Saturated				
	14						" "		"				
	15						" "		"				
	16		4				" " tr. clay		Wet				
				EOB									

* When rock coring, enter rock brokeness.

** Include monitor reading in 6 foot intervals @ borehole. Increase reading frequency if elevated reponse read.

Drilling Area 3
Background (ppm): 3

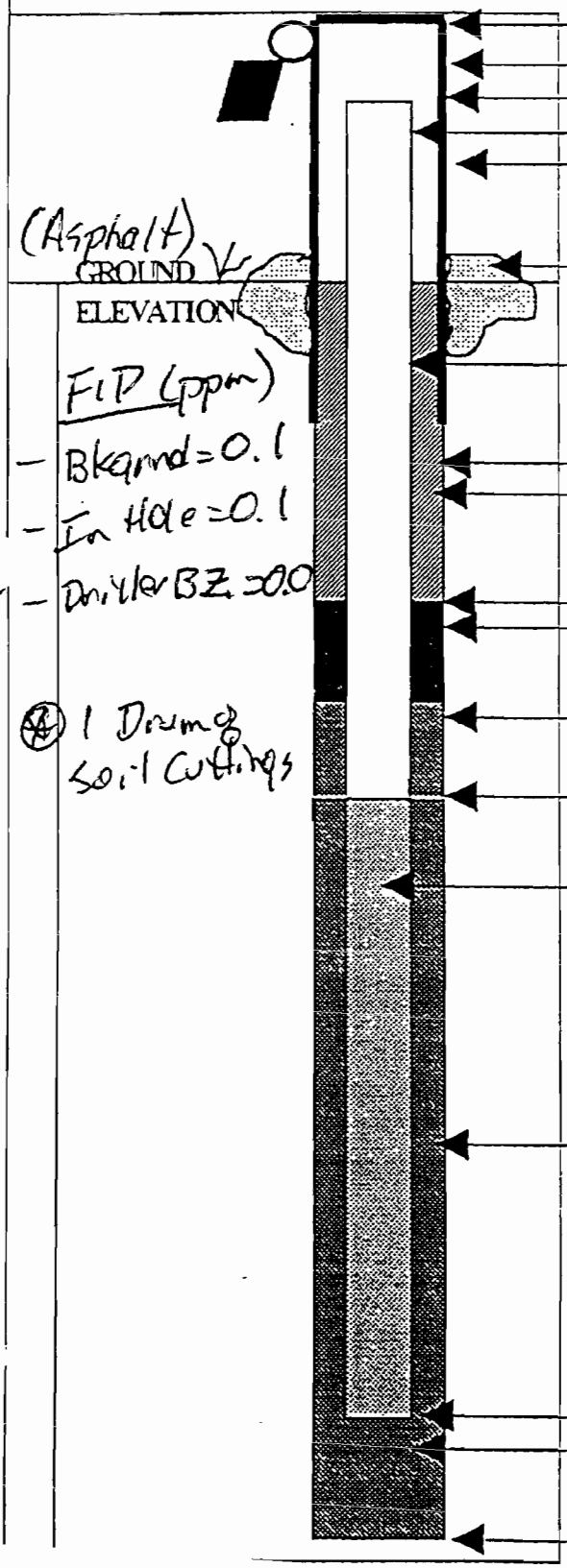
Remarks:

Converted to Well: Yes ____ No X Well I.D. #:

BORING NO

OVERBURDEN MONITORING WELL SHEET

PROJECT Chas Naval Complex	LOCATION: Site 17 (B42)	DRILLER Cosham Dri
PROJECT NO. ~~0124~~ ~~0219~~ N0124	BORING CUC017-MW03	METHOD: ~~DPT~~ 4.25" H.
ELEVATION Site 17	DATE 6/16/99	DRILLING Domed Martin
FIELD GEOLOGIST Mark Darrington		DEVELOPMENT: ~~NA~~



ELEVATION OF TOP OF SURFACE CASING:

ELEVATION OF TOP OF RISER PIPE:

STICK-UP TOP OF SURFACE CASING: Flush

STICK-UP RISER PIPE: Flush

I.D. OF SURFACE CASING: 8" ID x 10" OD

TYPE OF SURFACE CASING: Steel Cover with bolt-on lid (Flush) Pelnco

TYPE OF SURFACE SEAL: Concrete Pad (Quickcrete) 2ft x 2ft x 6 inch

RISER PIPE I.D.: 2 inch

TYPE OF RISER PIPE: PVC Sch. 40 Flush Threaded (F.T.)

BOREHOLE DIAMETER: 8.25 inch

TYPE OF SEAL: Portland Cement Type I

ELEVATION / DEPTH OF SEAL: 12.5'

TYPE OS SEAL: "Choke Sand" Very Fine Sand (30/65)

DEPTH TOP OF SAND PACK: 4.0'

ELEVATION / DEPTH TOP OF SCREEN: 5.0'

TYPE OF SCREEN: PVC, Sch. 40, F.T.

SLOT SIZE X LENGTH: 0.010 inch x 10 ft.

I.D. OF SCREEN: 2 inch.

TYPE OF SAND PACK: Standard Sand (*) Qtz sand (20/30) 7/50 lb. bags

ELEVATION / DEPTHBOTTOM OF SCREEN: 15.0'

ELEVATION / DEPTH BOTTOM OF SAND PACK: 15.0'

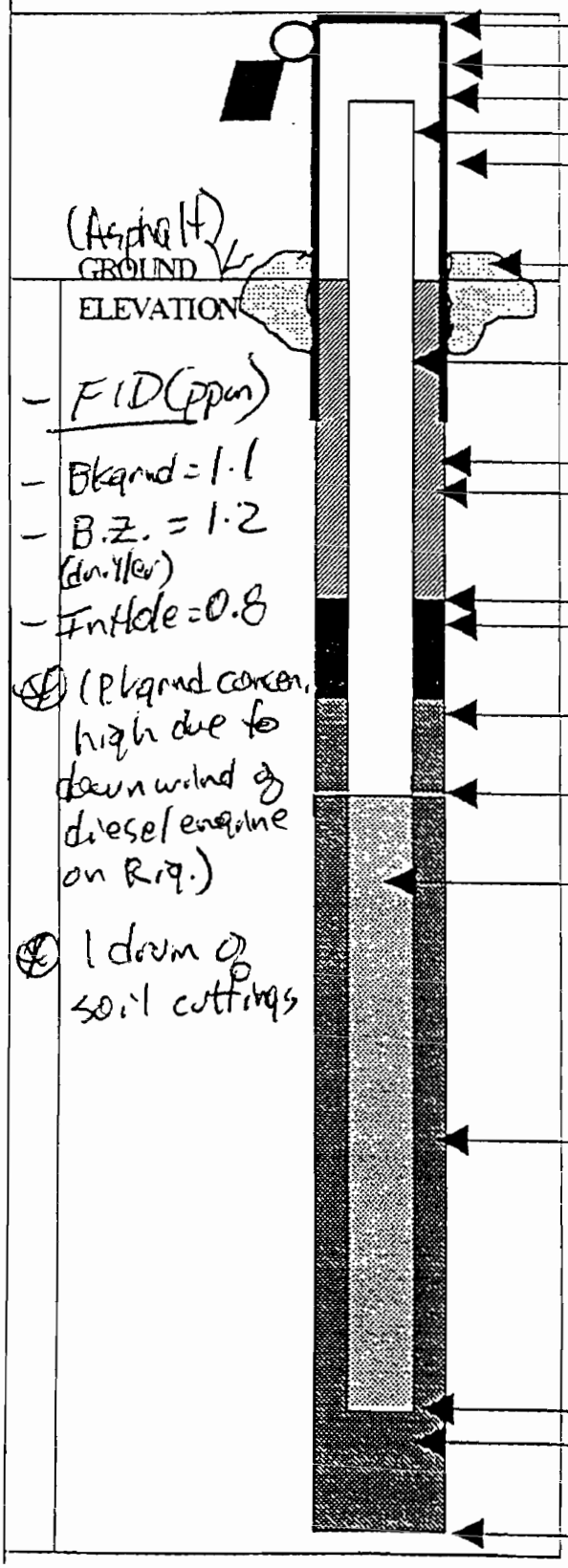
TYPE OF BACKFILL BELOW OBSERVATION WELL: Sand (20/30)

ELEVATION / DEPTH OF HOLE: 15.0'

BORING NO

OVERBURDEN MONITORING WELL SHEET

PROJECT Chas. Naval Complex	LOCATION: Site 17/842 ~~Zone F~~ Zone G	DRILLER Custom Dr
PROJECT NO. ~~0124~~ ~~0219~~ 0219	BORING CNC17-MW04	METHOD: ~~DPT~~ 4.25-in H
ELEVATION N0124	DATE 6/16/99	DRILLING Darrell Martin
FIELD GEOLOGIST Mark Barrington		DEVELOPMENT: ~~NA~~



- FID (ppm)
- Bkgrnd = 1.1
- B.Z. = 1.2 (downwind)
- In Hole = 0.8

(1) (Bkgrnd concen. high due to downwind of diesel engine on Rig.)

(2) 1 drum of soil cuttings

ELEVATION OF TOP OF SURFACE CASING:

ELEVATION OF TOP OF RISER PIPE:

STICK-UP TOP OF SURFACE CASING: Flush

STICK-UP RISER PIPE: Flush

I.D. OF SURFACE CASING: 8" ID x 10" OD

TYPE OF SURFACE CASING: Steel Cover w/ bolt-on lid (Flush) Pemco

TYPE OF SURFACE SEAL: Concrete Pad (Quickcrete) 2ft. x 2ft x 6 in.

RISER PIPE I.D.: 2-in.

TYPE OF RISER PIPE: PVC, Sch. 40, Flush Threaded (F.T.) (Tenaxy)

BOREHOLE DIAMETER: 8.25-in

TYPE OF SEAL: Portland Cement Type I

ELEVATION / DEPTH OF SEAL: 12.5'

TYPE OS SEAL: "Choke Sand" Very fine Qtz. sand (30/65)

DEPTH TOP OF SAND PACK: 4.0'

ELEVATION / DEPTH TOP OF SCREEN: 15.0'

TYPE OF SCREEN: PVC, Sch. 40, F.T.

SLOT SIZE X LENGTH: 0.010-in. x 10ft.

I.D. OF SCREEN: 2-in.

TYPE OF SAND PACK: Standard Sand (1) Qtz. sand (20/30) 7/50 lb. bags

ELEVATION / DEPTHBOTTOM OF SCREEN: 115.0'

ELEVATION / DEPTH BOTTOM OF SAND PACK: 115.0'

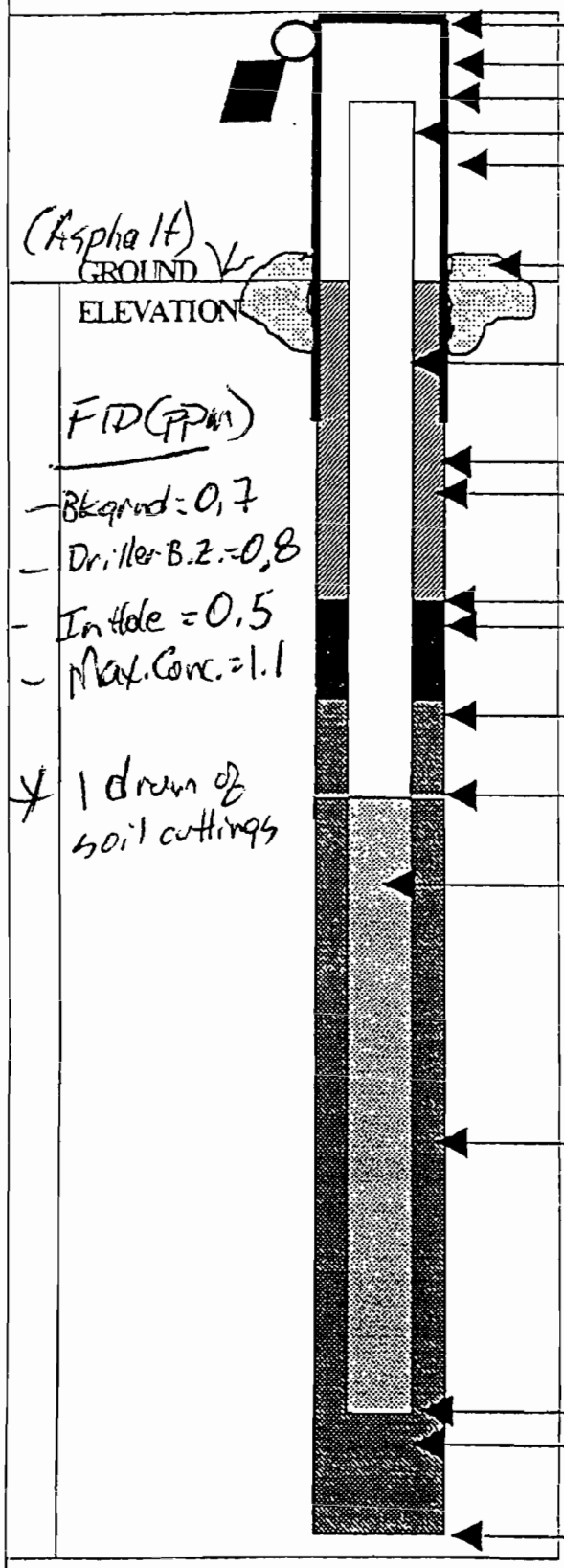
TYPE OF BACKFILL BELOW OBSERVATION WELL: Sand (20/30)

ELEVATION / DEPTH OF HOLE: 115.0'

BORING NO.: CNC17-MW05

OVERBURDEN MONITORING WELL SHEET

PROJECT Chas. Naval Complex	LOCATION: Site 17 / ~~Zone F~~ Zone G B42	DRILLER Custom Drilling
PROJECT NO. ~~0124~~ 0124	BORING CNC17-MW05	METHOD: ~~DPT~~ 4.25" HSA
ELEVATION	DATE 6/16/99	DRILLING Darrell Martin
FIELD GEOLOGIST Mark Darrington		DEVELOPMENT: ~~NA~~



ELEVATION OF TOP OF SURFACE CASING: _____

ELEVATION OF TOP OF RISER PIPE: _____

STICK-UP TOP OF SURFACE CASING: Flush

STICK-UP RISER PIPE: Flush

I.D. OF SURFACE CASING: 8" ID x 10" OD

TYPE OF SURFACE CASING: Steel cover w/ bolt-on lid (Flush) & Pemco

TYPE OF SURFACE SEAL: Concrete Pad (Quickcrete) 2ft x 2ft x 6in.

RISER PIPE I.D.: 2-in.

TYPE OF RISER PIPE: PVC, Sch. 40 Flush Threaded (F.T.) & Tooney

BOREHOLE DIAMETER: 8.25-in.

TYPE OF SEAL: Portland Cement Type I

ELEVATION / DEPTH OF SEAL: 12.5'

TYPE OS SEAL: "Choke Sand" Very fine Qtz. Sand (30/65)

DEPTH TOP OF SAND PACK: 4.0'

ELEVATION / DEPTH TOP OF SCREEN: 15.0'

TYPE OF SCREEN: PVC, Sch. 40, F.T.

SLOT SIZE X LENGTH: 0.010-in x 10ft.

I.D. OF SCREEN: 2-in.

TYPE OF SAND PACK: Standard Sand Qtz. Sand (20/30) 7/50lb. bags

ELEVATION / DEPTHBOTTOM OF SCREEN: 115.0'

ELEVATION / DEPTH BOTTOM OF SAND PACK: 115.0'

TYPE OF BACKFILL BELOW OBSERVATION WELL: Sand (20/30)

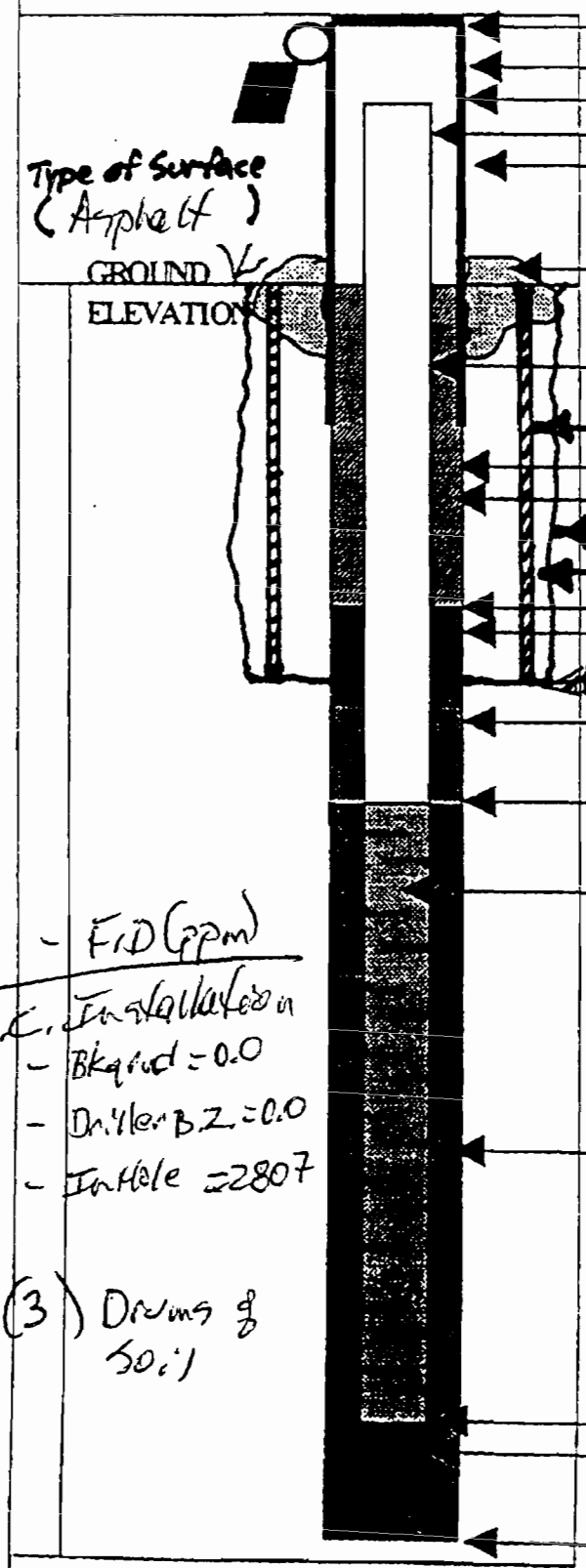
ELEVATION / DEPTH OF HOLE: 115.0'

BORING NO.: CNC17-MW06D

OVERBURDEN MONITORING WELL SHEET

PROJECT: Chas Naval Complex	LOCATION: S-to 17/Zone F G	DRILLER: Custom Drilling
PROJECT NO.: 0219 0124	BORING: CNC17-MW06D	METHOD: [redacted] 8.25 HSA/
ELEVATION:	DATE: 6/21/99	DRILLING: Darrell Martin
FIELD GEOLOGIST: Mark Damington		DEVELOPMENT: [redacted]

Boring Methods: Surface Casing: 8.25 HSA Inner Casing:



ELEVATION OF TOP OF SURFACE CASING:

ELEVATION OF TOP OF RISER PIPE:

STICK-UP TOP OF SURFACE CASING: Flush

STICK-UP RISER PIPE: Flush

I.D. OF SURFACE CASING: 8" ID x 10" OD

TYPE OF SURFACE CASING: Steel (Cover w/ Bolt on lid (Flush)

TYPE OF SURFACE SEAL: Concrete Pad (Quickcrete) 2ft x 2ft x 6"

RISER PIPE I.D.: ~~PVC~~ 2-in

TYPE OF RISER PIPE: PVC Sch.40, Flush Thread (F.T.)

Type of Surface Case (S.C.) PVC, Sch.40 Dia. 6-in.

BOREHOLE DIAMETER: 8.25-in

TYPE OF SEAL: Portland Cement Type I

Borehole Dia. 12.25-in

Type of S.C. Seal Portland Cement Type I

ELEVATION / DEPTH OF SEAL: 19 / 0

TYPE OS SEAL: "

Depth of S.C. 20'

DEPTH TOP OF SAND PACK: 20'

ELEVATION / DEPTH TOP OF SCREEN: 21 / 0

TYPE OF SCREEN: PVC, Sch. 40, F.T.

SLOT SIZE X LENGTH: 0.010-in x 10ft.

I.D. OF SCREEN: 2-in

TYPE OF SAND PACK: Standard Sand (Fm) Silica Sand (20/30)

ELEVATION / DEPTHBOTTOM OF SCREEN: 26 / 0

ELEVATION / DEPTH BOTTOM OF SAND PACK: 27 / 0

TYPE OF BACKFILL BELOW OBSERVATION WELL: 20/30

ELEVATION / DEPTH OF HOLE: 27 / 0

- FID (ppm)

S.C. Installation

- Bkgrnd = 0.0
- Drillers B.Z. = 0.0
- In Hole = 2807

(3) Drums of Soil

APPENDIX B

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Site 17 Bldg. B42
Project No.: N0124 Zone G

[] Surface Soil
[✓] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 17SLBC1-0708
Sample Location:
Sampled By: JT/JB
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 5/17/99			
Time: 1050	7-8'	orange	clay sand
Method:			
Monitor Reading (ppm): 1			

COMPOSITE SAMPLE DATA:

Date.	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method.				
Monitor Readings				
(Range in ppm).				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH	1 4oz jar	✓	
BTEX	4 encore	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Janet Bonknight

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Site 17 Bldg. B42
Project No.: N0124 Zone G

[] Surface Soil
[✓] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 17SLB01-0809
Sample Location:
Sampled By: JA/JB.
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 5/17/99	8-9'	orangish brown	sandy clay
Time: 1105			
Method:			
Monitor Reading (ppm): 5			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method.				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH	1 4oz jar	✓	
BTEX	4 Encore	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Janet Bonkwright

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Site 17 Bldg. 842
Project No.: N0124 Zone G

[] Surface Soil
[✓] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 17SLB03-0506
Sample Location:
Sampled By: JA / JB
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 5/17/99	5-6'	orange mottled	sandy clay
Time: 1210			
Method:			
Monitor Reading (ppm): 1			

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TOC - FCR	1 4oz jar	✓	
TPH	1 4oz jar	✓	
PAH	1 4oz jar	✓	
BTEX	4 EnCore	✓	
Grain Size Hydrometer	2 32oz jars	✓	

OBSERVATIONS / NOTES:

Bored twice to get enough sample

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Garrett Bonknight

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Site 17 Bldg. B42
Project No.: NC124 Zone G

[] Surface Soil
[x] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 17SLB04-0304
Sample Location:
Sampled By: JA/JB
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 5/17/99 Time: 1115 Method: Monitor Reading (ppm): 0	3-4'	orangish brown	sandy & clay

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH	1 4oz jar	✓	
BTEX	4 Encore	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD 17SLB04-0304MS

Duplicate ID No.:

Signature(s): Janet Bonknight

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Site 17 Bldg. B42
Project No.: N0124 Zone G

[] Surface Soil
[x] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 17SLB05-0708
Sample Location:
Sampled By: JA / JB
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 5/17/99 Time: 1200 Method: Monitor Reading (ppm): 3	7-8'	orange grey mottel	Sandy clay

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
TPH	1 4oz jar	✓	
BTEX	4 Encores	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:
	17SLB05-0708D

Signature(s): Janet Bonkinight

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Site 17 Bldg. 842
Project No.: N0124 Zone G

[] Surface Soil
[✓] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 17SLB07-0809
Sample Location:
Sampled By: JA/JB
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 5/17/99 Time: 1140 Method: Monitor Reading (ppm): 0	8-9'	orange/grey ~~mottled~~ mottled	sandy clay

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method:				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH	1 4oz jar	✓	
BTEX	4 EnCore	✓	

OBSERVATIONS / NOTES:

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Janet Bonknight

SOIL & SEDIMENT SAMPLE LOG SHEET

Project Site Name: Site 17 Bldg. B42
Project No.: NC124 Zone G

[] Surface Soil
[✓] Subsurface Soil
[] Sediment
[] Other:
[] QA Sample Type:

Sample ID No.: 17SLB09-07CE
Sample Location:
Sampled By: JA / JB
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

GRAB SAMPLE DATA:

	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Date: 5/17/99 Time: 1425 Method: Monitor Reading (ppm): 3	7-8'	orange & grey, mottled	clay sand moist

COMPOSITE SAMPLE DATA:

Date:	Time	Depth	Color	Description (Sand, Silt, Clay, Moisture, etc.)
Method				
Monitor Readings (Range in ppm):				

SAMPLE COLLECTION INFORMATION:

Analysis	Container Requirements	Collected	Other
PAH	1 4oz jar	✓	
BTEX	4 Encores	✓	

OBSERVATIONS / NOTES:

Drilled to 11 ft

MAP:

Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s): Janet Ponknight

MONITORING WELL DEVELOPMENT RECORD

Page ___ of ___

Well: MW-1 Zone G
Site: 17 Bldg. B42
Date Installed: 6.16.99
Date Developed: 7.9.99
Dev. Method: Pump
Pump Type:

Depth to Bottom (ft.): 15.05'
Static Water Level Before (ft.): 9.19'
Static Water Level After (ft.):
Screen Length (ft.): 10
Specific Capacity: .98
Casing ID (in.): 2"

Responsible Personnel: R Will
Drilling Co.: Custom Drilling
Project Name: CNC17 Zone G
Project Number: N0124

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)	D.O.
0843		2		29.0	5.84	.571	142	Cloudy	3.45
0847		7		29.3	6.16	.719	524	"	3.70
0854		10		32.2	6.09	.567	171	"	3.74
0903		13		32.3	5.99	.490	63	"	3.50
0908		16		32.6	5.92	.502	6	"	3.58

MONITORING WELL DEVELOPMENT RECORD

Well: MW-2 Zone G
Site: 17 Bldg. B42
Date Installed: 6-16-99
Date Developed: 7-9-99
Dev. Method: Pump
Pump Type:

Depth to Bottom (ft.): 14.75
Static Water Level Before (ft.): 9.00
Static Water Level After (ft.):
Screen Length (ft.): 10'
Specific Capacity: .98 gals.
Casing ID (in.): 2"

Responsible Personnel: B. Hill
Drilling Co.: Custom Drilling
Project Name: CNC17 Zone G
Project Number: N0124

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)	D.O
0812		3		28.6°	6.08	.647	999	Tan	3.80
0815		10		29.4°	6.22	.619	999	"	4.02
0817		15		30.6°	6.24	.620	865	"	4.06
0823		25		31.5°	6.27	.571	185	"	4.00
0827		30		30.9°	6.15	.524	89	Cloudy	4.00
0830		35		31.7°	6.19	.578	85	"	4.02
								Total Purged	
								~ 35 gals	

MONITORING WELL DEVELOPMENT RECORD

Page ___ of ___

Well: MW-4 Zone G
Site: 17 Bldg. B42
Date Installed: 6-16-99
Date Developed: 7-9-99
Dev. Method: Pump
Pump Type:

Depth to Bottom (ft.): 14.90
Static Water Level Before (ft.): 8.65
Static Water Level After (ft.):
Screen Length (ft.): 10'
Specific Capacity: 1.06
Casing ID (in.): 2"

Responsible Personnel: R. Hill
Drilling Co.: Custom
Project Name:
Project Number: N01.24

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)	D.O.
0958		1		37.4°	6.22	.827	999	Brownish Gray	2.39
1005		6		35.2°	6.30	.593	999	Tan	3.91
1010		8		33.7°	5.99	.453 ~~.597~~	930	"	3.74
1016		10		34.0°	5.98	.427	136	Cloudy	3.77
1022		12		34.0°	5.96	.445	81	"	3.94
1027		14		34.1°	5.93	.447	13	"	3.89
								Total Purged.	
								~14 gals	

MONITORING WELL DEVELOPMENT RECORD

Page ___ of ___

Well: MW-3 Zone G
Site: 17 Bldg. B42
Date Installed: 6-18-93
Date Developed: 7-9-97
Dev. Method: Pump
Pump Type:

Depth to Bottom (ft.): 15.10'
Static Water Level Before (ft.): 9.00
Static Water Level After (ft.):
Screen Length (ft.): 10'
Specific Capacity: .99 gals.
Casing ID (in.): 2"

Responsible Personnel: R. Hill
Drilling Co.: Custom Drilling
Project Name: CNG17 Zone G
Project Number: N01/24

Time	Estimated Sediment Thickness (Ft.)	Cumulative Water Volume (Gal.)	Water Level Readings (Ft. below TOC)	Temperature (Degrees C)	pH	Specific Conductance (Units ____)	Turbidity (NTU)	Remarks (odor, color, etc.)	D.O.
1040		1		34.5	6.08	.507	999	Tan	3.41
1046		6		31.6	6.11	.355	999	"	4.17
1052		10		32.4	6.11	.336	999	"	3.91
1058		14		32.9°	6.05	.317	500	"	4.10
1103		18		32.9°	5.99	.311	148	Cloudy	4.02
1108		22		33.3	6.00	.321	85	"	4.24
1113		26		32.8°	5.96	.313	53	"	4.42
1119		30		33.2°	5.91	.307	40	"	4.30

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

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Page __ of __

Project Site Name: CNC Zone G

Project No.: N0124 Site 17 Bldg. 842

Sampled By: JA/RH

Field Analyst:

Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: 17GLMØ1Ø1

Sample Location: MW1

Duplicate: ☐

Blank: ☐

SAMPLING DATA:

Date: 7 20 94	Color	ORP (Eh)	S.C.	Temp.	Turbidity	DO	Sal.	pH
Time:	(Visual)	(+/- mv)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	(%)	(SU)
Method:								

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT CHEMetrics (Range: 0-1 ppm ~~mg/L~~) Analysis Time: 1645 ~~1555~~

Range Used.	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
_____	x 0.01	= mg/L
_____	x 0.02	= mg/L

CHEMetrics: 1 ~~mg/L~~ ppm

Notes:

Alkalinity:

Analysis Time: 1620

Equipment: HACH Digital Titrator AL-DT CHEMetrics (Range: _____mg/L) Filtered: ☐

Range Used	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	= mg/L
☐	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	= mg/L
☒	100-400 mg/L	100 ml	1.600 N	1.0	~~[illegible]~~ & 1ØØ	x 1.0	= 1ØØ mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	Ø	Ø	1 ⇔ 4

CHEMetrics: _____mg/L

Notes:

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: _____mg/L) Analysis Time: 1632

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☒	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
_____	x 0.1	= mg/L
_____	x 0.2	= mg/L
3Ø1	x 1.0	= 3Ø1 mg/L
_____	x 2.0	= mg/L

CHEMetrics: _____mg/L

Notes:

Standard Additions: ☐ Titrant Molarity:_____ Digits Required. 1st.:_____ 2nd.:_____ 3rd.:_____

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

etra Tech NUS, Inc.

Page __ of __

Project Site Name: Site 17 Bldg. 1342

Sample ID No.: 17GCM01Ø1

Project No.: N0124 Zone G

Sample Location:

Sampled By:

Duplicate: ☐

Field Analyst:

Blank: ☐

Field Form Checked as per QA/QC Checklist (initials):

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Sulfide (S^{2-}):

Equipment: DR-700 DR-8 __ HS-C Color Chart HS-WR Color Wheel Analysis Time: 1710

Program/Module: 610nm 93 Other: _____

Concentration: 0.02 mg/L Filtered: ☐

Notes:

Sulfate (SO_4^{2-}):

Equipment: DR-700 DR-8 __ Other: _____ Analysis Time: _____

Program/Module: 91

Concentration: _____ mg/L Filtered: ☐

ndard Solution: ☐ Results: _____

Standard Additions: ☐ Digits Required: 0.1ml:_____ 0.2ml:_____ 0.3ml:_____

Notes:

Nitrite (NO_2^--N):

Analysis Time: _____

Equipment: DR-700 DR-8 __ Other: _____ Filtered: ☐

Program/Module: 60

Concentration: _____ mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results: ☐

Notes:

Nitrate (NO_3^--N):

Analysis Time: 1755

Equipment: DR-700 DR-8 __ Other: _____ Filtered: ☐

Program/Module: 55

Concentration: 0.04 mg/L

Nitrite Interference Treatment: ☐

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml:_____ 0.2ml:_____ 0.3ml:_____

Notes:

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tetra Tech NUS, Inc.

Page __ of __

Project Site Name: Site 17 Bldg. B42

Project No.: N0124 Zone G

Sample ID No.: 17GL~~[illegible]~~ M01 01 QA

Sample Location:

Sampled By:

Duplicate: ☐

Field Analyst:

Blank: ☐

Field Form Checked as per QA/QC Checklist (initials):

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Manganese (Mn^{2+}):

Equipment: DR-700 DR-8 __ HACH MN-5 Other: _____ Analysis Time: 1821

Program/Module: 525nm 41

Concentration: 0.1 mg/L

Filtered: ☐

Digestion: ☐

Standard Solution: ☐ Results: _____

Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml:_____ 0.2ml:_____ 0.3ml:_____

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-8 __ IR-18C Color Wheel Other: _____ Analysis Time: _____

Program/Module: 500nm 33

Concentration: 0.07 mg/L

Filtered: ☐

Notes:

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: _____ Analysis Time: _____

Concentration: _____ mg/L Exceeded 5.0 mg/L range on color chart: ☐

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☑

Correct measurement units are cited in the SAMPLING DATA block: ☑

Mulitplication is correct for each *Multiplier* table: ☑

Final calulated concentration is within the appropriate *Range Used* block: ☑

Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☑

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☑

Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☑

Title block is initialized by person who performed the QA/QC Ckecklist: ☑

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: CNC/7 Bldg. B42
Project No.: N0124 Zone G

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: ~~MW~~ MS201
Sample Location: MW-2
Sampled By: JR/BR
C.O.C. No.:
Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Date: 7-20-99	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Time. 1425								
Method:	clear	5.24	.478	28.6	6	2.26		

PURGE DATA:

	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Date: 7-20-99								
Method: Slow Purge	Initial	5.56	.743	28.0	32	2.60		
Monitor Reading (ppm):	1	5.63	.650	28.0	7	3.13		
Well Casing Diameter & Material	2	5.46	.500	28.6	5	2.40		
Type: P.V.C. 2"	3	5.34	.478	28.6	17	2.26		
Total Well Depth (TD):	14.71							
Static Water Level (WL):	8.73							
One Casing Volume(gal/L):	2.98							
Start Purge (hrs):	1010							
End Purge (hrs):	1122							
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
BTEX, Naph., EDB, MTBE	HCl	3x40 ml vials	7-20-99
PAH	—	2x1 L amber	7-20-99

OBSERVATIONS / NOTES:

Circle if Applicable:

MS/MSD

Duplicate ID No.:

Signature(s):

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

tra Tech NUS, Inc.

Page __ of __

Project Site Name: Site 17 Bldg. B42
Project No.: N0124 Zone G
Sampled By:
Field Analyst:
Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.: 17GLM02Ø1
Sample Location:
Duplicate: ☐
Blank: ☐

SAMPLING DATA:

Date: 7 20 95	Color	ORP (Eh)	S.C.	Temp.	Turbidity	DO	Sal.	pH
Time:	(Visual)	(+/- mv)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	(%)	(SU)
Method:								

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT CHEMetrics (Range: _____mg/L) Analysis Time: 1608

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
_____	x 0.01	= mg/L
_____	x 0.02	= mg/L

CHEMetrics: .6 mg/L

Notes:

Alkalinity:

Analysis Time: 1623

Equipment: HACH Digital Titrator AL-DT CHEMetrics (Range: _____mg/L) Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	= mg/L
☐	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	= mg/L
☒	100-400 mg/L	100 ml	1.600 N	1.0	275 & 275	x 1.0	= 275 mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	Ø	Ø	160

CHEMetrics: _____mg/L

Notes:

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: _____mg/L) Analysis Time: 1645

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☒	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
_____	x 0.1	= mg/L
_____	x 0.2	= mg/L
22Ø	x 1.0	= 22Ø mg/L
_____	x 2.0	= mg/L

CHEMetrics: _____mg/L

Notes:

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

tra Tech NUS, Inc.

Page __ of __

Project Site Name: Site 17 Bldg. B42
Sample ID No.: 17GLm03Ø1
Project No.: N0124 Zone G
Sample Location:
Sampled By:
Duplicate: ☐
Field Analyst:
Blank: ☐
Field Form Checked as per QA/QC Checklist (initials):

SAMPLING DATA:

Date: 7 2Ø 99	Color	ORP (Eh)	S.C.	Temp.	Turbidity	DO	Sal.	pH
Time:	(Visual)	(+/- mv)	(mS/cm)	(°C)	(NTU)	(Meter, mg/l)	(%)	(SU)
Method:								

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Dissolved Oxygen:

Equipment: HACH Digital Titrator OX-DT CHEMetrics (Range: _____mg/L) Analysis Time: 1614

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	1-5 mg/L	200 ml	0.200 N	0.01
☐	2-10 mg/L	100 ml	0.200 N	0.02

Titration Count	Multiplier	Concentration
_____	x 0.01	= mg/L
_____	x 0.02	= mg/L

CHEMetrics: .9 ~~mg/L~~ ppm

Notes:

Alkalinity:

Analysis Time: 1626

Equipment: HACH Digital Titrator AL-DT CHEMetrics (Range: _____mg/L) Filtered: ☐

Range Used:	Range	Sample Vol.	Cartridge	Multiplier	Titration Count	Multiplier	Concentration
☐	10-40 mg/L	100 ml	0.1600 N	0.1	_____ & _____	x 0.1	= mg/L
☐	40-160 mg/L	25 ml	0.1600 N	0.4	_____ & _____	x 0.4	= mg/L
☒	100-400 mg/L	100 ml	1.600 N	1.0	— & 2ØØ	x 1.0	= 2ØØ mg/L
☐	200-800 mg/L	50 ml	1.600 N	2.0	_____ & _____	x 2.0	= mg/L
☐	500-2000 mg/L	20 ml	1.600 N	5.0	_____ & _____	x 5.0	= mg/L
☐	1000-4000 mg/L	10 ml	1.600 N	10.0	_____ & _____	x 10.0	= mg/L

Parameter:	Hydroxide	Carbonate	Bicarbonate
Relationship:	Ø	Ø	2ØØ

CHEMetrics: _____mg/L

Notes:

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

Carbon Dioxide:

Equipment: HACH Digital Titrator CA-DT CHEMetrics (Range: _____mg/L) Analysis Time: 1653

Range Used:	Range	Sample Vol.	Cartridge	Multiplier
☐	10-50 mg/L	200 ml	0.3636 N	0.1
☐	20-100 mg/L	100 ml	0.3636 N	0.2
☒	100-400 mg/L	200 ml	3.636 N	1.0
☐	200-1000 mg/L	100 ml	3.636 N	2.0

Titration Count		Concentration
_____	x 0.1	= mg/L
_____	x 0.2	= mg/L
195	x 1.0	= 195 mg/L
_____	x 2.0	= mg/L

CHEMetrics: _____mg/L

Notes:

Standard Additions: ☐ Titrant Molarity:_____ Digits Required: 1st.:_____ 2nd.:_____ 3rd.:_____

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

NUS, Inc.

Page __ of __

ject Site Name: Site 17 Bldg. B42

ject No.: N0124 Zone G

npled By:

ld Analyst:

ld Form Checked as per QA/QC Checklist (initials):

Sample ID No.:

Sample Location: 17 mw 3

Duplicate: ☐

Blank: ☐

PLE COLLECTION/ANALYSIS INFORMATION:

ide (S^{2-}):

ɔment: DR-700 DR-8 __ HS-C Color Chart HS-WR Color Wheel Analysis Time: 1712

ram/Module: 610nm 93 Other: _____

centration: 0.03 mg/L Filtered: ☐

es:

lfate (SO_4^{2-}):

ipment: DR-700 DR-8 __ Other: _____ Analysis Time: _____

gram/Module: 91

ncentration: _____ mg/L Filtered: ☐

d Solution: ☐ Results: _____

andard Additions: ☐ Digits Required: 0.1ml:_____ 0.2ml:_____ 0.3ml:_____

tes:

trite (NO_2^--N):

Analysis Time: _____

uipment: DR-700 DR-8 __ Other: _____ Filtered: ☐

ogram/Module: 60

ncentration: _____ mg/L Reagent Blank Correction: ☐

Standard Solution: ☐ Results: ☐

tes:

trate (NO_3^--N):

Analysis Time: 1814

uipment: DR-700 DR-8 __ Other: _____ Filtered: ☐

ogram/Module: 55

ncentration: 0.09 mg/L

Nitrite Interference Treatment: ☐

andard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

andard Additions: ☐ Digits Required: 0.1ml:_____ 0.2ml:_____ 0.3ml:_____

tes:

FIELD ANALYTICAL LOG SHEET
GEOCHEMICAL PARAMETERS

Tech NUS, Inc.

Page __ of __

Project Site Name: Site 17 Bldg. B42

Project No.: N0124 Zone G

Sampled By:

Field Analyst:

Field Form Checked as per QA/QC Checklist (initials):

Sample ID No.:

Sample Location: 17MW3

Duplicate: ☐

Blank: ☐

SAMPLE COLLECTION/ANALYSIS INFORMATION:

Manganese (Mn^{2+}):

Equipment: DR-700 DR-8 __ HACH MN-5 Other: _____ Analysis Time: 1823

Program/Module: 525nm 41

Concentration: 1.1 mg/L

Filtered: ☐

Digestion: ☐

Standard Solution: ☐ Results: _____ Reagent Blank Correction: ☐

Standard Additions: ☐ Digits Required: 0.1ml:_____ 0.2ml:_____ 0.3ml:_____

Notes:

Ferrous Iron (Fe^{2+}):

Equipment: DR-700 DR-8 __ IR-18C Color Wheel Other: _____ Analysis Time: _____

Program/Module: 500nm 33

Concentration: Ø.ØØ mg/L

Filtered: ☐

Notes:

Hydrogen Sulfide (H_2S):

Equipment: HS-C Other: _____ Analysis Time: _____

Concentration: _____ mg/L Exceeded 5.0 mg/L range on color chart: ☐

Notes:

QA/QC Checklist:

All data fields have been completed as necessary: ☐

Correct measurement units are cited in the SAMPLING DATA block: ☐

Mulitplication is correct for each *Multiplier* table: ☐

Final calulated concentration is within the appropriate *Range Used* block: ☐

Alkalinity *Relationship* is determined appropriatly as per manufacturer instructions: ☐

QA/QC sample (e.g., Std. Additions, etc.) frequency is appropriate as per the project planning documents: ☐

Nitrite Interference treatment used for Nitrate test if Nitrite was detected: ☐

Title block is initialized by person who performed the QA/QC Ckecklist: ☐

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: CNC 17 Bldg. 842
Project No.: N0124 Zone G

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: 17G-MW[illegible]
Sample Location: [illegible]
Sampled By: JA [illegible]
C.O.C. No.:
Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-20-99	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time: 1353	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method:	Clear	5.12	.519	28.9	13	2.20		

PURGE DATA:

Date: 7-20-99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Slow Purge	Initial	5.34	.950	25.5	42	2.80		
Monitor Reading (ppm):	1	5.17	.659	25.6	3	1.56		
Well Casing Diameter & Material	2	5.15	.593	28.8	14	2.16		
Type: PVC 2"	3	5.16	.519	28.9	13	2.20		
Total Well Depth (TD):	14.91							
Static Water Level (WL):	3.41							
One Casing Volume(gal/L):	1.05							
Start Purge (hrs):	1005							
End Purge (hrs):	1117							
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
BTEX, Naph, EDB, MTBE	HCl	3x40ml vials	7-20-99
PAH	None	2x1L amber	7-20-99

OBSERVATIONS / NOTES:

Signature(s):

GROUNDWATER SAMPLE LOG SHEET

Page___ of ___

Project Site Name: CASCO Bldg. B42
Project No.: ND124 Zone G

[] Domestic Well Data
[X] Monitoring Well Data
[] Other Well Type:
[] QA Sample Type:

Sample ID No.: [illegible]
Sample Location: MW-5
Sampled By: [illegible]
C.O.C. No.:
Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 7-20-99	Color	pH	S.C.	Temp.	Turbidity	DO	Salinity	Other
Time. 1510	Visual	Standard	mS/cm	Degrees C	NTU	mg/l	%	NA
Method:	Clear	[illegible]						

PURGE DATA:

Date: 7-20-99	Volume	pH	S.C.	Temp. (C)	Turbidity	DO	Salinity	Other
Method: Slow Purge	Initial	4.37	.230	26.2	19	3.51		
Monitor Reading (ppm):	1	[illegible]	[illegible]	[illegible]	5	[illegible]		
Well Casing Diameter & Material	2	[illegible]	[illegible]	26.9	21	[illegible]		
Type: PVC 2"	3	4.57	.198	26.9	15	3.25		
Total Well Depth (TD):	11.05							
Static Water Level (WL):	2.68							
One Casing Volume(gal/L): 1.05	~~1008~~							
Start Purge (hrs):	1008							
End Purge (hrs):	1100							
Total Purge Time (min):								
Total Vol. Purged (gal/L):								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
BTEX, Naph., MTBE, EDB	HCl	3 x 40ml vials	7-20-99
PAH	—	2 x 1 L amber	7-20-99

OBSERVATIONS / NOTES:

Circle if Applicable:

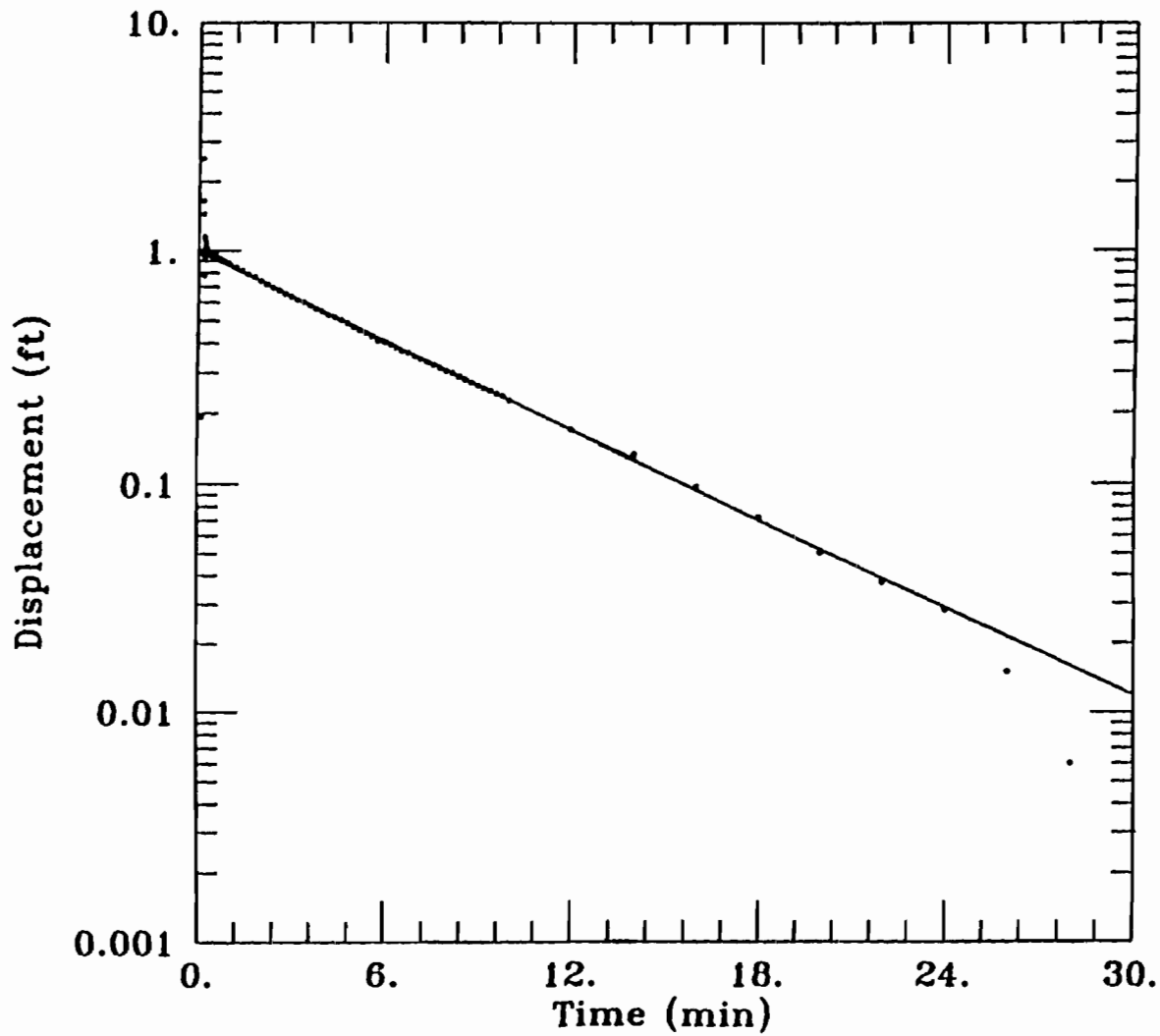
MS/MSD | Duplicate ID No.:

Signature(s): [illegible]

APPENDIX C

Client: **CLEAN**	Company: **E/A&H**
Location: **NAVAL BASE CHARLESTON**	Project: **2907-08450**

FALLING HEAD SLUG TEST NBCGGDG002



DATA SET:
G002FAL.AQT
04/09/97

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: January 1997

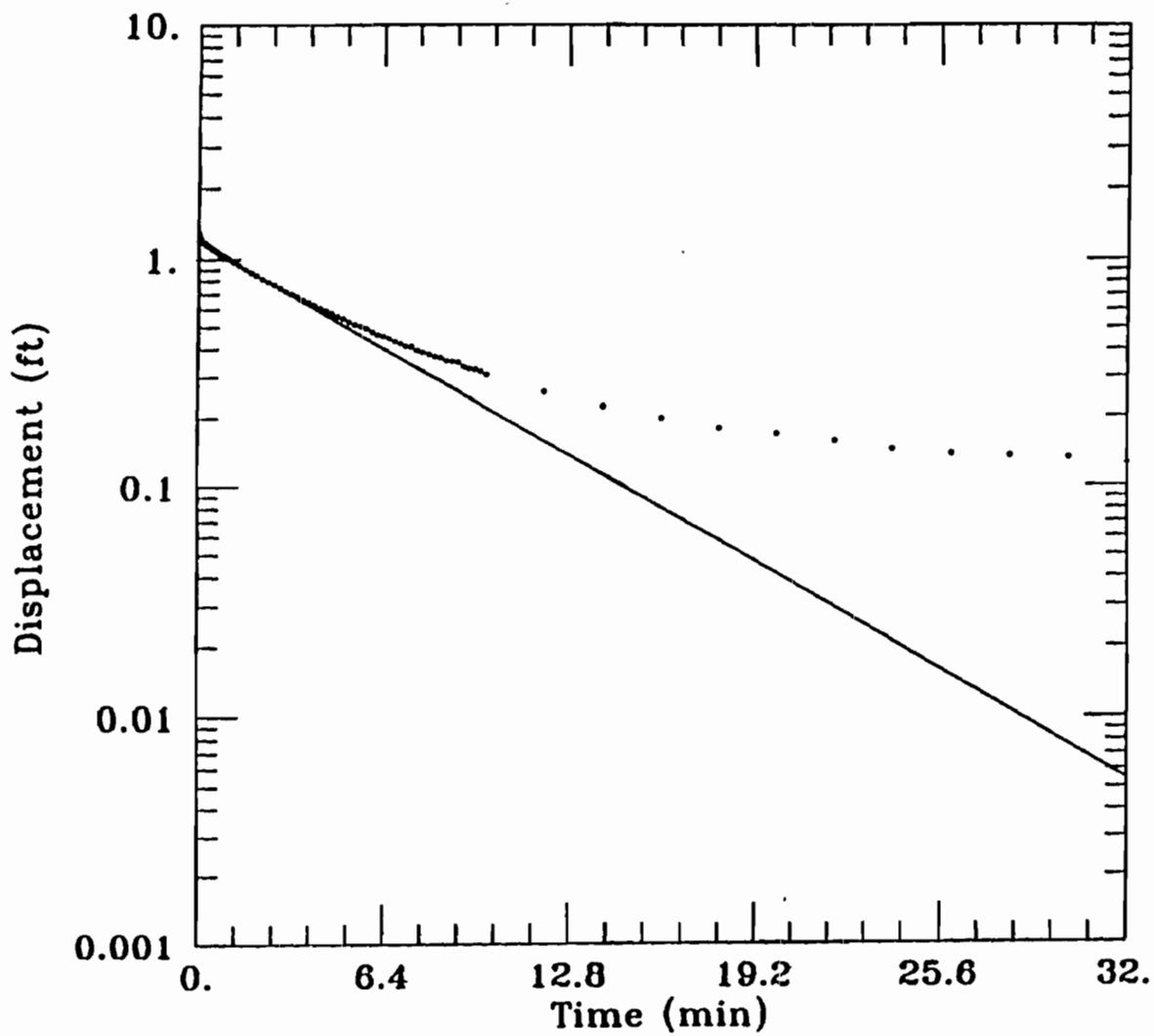
TEST DATA:
H0 = 1. ft
rc = 0.083 ft
rw = 0.3125 ft
L = 5. ft
b = 5. ft
H = 5. ft

PARAMETER ESTIMATES:
K = 0.0002064 ft/min
y0 = 0.9928 ft

AQTE'

Client: **CLEAN**	Company: **E/A&H**
Location: **NAVAL BASE CHARLESTON**	Project: **2907-08450**

RISING HEAD SLUG TEST NBCGGDG002



DATA SET:
G002RIS.AQT
04/09/97

AQUIFER MODEL:
Unconfined

SOLUTION METHOD:
Bouwer-Rice

PROJECT DATA:
test date: January 1997

TEST DATA:
H0 = 1. ft
rc = 0.083 ft
rw = 0.3125 ft
L = 5. ft
b = 5. ft
H = 5. ft

PARAMETER ESTIMATES:
K = 0.0002353 ft/min
y0 = 1.184 ft

AQTES

TABLE 1

GROUNDWATER ELEVATIONS
SITE 17, BUILDING B42
ZONE G, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA
PAGE 1 OF 1

Well #	Total Depth of Well (ft)	Top of Casing Elevation, ft (MSL)	Date Measured	Depth to Water, ft (BTOC)	Depth to Product, ft (BTOC)	Product Thickness (ft)	Groundwater Elevation (MSL)
CNC17-M01	12	12.54	7/20/1999	8.85	ND	ND	3.69
CNC17-M02	12	12.42	7/20/1999	8.73	ND	ND	3.69
CNC17-M03	12	12.36	7/20/1999	8.66	ND	ND	3.70
CNC17-M04	12	12.09	7/20/1999	8.41	ND	ND	3.68
CNC17-M05	12	12.42	7/20/1999	8.68	ND	ND	3.74
CNC17-M06D	12	12.57	7/21/1999	9.50	ND	ND	3.07

TABLE 2

GROUNDWATER FIELD MEASUREMENTS
SITE 17, BUILDING B42
ZONE G, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Well I.D.	Date Sampled	Purge method	Volume (gallons)	Temp. (°C)	pH	Conductivity (uMHOS/cm)
CNC17-M01	7/20/1999	PP	3.1	28.4	5.68	0.39
CNC17-M02	7/20/1999	PP	2.9	28.6	5.34	0.48
CNC17-M03	7/20/1999	PP	3.1	28.8	5.81	0.34
CNC17-M04	7/20/1999	PP	3.0	28.9	5.12	0.52
CNC17-M05	7/20/1999	PP	3.2	26.9	4.57	0.19
CNC17-M06D	7/21/1999	PP	8.2	27.2	7.06	1.71

Notes:
(°C) - Degrees Celsius
PP - Peristaltic pump, low flow technique
uMHOS/cm - Micro HOS per centimerter

TABLE 3

GROUNDWATER NATURAL ATTENUATION FIELD MEASUREMENTS
SITE 17, BUILDING B42
ZONE G, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Well I.D.	Date Sampled	Dissolved Oxygen (mg/l)	Alkalinity (mg/l)	Carbon Dioxide (mg/l)	Sulfide (mg/l)	Ferrous Iron (mg/l)	Nitrite (mg/l)	Manganese (mg/l)	Nitrogen/ Nitrate (mg/l)*	Sulfate (mg/l)*	Methane (ug/l)*
CNC17-M01	7/20/1999	2.60	100	301	0.02	0.07	NA	0.1	0.040	NA	NA
CNC17-M02	7/20/1999	2.26	275	220	0.01	0.11	NA	1.2	NA	NA	NA
CNC17-M03	7/20/1999	3.60	200	195	0.03	0.00	NA	1.1	0.090	NA	NA

Notes:
mg/l - Milligrams per liter
ug/l - Micrograms per liter
E- Estimated Concentration
* Fixed base laboratory analysis
NA = Not analyzed

TABLE 4

SUMMARY OF OVA SOIL SCREENING RESULTS
SITE 17, BUILDING B42
ZONE G, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Sample Location	Sample Identification	Sample Depth (feet)	Total Organic Vapor Headspace Concentration (ppm)
CNC17-B06	17SSB0602	2	2
	17SSB0603	3	2
	17SSB0604	4	2
	17SSB0605	5	2
	17SSB0606	6	50
	17SSB0607	7	100
	17SSB0608	8	10
	17SSB0609	9	20
	17SSB0610	10	20
CNC17-B07	17SSB0703	3	2
	17SSB0704	4	2
	17SSB0705	5	2
	17SSB0706	6	2
	17SSB0707	7	2
	17SSB0708	8	2
	17SSB0709	9	2
	17SSB0710	10	3
CNC17-B08	17SSB0803	3	3
	17SSB0804	4	3
	17SSB0805	5	3
	17SSB0806	6	3
	17SSB0807	7	3
	17SSB0808	8	3
	17SSB0809	9	3
	17SSB0810	10	3
CNC17-B09	17SSB0903	3	3
	17SSB0904	4	3
	17SSB0905	5	3
	17SSB0906	6	3
	17SSB0907	7	3
	17SSB0908	8	3
	17SSB0909	9	5
	17SSB0910	10	10

Notes:
OVA - organic vapor analyzer equipped with a flame ionization detector
PPM - parts per million

TABLE 4

SUMMARY OF OVA SOIL SCREENING RESULTS
SITE 17, BUILDING B42
ZONE G, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Sample Location	Sample Identification	Sample Depth (feet)	Total Organic Vapor Headspace Concentration (ppm)
CNC17-B01	17SSB0103	3	2
	17SSB0104	4	2
	17SSB0105	5	2
	17SSB0106	6	2
	17SSB0107	7	2
	17SSB0108	8	2
	17SSB0109	9	2
	17SSB0110	10	2
	17SSB0111	11	2
CNC17-B02	17SSB0203	3	2
	17SSB0204	4	2
	17SSB0205	5	2
	17SSB0206	6	2
	17SSB0207	7	2
	17SSB0208	8	2
	17SSB0209	9	2
	17SSB0210	10	5
CNC17-B03	17SSB0303	3	2
	17SSB0304	4	2
	17SSB0305	5	2
	17SSB0306	6	50
	17SSB0307	7	100
	17SSB0308	8	10
	17SSB0309	9	20
	17SSB0310	10	20
CNC17-B04	17SSB0403	3	3
	17SSB0404	4	3
CNC17-B05	17SSB0503	3	3
	17SSB0506	6	3
	17SSB0507	7	70
	17SSB0508	8	70
	17SSB0510	10	20
	17SSB0511	11	60

Notes:
OVA - organic vapor analyzer equipped with a flame ionization detector
PPM - parts per million

TABLE 5

SUMMARY OF MOBILE LABORATORY SCREENING RESULTS FOR SOIL
SITE 17, BUILDING B42
ZONE G, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Sample Location	Sample Identification	Sample Depth (feet)	Laboratory Screening Data (PPB)[1]					
			Benzene	Toluene	Ethyl-benzene	Total Xylenes	Naphthalene	Diesel Range Organics
CNC17-B01	17SFB01-0708	7-8	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC17-B02	17SFB02-0809	8-9	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC17-B03	17SFB03-0506	5-6	<5.0	<5.0	34	16	17000	1200
CNC17-B04	17SFB04-0304	3-4	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC17-B05	17SFB05-0708	7-8	<5.0	<5.0	<5.0	<5.0	330	57
CNC17-B06	17SFB06-0910	7-8	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC17-B07	17SFB07-0910	8-9	<5.0	<5.0	<5.0	<5.0	140	<10
CNC17-B08	17SFB08-1011	2-3	<5.0	<5.0	<5.0	<5.0	170	<10
CNC17-B08	17SFB08-1011	2-3	<5.0	<5.0	<5.0	<5.0	<5.0	<10
CNC17-B09	17SFB09-1011	7-8	<5.0	<5.0	<5.0	<5.0	1100	130

NOTES:
[1] Laboratory screening data were analyzed using USEPA Method 8260. Compounds not detected are reported as less than the instrument detection limit.
PPB - parts per billion

TABLE 6

SUMMARY OF MOBILE LABORATORY SCREENING RESULTS FOR GROUNDWATER
SITE 17, BUILDING B42
ZONE G, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Sample Location	Sample Identification	Laboratory Screening Date (PPB)[1]					
		Benzene	Toluene	Ethyl-benzene	Total Xylenes	Naphthalene	Diesel Range Organics
CNC17-B01	17GFB01-16	<1.0	<1.0	<1.0	<1.0	<1.0	0.1
CNC17-B02	17GFB02-16	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1
CNC17-B03	17GFB03-16	<1.0	<1.0	9.8	3.1	540	1.4
CNC17-B04	17GFB04-16	<1.0	<1.0	<1.0	<1.0	8	0.1
CNC17-B05	17GFB05-16	<1.0	<1.0	<1.0	<1.0	21	0.2
CNC17-B06	17GFB06-16	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1
CNC17-B07	17GFB07-16	<1.0	<1.0	<1.0	<1.0	<1.0	0.1
CNC17-B08	17GFB08-16	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1
CNC17-B09	17GFB09-16	<1.0	<1.0	<1.0	<1.0	<1.0	<0.1

NOTES:
(1) Laboratory screening data were analyzed using USEPA Method 8260.
Compounds not detected are reported as less than the instrument detection limit.
PPB - parts per billion
NA = Not analyzed

TABLE 7

SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN SOIL
SITE 17, BUILDING B42
ZONE G, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Soil Boring / Sample No.	Sample Date	Benzene (ug/kg)	Toluene (ug/kg)	Ethyl-benzene (ug/kg)	Xylenes (total) (ug/kg)	Benzo(a) anthracene (ug/kg)	Benzo(b) fluoranthene (ug/kg)	Benzo(k) fluoranthene (ug/kg)	Chrysene (ug/kg)	Dibenzo(a,h) anthracene (ug/kg)	Naphthalene (ug/kg)
RBSL [1]		5	1622	1260	42471	73084	29097	231109	12998	87866	210
CNC17-B01 / 17SLB010708	17-May-99	< 6	< 6	< 6	< 6	< 430	< 430	< 430	< 430	< 430	< 6
CNC17-B02 / 17SLB020809	17-May-99	< 5	< 5	< 5	< 5	< 430	< 430	< 430	< 430	< 430	< 5
CNC17-B03 / 17SLB030506	17-May-99	< 5	< 5	< 5	< 5	< 430	< 430	< 430	< 430	< 430	22.00
CNC17-B04 / 17SLB040304	17-May-99	< 5	< 5	< 5	< 5	< 400	< 400	< 400	< 400	< 400	< 5
CNC17-B05 / 17SLB050708	17-May-99	< 6	< 6	< 6	< 6	< 430	< 430	< 430	< 430	< 430	< 6
CNC17-B05 / 17SLB050708D	17-May-99	< 6	< 6	< 6	< 6	< 430	< 430	< 430	< 430	< 430	< 6
CNC17-B07 / 17SLB070809	17-May-99	< 5	< 5	< 5	< 5	< 430	< 430	< 430	< 430	< 430	< 5
CNC17-B09 / 17SLB090708	17-May-99	< 5	< 5	< 5	< 5	< 430	< 430	< 430	< 430	< 430	< 5
CNC17-TL [2] / 01TL00103	17-May-99	< 5	< 5	< 5	< 5	NA	NA	NA	NA	NA	< 5

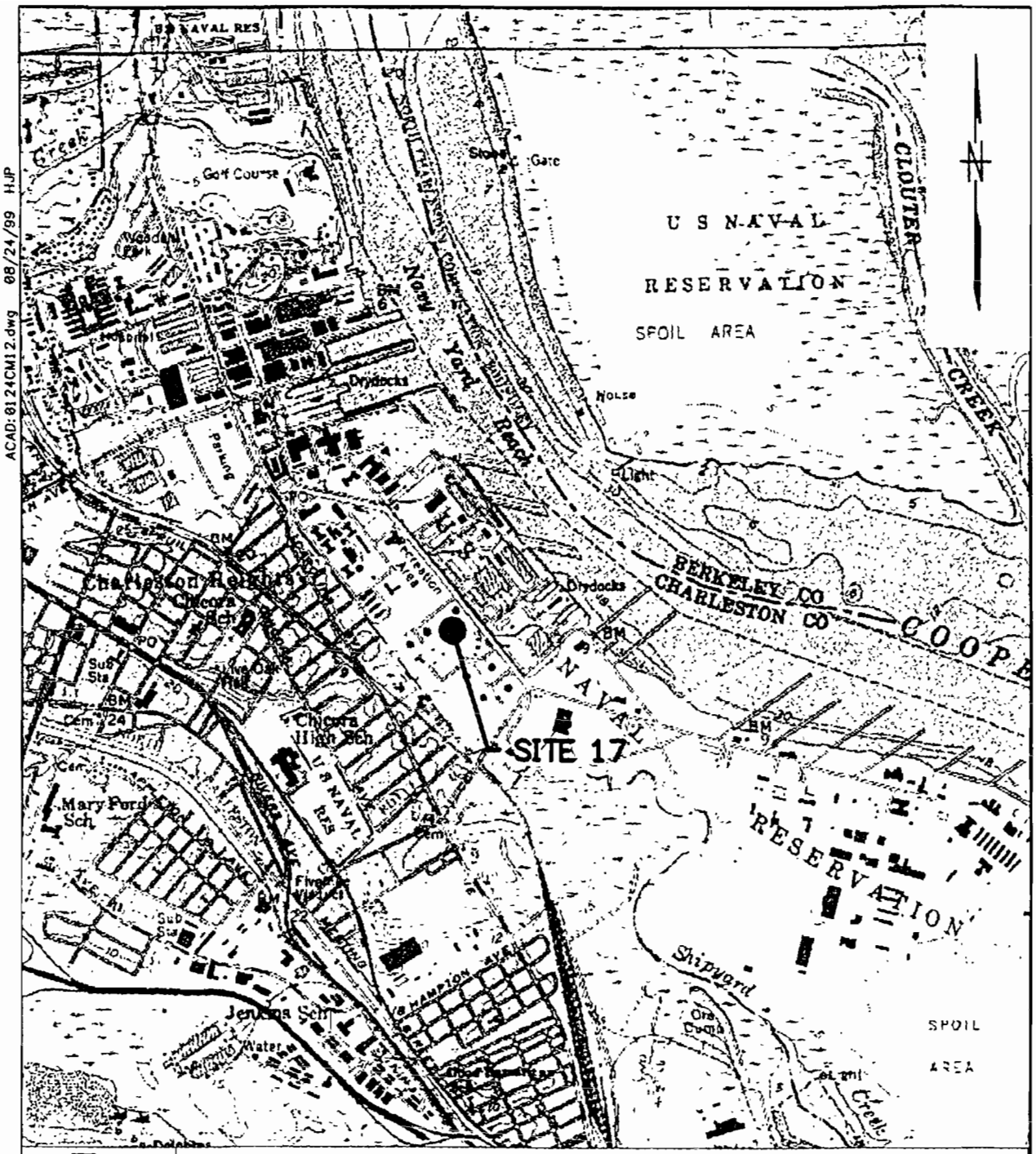
All concentrations are in micrograms per kilogram (ug/kg).
NA - Not analyzed
[1] South Carolina Department of Health and Environmental Control Risk Based Screening Levels for sandy soils; depth to groundwater less than 5 feet.
[2] Trip blank

TABLE 8

SUMMARY OF FIXED-BASE LABORATORY ANALYTICAL RESULTS FOR CHEMICALS OF CONCERN IN GROUNDWATER
SITE 17, BUILDING B42
ZONE G, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

Monitoring Well/ Sample No.	Sample Date	Benzene (ug/L)	Ethyl-benzene (ug/L)	Toluene (ug/L)	Xylenes (total) (ug/L)	Naphthalene (ug/L)	Benzo(a) anthracene (ug/L)	Benzo(b) fluoranthene (ug/L)	Benzo(k) fluoranthene (ug/L)	Chrysene (ug/L)	Dibenzo(a,h) anthracene (ug/L)	MTBE (ug/L)
RBSL[1]		5	700	1000	10000	10 [2]	10 [2]	10 [2]	10 [2]	10 [2]	10 [2]	40
CNC17M-01 / 17GLM0101	20-Jul-99	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 10	< 5
CNC17M-02 / 17GLM0201	20-Jul-99	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 10	< 5
CNC17M-03 / 17GLM0301	20-Jul-99	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 10	< 5
CNC17M-04 / 17GLM0401	20-Jul-99	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 10	< 5
CNC17M-05 / 17GLM0501	20-Jul-99	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 10	< 5
CNC17M-06 / 17GLM0601	21-Jul-99	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 10	< 5
CNC17M-06 / 17GLM0601D	21-Jul-99	< 5	< 5	< 5	< 5	< 5	< 10	< 10	< 10	< 10	< 10	< 5
CNC17TL[3] / 17TL00401	20-Jul-99	< 5	< 5	< 5	< 5	< 5	NA	NA	NA	NA	NA	< 5
CNC17TL[3] / 17TL00501	21-Jul-99	< 5	< 5	< 5	< 5	< 5	NA	NA	NA	NA	NA	< 5

All concentrations are in ug/L.
NA - Not analyzed
(1) South Carolina Department of Health and Environmental Control Risk Based Screening Levels for ground water.
(2) The Risk based screening level for individual PAH CoC is 10 ug/l or 25 ug/l for total PAHs.
(3) Trip blank



SOURCE: QUADRANGLE MAP SOUTH CAROLINA, REVISED 1979
QUADRANGLE MAP NORTH CHARLESTON REVISED, 1979

0 2000 4000
SCALE IN FEET

DRAWN BY HJP DATE 8/20/99	DEPARTMENT OF THE NAVY SOUTHERN DIV FACILITIES ENGINEERING COMD	SITE LOCATION MAP SITE 17, BUILDING B42, ZONE G CHARLESTON NAVAL COMPLEX NORTH CHARLESTON, SC	CONTRACT NO. N0124
CHECKED BY DATE			APPROVED BY DATE
COST/SCHED-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 1 / REV. 0

FORM CADD NCL SDIV_AV.DWG - REV 0 - 1/20/98

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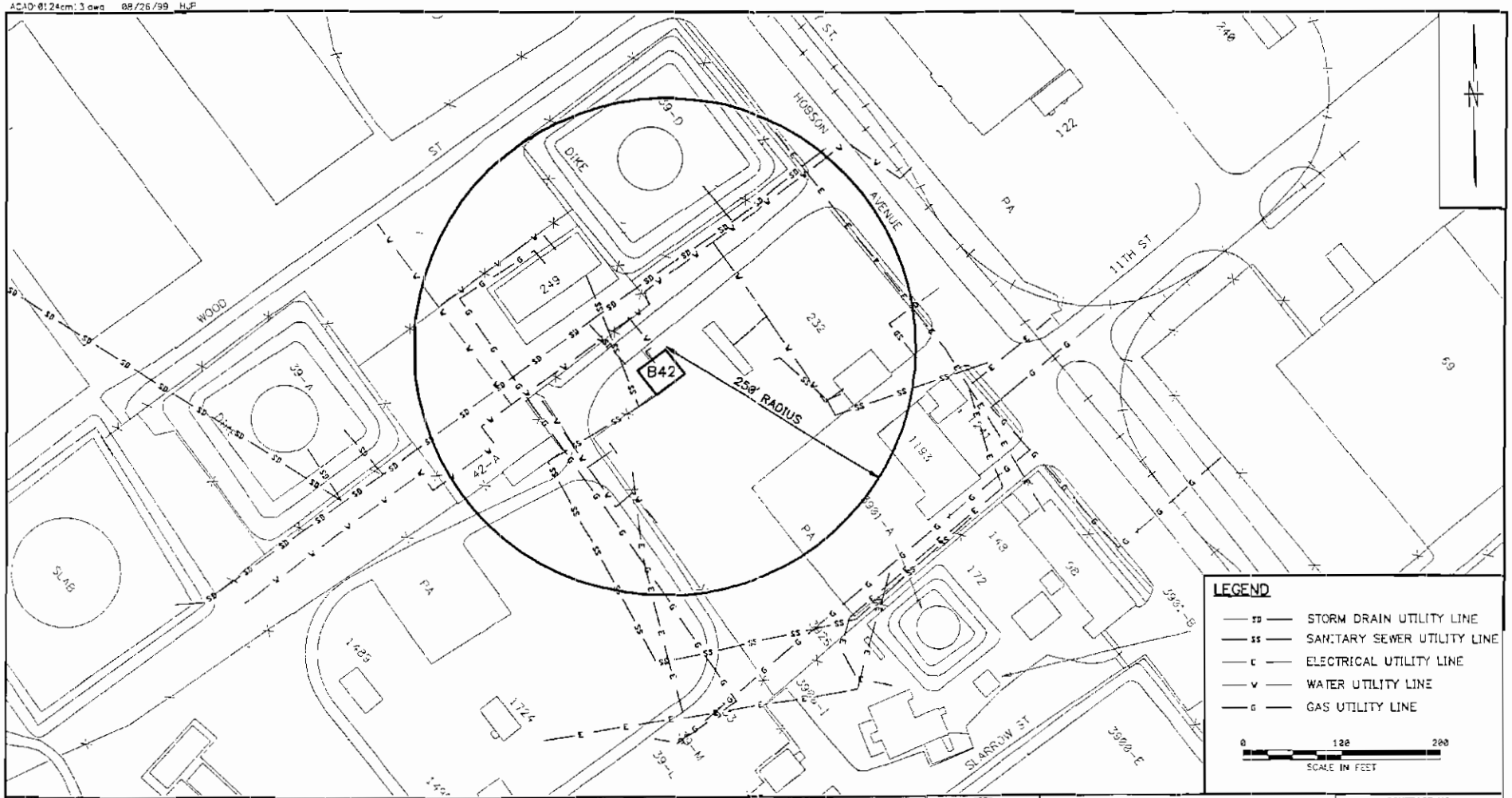

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY HJP DATE 8/24/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

SITE VICINITY MAP
SITE 17, BUILDING B42
ZONE G, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0.24
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 2
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

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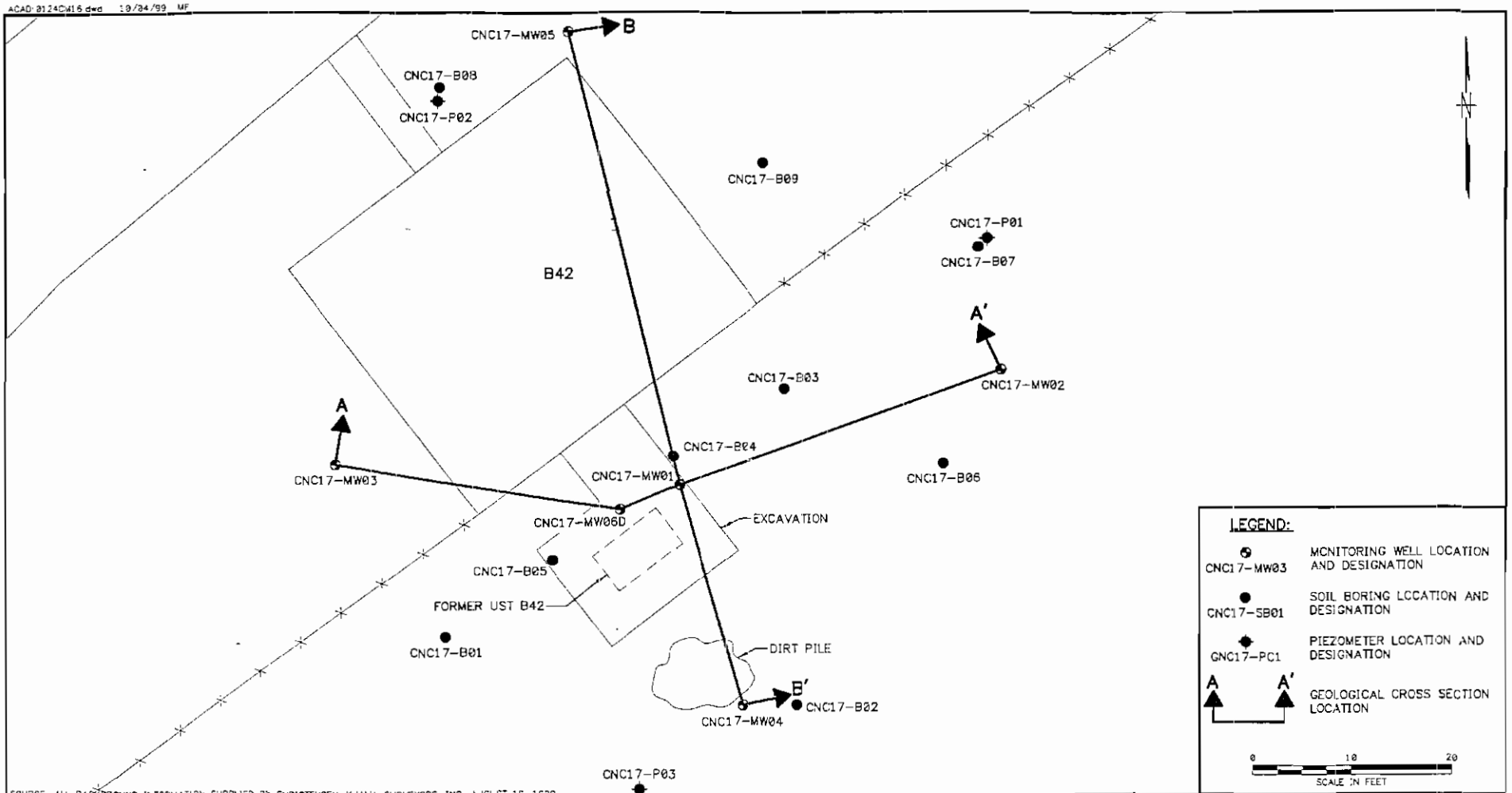


SOURCE: ALL BACKGROUND INFORMATION SUPPLIED BY CHRISTENSEN-KHALIL SURVEYORS, INC. AUGUST 15, 1999

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

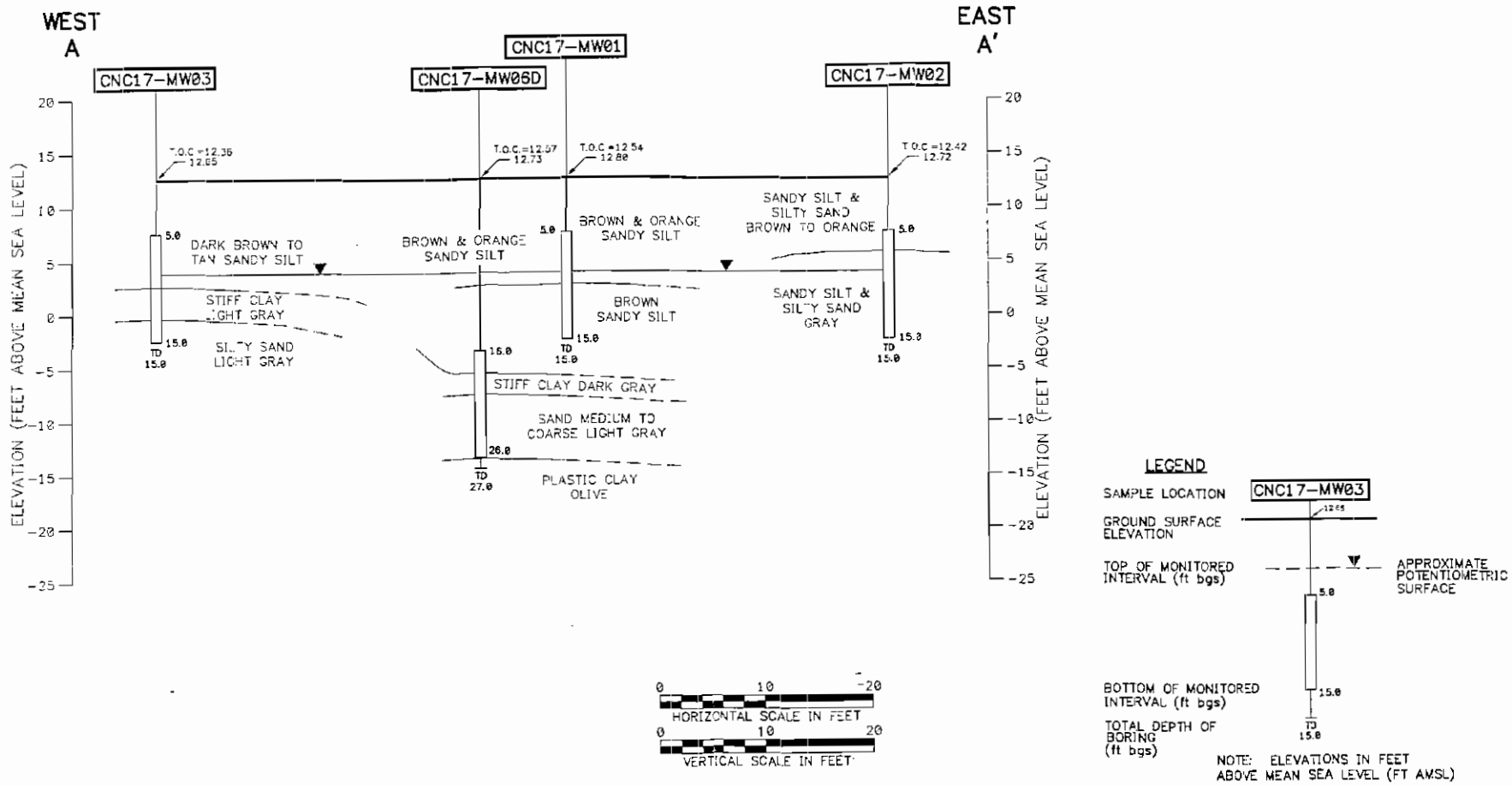
DRAWN BY MF DATE 10/4/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

SITE AREA AND SAMPLING LOCATIONS
SITE 17 BUILDING B42
ZONE G, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0124
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 3
REV. 0

FORM CADD NO. SDIV_BH.DWG – REV 0 – 1/20/98

ACAD:0124GX01.dwg 10/05/99 MF



NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MF DATE 10/5/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

GEOLOGIC CROSS SECTION A-A'
SITE 17, BUILDING 842
ZONE G CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0124
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 4
REV. 0

FORM CADD NO. SDIV_BHDWG - REV 0 - 1/20/98

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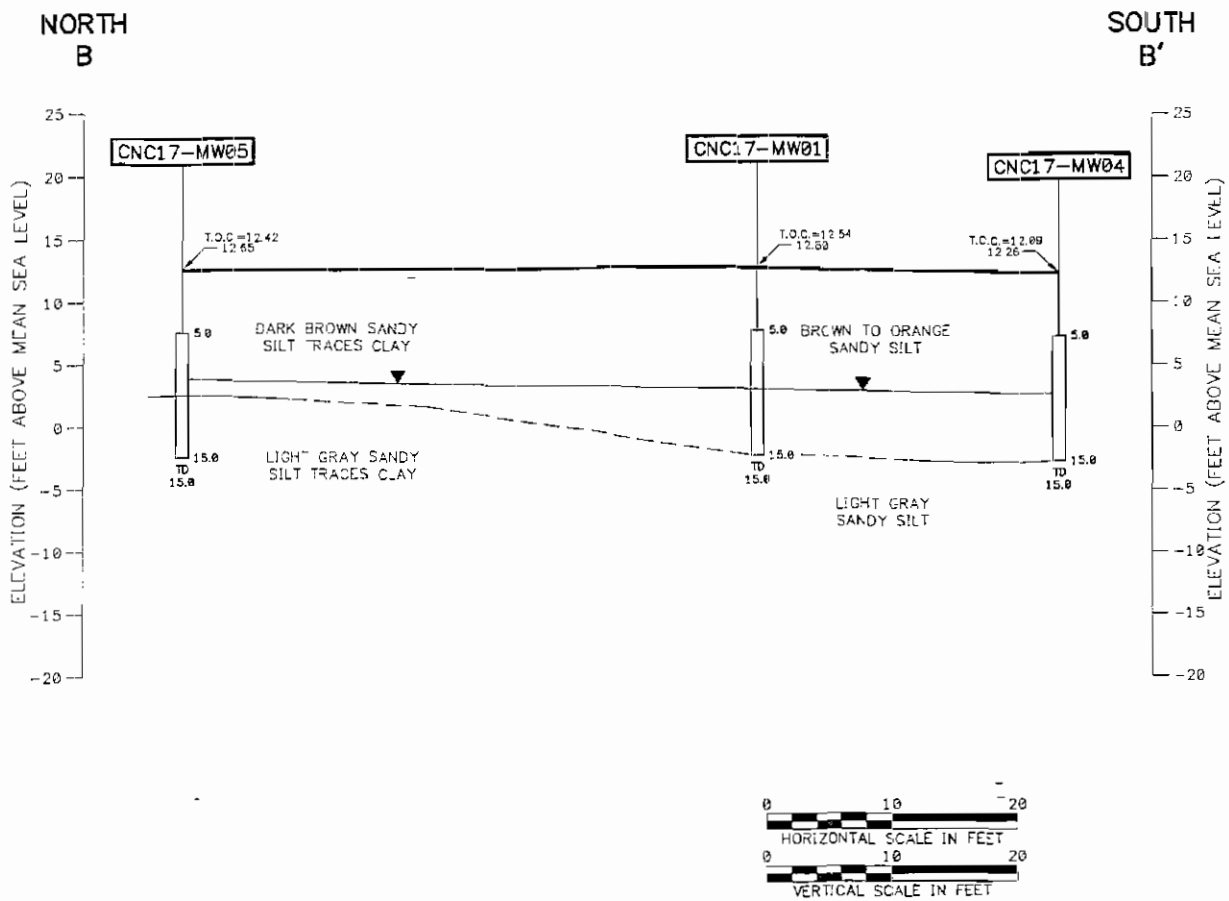
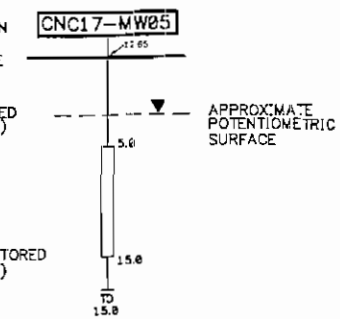


LEGEND



NOTE: ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL (FT AMSL)

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MF DATE 10/5/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

GEOLOGIC CROSS SECTION B-B'
SITE 17, BUILDING B42
ZONE G CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0124
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 5
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

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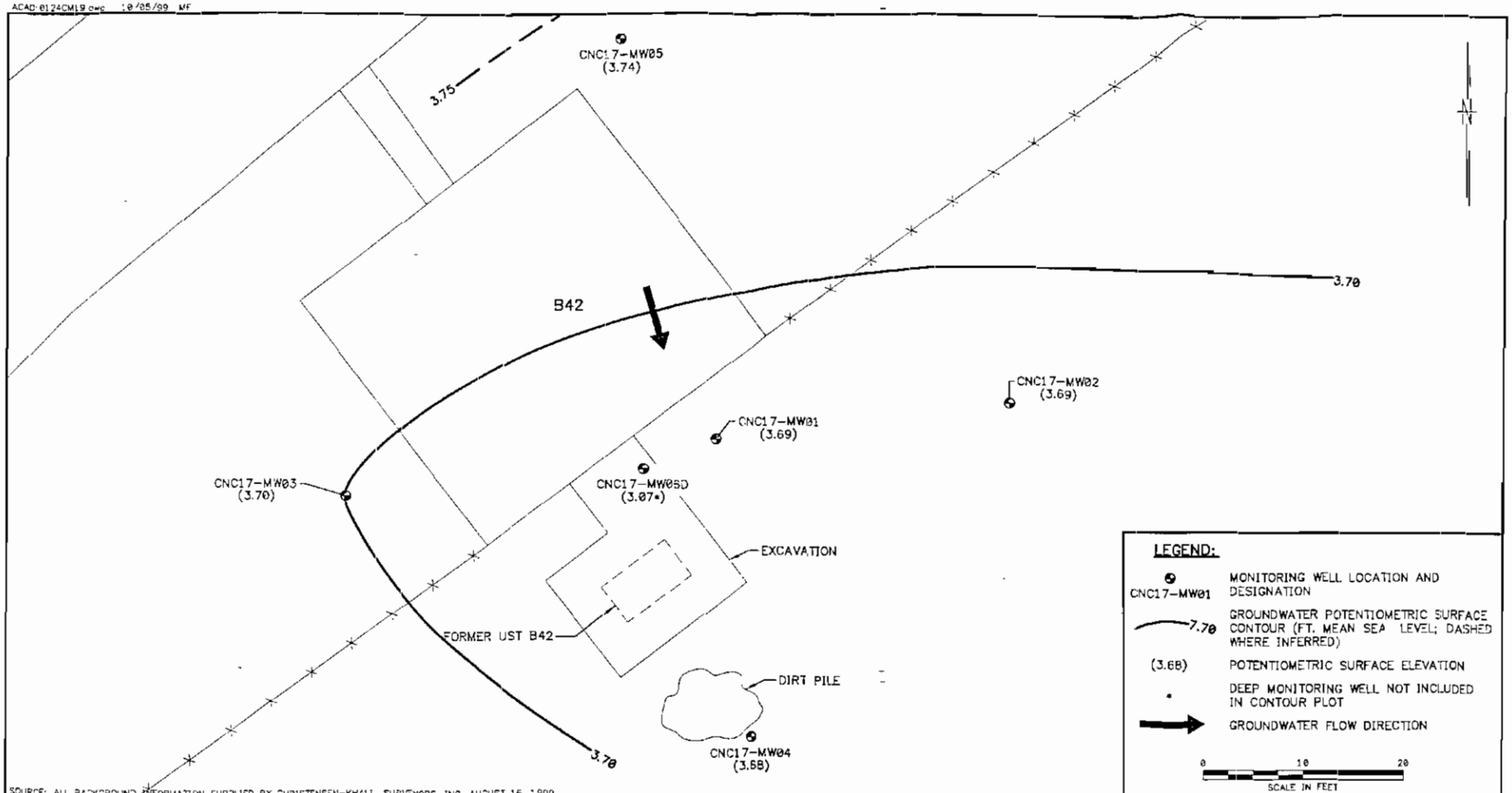


SOURCE: ALL BACKGROUND INFORMATION SUPPLIED BY CHRISTENSEN-KHALIL SURVEYORS INC. AUGUST 16, 1999

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

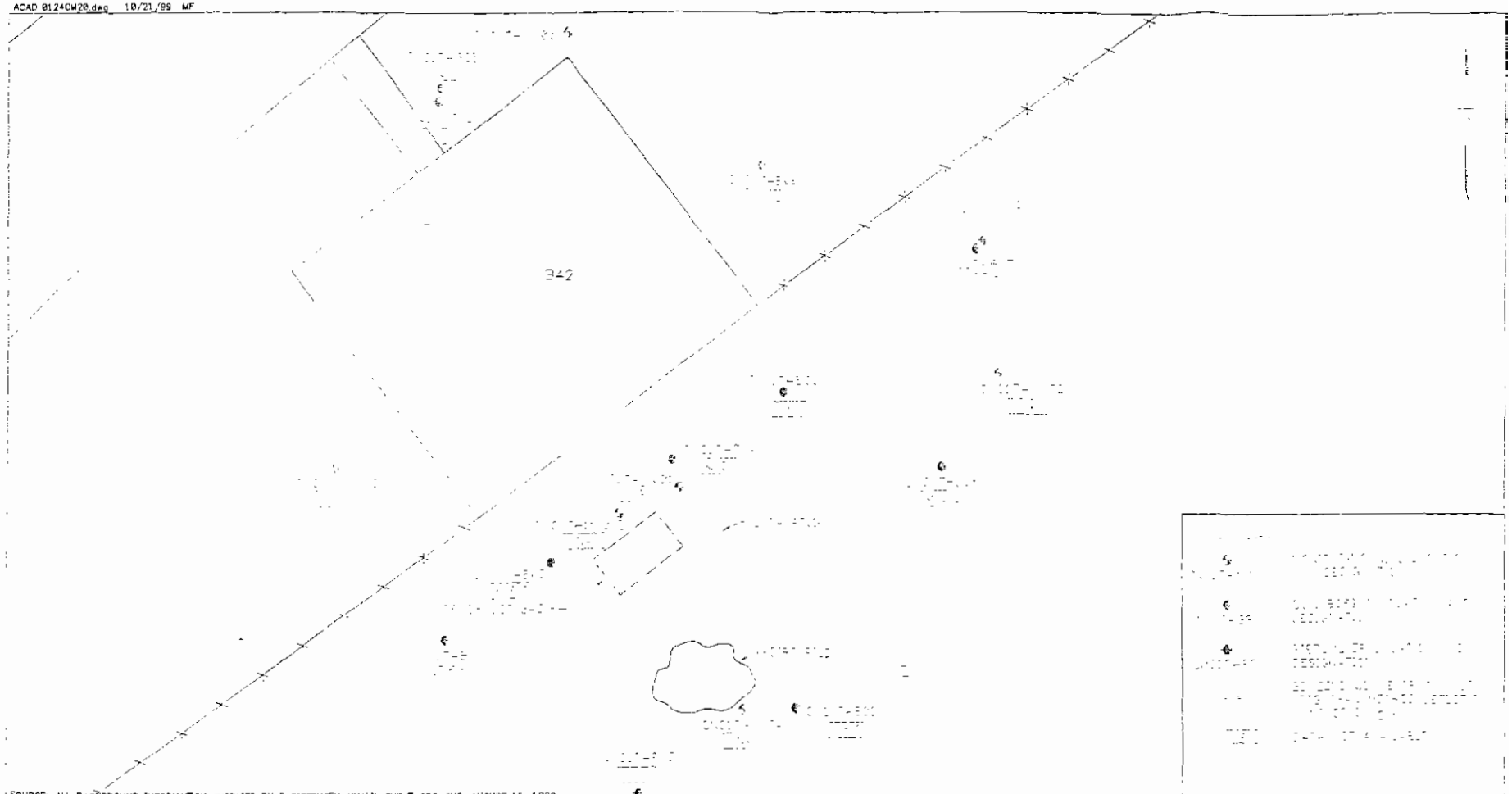
DRAWN BY MF DATE 10/5/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

GROUNDWATER POTENTIOMETRIC MAP
(JULY 20, 1999)
SITE 17 BUILDING B42
ZONE G, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0124
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 6
REV. 0

FORM CADD NO. SDIV_BM.DWG - REV 0 - 1/20/96

ACAD 0124CM20.dwg 10/21/99 MF



SOURCE: ALL BACKGROUND INFORMATION SUPPLIED BY CHRISTENSEN-KHALIL SURVEYORS, INC. AUGUST 16, 1999

FORM CADD NO. SDN_BH.DWG - REV 0 - 1/23/98

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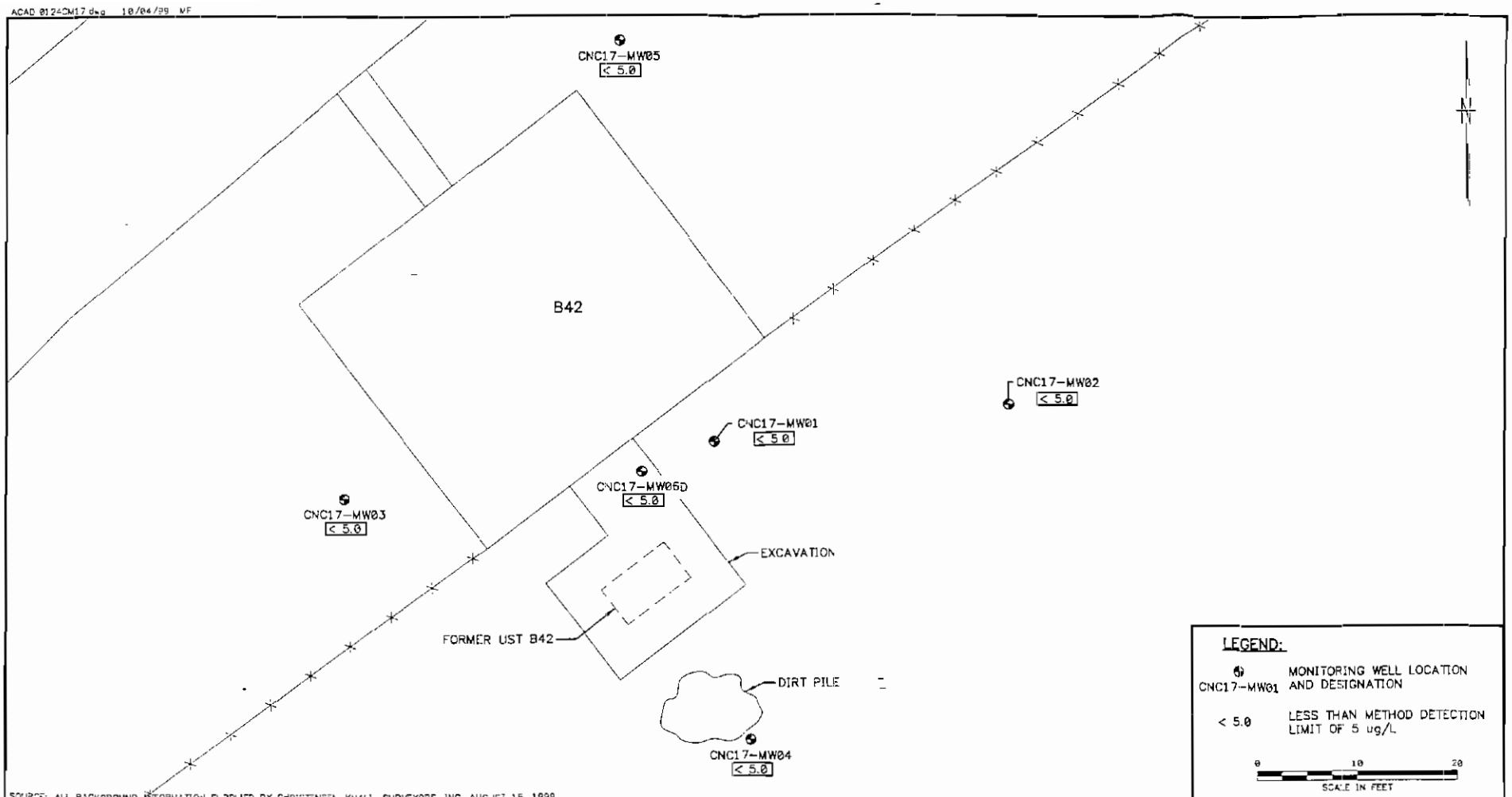

SOURCE: ALL BACKGROUND INFORMATION SUPPLIED BY CHRISTENSEN-KHALI, SURVEYORS, INC. AUGUST 15, 1999

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MF DATE 10/4/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

GROUNDWATER BENZENE CONCENTRATION MAP
(JULY 20, 1999)
SITE 17 BUILDING B42
ZONE G, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO. 0124
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 8
REV. 0

FORM CADD NO. SDIV_BH.DWG - REV 0 - 1/20/98

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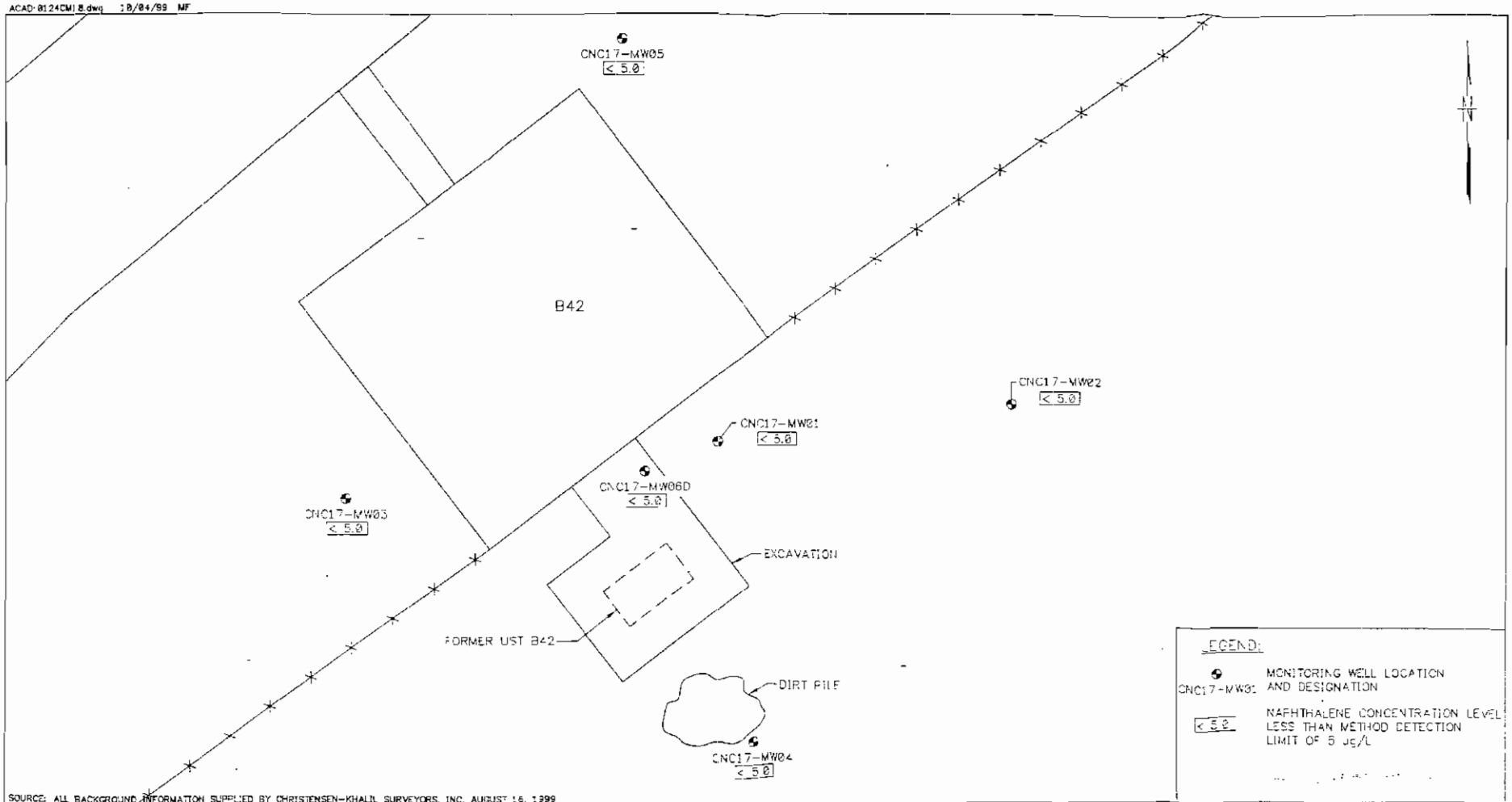

LEGEND:

CNC17-MW01 — MONITORING WELL LOCATION AND DESIGNATION

< 5.0 — NAPHTHALENE CONCENTRATION LEVEL LESS THAN METHOD DETECTION LIMIT OF 5 µg/L

SOURCE: ALL BACKGROUND INFORMATION SUPPLIED BY CHRISTENSEN-KHALIL SURVEYORS, INC. AUGUST 16, 1999

NO	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY MF DATE 10/4/99
CHECKED BY DATE
COST/SCHED-AREA
SCALE AS NOTED

GROUNDWATER NAPHTHALENE CONCENTRATION MAP (JULY 28, 1999)
SITE 17 BUILDING B42
ZONE G, CHARLESTON NAVAL COMPLEX
NORTH CHARLESTON, SOUTH CAROLINA

CONTRACT NO 0124
APPROVED BY DATE
APPROVED BY DATE
DRAWING NO. FIGURE 9 REV. 0

FORM CADD RO SDW_BH.DWG — REV 0 — 1/20/98