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# Groundwater Sampling Summary Report for Sites 13 and 22

Naval Weapons Station Seal Beach Detachment Concord  
Concord, California

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**DRAFT FINAL**

November 4, 2003



Engineering Field Activity West  
Naval Facilities Engineering Command  
San Bruno, California



TETRA TECH, INC.

GENERAL SERVICES ADMINISTRATION  
Contract No. 62474-03-F-4032  
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**Draft Final**  
**Groundwater Sampling Summary**  
**Report for Sites 13 and 22**  
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**Seal Beach Detachment Concord**  
**Concord, California**

**November 4, 2003**

Prepared for



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Naval Facilities Engineering Command  
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A handwritten signature in black ink, appearing to read "Penny Wilson", is written over a horizontal line.

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## ACRONYMS AND ABBREVIATIONS

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µg/L	Micrograms per liter
Army	Department of the Army
bgs	Below ground surface
DHS	California Department of Health Services
DI	Deionized
DTSC	California Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
FSP	Field sampling plan
HLA	Harding Lawson Associates
IAS	Initial assessment study
MCL	Maximum contaminant level
mg/kg	Milligrams per kilogram
msl	Mean sea level
Navy	U.S. Department of the Navy
NWSSBD	Naval Weapons Station Seal Beach Detachment
OEHHA	Office of Environmental Health Hazard Assessment
PRC	PRC Environmental Management, Inc.
PRG	Preliminary remediation goal
QA	Quality assurance
QAPP	Quality assurance project plan
QC	Quality control
RFA	Resource Conservation and Recovery Act (RCRA) Facility assessment
RfD	Reference dose
RI	Remedial investigation
SAP	Sampling and analysis plan
SFBRWQCB	San Francisco Bay Regional Water Quality Control Board
SI	Site investigation
SMP	Site Management Plan
SVOC	Semivolatile organic compound
SWMU	Solid waste management unit
Tetra Tech	Tetra Tech EM Inc.
TPH	Total petroleum hydrocarbons
UST	Underground storage tank
VOC	Volatile organic compound

## EXECUTIVE SUMMARY

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On June 16 and 17, 2003, the U.S. Department of the Navy, Naval Facilities Engineering Command, Engineering Field Activity West, directed Tetra Tech EM Inc. (Tetra Tech) to collect groundwater samples from four monitoring wells at Site 13 (wells BUAMW002 and BUAMW010 through BUAMW012) and one monitoring well at Site 22 (well 7SHMW002) at Naval Weapons Station Seal Beach Detachment (NWSSBD) Concord in Concord, California. This report summarizes the results of that sampling event.

Samples were collected to assess perchlorate concentrations in groundwater at Sites 13 and 22 and explosive residue concentrations in groundwater at Site 13. Live ordnance was burned at Site 13 in trenches and gullies from the 1940s to about 1970. The ordnance burned included flares, smoke chemicals, thermite generators, small-arms ammunition powder, and loose material cleaned from ammunition ships. Site 22 was used from 1944 to 1978 for various purposes, including missile maintenance (stripping, cleaning, and painting missile wings and fins), storage of inert equipment, testing of missile components, and for manufacturing of mobile laboratories to be used during explosive ordnance disposal activities.

Based on a review of Navy historic documents, perchlorate may have been used in activities at Site 13, but was not previously sampled for. Perchlorate is a groundwater contaminant, which is a primary ingredient in solid propellant for rockets and missiles, and has been used in a range of industrial processes, including production of highway safety flares, aluminum refining, electroplating, and production of paints. The regulatory agencies (United States Environmental Protection Agency [EPA], California Department of Toxic Substances Control [DTSC], and the San Francisco Bay Regional Water Quality Control Board [SFBRWQCB] recommended conducting additional sampling for perchlorate, an emerging chemical of concern, before moving forward with a record of decision for Site 13. The Restoration Advisory Board (RAB) also requested that perchlorate be analyzed at the site. In its letter of January 29, 2003, EPA invoked informal dispute with the Navy on the Revised Draft Final (No-Action) Record of Decision (ROD) for Sites 13 and 17 over a possible data gap associated with characterization of perchlorate at Site 13 (EPA 2003a). Following informal dispute discussions (EPA 2003b), the Navy in April 2003 agreed to conduct additional sampling for perchlorate at Site 13 and Site 22 and provided a draft plan for the sampling (EFA West 2003).

One well at Site 22 was sampled for perchlorate because this well is located near the boundary of the base and is one of the wells furthest downgradient. Samples were collected to test for explosive residues at the request of the EPA to supplement two previous quarterly sampling events.

Groundwater samples were collected using the low-flow sampling methodology, as approved in the draft addendum to the field sampling and analysis plan and quality assurance project plan (Tetra Tech 2003a). Due to minimal comments on the draft addendum and to expedite field work, the regulatory agencies agreed to accept as final the responses to comments on the draft addendum and a supplemental data package instead of a draft final SAP. Samples were

submitted to GPL Laboratories for analysis of perchlorate (both Sites 13 and 22) and explosive residues (Site 13 only). In addition, the EPA Laboratories in Las Vegas, Nevada, provided a performance evaluation blank (a sample of groundwater spiked with a known concentration of perchlorate) that was submitted along with the samples collected at the site for analysis.

Currently, no maximum contaminant levels (MCL) for drinking water exist for perchlorate. EPA recently released a draft reference dose (RfD) for perchlorate based on its chemical effects on the thyroid gland (EPA 2002a). The remedial project team agreed to use a concentration of 1 microgram per liter ( $\mu\text{g/L}$ ) as a screening level for perchlorate. The California Department of Health Services (DHS) is currently using 4  $\mu\text{g/L}$  as an “action level” for perchlorate in drinking water. According to the DHS website, this action level was recently lowered to 4  $\mu\text{g/L}$  based on the draft RfD proposed by EPA, and the revised level represents the lower value of the 4- to 18- $\mu\text{g/L}$  range that resulted from an earlier provisional RfD proposed by EPA (DHS <http://www.dhs.ca.gov/ps/ddwem/chemicals/perchl/actionlevel.htm>).

Based on the results of groundwater sampling conducted at Sites 13 and 22, perchlorate was detected in three of the four wells at Site 13 and in the single well sampled at Site 22. The detected concentrations from two monitoring wells at Site 13 (1.3  $\mu\text{g/L}$  at BUAMW002 and 2  $\mu\text{g/L}$  at BUAMW012) exceed the proposed screening level of 1.0  $\mu\text{g/L}$ . The perchlorate concentration in the single well sampled at Site 22 was below the screening level. None of the concentrations exceeded the DHS action level of 4  $\mu\text{g/L}$ . Explosive residues were not detected in any of the groundwater samples collected at Site 13.

As a result of the detected perchlorate, the Navy plans to work with the regulatory agencies to further assess the extent of contamination at these sites. The Navy will conduct additional groundwater sampling at Sites 13 and 22 in 2004 following the completion and finalization of separate sampling and analysis plans (SAPs). The sampling results will be presented in separate remedial investigation (RI) reports: a RI Addendum Report for Site 13 and a revised Draft Supplemental RI Report for Site 22. Following the finalization of the RIs, feasibility studies (FSs) are currently anticipated. The current schedule for the RI and FS for both sites is presented in the draft final annual amendment to the Site Management plan (SMP) dated September 30, 2003. This work RI and FS work is projected to be completed in 2004 and 2005.

## 1.0 INTRODUCTION

On June 16 and 17, 2003, the U.S. Department of the Navy (Navy), Naval Facilities Engineering Command Engineering Field Activity West, directed Tetra Tech EM Inc. (Tetra Tech) to collect groundwater samples from four monitoring wells at Site 13 and one monitoring well at Site 22 at Naval Weapons Station Seal Beach Detachment Concord (NWSSBD) in Concord, California. Tetra Tech conducted this sampling under Contract Task Order No. 121 pursuant to the General Services Administration Contract No. 10F-0076K. Sampling was conducted in accordance with the draft addendum to the sampling and analysis plan (SAP) for additional groundwater investigation at Sites 13 and 22 ([Tetra Tech 2003a](#)). Due to minimal comments on the draft addendum and to expedite field work, the regulatory agencies agreed to accept as final the responses to comments on the draft addendum and a supplemental data package instead of a draft final SAP.

This report summarizes the results of groundwater sampling at Sites 13 and 22 and includes the following sections:

- [Section 1.0](#) – Introduction, discusses the purpose of the investigation, site history, previous investigations at the site, and technical or regulatory standards.
- [Section 2.0](#) – Groundwater Sampling Procedures and Methods, discusses groundwater levels measurements and sampling procedures and explains the laboratory analyses process.
- [Section 3.0](#) – Groundwater Sampling Results, discusses groundwater levels, analytical results, and the quality of the data.
- [Section 4.0](#) – Conclusions, presents the conclusions of the groundwater sampling results.
- [Section 5.0](#) – References, lists the documents used to prepare this report.

Figures and tables are presented after their first mention in the text of this report. The following appendices were used to prepare this report and are presented after [Section 5.0](#):

- [Appendix A](#) – Boring Logs and Well Construction Logs
- [Appendix B](#) – Geologic Cross Sections and Potentiometric Surface Maps
- [Appendix C](#) – Photographic Log
- [Appendix D](#) – Well Sampling Sheets and Chain-of-Custody Records
- [Appendix E](#) – Laboratory Results and Data Validation Report
- [Appendix F](#) – Responses to Agency and Restoration Advisory Board Comments

## 1.1 PURPOSE OF THE INVESTIGATION

Previous investigations at Sites 13 and 22 did not address the possibility of perchlorate as a site contaminant. In a letter dated January 29, 2003, from Ms. Michelle Schultz of the U.S. Environmental Protection Agency (EPA) to Mr. Tony Tactay of the Navy, the EPA requested that the Navy identify all perchlorate analytical information collected at Site 13 and throughout NWSSBD Concord (EPA 2003a). Based on this request, the Navy reviewed all relevant analytical records, and found that no samples from NWSSBD Concord had been analyzed for perchlorate. Therefore, the primary purpose of this investigation was to sample groundwater for perchlorate at Site 13, which, based on site history, is the most likely site for perchlorate to occur at NWSSBD Concord. One well at Site 22 was also identified for sampling because this well is located near the boundary of the base and is one of the wells furthest downgradient.

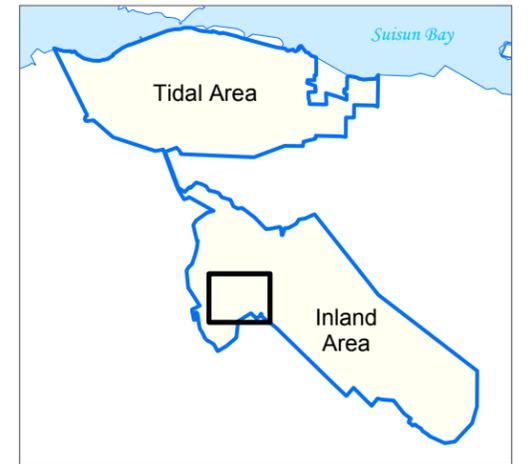
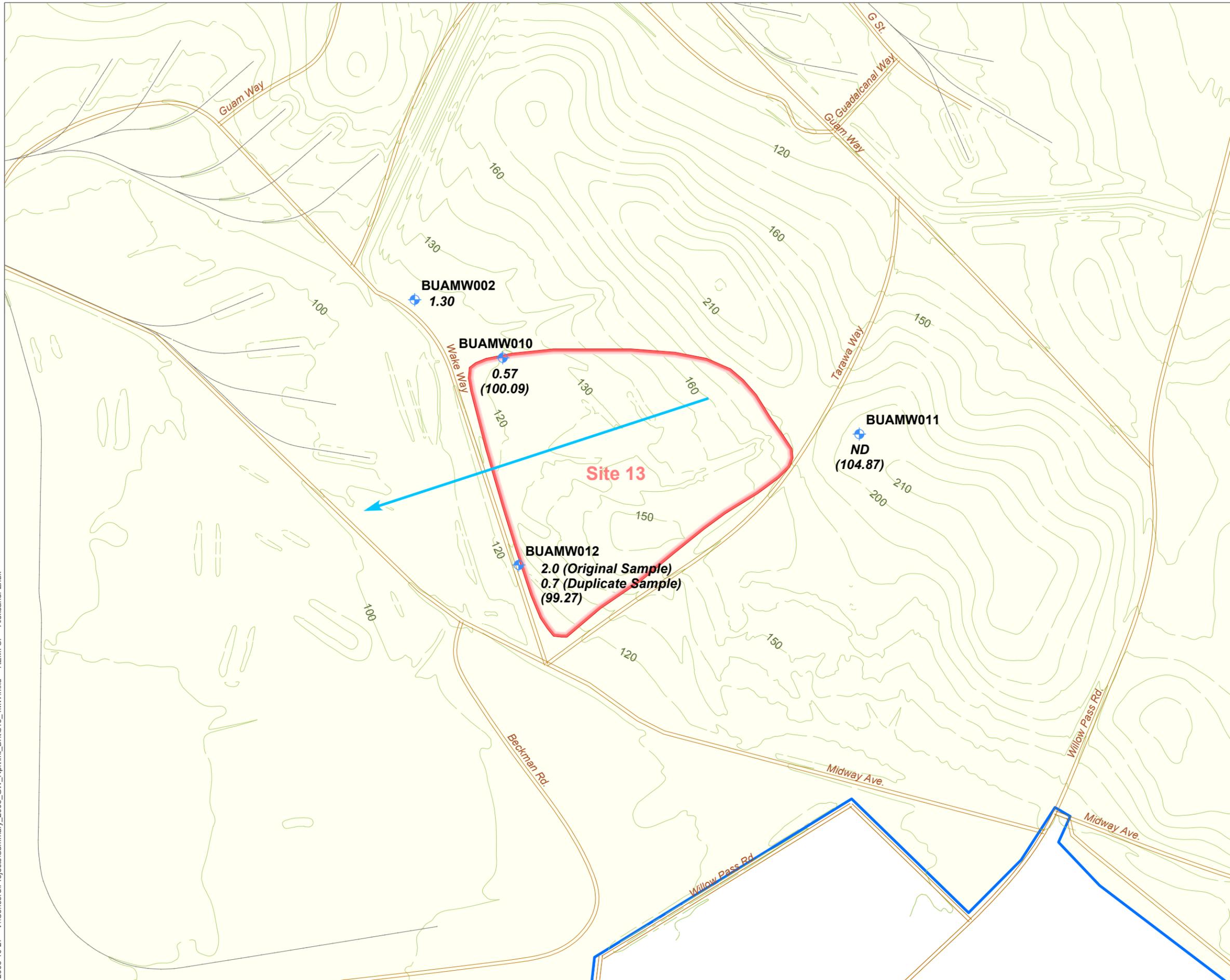
An additional goal for this investigation was to supplement previous groundwater sampling for explosive residues at Site 13. Mr. Phillip Ramsey of EPA expressed concern that sampling for explosive residues (for analysis by EPA Method 8330 [EPA 1998]) previously completed at the site were not sufficient to reject the possibility of explosives residues in downgradient well BUAMW002 at Site 13.

## 1.2 SITE DESCRIPTION

NWSSBD Concord is the major naval munitions transshipment facility on the West Coast. NWSSBD Concord is located in the north-central portion of Contra Costa County, California, 30 miles northeast of San Francisco. The facility, which encompasses 13,000 acres, is bounded to the north by Suisun Bay, to the east by Los Medanos Hills and the City of Pittsburg, and to the south and west by the City of Concord. Currently, the facility is made up of three main separate land holdings: the Tidal Area (which includes islands in Suisun Bay), the Inland Area, and a radiography facility in Pittsburg. While the base is an active base, it is operating in a reduced capacity.

The Inland Area encompasses 6,200 acres. A Navy-owned road and rail line link the Inland Area to the Tidal Area. The Inland Area lies between Los Medanos Hills and the City of Concord and is crossed by three public roads: State Route 4, Willow Pass Road, and Bailey Road.

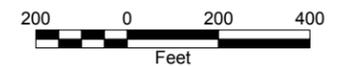
Site 13 spans an irregularly shaped area 1,100-feet wide by 1,400-feet long in the western portion of the Inland Area of NWSSBD Concord (Figure 1). Site 13 was used as a burn area for live ordnance and napalm from 1940 to about 1974. Ordnance, which was burned at the site in trenches and natural gullies, included flares, smoke chemicals, thermite generators, small-arms ammunition, powder and loose material cleaned from ammunition ships. Site 13 was also used as a firefighting training area, where napalm and fuel oil were ignited and extinguished by firefighters, and as a target practice area for 50-caliber machine guns. Site 13 is currently used as open space and pastureland for grazing. The land use is not expected to change in the future.



**LEGEND:**

-  Groundwater Flow Direction (June 2003)
-  Monitoring Well Locations with Perchlorate Concentrations (in micrograms per liter) and Groundwater Elevation (in feet Above MSL, June 2003)
-  Site 13 Boundary
-  Navy Weapons Station Boundary
-  Buildings
-  Roads
-  Railroads
-  Topographic Contour (in feet, NGVD 1929)

Note:  
 ND - Not detected.  
 NS - Not sampled.



NAVAL WEAPONS STATION SEAL BEACH DETACHMENT  
**CONCORD, CALIFORNIA**  
 EFA West, Daly City

**FIGURE 1**  
**SITE 13 MONITORING WELL LOCATIONS**  
**AND PERCHLORATE CONCENTRATIONS**  
**IN GROUNDWATER**

Site 22 is located along the southwestern portion of the Inland Area. The site is bounded by 16<sup>th</sup> Street to the northeast, 17<sup>th</sup> Street to the southwest, P Street to the northwest, and Wildon Road to the southwest. The area surrounding the site is known as the magazine area and consists of an array of ammunition magazines connected by a series of parallel roads and railroad spurs. The site consists of Building 7SH5 and is mostly unpaved except for some asphalt streets and concrete pavement surrounding the building (Figure 2). Building 7SH5, which was built in 1944, was used primarily for missile maintenance (stripping, cleaning, and painting missile wings and fins), but was also used as a storehouse for inert equipment, testing missile components, and for manufacturing of mobile laboratories to be used during explosive ordnance disposal activities. About 500 feet south of Site 22 is the perimeter of NWSSBD Concord; beyond the boundary are single-family residential homes.

### **1.2.1 Physiography and Topography**

NWSSBD Concord lies 10 miles west of the confluence of the Sacramento and San Joaquin Rivers. This confluence forms the Delta region, which contains more than 600 miles of interconnected and meandering tidal waterways.

Most of the western half of the Inland Area is characterized by gently sloping land designated as alluvial slope. Steeply sloping terrain, beginning at 100 feet above mean sea level (msl) and rising to more than 800 feet above msl, forms the northeast boundary of the Inland Area. These hills are generally made up of soft shale and sandstone.

### **1.2.2 Geology and Hydrogeology**

This section briefly describes geologic and hydrogeologic features for Sites 13 and 22. Regional and local geology for the Inland Area is detailed in the remedial investigation (RI) report prepared for the sites (Tetra Tech 1997). Appendix A presents the boring logs and well construction logs, and Appendix B contains geologic cross sections and potentiometric surface maps.

Quaternary alluvial deposits underlying Site 13 consist of clay and silt interbedded with sand. On the western side of Site 13, a clay and silt unit 18- to 48-feet thick is underlain by sand. On the eastern side of Site 13, which is about 90 feet higher in elevation than the western side, thick clay and silt layers are interbedded with sand layers 10- to 15-feet thick (Appendix B). Site 22 is underlain primarily by silty clay and clayey silt with occasional lenses of silty sand and silty gravel (Appendix B). Groundwater beneath the Inland Area (including Sites 13 and 22) is commonly found in the coarser sand and gravel units of the unconsolidated alluvial deposits. Figures 1 and 2 show the groundwater flow direction at Sites 13 and 22, respectively. Flow directions were measured in June 2003 for Site 13 and in April 1997 for Site 22. In the low-lying flat areas of Sites 13 and 22, groundwater is first encountered at depths of about 20 to 25 feet below ground surface (bgs) under semiconfined to confined conditions. Because of the rise in ground elevation, depth to groundwater is greater than 100 feet in the eastern part of Site 13.

## Figure 2

This detailed station map has been deleted from the Internet-accessible version of this document as per Department of the Navy Internet security regulations.

Based on the available information, it is believed that the upper 30 to 120 feet of sediments consist of discontinuous sand and gravel layers surrounded by a silt and clay matrix. A regionally continuous sand and gravel layer lies beneath the upper fine-grained sediments. Groundwater in this zone is under confined conditions. Measured depths to groundwater at the sites during the sampling events are presented in Table 1 below.

**TABLE 1: GROUNDWATER ELEVATIONS**

Groundwater Sampling Summary Report for Sites 13 and 22, NWSSBD Concord

Site	Monitoring Well	Sample Date	Top of Casing (feet above msl)	Depth to Groundwater (feet below top of casing)	Groundwater Elevation (feet above msl)
13	BUAMW002	6/16/03	Not Available	17.17	Not Available
	BUAMW010	6/16/03	120.91	20.82	100.09
	BUAMW011	6/17/03	205.16	100.29	104.87
	BUAMW012	6/17/03	119.22	19.95	99.27
22	7SHMW002	6/17/03	162.14	26.56	135.58

### 1.3 SITE HISTORY AND PREVIOUS INVESTIGATIONS

This section summarizes the background and environmental investigations that have occurred at Sites 13 and 22.

In December 1942, the Navy commissioned the ordnance-shipping depot at Naval Magazine, Port Chicago, now known as the Tidal Area of NWSSBD Concord. When munitions passing through the Port Chicago waterfront began to exceed the capacity of the facility, the Navy acquired a 5,143-acre parcel of land in the Diablo Creek Valley. This land became the Inland Area of NWSSBD Concord.

Current operations at NWSSBD Concord are associated primarily with routine ammunition transshipment and storage. At present, the facility's current active tenant, the U.S. Department of the Army (Army), limits these activities mostly to the Tidal Area. Although the Army controls daily site activities, the Navy retains responsibility for environmental restoration at the facility. Since 1999, the Inland Area has been on reduced operational status and is mostly inactive (mothballed), with no immediate plans to resume active operations. Former operations in the Inland Area included receiving both containerized and bulk munitions for inspection and classification. Munitions were held while waiting to be transported and unloaded. Five magazine groups for ammunition storage were used within the Inland Area. The Inland Area also housed several production support facilities for weapons as well as vehicle maintenance facilities. The northwest corner of the Inland Area included an administrative complex, the public works department, and personnel housing used to support the munitions operations. The 162-acre public golf course (80 acres of which are owned by the City of Concord) remains active. A Weapons Quality Engineering Center was located between State Route 4 and Willow Pass Road, and an abandoned airfield south of State Route 4 was used to train forklift operators.

About 1,000 acres of pastureland in the Inland Area currently is leased for cattle grazing. No current plans exist for any change in land use or ownership of the Inland Area.

The site background and environmental investigation for Sites 13 and 22 are discussed below.

### **1.3.1 Site 13**

Site 13, or the Burn Area, is located in the western portion of the Inland Area and within the area bounded on the west by Wake Way and on the southeast by Tarawa Way (Figure 1). The Contra Costa Canal runs parallel to Wake Way along the west side of the road.

From the late 1940s to about 1974, portions of Site 13 were used for the destruction of live ordnance. Ordnance was destroyed by open burning in large, excavated trenches and natural gullies at the site. The initial assessment study (IAS) indicated that ordnance burned at the site might have included flares, smoke chemicals, thermite generators, small-arms ammunition, powder, and loose material cleaned from ammunition ships (Ecology and Environment 1983). Mark 1 and Mark 13 flares might also have been burned or buried in the burn pit. Additionally, powder from several thousand 5-inch rockets and photoflash cartridges might have been burned. In 1947, smoke chemicals (sulfur trioxide and chlorosulfonic acid) may have been disposed of at the site (Ecology and Environment 1983). From 1967 to 1969, an estimated 500,000 pounds of explosives (both black and smokeless powder) reportedly was destroyed at this site. Data on the amount of material destroyed during other periods are not available; however, residual material from ordnance burning reportedly was removed and disposed of off site (Tetra Tech 1997).

Site 13 also was used briefly as a firefighting training area, where napalm and fuel oil were ignited and extinguished by firefighters. Napalm is a general term for jellied gasoline and consists of a mixture of gasoline and aluminum soap powder or polystyrene. Personnel that disposed of explosive ordnance at NWSSBD Concord stated that target practice with 50-caliber machine guns also had been conducted at the site.

Previous investigations conducted at Site 13 included an IAS, site investigation (SI), and RI. During the 1997 RI, soil and groundwater samples were collected at Site 13 to characterize whether ordnance burning had contaminated environmental media at the site (Tetra Tech 1997). Sampling focused on gullies where burning occurred, in site drainage channels, and at randomly selected grid locations.

Based on results from the IAS, SI, RI, and subsequent targeted investigations, soils contaminated with a residue (apparently from burning napalm) were excavated in October 1997 from a former burn area at Site 13. A human health risk assessment following the excavation indicated that the residue no longer posed a significant risk to human health or the environment. The results of the confirmation samples used for the risk assessment are discussed further in Section 2.5.1 of the record of decision (Tetra Tech 2002).

In May 2000, one additional round of groundwater sampling was conducted in well BUAMW010 at Site 13 to evaluate elevated concentrations of manganese formerly measured in groundwater samples from that well. The additional sampling was conducted to evaluate previous sample results where manganese concentrations in groundwater exceeded EPA Region 9 preliminary remediation goals (PRG) for tap water (EPA 2002b).

### 1.3.2 Site 22

Site 22 is located along the southwestern portion of the Inland Area (Figure 2). Environmental investigations at Site 22 focused on Building 7SH5 as a possible contamination source. Building 7SH5 was built in 1944 on a concrete slab with no plumbing or heating (Tetra Tech 1997). Four different operations have been conducted sequentially at this building between 1944 and the present. Between 1944 and 1957, Building 7SH5 was used as a storehouse for inert equipment. In 1957, the building was converted to accommodate testing operations for missile components, including vibration and environment testing, which was the main function of the building until the early 1970s, when it was converted again to accommodate maintenance operations for the Guided Missile Division of the Ordnance Department. During the maintenance operations phase, specific building activities included paint stripping, cleaning, and painting missile wings and fins. These activities primarily involved the use of acetone, trichloroethane, methyl ethyl ketone, chloroethane, and several types of paint thinners. The Tidal Area Landfill reportedly received all wastes from Building 7SH5 until 1978, which was the last year that the maintenance operations for the Guided Missile Division occupied the building. Since 1978, wastes have been disposed of off base. Currently, Building 7SH5 is not in use.

All previous investigations conducted at Site 22 focused on Building 7SH5 as a possible source of contamination. These previous investigations included the following:

- IAS (Ecology and Environment 1983)
- SI (PRC Environmental Management Inc [PRC] 1993)
- Resource Conservation and Recovery Act facility assessment (RFA) (California Department of Toxic Substances Control [DTSC] 1992) and RFA confirmation study (PRC 1997)
- Underground storage tank (UST) investigation (Harding Lawson Associates [HLA] 1995)
- Phase I RI (Tetra Tech 1997)
- Phase II RI (Tetra Tech 1998)
- Supplemental RI (Tetra Tech 2003b)

Each of the previous investigations conducted at Site 22 are summarized below.

### ***Initial Assessment Study***

A visual inspection of Site 22 was conducted during the IAS in 1983 ([Ecology & Environment 1983](#)). The IAS concluded that this site should be excluded from further consideration, but acknowledged that small quantities of wastes might be present there. However, Site 22 was included in the SI, because the absence of records on the disposal activities raised the need to evaluate whether it poses risks to human health or the environment.

### ***Site Investigation***

From 1992 to 1993, the Navy conducted an SI at Site 22, which included the collection of soil samples from three soil borings within a suspected disposal pit and the collection and analysis of one composite surface soil sample from the bottom of a drainage ditch ([PRC 1993](#)).

Soil borings were drilled to a depth of 4 feet within the area of the alleged disposal pit. The soil samples were analyzed for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), metals, tributyltin, and extractable and purgeable total petroleum hydrocarbons (TPH).

Most metals detected in soil samples from the alleged pit area were not detected at concentrations greater than the residential PRG ([EPA 2002b](#)). Only arsenic (16.7 milligrams per kilogram [mg/kg]), copper (332 mg/kg), lead (60.7 gm/kg), and mercury (1.1 and 0.85 mg/kg) were detected at concentrations slightly above the PRGs. The results of the SI sampling at the suspected disposal pit did not indicate evidence of paints, oils, or solvents; however, it was not certain whether the samples were collected from soils beneath the original pit or from relatively clean backfill material.

A composite soil sample from a nearby drainage ditch contained arsenic at a concentration of 33 mg/kg; arsenic was the only metal from the composited ditch sample detected at a concentration that exceeded the reference (estimated ambient) level for metals.

### ***Resource Conservation and Recovery Act Facility Assessment and Confirmation Study***

During the RFA conducted by the DTSC in 1992, Building 7SH5 was designated as solid waste management unit (SWMU) 52 because hazardous waste may have leached into soil from the building's septic tank system ([DTSC 1992](#)).

During the RFA confirmation study conducted from 1995 to 1997, two deep soil borings were advanced in the septic leach field, and two shallow soil borings were advanced along the drainage ditch west of the leach field ([PRC 1997](#)). In addition, one liquid sample from the septic tank and a surface water sample from the drainage ditch were collected. All samples were analyzed for VOCs, SVOCs, total oil and grease, and metals. Arsenic was detected at concentrations of 38.0 and 65.4 mg/kg in surface samples from borings 52-03 and 52-04, respectively.

### ***Underground Storage Tank Investigation***

In September 1993, the Navy conducted an investigation of the UST west of Building 7SH5 (HLA 1995). Soil samples from a boring advanced to 16.5 feet bgs indicated that TPH as diesel was present at depths of 4.5 feet bgs (7,700 mg/kg) and 8 feet bgs (1,600 mg/kg).

An investigation and tank removal plan was prepared in 1995 (HLA 1995); it called for the removal of the UST, associated piping, and all contaminated soils until the results indicated that residual hydrocarbon levels in soil were below 100 mg/kg. The UST was removed, and the surrounding area was investigated in January 1997. Results of the removal showed that the UST was heavily rusted and contained one small hole. Staining was observed in the southern portion of the UST excavation. The soil was excavated to about 12 feet bgs to remove diesel contamination.

### ***Phase I Remedial Investigation***

In 1995, three areas around Building 7SH5 were sampled as part of the Phase I RI to assess whether past site activities have affected environmental media at the site. These areas included the drainage ditches, the alleged disposal pit area, and the UST and associated piping. The analytical results from this sampling event are discussed in the RI report (Tetra Tech 1997).

### ***Phase II Remedial Investigation***

In 1998, a Phase II RI was conducted to confirm the presence of chlorinated hydrocarbons detected in grab groundwater samples collected during the Phase I RI to locate the source of contamination. Sampling was also conducted to assess the extent of TPH contamination in groundwater. During the investigation, four monitoring wells were installed in January 1997; soil and groundwater samples were analyzed for VOCs and extractable TPH. The results of the sampling indicate no evidence of a contaminated groundwater plume (Tetra Tech 1998).

### ***Supplemental RI***

Subsequent to the RI, the Navy initiated an additional field investigation to investigate elevated concentrations of arsenic in soil at Site 22. This investigation, conducted in October 2002, involved the collection of additional soil data to evaluate the extent of arsenic in soil at the site and to assess whether the source of arsenic is anthropogenic (Tetra Tech 2003b). The extent of arsenic in soils surrounding the site has not been established and is the subject of ongoing studies.

## **1.4 TECHNICAL OR REGULATORY STANDARDS**

There are currently no established maximum contaminant levels (MCL) for perchlorate. As discussed in the draft addendum to the field sampling plan (FSP) and quality assurance project plan (QAPP) (Tetra Tech 2003b), a screening level of 1 microgram per liter ( $\mu\text{g/L}$ ) was used to evaluate whether perchlorate was present at concentrations of concern in site groundwater. The criterion is based on the EPA draft reference dose (RfD) for perchlorate presented in

“Perchlorate Environmental Contamination: Toxicological Review and Risk Characterization (2002 External Review Draft)” (EPA 2002a).

The California Department of Health Services (DHS) is currently using 4 µg/L as an action level for perchlorate in drinking water. This action level was recently lowered to its current level based on the draft RfD proposed by EPA, and this revised level represents the lower value of the 4- to 18-µg/L range that resulted from an earlier provisional RfD proposed by EPA (<http://www.dhs.ca.gov/ps/ddwem/chemicals/perchl/actionlevel.htm>). In December 2002, the Office of Environmental Health Hazard Assessment (OEHHA) released a revised draft public health goal for perchlorate of 2 to 6 µg/L. According to the DHS website, OEHHA’s public health goal, when final, will contribute to DHS’s development of an MCL for perchlorate.

Although explosive residues were not detected in any of the groundwater samples at the site, EPA’s PRGs for tap water (EPA 2002b) were proposed as screening criteria in the SAP addendum (Tetra Tech 2003a).

## 2.0 GROUNDWATER SAMPLING PROCEDURES AND METHODS

Groundwater sampling was conducted in accordance with the draft SAP addendum (Tetra Tech 2003a). On June 16 and 17, 2003, Tetra Tech sampled five monitoring wells, including four wells at Site 13 and one well at Site 22. The following sections discuss groundwater level measurements in these wells and sample collection procedures and the laboratory analyses process. Appendix C provides photographs of the groundwater sampling event.

### 2.1 GROUNDWATER LEVEL MEASUREMENT AND SAMPLING PROCEDURES

Before groundwater sampling began, groundwater levels were measured using an electronic water level indicator. Table 1 presents the water level measurements.

Following water level measurements, each well was purged using a bladder pump and sampled using the low-flow rate (minimal drawdown) sampling method (Tetra Tech 2003b). Field parameters including temperature, pH, turbidity, specific conductance, dissolved oxygen, and depth to water were measured. Each parameter was measured before purging and then at regular 1-liter increments thereafter. Parameters were recorded on monitoring well sampling sheets, which are included in this report as Appendix D. A minimum of 8 liters was purged from each well until the water quality parameters were stabilized. On June 16, 2003, Phillip Ramsey of the EPA was on site to observe sampling activities at Site 13.

Groundwater samples for perchlorate analyses were collected in unpreserved plastic bottles. The groundwater samples for explosives residues were collected into amber glass bottles with Teflon-lined lids. The required volumes of groundwater (Tetra Tech 2003b) were placed in appropriate sample containers, cooled to  $4 \pm 2^\circ\text{C}$ , and shipped to the laboratory.

Quality control (QC) samples were also collected, including one source water blank, two equipment rinsates, one field duplicate sample, and one matrix spike/matrix spike duplicate sample ([Appendix D](#)). A performance evaluation blank, a sample spiked with perchlorate by EPA laboratories in Las Vegas, Nevada, was provided to Tetra Tech. The sample, which was poured into the same container type as the samples collected at Sites 13 and 22, was submitted to GPL Laboratories on June 16, 2003. [Appendix D](#) contains a chain of custody for the performance evaluation blank sample.

Water level sounders used during water sampling activities were decontaminated before each use by washing the probe and the portion of the cable directly above the probe with deionized (DI) water and wiping it clean with a disposable paper towel. Bladder pumps were decontaminated before each use by washing the exterior of the pump with DI water and Liquinox soap solution and then pumping a solution of DI water and Liquinox soap through the pump. The pump was then flushed with DI water. New polyethylene tubing for the pumps was used at each well; therefore, decontamination of the tubing was not necessary. Purged water from sampling and decontamination fluids were placed in a 55-gallon drum, which was removed in August 2003.

## **2.2 LABORATORY ANALYSES**

The groundwater samples were analyzed by GPL Laboratories. [Appendix D](#) contains the complete chain-of-custody record forms that accompanied the samples collected from monitoring wells to the laboratory.

Groundwater samples were analyzed using the following analytical methods:

- EPA Method 8330 for explosives residue ([EPA 1998](#))
- EPA Method 314 for perchlorate ([EPA 1999](#))

## **3.0 GROUNDWATER SAMPLING RESULTS**

This section discusses analytical results and data quality for samples collected from four wells at Sites 13 and the one well at Site 22. [Appendix E](#) presents the complete analytical results, which are also posted on [Figures 1 and 2](#).

### **3.1 ANALYTICAL RESULTS**

The results of the analysis indicate the presence of perchlorate in three of the four wells sampled at Site 13 and in the one well sampled at Site 22. The highest concentration detected in the Site 13 well was 2 µg/L. Concentrations in only two of the wells (wells BUAMW002 and BUAMW012 at Site 13) exceeded the 1-µg/L screening level adopted by the remedial project team. The concentration in the Site 22 well (0.56 µg/L) was below the screening level. All concentrations were below the DHS action level of 4 µg/L. [Table 2](#) presents the results of groundwater sampling at Sites 13 and 22.

**TABLE 2: ANALYTICAL RESULTS FOR GROUNDWATER SAMPLES**

Groundwater Sampling Summary Report for Sites 13 and 22, NWSSBD Concord

Sample Identification No.	Site	Monitoring Well	Perchlorate	Explosive Residue
12113001	Site 13	BUAMW002	1.3 µg/L	Not Detected
12113002	Site 13	BUAMW010	0.57 µg/L	Not Detected
12113003	Site 13	BUAMW011	Not Detected	Not Detected
12113004	Site 13	BUAMW012	2 µg/L	Not Detected
12113005	Site 13	BUAMW012 (duplicate)	0.7 µg/L	Not Detected
12122005	Site 22	7SHMW002	0.56 µg/L	Not Tested

**3.2 DATA QUALITY**

Ethix Inc. validated the analytical data, as detailed in the data validation report ([Appendix E](#)). Adherence to standard quality assurance (QA) and QC techniques in the field and in the laboratory ensured the quality of the data collected during groundwater sampling at Sites 13 and 22. Field QA/QC consisted of collecting one source water blank, two equipment rinsates, one field duplicate sample, one matrix spike/matrix spike duplicate sample, and a performance evaluation blank. Table 3 presents the analytical results for QC samples.

**TABLE 3: ANALYTICAL RESULTS FOR QUALITY CONTROL SAMPLES**

Groundwater Sampling Summary Report for Sites 13 and 22, NWSSBD Concord

Sample Identification No.	Sample Type	Perchlorate	Explosive Residue
12113007	Source Blank	Not Detected	0.27 µg/L (2,4,6-Trinitrotoluene) 9 µg/L (octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine)
12113008	Equipment rinsate	Not Detected	0.34 µg/L (2,4,6-Trinitrotoluene)
12113003	Matrix Spike/Matrix Duplicate	Not Detected	0.026 µg/L UJ (1,3,5-Trinitrobenzene)
12113009	Performance Evaluation Sample <sup>a</sup>	1.6 µg/L	Not Tested
12113010	Equipment rinsate	Not Detected	Not Tested

Note:

a Performance evaluation sampled provided by EPA.

The presence of explosive residues in the source blank and equipment rinsate samples suggests contamination of the source water itself. Two equipment rinsate samples were collected during the 2-day sampling event by flushing DI water over the bladder pump after it was decontaminated. One of the samples contained 2,4,6-trinitrotoluene at a concentration just slightly above the reporting detection limit of 0.26 µg/L, which may be related to analytical error.

Due to accuracy problems in the matrix spike/matrix spike duplicate analysis, the nondetected result of 1,3,5-trinitrobenzene was qualified as estimated. Only the spiked sample was affected by the outlier ([Appendix E](#)).

As discussed above, a field duplicate sample was collected from well BUAMW012 ([Table 2](#)). The original sample contained perchlorate at a concentration of 2 µg/L ([Table 2](#)), and the duplicate sample contained perchlorate at a concentration of 0.7 µg/L ([Table 2](#)). The relative percent difference between these concentrations is greater than 25 percent, which indicates some inconsistency with the sample collection or analysis. However, the validator did not flag or qualify the result as estimated.

A performance evaluation sample prepared by the EPA Quality Assurance Technical Support Laboratory with a known concentration of perchlorate was included for analysis with the groundwater samples collected at the site. The sample was spiked with a perchlorate concentration (1.997 µg/L) close to the laboratory detection limit of 1.0 µg/L to assess whether the laboratory could successfully identify and report perchlorate near the detection limit. The GPL laboratories, which analyzed the samples collected at the site, reported a result of 1.6 µg/L for the PE sample. Based on these results, EPA concluded that the laboratory had successfully identified and reported perchlorate in the PE.

Overall, the perchlorate and explosive residue data were found to be of good quality ([Appendix E](#)).

#### **4.0 CONCLUSIONS**

Based on groundwater sampling and analysis conducted at Sites 13 and 22, perchlorate was detected in three of the four wells at Site 13 and in the single well sampled at Site 22. Perchlorate concentrations from two of four monitoring wells at Site 13 exceed the screening level of 1.0 µg/L agreed to by the remedial project team. The perchlorate concentration in the single well sampled at Site 22 was below the screening level. No concentrations in any of the wells exceeded the DHS action level of 4 µg/L. Explosive residues were not detected in any of the groundwater samples collected at Site 13.

As a result of the detected perchlorate, the Navy plans to work with the regulatory agencies to further assess the extent of contamination at these sites. The schedule of the work is discussed in the executive summary and is presented in the draft Site Management Plan (SMP) dated September 30, 2003. The Navy will conduct additional groundwater sampling following the finalization of the SAPs. The results will be reported in RI reports. Upon completion of the RI reports, FSs are currently anticipated to be necessary.

## 5.0 REFERENCES

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**APPENDIX A**  
**BORING LOGS AND WELL CONSTRUCTION LOGS**

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**SITE 13 – BORING LOGS AND WELL CONSTRUCTION LOGS**

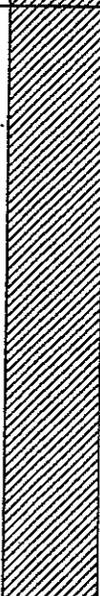
**MONTGOMERY  
WATSON**



365 Lennon Lane  
Walnut Creek,  
California 94598  
(510) 975-3400

CLIENT <b>CONCORD WPNSTA</b>		PROJECT NUMBER <b>CTO 303</b>	LOCATION <b>INLAND AREA</b>	
DRILLING AND SAMPLING METHODS <b>Air Rotary Casing Hammer</b>				
Water Level	<b>31.06</b>		START	FINISH
Time	<b>08:00</b>		TIME	TIME
Date	<b>06/12/95</b>		DATE <b>6/8/95</b>	DATE <b>6/8/95</b>

LOG OF SOIL BORING: **BUAMW010**  
Coordinates: **Burn Area**

DEPTH (ft)	PID (ppm)	USCS	GRAPHIC LOG	SURFACE CONDITIONS: <b>dry grass</b>		FEATURES/REMARKS
				GEOLOGIST: <b>Y.LEUNG/D.WINTER</b>		
0.0		CL		Sandy CLAY, Occasional Gravel, 7.5 YR 5/1, strong structure, hard, poor gradation, dry, nonplastic, many pores/paths, majority fines, 15% coarse		sample collected
1						
2						
3						
4						
5		CL		Sandy CLAY, Occasional Gravel, 7.5 YR 6/4, strong structure, hard, poor gradation, dry, nonplastic, many pores/paths, majority fines, 15% coarse		sample collected
6						
7						
8						
9						
0.3						
10						

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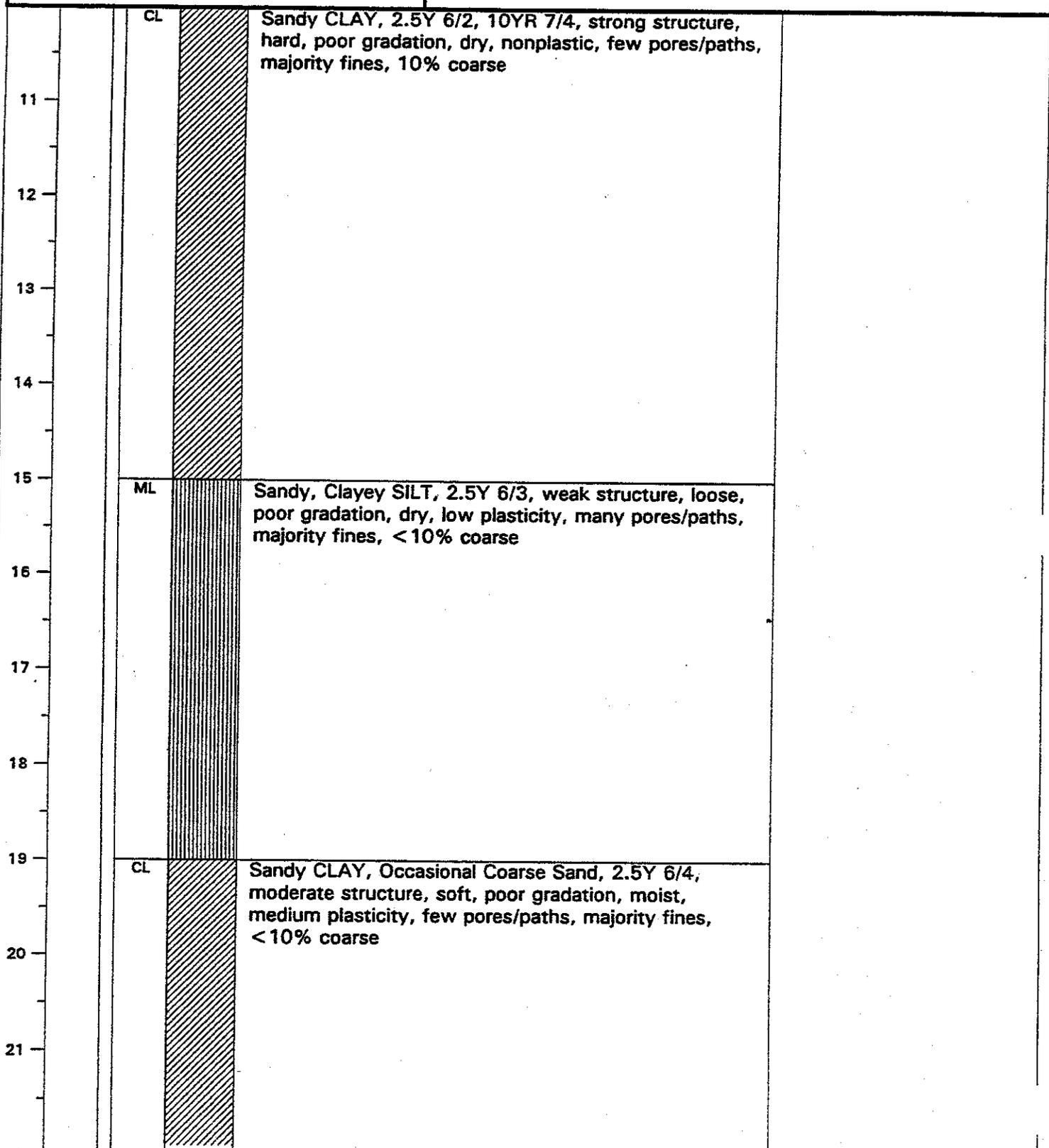
PROJECT NUMBER

CTO 303

LOCATION

INLAND AREA

LOG OF SOIL BORING: **BUAMW010**



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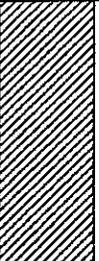
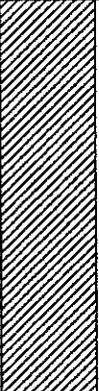
PROJECT NUMBER

CTO 303

LOCATION

INLAND AREA

LOG OF SOIL BORING: **BUAMW010**

22	CL		Sandy CLAY, Occasional Coarse Sand, 2.5Y 6/4, moderate structure, soft, poor gradation, moist, medium plasticity, few pores/paths, majority fines, <10% coarse
23			
24	CL		Sandy CLAY with Gravel, 2.5Y 6/4, moderate structure, soft, poor gradation, moist, medium plasticity, few pores/paths, majority fines, <10% coarse
25			
26			
27	CL		Sandy CLAY, Trace Coarse Sand, 2.5Y 6/3, moderate structure, firm, poor gradation, moist, medium plasticity, few pores/paths, majority fines, 10% coarse
28			
29			
30	GC		Sandy, Clayey GRAVEL, 2.5Y 5/6, weak structure, loose, well graded, moist, nonplastic, many pores/paths, 20% fines, majority coarse
31			
32	CL		Gravelly CLAY, with Coarse to Fine Sand, 2.5Y 5/6, weak structure, loose, fair gradation, moist grading to wet, low plasticity, many pores/paths, majority fines, 30% coarse
33			



LOG OF SOIL BORING: **BUAMW010**

34	CL	Gravelly CLAY, with Coarse to Fine Sand, 2.5Y 5/6, weak structure, loose, fair gradation, moist grading to wet, low plasticity, many pores/paths, majority fines, 30% coarse	geotech sample collected at 38.0 feet
35			
36			
37	CL	Gravelly CLAY, with Coarse to Fine Sand, 2.5Y 5/6, weak structure, loose, fair gradation, wet, low plasticity, many pores/paths, majority fines, 30% coarse	
38	GC	Clayey GRAVEL, 2.5Y 5/6, weak structure, loose, fair gradation, wet, nonplastic, many pores/paths, 50% fines, 50% coarse	similar color to water bearing lens in BUAMW12
39			
40			
41			
42	SC	Clayey SAND, with Gravel, GLEY 4/ 10Y, weak structure, soft, fair gradation, wet, low plasticity, many pores/paths, 30% fines, majority coarse	
43			
44			
45		End of Boring at 45.0 ft	

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LOCATION

INLAND AREA

DRILLING AND  
SAMPLING  
METHODS

Air Rotary Casing Hammer

Water Level

100.45

START

FINISH

Time

09:00

TIME

TIME

Date

06/13/95

DATE

6/6/95

DATE

6/7/95

LOG OF SOIL BORING: **BUAMW011**

Coordinates: Burn Area

SURFACE  
CONDITIONS: dry grass

GEOLOGIST: Y.LEUNG/D.WINTER

FEATURES/REMARKS

DEPTH  
(ft)

PID  
(ppm)

USCS

GRAPHIC  
LOG

0.0		ML		Sandy SILT with Gravel, 10YR3/4, weak structure, very hard, poor gradation, dry, nonplastic, many pores/paths, majority fines, 15% coarse	compacted silt pieces, sample collected; PID, CGI, RAD meters all are 0 above background
1		ML		Clayey SILT with Gravel, 10YR5/3, medium structure, very hard, poor gradation, damp, low plasticity, many pores/paths, majority fines, 25% coarse	
2					
3					
4		CL		Sandy CLAY with Gravel, 10YR5/4, medium structure, stiff, poor gradation, damp, low plasticity, many pores/paths, majority fines, 25% coarse	sample collected; PID, CGI, RAD meters all are 0 above background
5	0.1				
6					
7					
8		ML		Sandy SILT, 10YR5/6, medium structure, soft to stiff, poor gradation, damp, low plasticity, few pores/paths, majority fines, 25% coarse	sample collected; PID, CGI, RAD meters all are 0 above background
9					
10					

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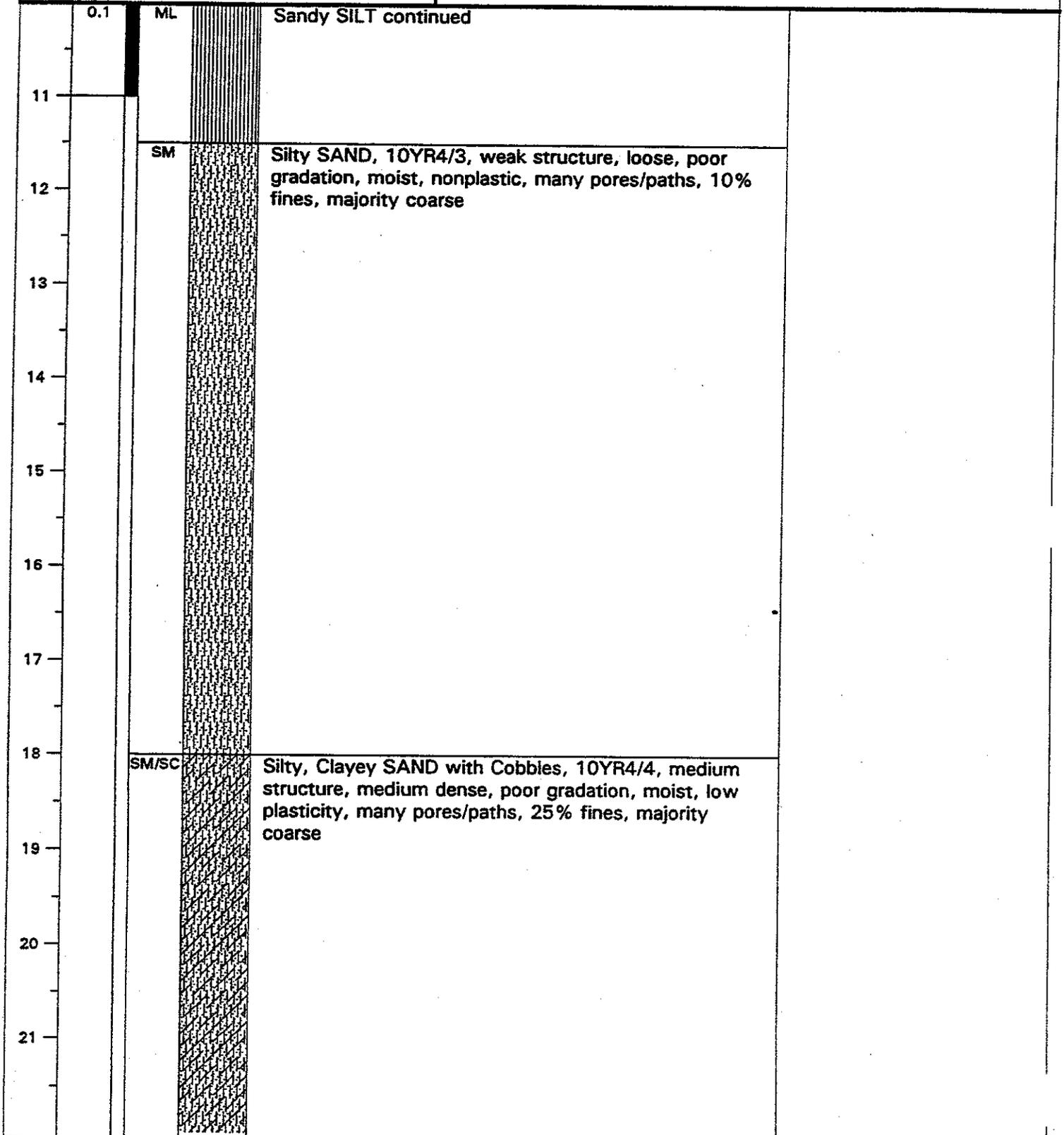
PROJECT NUMBER

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LOCATION

INLAND AREA

LOG OF SOIL BORING: **BUAMW011**



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LOG OF SOIL BORING: **BUAMW011**

22	CL	Sandy CLAY, Occasional Fine Gravel, 10YR5/4, medium structure, medium stiff, poor gradation, moist, low plasticity, few pores/paths, majority fines, 20% coarse	
23			
24			
25			
26			
27			
28			
29			
30	CL	Silty, Sandy CLAY, Occasional Fine Gravel, 10YR5/6, strong structure, very stiff, poor gradation, moist, medium plasticity, no pores/paths, majority fines, <10% coarse	PID, CGI, RAD meters all are 0 above background
31			
32	SM/SC	Clayey, Silty SAND with Gravel, 10YR4/4, weak structure, loose, poor gradation, damp, nonplastic, many pores/paths, 15% fines, majority coarse	clay clumps together in cobble size pieces. gravels increase to cobble size with depth at 40 ft bgs
33			

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LOG OF SOIL BORING: **BUAMW011**

34	SM/SC	Clayey, Silty SAND with Gravel continued
35		
36		
37		
38	SM	Silty SAND with Gravel, 10YR3/6, weak structure, loose, poor gradation, damp, nonplastic, many pores/paths, 10% fines, majority coarse
39		
40		
41		
42	ML	Sandy, Clayey SILT, Occasional Gravel, 10YR5/4, weak structure, soft, poor gradation, damp, low plasticity, few pores/paths, majority fines, 10% coarse
43		
44		
45		

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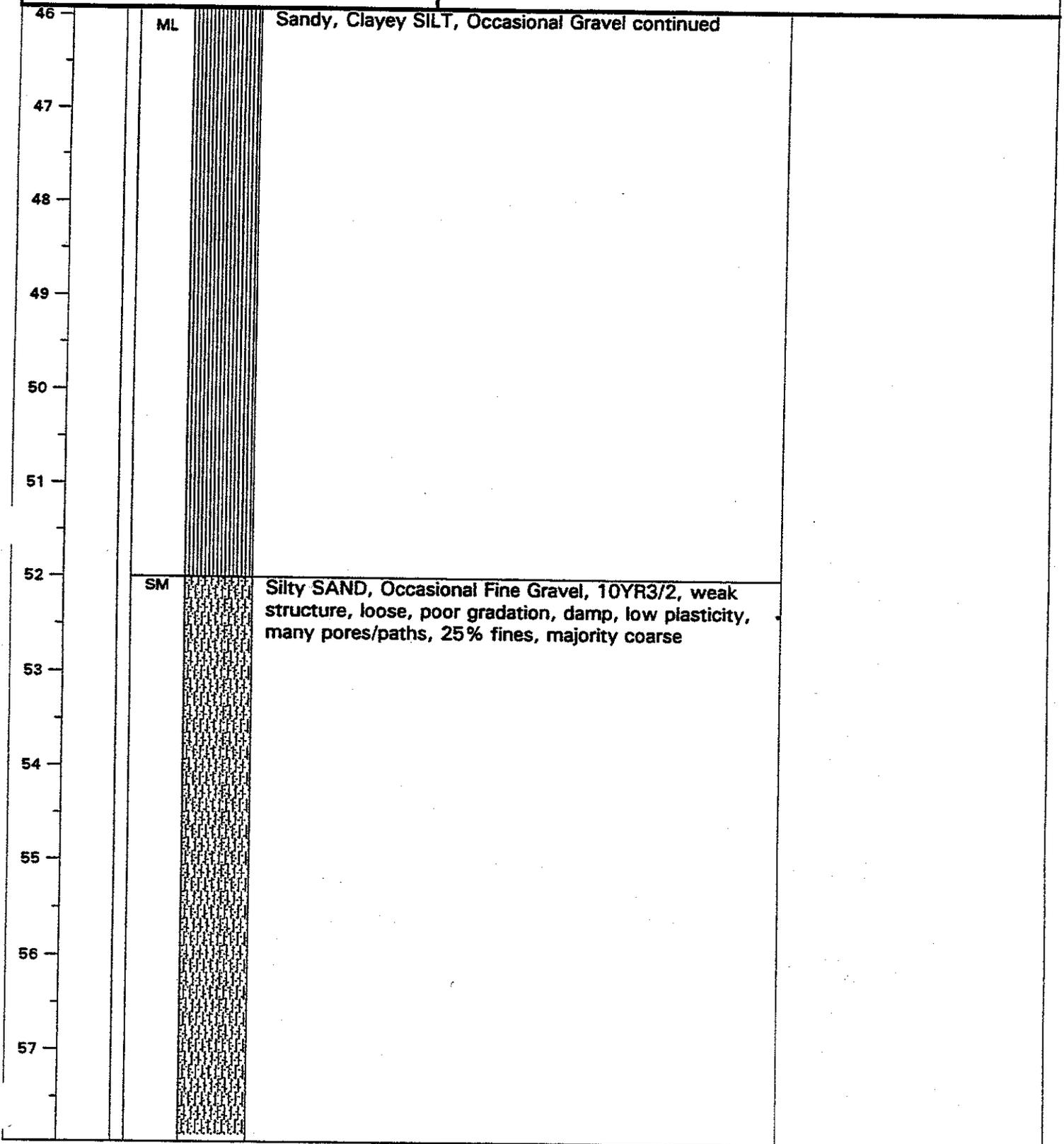
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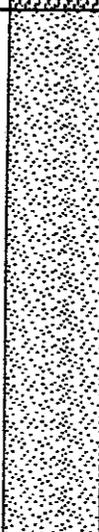
LOCATION

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LOG OF SOIL BORING: **BUAMW011**





58	SM		Silty SAND, Occasional Fine Gravel continued	PID, CGI, RAD meters all are 0 above background
59				
60	SP		Gravelly SAND with Silt, 10YR4/3, weak structure, loose, poor gradation, damp, nonplastic, many pores/paths, 10% fines, majority coarse	
61				
62				
63				
64	GP		Sandy GRAVELS, 10YR4/4, weak structure, loose, poor gradation, dry, nonplastic, many pores/paths, 10% fines, majority coarse	
65				
66				
67	CL		Gravelly CLAY, 10YR5/3, 10YR4/3, medium structure, medium stiff, poor gradation, damp, low to medium plasticity, few pores/paths, majority fines, 25% coarse	
68				
69				



70	SM		Silty, Clayey SAND, 10YR4/4, weak structure, medium dense, poor gradation, damp, low plasticity, many pores/paths, 20% fines, majority coarse	PID, CGI, RAD meters all are 0 above background
71				
72	CL		Sandy CLAY with Gravel, 10YR5/4, medium structure, medium stiff, poor gradation, damp, medium plasticity, few pores/paths, majority fines, 15% coarse	
73				
74				
75	CL		Silty CLAY with Sand, 10YR5/4, strong structure, very stiff, poor gradation, damp, high plasticity, few pores/paths, majority fines, 10% coarse	
76				
77	SP		Gravelly SAND with Clay, 2.5Y6/2, weak structure, loose, poor gradation, dry, nonplastic, many pores/paths, 10% fines, majority coarse	
78				
79				
80	SM		Silty SAND, 2.5Y6/3, 10YR4/3, weak structure, loose, poor gradation, damp, low, many pores/paths, 20% fines, majority coarse	
81				



82	SM	Silty SAND continued
83		
84		
85		
86		
87		
88	CL	Sandy CLAY, 2.5Y5/3, medium structure, stiff, poor gradation, moist, medium, few pores/paths, majority fines, 15% coarse
89		
90	SM/SC	Silty, Clayey SAND, 2.5Y5/3, 10YR5/3, weak structure, loose, poor gradation, damp, low plasticity, many pores/paths, 15% fines, majority coarse
91		
92		
93		

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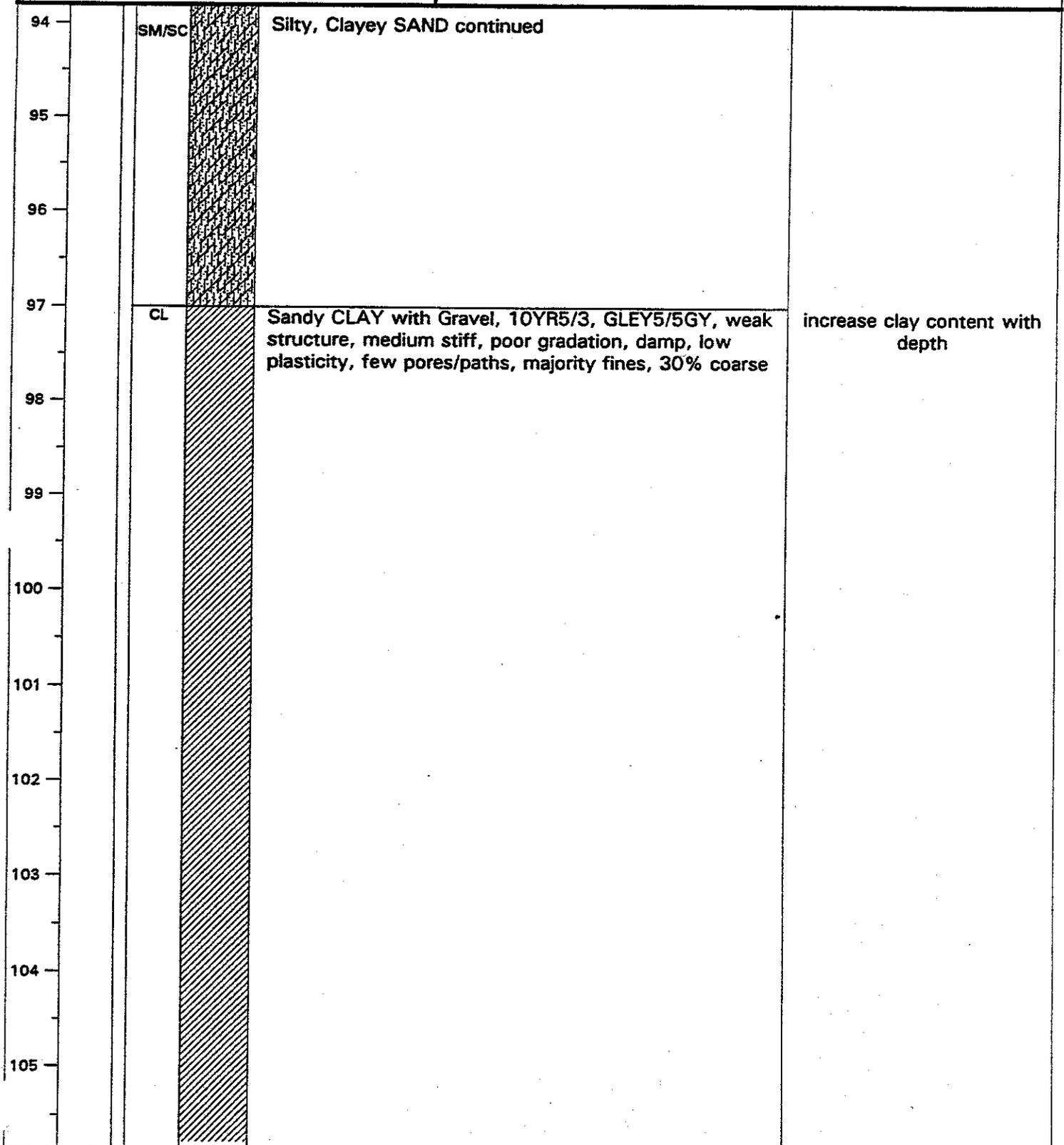
PROJECT NUMBER

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LOCATION

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LOG OF SOIL BORING: **BUAMW011**



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LOCATION

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LOG OF SOIL BORING: **BUAMW011**

106	CL	Sandy CLAY with Gravel continued	
107			
108			
109			
110			
111			
112	CL	Sandy CLAY with Gravel, GLEY5/10Y, strong structure, stiff, poor gradation, wet, high plasticity, many pores/paths, majority fines, 20% coarse	gravels increase to 2" in diameter, encounter water at 117
113			
114			
115			
116			
117	0.6 SM	Silty SAND with Clay, GLEY5/10Y, weak structure, loose, fair gradation, wet, nonplastic, many pores/paths, 25% fines, majority coarse	sample collected, sample collected; PID, CGI, RAD meters all are 0 above background

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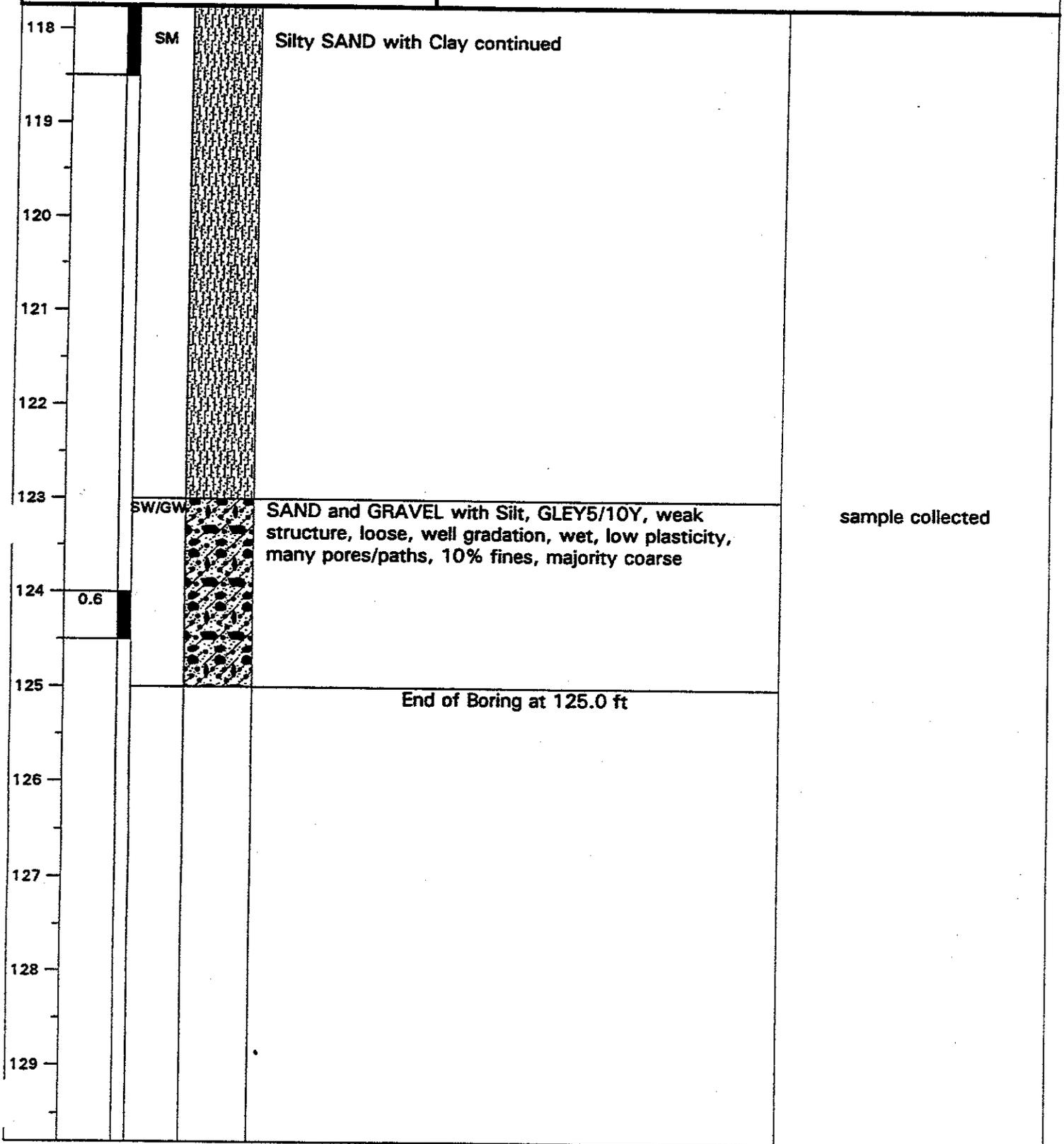
PROJECT NUMBER

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LOCATION

INLAND AREA

LOG OF SOIL BORING: **BUAMW011**



<b>MONTGOMERY WATSON</b>  365 Lennon Lane Walnut Creek, California 94598 (510) 975-3400	CLIENT	PROJECT NUMBER	LOCATION
	CONCORD WPNSTA	CTO 303	INLAND AREA
	DRILLING AND SAMPLING METHODS <b>Air Rotary Casing Hammer</b>		
<b>LOG OF SOIL BORING: BUAMW012</b> Coordinates: <b>Burn Area</b>	Water Level	18.11	START
	Time	08:22	FINISH
	Date	06/13/95	DATE
			5/31/95
			6/5/95

DEPTH (ft)	PID (ppm)	USCS	GRAPHIC LOG	SURFACE CONDITIONS: grasses	FEATURES/REMARKS
				GEOLOGIST: Y.LEUNG/D.WINTER	
2.0		ML		Sandy SILT with Gravel, 10YR5/3, weak structure, very hard, poor gradation, dry, nonplastic, many pores/paths, majority fines, 20% coarse	sample collected; PID, CGI, RAD meters all are 0 above background
1		CL		Sandy CLAY, Occasional Gravel, 10YR5/4, medium structure, medium stiff, poor gradation, dry, low plasticity, few pores/paths, majority fines, 15% coarse	
5		CH		CLAY, 10YR5/4, strong structure, very firm, poor gradation, dry, high plasticity, no pores/paths, majority fines, <10% coarse	sample collected; PID, CGI, RAD meters all are 0 above background
0.0		ML		Sandy SILT, w/clay, 10YR 5/3, 10YR 5/4, weak structure, medium stiff, poor gradation, dry, low plasticity, few pores/paths, majority fines, 10% coarse	
8		CL		Sandy CLAY, Occasional Gravel, 10YR 6/4, strong structure, stiff, poor gradation, moist, medium plasticity, few pores/paths, majority fines, 15% coarse	sample collected; PID, CGI, RAD meters all are 0 above background
10					

**MONTGOMERY  
WATSON**



365 Lennon Lane  
Walnut Creek,  
California 94598  
(510) 975-3400

CLIENT

CONCORD WPNSTA

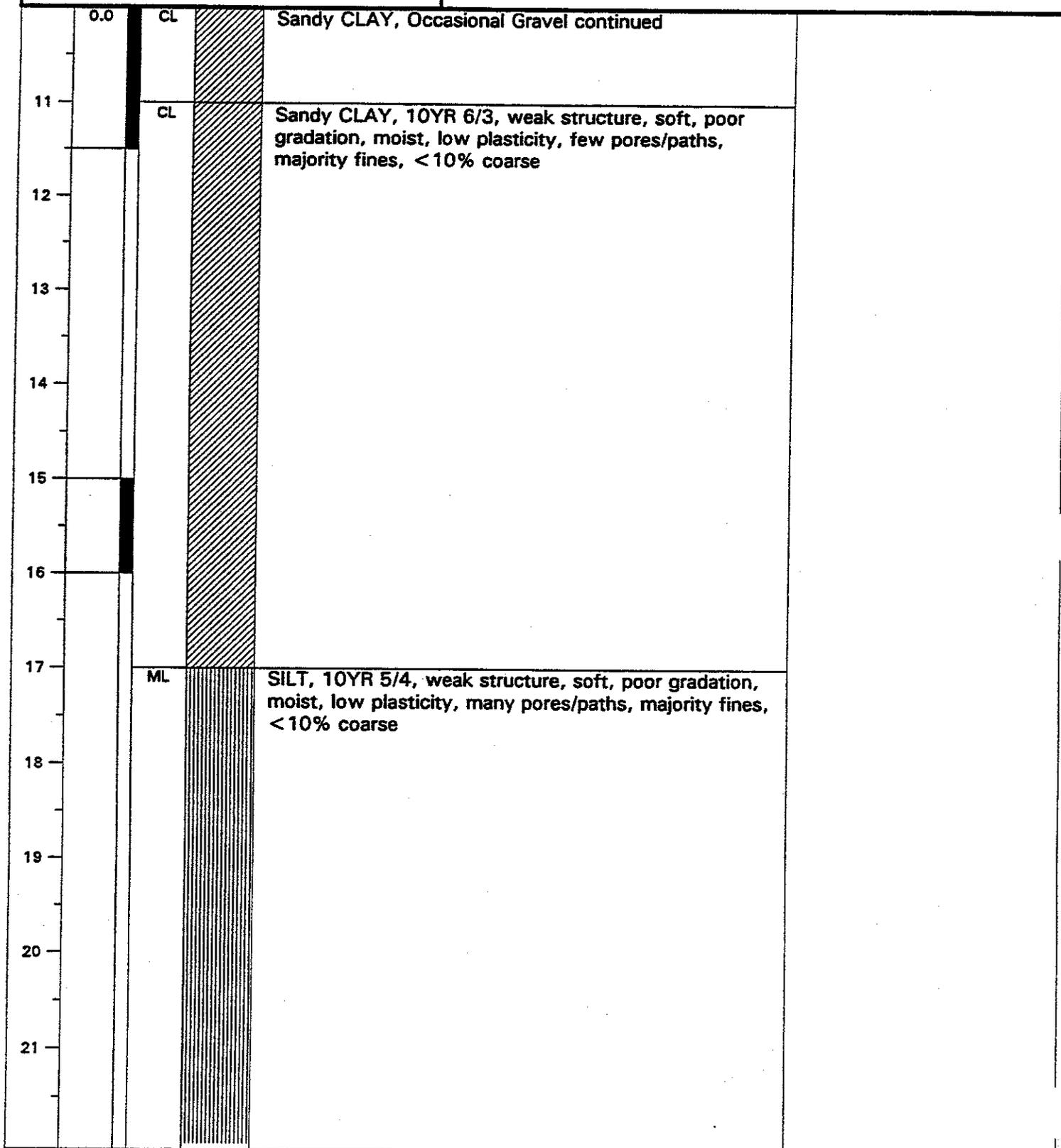
PROJECT NUMBER

CTO 303

LOCATION

INLAND AREA

LOG OF SOIL BORING: **BUAMW012**



**MONTGOMERY  
WATSON**



365 Lennon Lane  
Walnut Creek,  
California 94598  
(510) 975-3400

CLIENT

CONCORD WPNSTA

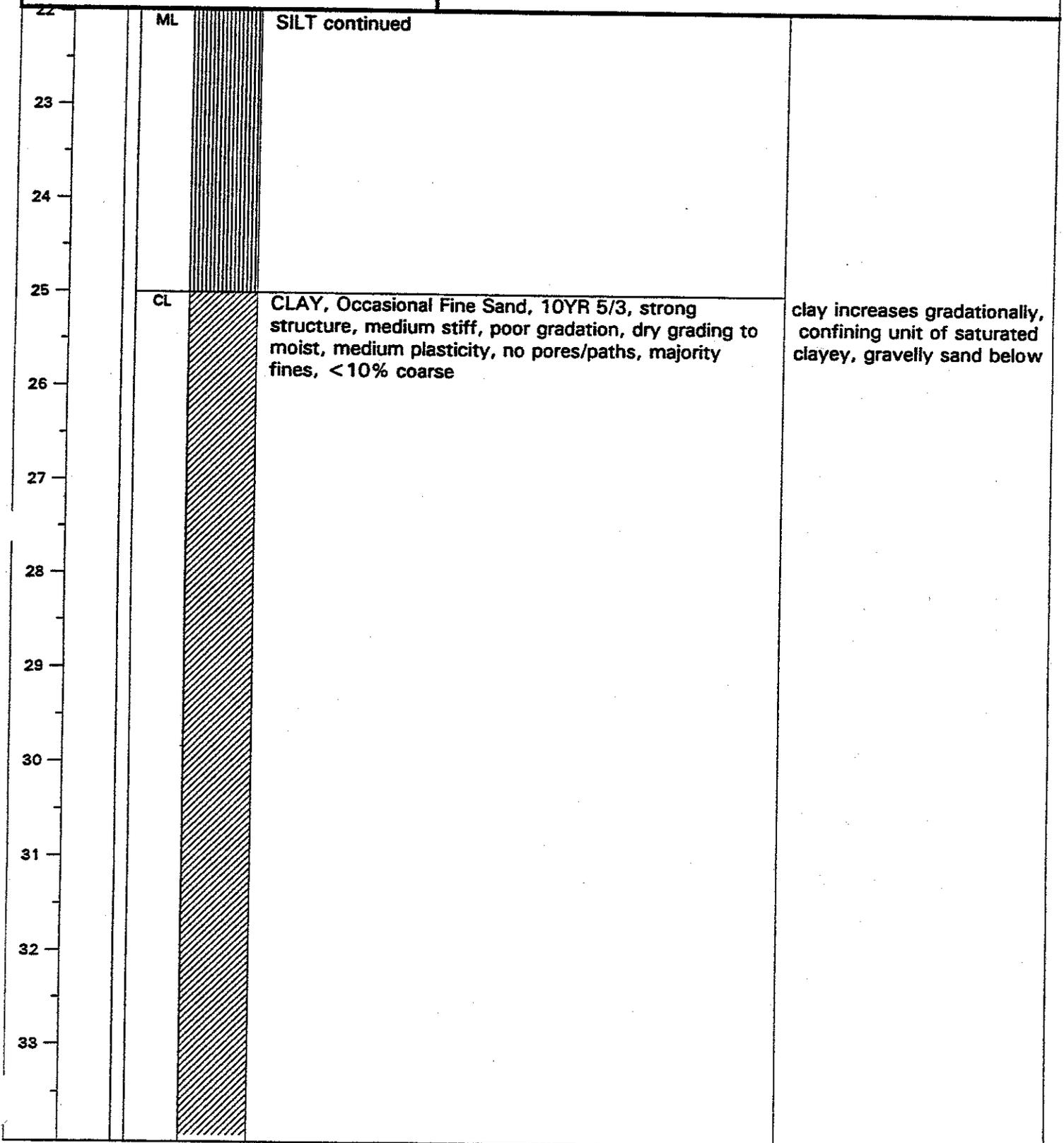
PROJECT NUMBER

CTO 303

LOCATION

INLAND AREA

LOG OF SOIL BORING: **BUAMW012**



**MONTGOMERY  
WATSON**



365 Lennon Lane  
Walnut Creek,  
California 94598  
(510) 975-3400

CLIENT

CONCORD WPNSTA

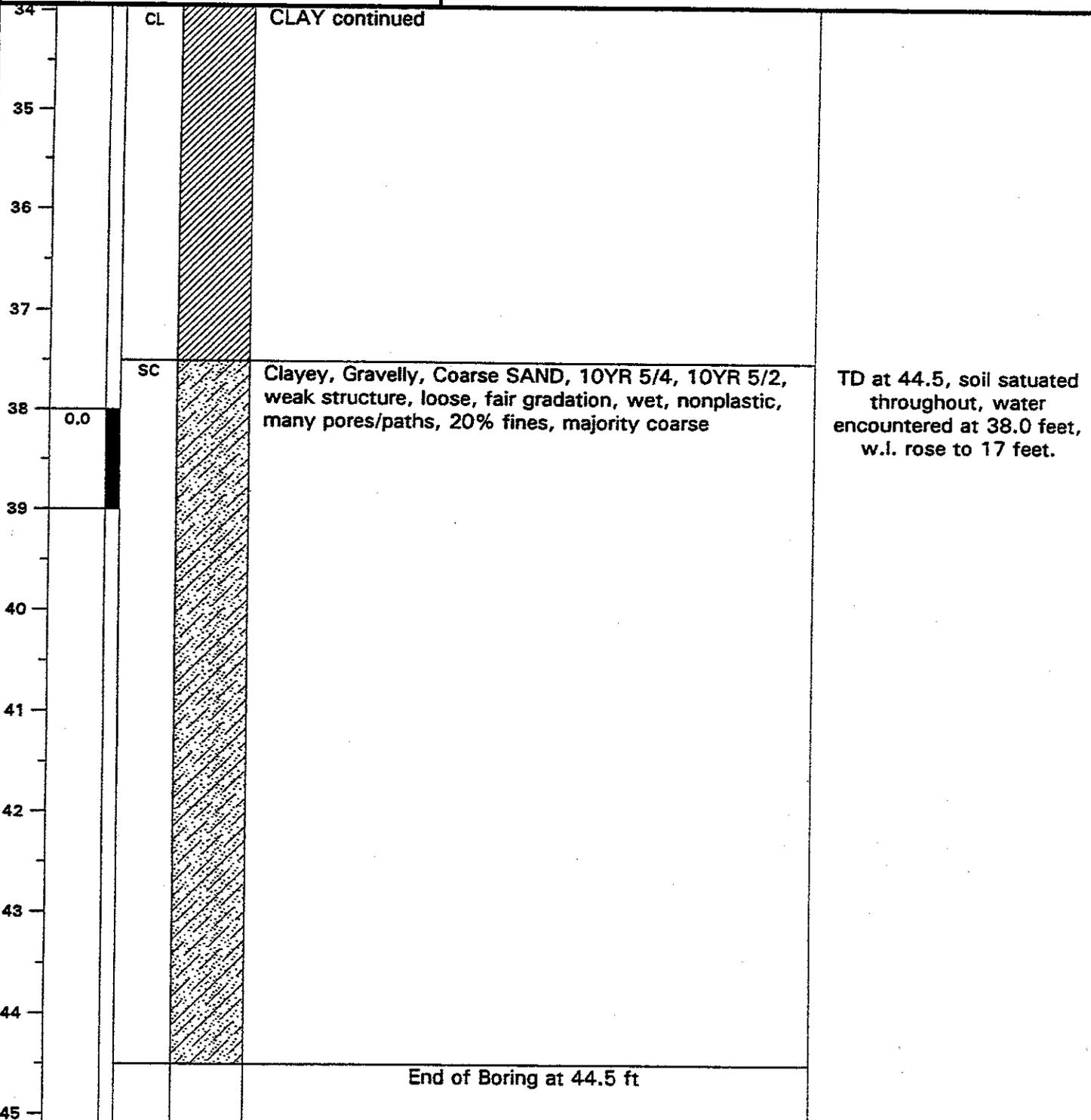
PROJECT NUMBER

CTO 303

LOCATION

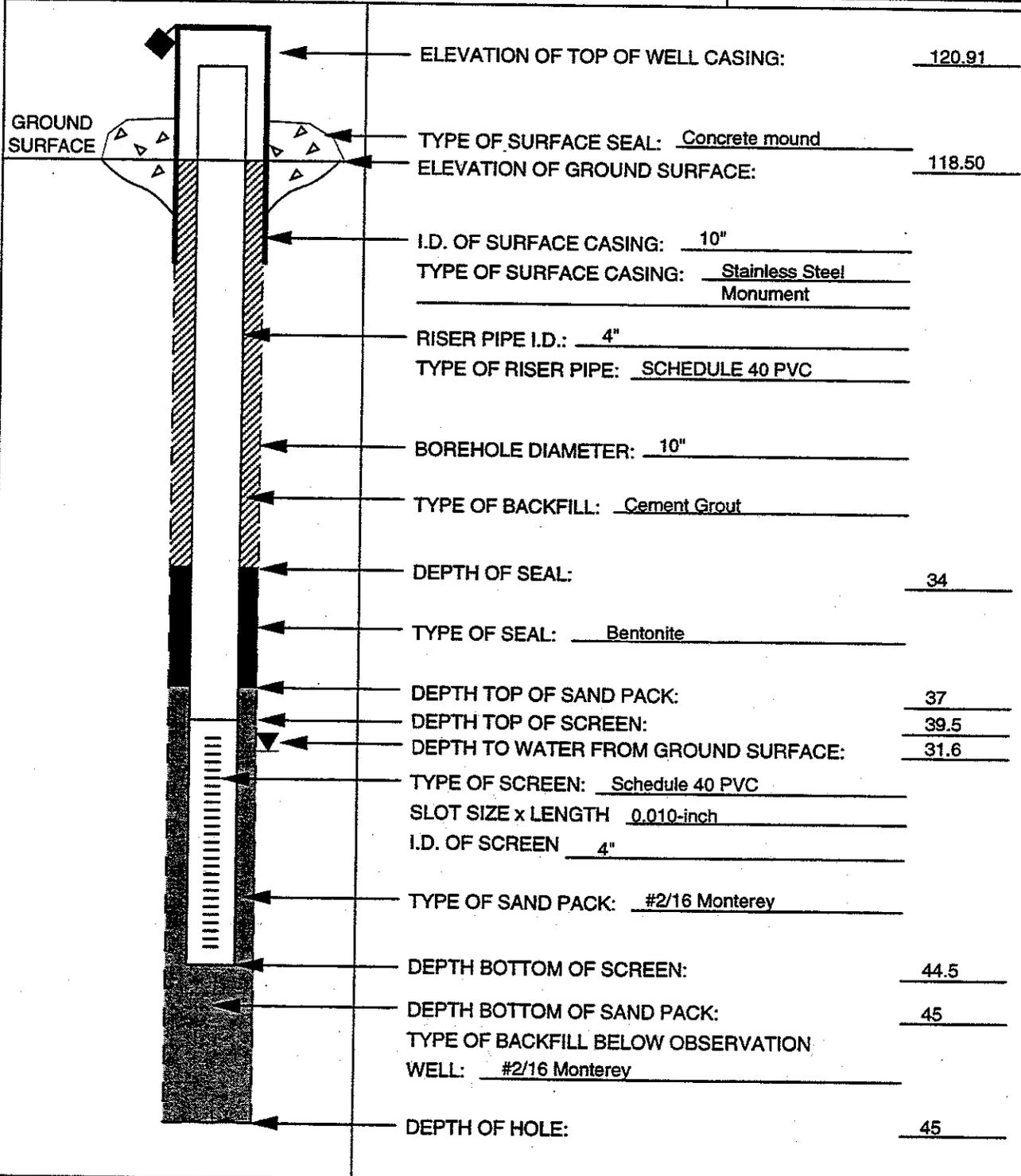
INLAND AREA

LOG OF SOIL BORING: **BUAMW012**



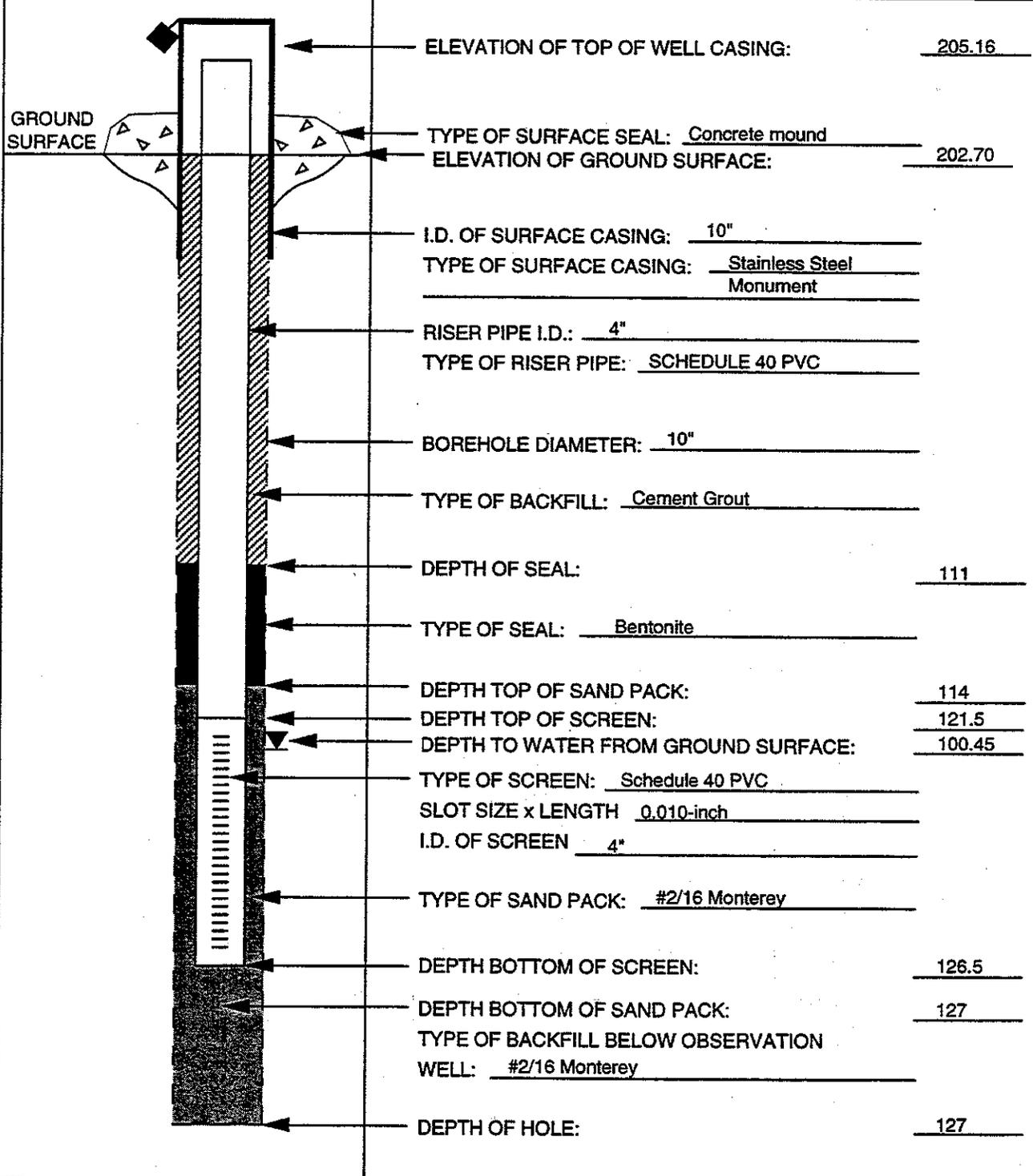
### MONITORING WELL DIAGRAM

PROJECT <u>Concord Inland RI</u>	LOCATION <u>WPNSTA Concord</u>	DRILLER <u>West Hazmat Drilling Corp.</u>
PROJECT NO. <u>2738.1325</u>	BORING <u>BUAMW010</u>	METHOD <u>Hollow Stem Auger DEVELOPMENT</u>
ELEVATION <u>(TOC) 120.91</u>	DATE <u>6/8/95</u>	METHOD <u>Surge/Bail</u>
FIELD GEOLOGIST <u>Y. Leung/D. Winter</u>		



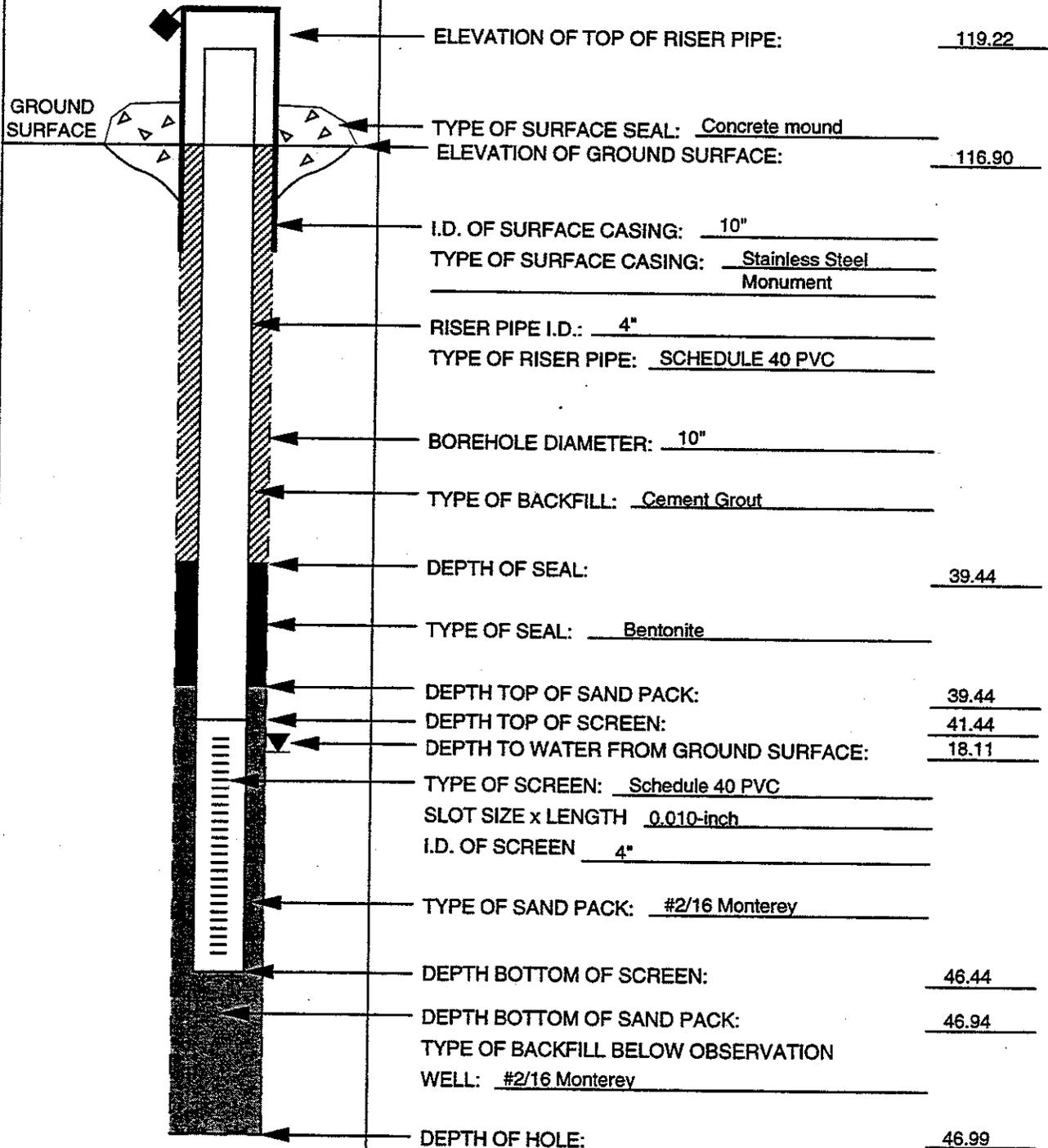
### MONITORING WELL DIAGRAM

PROJECT <u>Concord Inland RI</u>	LOCATION <u>WPNSTA Concord</u>	DRILLER <u>West Hazmat Drilling Corp.</u>
PROJECT NO. <u>2738.1325</u>	BORING <u>BUAMW011</u>	METHOD <u>Hollow Stem Auger DEVELOPMENT</u>
ELEVATION <u>(TOC) 205.16</u>	DATE <u>6/8/95</u>	METHOD <u>Surge/Bail</u>
FIELD GEOLOGIST <u>Y. Leung/D. Winter</u>		



### MONITORING WELL DIAGRAM

PROJECT <u>Concord Inland RI</u>	LOCATION <u>WPNSTA Concord</u>	DRILLER <u>West Hazmat Drilling Corp.</u>
PROJECT NO. <u>2738.1325</u>	BORING <u>BUAMW012</u>	METHOD <u>Air Rotary Casing Hammer DEVELOPMENT</u>
ELEVATION <u>(TOC) 112.22</u>	DATE <u>6/13/95</u>	METHOD <u>Surge/Bail</u>
FIELD GEOLOGIST <u>Y. Leung/D. Winter</u>		



**SITE 22 – BORING LOGS AND WELL CONSTRUCTION LOGS**

PROJECT: Navy Clean II, Concord Naval Weapons Station

SITE ID: 7SH

BORING ID: MW02

PROJECT MANAGER: Anju Vig

CHARGE NO.: 069-036B0202

PROJECT TASK: Site 22, Monitoring Well Installation

LOGGED BY: Hal Dawson

BACKFILL DATE: 1- -97 BY: Bay Area Exploration

MATERIAL: Powder Bentonite & Portland Cement

WEATHER: Cloudy, Cool ~ 55°F

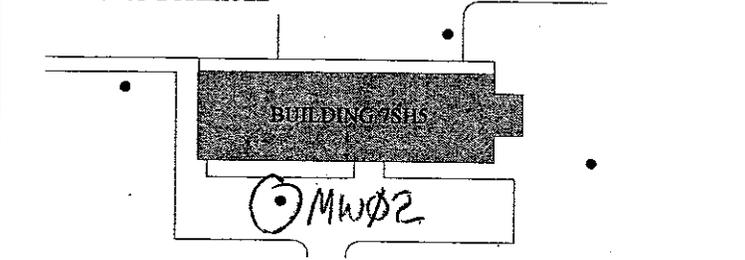
BEGIN BORING: 1300

FINISH BORING: 1700

TOTAL DEPTH (ft bgs):

LOCATION OF BOREHOLE

WATER DEPTH (ft bgs):



SAMPLE ID	SAMPLE TIME	SAMPLE DEPTH (ft)	PID-SAMPLE (ppm)	INCHES RECOVERED	INCHES DRIVEN	DEPTH (ft bgs)	USCS SOIL TYPE	MW PLACEMENT
		25				1		
		30				2		
0367SHSS01A	1320	27						
		32						
		6	18		18	3		
		8				4		
0367SHSS015	1328	12						
		8	18		18	5		
		15						
		22						
		9	21		24	6		
		19						
0367SHSS016	1345	25				7		
		38						
		10	15		18	8		
		14						
		19				9		
						10		

SYMBOLS:  
 - Static water level  
 \* Staining / Odor  
 CONTACTS:  
 - Distinct  
 - Inferred  
 / Gradational

2 1/2" (.15') Asphalt  
 Baserock

Silty Clay (CH) ~~stiff~~, 7.5YR 5/8 strong brown, moist, stiff, with little gravel and trace sand.

Same as above

Same as above.

Clay (CH), 10YR 3/1 very dark gray, moist, stiff, with trace gravel. Gravel is well rounded.

Same as above.

Same as above, color change to 7.5YR 3/4 dark brown.

Same as above

SAMPLE ID	SAMPLE TIME	SAMPLE DEPTH PID-SAMPLE (ppm)	INCHES RECOVERED INCHES DRIVEN	DEPTH (ft bgs)	USCS SOIL TYPE	MW PLACEMENT	SYMBOLS:		SITE ID: 7SH5	BORING ID: MW02
							Static water level	Staining / Odor	PROJECT TASK: Site 22, Monitoring Well Installation	
							CONTACTS:		LOGGED BY: Hal Dawson	
							Distinct			
							Inferred			
							Gradational			
		9	18							
		14	24							
0367SHSS017	1405	15		11	SP					Sand (SP), 7.5YR 4/6 strong brown, medium grained, moist, med. dense, with some silt & clayey silt (ML), 7.5YR 4/6, strong brown, moist, med. stiff.
		12		12	ML					
		10	15	12	GP					Sandy Gravel (GP), 7.5YR 4/6 strong brown, medium grain size, moist, med. dense.
		12	18	13						
		6		14						Silty Clay (CH), 7.5YR 4/6 strong brown, moist, med. stiff, trace gravel.
		4	12	14						
		6		15						Same as above.
		9	19	15						
		6	24	16						Same as above, gravel size noticeably larger, up to 2" diameter
0367SHSS018	1435	12		16						
		18		17						
		20		17						
		6	14	18						Same as above, gravel size back to ~1" diam. and smaller. Silt & clay percentages very close to SP/SP.
		8		18						
		12		19						
		4	16	19						Same as above, moist to wet.
		4	18	19						
		4		20						
0367SHSS019	1515	15	11	20						Silty Gravel (GP), 7.5YR 4/6 strong brown, medium grain size, moist, dense.
		50/5	11	21						Same, extremely dense. Sampler bounces on gravel. Drill to 25' to continue sampling.
				21						
				22						

# PRC BORING LOG

DATE: 1-30-97

SAMPLE ID	SAMPLE TIME	SAMPLE DEPTH PID-SAMPLE (ppm)	INCHES RECOVERED INCHES DRIVEN	DEPTH (ft. bgs)	USCS SOIL TYPE	MW PLACEMENT	SYMBOLS:		SITE ID: 7SH5	BORING ID: MW02
							* Static water level	* Staining / Odor	PROJECT TASK: Site 22, Monitoring Well Installation	
							CONTACTS:		LOGGED BY: Hal Dawson	
							— Distinct			
							- - - Inferred			
							/ Gradational			
				23					Silty Clay (CH), 10 YR 5/4 Yellowish Brown, moist, stiff, with little sand.	
				24					Same as above.	
		8	22/24	25						
0367SHSS021	1537	15		26					Same as above with trace sand, moist. Iron oxide staining apparent.	
		20								
		22								
		10	15/18	27					Same as above. Silt+clay percentages approx 50/50. Dry to moist.	
		12								
		14								
		7	16/18	29					Same as above, moist to wet. Center bit came up dripping (wet) from 30' bgs. GW first encountered at 30'.	
		11								
		13								
		6	21/24	30						
0367SHSS021	1620	18		31						
		26								
		38		32					At 1640 Water measured in boring at 22' bgs. To construct well in remaining daylight hours, drill to 35' without further sampling and (set well).	
				33						
				34						

# PRC BORING LOG

DATE: 1-30-97

SAMPLE ID	SAMPLE TIME	SAMPLE DEPTH	PID-SAMPLE (ppm)	INCHES RECOVERED INCHES DRIVEN	DRIVE INTERVAL	DEPTH (ft bgs)	USCS SOIL TYPE	MW PLACEMENT	SYMBOLS:		SITE ID: 7SH5	BORING ID: MW02
									Static water level	Staining / Odor	PROJECT TASK: Site 22, Monitoring Well Installation	
									CONTACTS:		LOGGED BY: <i>H. Dawson</i>	
									Distinct			
									Inferred			
									Gradational			
						35			<i>Total depth - 35' bgs.</i>			
						36						
						37						
						38						
						39						
						40						
						41						
						42						
						43						
						44						
						45						
						46						

# MONITORING WELL COMPLETION RECORD

### DRILLING INFORMATION

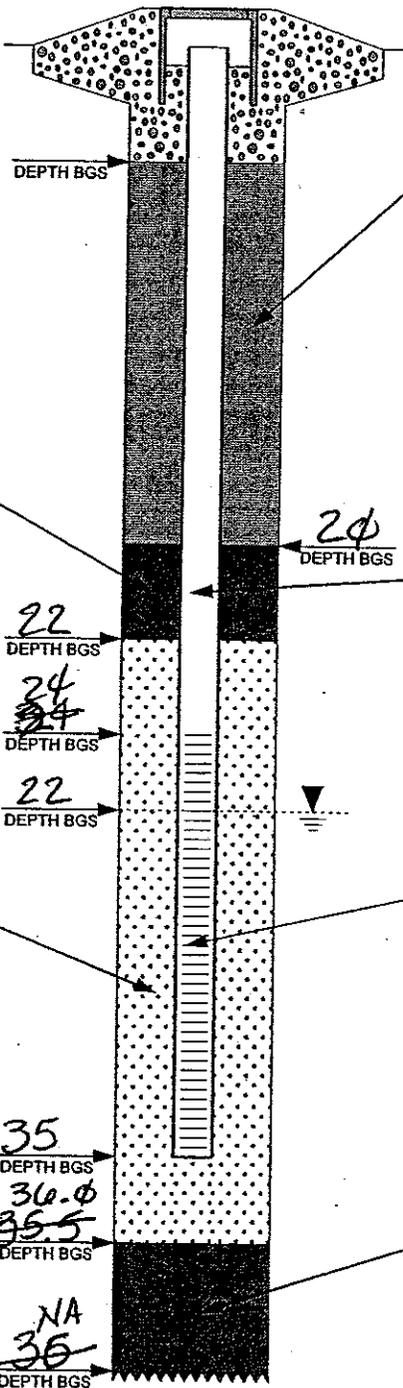
DRILLING BEGAN:  
 DATE 1-30-97 TIME 1300  
 WELL INSTALLATION BEGAN:  
 DATE 1-31-97 TIME 1530  
 WELL COMPLETION FINISHED:  
 DATE 1-31-97 TIME 1800  
 DRILLING CO. BAY AREA EXPLORATION  
 DRILLER Gray BALSERINI  
 LICENSE C6889950  
 DRILL RIG 75 CME  
 DRILLING METHOD:  
 HOLLOW STEM AUGER  
 AIR ROTARY  
 \_\_\_\_\_  
 DIAMETER OF AUGERS:  
 ID 3 3/4" OD 8"

### SURFACE COMPLETION

FLUSH MOUNT  
 ABOVE GROUND W/BUMPER POST  
 CONCRETE  ASPHALT

### MONITORING WELL

MONITORING WELL NO. MW02  
 PROJECT CONCORD NW 5  
 SITE Site 22, Box 75H5  
 BOREHOLE NO. 75H MW02  
 WELL PERMIT NO. M97-1028  
 TOC TO BOTTOM OF WELL 35.27



### ANNULAR SEAL

AMOUNT CALCULATED 43 gal  
 AMOUNT USED 40 gal  
 GROUT FORMULA  
 PORTLAND CEMENT PASALITE Type I-II  
 BENTONITE AQUACEL GROUT SEAL  
 WATER \_\_\_\_\_  
 PREPARED MIX  
 PRODUCT \_\_\_\_\_  
 MFG. BY \_\_\_\_\_  
 METHOD INSTALLED:  
 POURED  TREMIE

### BENTONITE SEAL

AMOUNT CALCULATED 50 lbs  
 AMOUNT USED 50 lbs  
 PELLETS, SIZE \_\_\_\_\_  
 CHIPS, SIZE 3/8"  
 \_\_\_\_\_  
 PRODUCT Wyoming Bentonite  
 MFG. BY Pacoco Drilling  
 METHOD INSTALLED:  
 POURED  TREMIE  
 AMOUNT OF WATER USED 0

### CASING

SCHEDULE 40 PVC  
 \_\_\_\_\_  
 PRODUCT \_\_\_\_\_  
 MFG. BY GEOTECH  
 CASING DIAMETER:  
 ID 2 1/8" OD 2 3/8"  
 LENGTH OF CASING ~25'

### FILTER PACK

AMOUNT CALCULATED 480 lbs  
 AMOUNT USED 460 lbs  
 SAND, SIZE # 2/12 Monterey  
 FORMATION COLLAPSE:  
 FROM \_\_\_\_\_ TO \_\_\_\_\_  
 PRODUCT Monterey SANDS  
 MFG. BY RMC Longstar  
 METHOD INSTALLED:  
 POURED  TREMIE

### WELL SCREEN

SCHEDULE 40 PVC  
 \_\_\_\_\_  
 PRODUCT \_\_\_\_\_  
 MFG. BY GEOTECH  
 CASING DIAMETER:  
 ID 2 1/8" OD 2 3/8"  
 SLOT SIZE 0.01"  
 LENGTH OF SCREEN 10"

### SURVEY INFORMATION

TOC ELEVATION 102.14  
 GROUND ELEVATION 102.30  
 NORTHING CORD. 543314.20  
 EASTING CORD. 1571551.84  
 DATE SURVEYED 3-9-97  
 SURVEY CO. AUTUMBER LAND SURVEYING

### BOREHOLE BACKFILL

AMOUNT CALCULATED \_\_\_\_\_  
 AMOUNT USED \_\_\_\_\_  
 BENTONITE CHIPS, SIZE \_\_\_\_\_  
 BENTONITE PELLETS, SIZE \_\_\_\_\_  
 SLURRY \_\_\_\_\_  
 FORMATION COLLAPSE  
 PRODUCT \_\_\_\_\_  
 MFG. BY \_\_\_\_\_  
 METHOD INSTALLED:  
 POURED  TREMIE

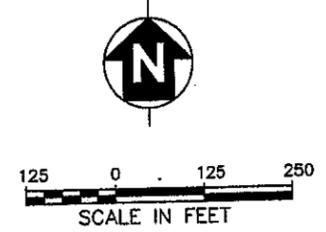
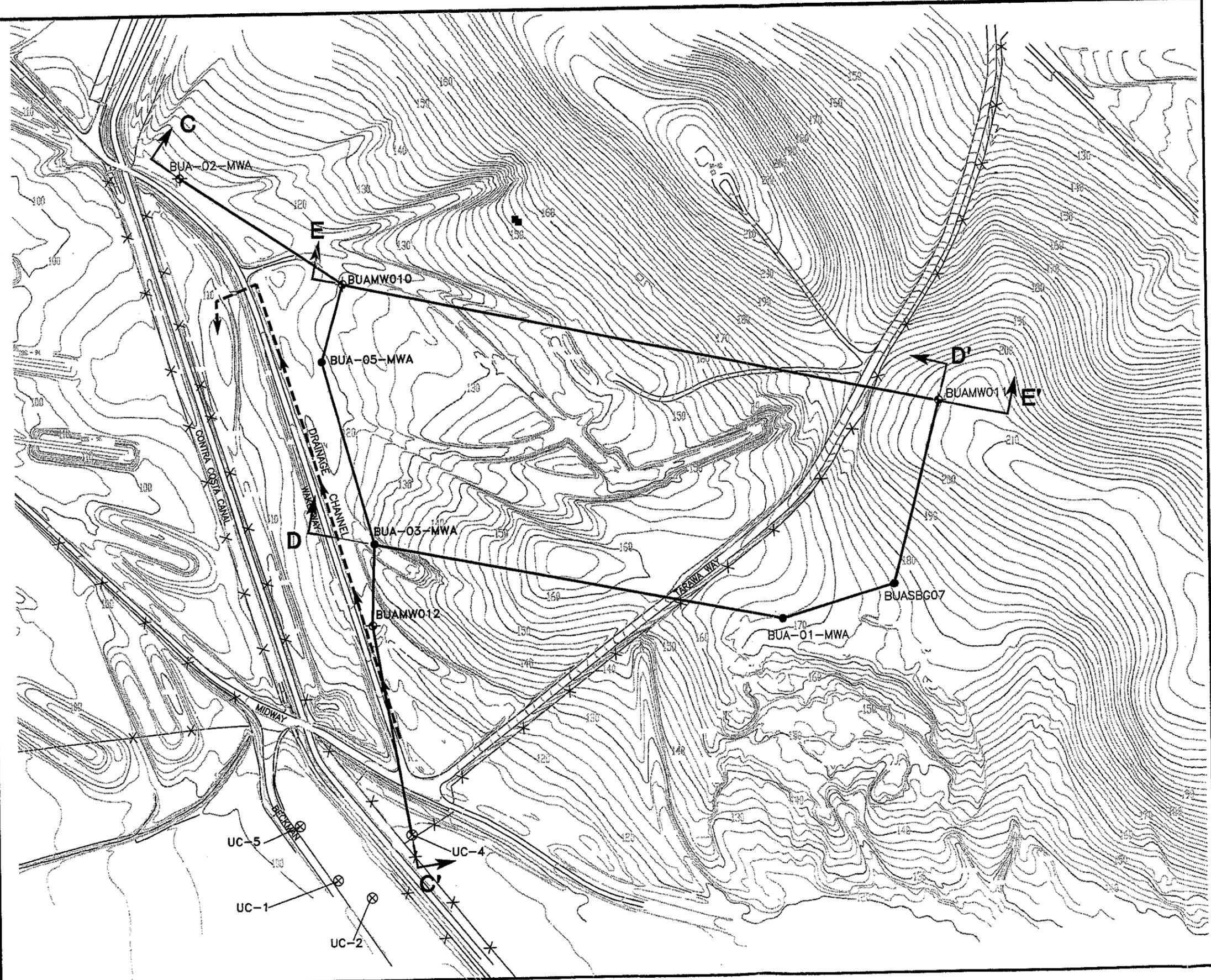
site 22

**APPENDIX B**  
**GEOLOGIC CROSS-SECTIONS AND POTENTIOMETRIC SURFACE MAPS**

---

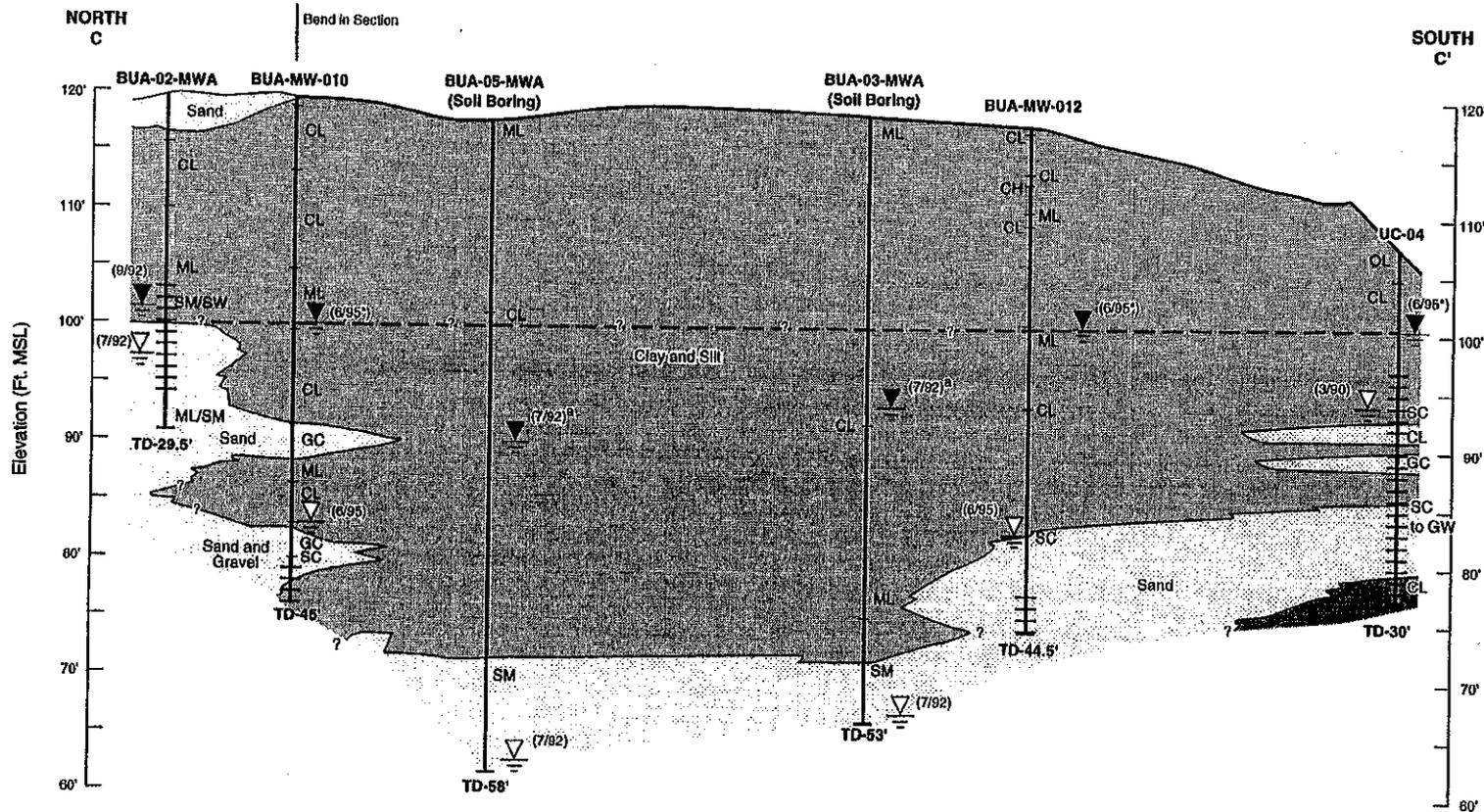
**SITE 13 - GEOLOGIC CROSS SECTIONS AND  
POTENTIOMETRIC SURFACE MAPS**

JOB No. 2738.1325 FILE: RI-13 REV. 8/19/97 VIEW=MAIN



- LEGEND:**
- x — FENCE
  - ← - - - DRAINAGE CHANNEL (WITH ARROW INDICATING FLOW DIRECTION)
  - 130 — GROUND SURFACE ELEVATION CONTOUR (FT MSL)
  - PIEZOMETER LOCATION (50-110 FT BGS, INSTALLATION DATA UNKNOWN)
  - UC-2 ⊗ UNOCAL MONITORING WELLS (0-30 FT BGS, INSTALLED BY GTI, 1991)
  - ⊙ MONITORING WELL LOCATION (30 FT BGS)
  - SOIL BORING LOCATION (30-100 FT BGS)
  - C C' CROSS SECTION LINE

NWS CONCORD - INLAND AREA CONCORD, CALIFORNIA			
FIGURE 5-2 SITE 13 GEOLOGIC CROSS SECTION LINES			
SIZE	DATE	DWG NAME	REV

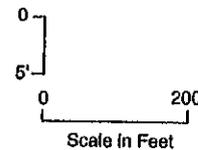


a Water levels in Soil Borings BUA-03-MWA and BUA-05-MWA were measured during borehole drilling activities. Because monitoring wells were not installed at these locations, water levels presented may not accurately reflect static conditions.

**LEGEND**

- Depth to first encountered groundwater (Date)
- Static Water Level (Date)
- Monitoring Well Screened Interval
- Water Level Collected During Groundwater Sampling and Gauging Event
- Sand and Gravel
- Clay and Silt
- Projected Potentiometric Surface (Queried Where Inferred)

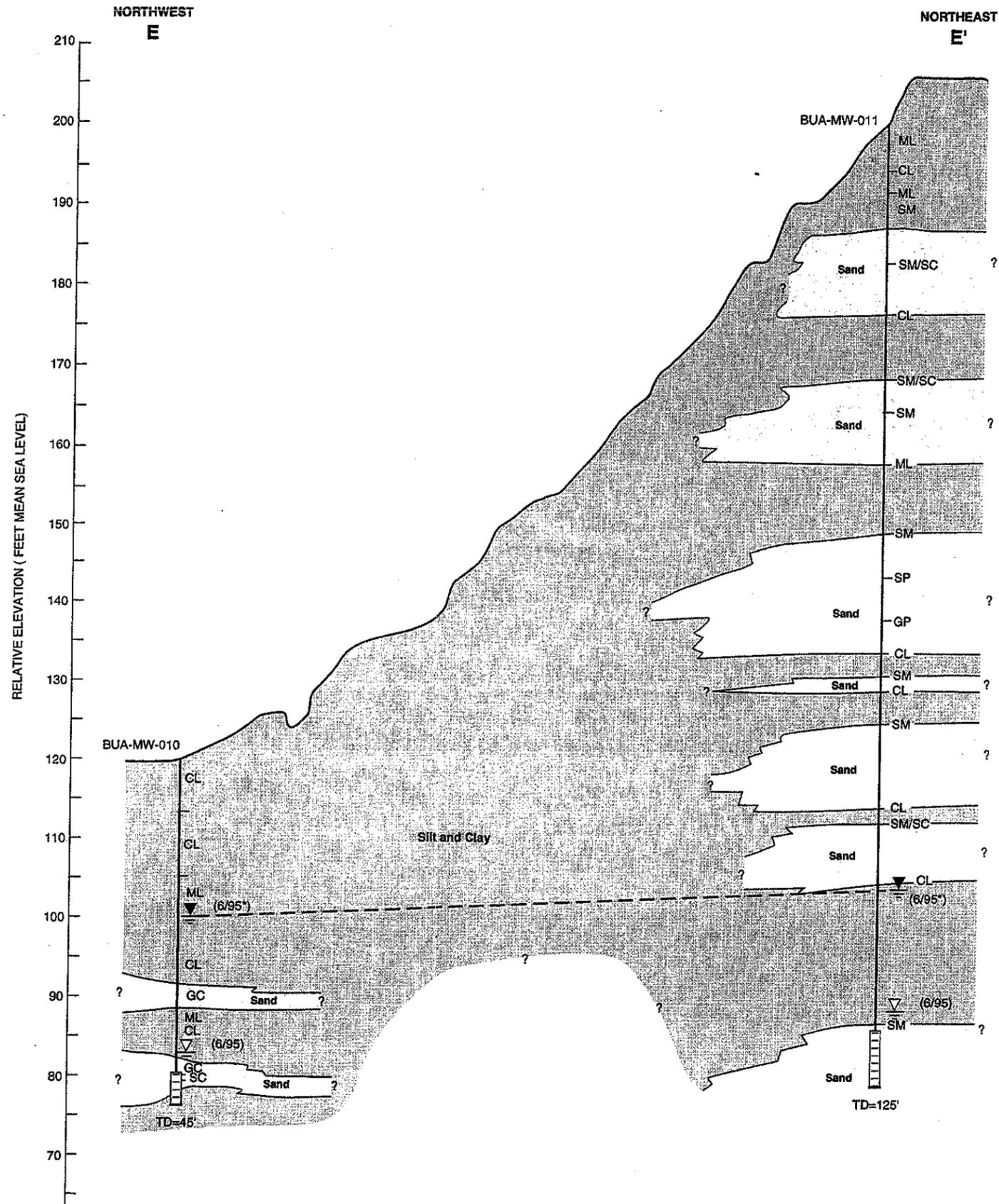
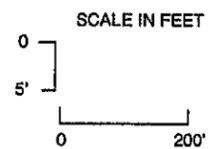
Note:  
All wells/borings projected onto cross section



NWS CONCORD - INLAND AREA CONCORD, CALIFORNIA			
<b>FIGURE 5-3</b> <b>SITE 13</b> <b>HYDROGEOLOGIC CROSS SECTION C-C'</b>			
SIZE	DATE	DWG NAME	REV
	06/05/96		1

08/97.CO

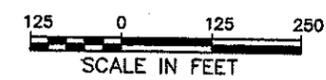
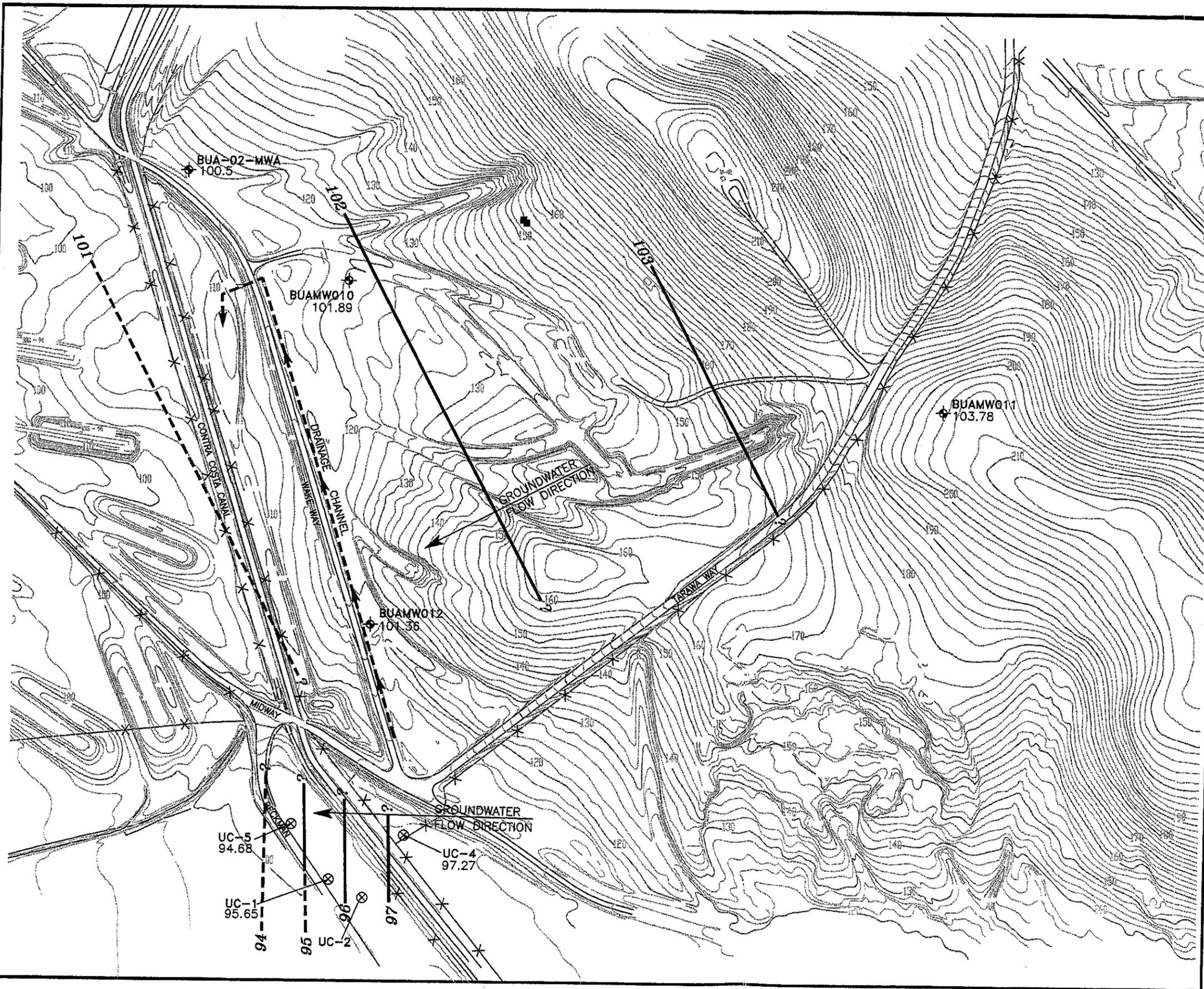
- LEGEND**
- Depth to First Encountered Groundwater (Date)
  - Static Water Level (Date)
  - Water Level Collected During Groundwater Sampling and Gauging Event
  - Projected Potentiometric Surface
  - Sand
  - Clay and Silt
  - Monitoring Well Screened Interval



NWS CONCORD - INLAND AREA  
 CONCORD, CALIFORNIA

**FIGURE 5-5**  
**SITE 13**  
**HYDROGEOLOGIC CROSS SECTION E-E'**

Date: 8/97



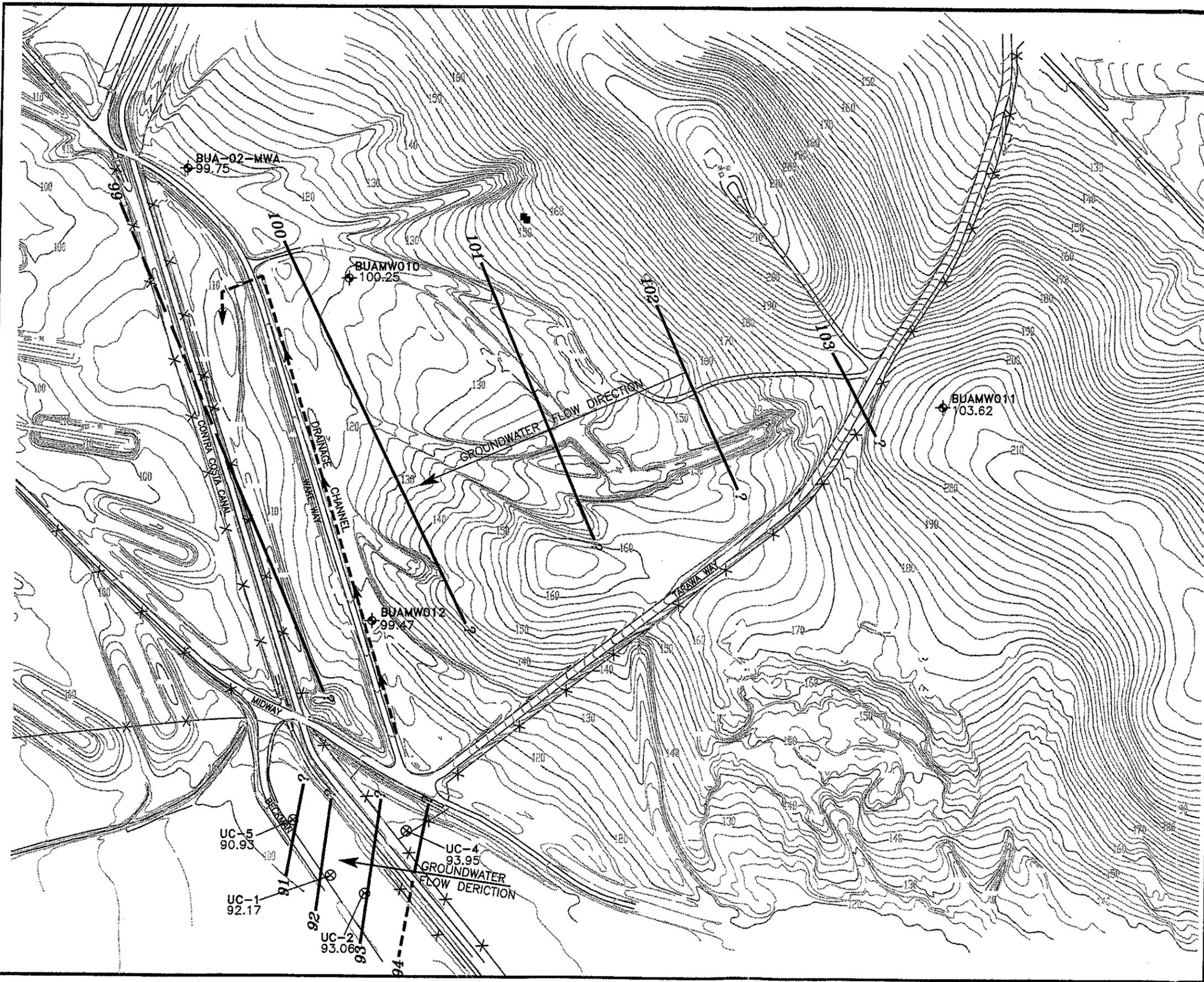
**LEGEND:**

- x — FENCE
- ← - - - DRAINAGE CHANNEL (WITH ARROW INDICATING FLOW DIRECTION)
- 190 — GROUND SURFACE ELEVATION CONTOUR (FT MSL)
- PIEZOMETER LOCATION (50-110 FT BGS, INSTALLATION DATA UNKNOWN)
- UC-2 ⊗ UNOCAL MONITORING WELLS (0-30 FT BGS, INSTALLED BY GTI, 1991)
- BUA-MW-010 ⊕ MONITORING WELL LOCATION AND GROUNDWATER ELEVATION (FT MSL)
- 101 - - - INTERPRETED CONTOUR ON POTENTIOMETRIC SURFACE (FT MSL) DASHED WHERE INFERRED

**NOTE:**  
 IT IS NOT CLEAR WHETHER MONITORING WELL BUA-02-MWA IS HYDRAULICALLY CONNECTED WITH DEEPER WELLS (BUAMW010 THROUGH BUAMW012) BECAUSE IT IS SCREENED AT A SHALLOWER DEPTH. THEREFORE, THE WATER LEVEL ELEVATION FROM WELL BUA-02-MWA WAS NOT USED TO INTERPRET GROUNDWATER CONTOURS.

NWS CONCORD - INLAND AREA CONCORD, CALIFORNIA			
<b>FIGURE 5-6</b> <b>SITE 13-INTERPRETIVE</b> <b>GROUNDWATER CONTOURS</b> <b>JUNE 1995</b>			
SIZE	DATE	DWG NAME	REV

JOB No. 2738.1325 FILE: RI-13 REV. 8/19/97 VIEW=MAIN



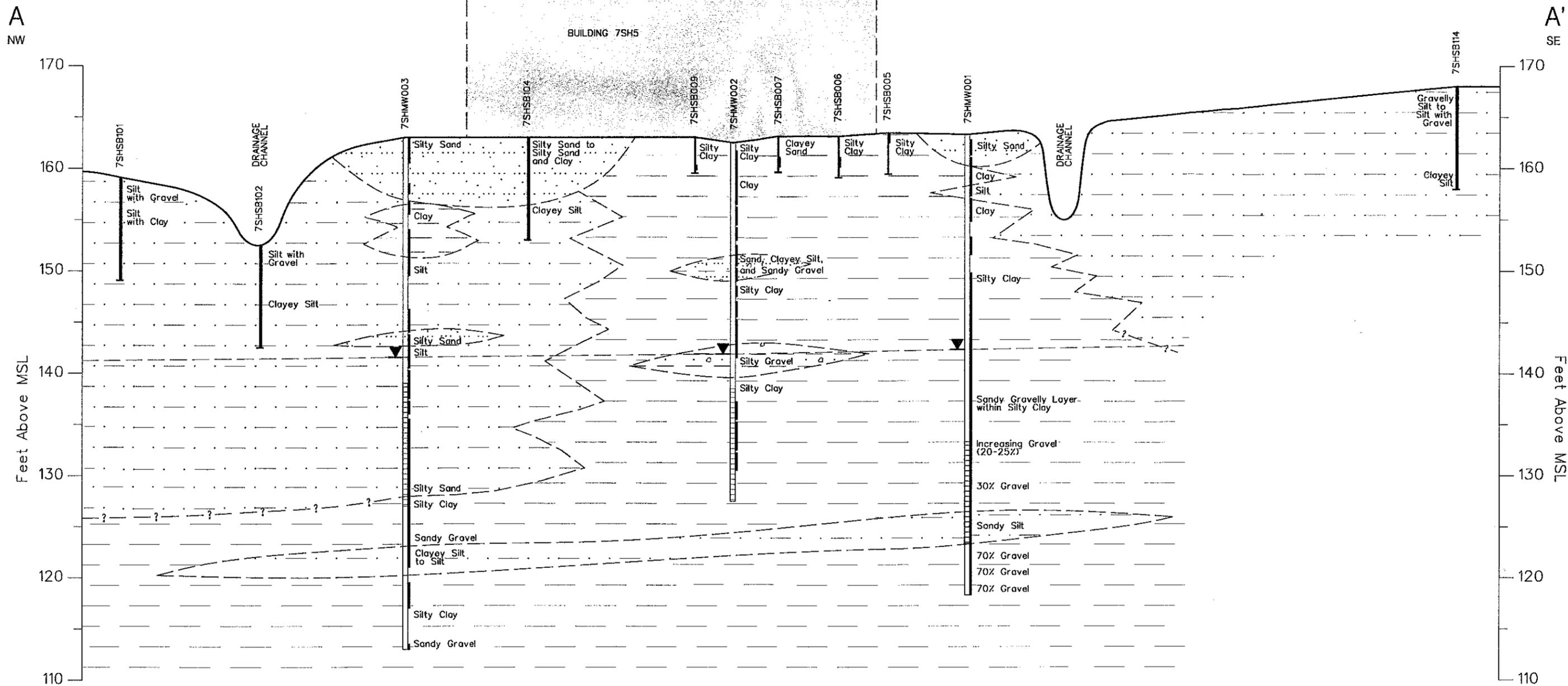
**LEGEND:**

- X — FENCE
- ← --- DRAINAGE CHANNEL (WITH ARROW INDICATING FLOW DIRECTION)
- 190 — GROUND SURFACE ELEVATION CONTOUR (FT MSL)
- PIEZOMETER LOCATION (50-110 FT BGS, INSTALLATION DATA UNKNOWN)
- UC-2 ⊗ UNOCAL MONITORING WELLS (0-30 FT BGS, INSTALLED BY GTI, 1991)
- BUA-MW-010 ⊕ MONITORING WELL LOCATION GROUNDWATER ELEVATION (FT MSL)
- 101 - - - INTERPRETED CONTOUR ON POTENTIOMETRIC SURFACE (FT MSL) DASHED WHERE INFERRED

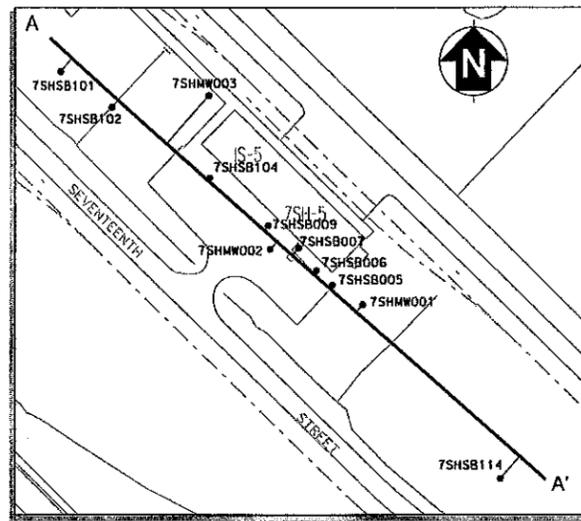
**NOTE:**  
 IT IS NOT CLEAR WHETHER MONITORING WELL BUA-02-MWA IS HYDRAULICALLY CONNECTED WITH DEEPER WELLS (BUAMW010 THROUGH BUAMW012) BECAUSE IT IS SCREENED AT A SHALLOWER DEPTH. THEREFORE, THE WATER LEVEL ELEVATION FROM WELL BUA-02-MWA WAS NOT USED TO INTERPRET GROUNDWATER CONTOURS.

NWS CONCORD - INLAND AREA CONCORD, CALIFORNIA			
FIGURE 5-7 SITE 13 - INTERPRETATIVE GROUNDWATER CONTOURS SEPTEMBER 1995			
SIZE	DATE	DWG NAME	REV

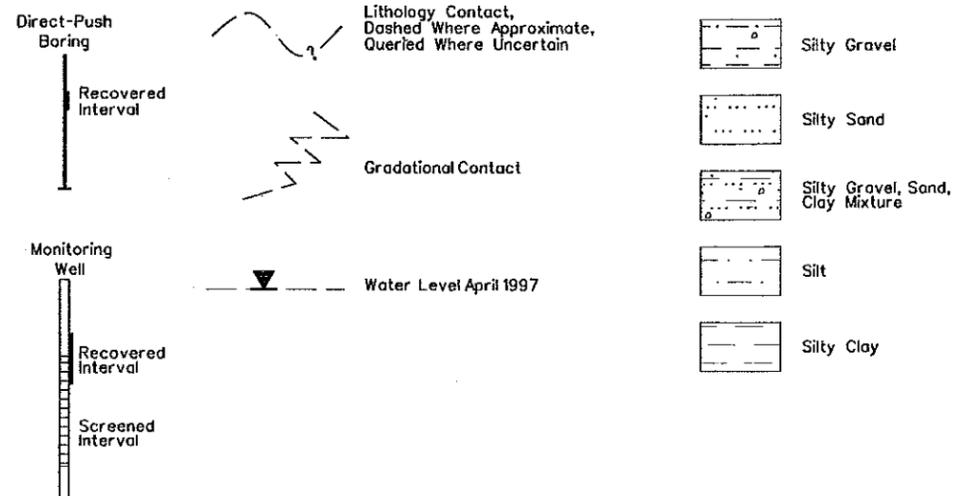
**SITE 22 - GEOLOGIC CROSS SECTION AND  
POTENTIOMETRIC SURFACE MAP**



LINE OF SECTION

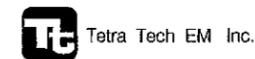
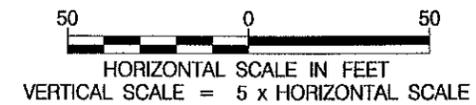


LEGEND



Notes:

- 1) This is one interpretation based on available data. Other interpretations are possible.
- 2) Lithologic descriptors are abbreviated for presentation purposes.
- 3) Lithologic patterns are generalized for presentation purposes.
- 4) MSL - Mean Sea Level



SITE 22  
NAVAL WEAPONS STATION SEAL BEACH DETACHMENT  
CONCORD, CALIFORNIA

FIGURE 2-3b  
GEOLOGIC CROSS SECTION A-A'  
SITE 22

**APPENDIX C**  
**PHOTOGRAPHIC LOG**

---

This appendix presents photographs taken during the groundwater sampling events at Sites 13 and 22, Naval Weapons Station Seal Beach Detachment Concord in Concord, California.



**Photograph C-1.** Patrick Callahan (Tetra Tech EM Inc. [Tetra Tech]) monitors groundwater levels during sampling at well BUAMW012 at Site 13. This well was sampled for perchlorates and explosive residues. Photograph was taken on June 16, 2003.



**Photograph C-2 (below).** Groundwater sampling equipment set up at monitoring well 7SHMW002 at Site 22. Photograph was taken on June 17, 2003.



**Photograph C-3.** Hwakong Cheng (Tetra Tech) records water quality parameters during sampling at monitoring well 7SHMW002 at Site 22. This monitoring well was sampled for perchlorates. Photograph was taken on June 17, 2003.



**Photograph C-4.** View of sampling at monitoring well 7SHMW002 at Site 22. Purged groundwater and decontamination fluids from sampling activities will be stored in a 55-gallon drum pending analysis results for disposal. Building 7SH-5 is in the background. Photograph was taken on June 17, 2003.

**APPENDIX D**  
**WELL SAMPLING SHEETS AND CHAIN-OF-CUSTODY RECORDS**

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**TETRA TECH EM, INC.**  
**MONITORING WELL SAMPLING SHEET**

Monitoring Well No.: BUAMW002 Date: 6/16/03

Personnel: H. CHENG, P. CALLAHAN

Organic Vapor Concentration TOC: N/A ppm Breathing Zone: N/A ppm

Depth to Well Bottom: 29.63 ft STOC Well Volume: 2-inch well = water column x 0.163 gal/ft

Depth to Water: 17.17 ft STOC 3-inch well = water column x 0.367 gal/ft

4-inch well = water column x 0.652 gal/ft

Water Column: N/A ft Well Volume: N/A gal

Time	Vol. Purged	Water Level	pH	Conductivity ( $\mu\text{mhos/cm}$ )	Temperature ( $^{\circ}\text{C}/^{\circ}\text{F}$ )	Turbidity NTU	DO mg/L
1056	0	17.26	7.87	1.580	23.75	0.19	7.07
1108	1	17.28	7.86	1.564	22.87	0.05	6.02
1126	2	17.25	7.87	1.585	24.40	0.07	5.56
1144	3	17.26	7.86	1.564	24.09	0.11	5.62
1200	4	17.28	7.88	1.559	24.09	0.07	5.49
1213	5	17.30	7.85	1.556	23.94	0.11	5.54
1225	6	17.29	7.85	1.553	24.29	0.25	5.50
1237	7	17.29	7.84	1.549	24.38	0.17	5.41
1250	8	17.29	7.84	1.547	24.64	0.15	5.42

Begin Purge: 1045 Method of Purging  Pump  Bailer

End Purge: 1250 Purged Dry? No

Total Volume Purged: 8 L How Measured? GRADUATED CYLINDER

QA/QC Sample Collected Here?  Duplicate  Matrix Spike  Equip. Blank  No QA/QC Sample

Date and Time of Sample Collection: 6/16/03 1300 Sample Number (s): 12113001

Comments: PUMP INTAKE AT 25' BGS

WELL LOCKED & IN GOOD CONDITION

**TETRA TECH EM, INC.**  
**MONITORING WELL SAMPLING SHEET**

Monitoring Well No.: BUAMW010 Date: 6/16/03

Personnel: H. CHENG, P. CALLAHAN

Organic Vapor Concentration TOC: N/A ppm Breathing Zone: N/A ppm

Depth to Well Bottom: 47.26 ft STOL Well Volume: 2-inch well = water column x 0.163 gal/ft  
3-inch well = water column x 0.367 gal/ft  
4-inch well = water column x 0.652 gal/ft

Depth to Water: 20.82 ft STOL  
Water Column: N/A ft Well Volume: N/A gal

Time	Vol. Purged	Water Level	pH	Conductivity ( $\mu\text{mhos/cm}$ )	Temperature ( $^{\circ}\text{C}$ )	Turbidity NTU	DO mg/L
1547	0	21.20	7.55	2.431	20.79	14.4	4.85
1550	1	21.22	7.30	2.432	19.84	14.9	2.00
1553	2	21.60	7.23	2.422	19.81	14.0	2.06
1602	3	21.35	7.24	2.401	20.26	7.9	1.86
1607	4	21.36	7.22	2.393	20.19	6.8	1.62
1610	5	21.36	7.23	2.375	20.34	5.5	1.56
1614	6	21.37	7.23	2.353	20.37	5.1	1.54
1618	7	21.37	7.24	2.345	20.31	5.0	1.72
1623	8	21.38	7.23	2.334	20.38	4.0	1.51
1627	9	21.40	7.23	2.323	20.39	3.6	1.46
1631	10	21.37	7.22	2.315	20.37	3.8	1.46

Begin Purge: 1516 Method of Purging  Pump  Bailer

End Purge: 1631 Purged Dry? No

Total Volume Purged: 10 L How Measured? GRADUATED CYLINDER

QA/QC Sample Collected Here?  Duplicate  Matrix Spike  Equip. Blank  No QA/QC Sample

Date and Time of Sample Collection: 6/16/03 1640 Sample Number (s): 12113002

Comments: PUMP INTAKE AT 42' BGS  
WELL LOCKED & IN GOOD CONDITION

**TETRA TECH EM, INC.**  
**MONITORING WELL SAMPLING SHEET**

Monitoring Well No.: BWAMW011 Date: 6/17/03

Personnel: H. CHENG, P. CALLAHAN

Organic Vapor Concentration TOC: N/A ppm Breathing Zone: N/A ppm

Depth to Well Bottom: 126.8 ft STOC Well Volume: 2-inch well = water column x 0.163 gal/ft  
 3-inch well = water column x 0.367 gal/ft  
 4-inch well = water column x 0.652 gal/ft

Depth to Water: 102.9 ft STOC  
 Water Column: N/A ft Well Volume: N/A gal

Time	Vol. Purged	Water Level	pH	Conductivity ( <del>µmhos/cm</del> )	Temperature ( <del>°C/°F</del> )	Turbidity NTU	DO mg/L
1342	0	100.29	8.39	0.577	21.75	9.10	5.35
1344	1	100.28	8.36	0.575	21.22	6.15	4.17
1348	2	100.31	8.34	0.574	21.26	4.74	3.20
1353	3	100.25	8.33	0.572	21.99	4.93	2.92
1358	4	100.35	8.29	0.571	21.58	4.61	3.22
1402	5	100.34	8.26	0.569	21.34	3.61	2.91
1406	6	100.32	8.24	0.567	21.22	4.39	2.68
1411	7	100.37	8.21	0.566	21.24	2.89	2.45
1415	8	100.35	8.18	0.566	21.22	2.33	2.20
1419	9	100.36	8.15	0.566	21.20	2.11	2.05
1422	10	100.36	8.12	0.565	21.24	2.46	2.03

Begin Purge: 1330 Method of Purging  ~~Blander~~ Pump  Bailer  
 End Purge: 1422 Purged Dry? NO  
 Total Volume Purged: 10 L How Measured? GRADUATED CYLINDER

QA/QC Sample Collected Here?  Duplicate  Matrix Spike  Equip. Blank  No QA/QC Sample  
 Date and Time of Sample Collection: 6/17/03 1430 Sample Number (s): 12113003

Comments: PUMP INTAKE AT ~ 125' STOC  
WELL LOCKED & IN GOOD CONDITION

**TETRA TECH EM, INC.**  
**MONITORING WELL SAMPLING SHEET**

Monitoring Well No.: Buamw012 Date: 6/17/03

Personnel: H. CHOI, P. CALLAHAN

Organic Vapor Concentration TOC: N/A ppm Breathing Zone: N/A ppm

Depth to Well Bottom: 46.5 ft BTC Well Volume: 2-inch well = water column x 0.163 gal/ft

Depth to Water: 19.95 ft BTC 3-inch well = water column x 0.367 gal/ft

4-inch well = water column x 0.652 gal/ft

Water Column: N/A ft Well Volume: N/A gal

Time	Vol. Purged	Water Level	pH	Conductivity ( $\mu\text{mhos/cm}$ )	Temperature ( $^{\circ}\text{C}$ )	Turbidity NTU	DO mg/L
0855	0	20.40	7.66	0.865	19.81	46.9	6.95
0858	1	20.57	7.68	0.858	19.83	30.7	6.60
0902	2	20.61	7.70	0.858	19.84	10.9	6.45
0910	3	20.56	7.73	0.858	19.79	8.42	6.87
0918	4	20.63	7.73	0.858	20.17	6.91	6.75
0923	5	20.65	7.72	0.859	20.34	5.23	6.82
0929	6	20.68	7.70	0.864	20.37	4.78	6.97
0934	7	20.74	7.60	0.872	20.43	4.92	6.85
0940	8	20.69	7.62	0.883	20.42	4.06	6.88
0946	9	20.67	7.59	0.891	20.41	3.99	6.96

Begin Purge: 0854 Method of Purging  BLADDER Pump  Bailer  
 End Purge: 0946 Purged Dry? NO  
 Total Volume Purged: 9 L How Measured? GRADUATED CYLINDER

QA/QC Sample Collected Here?  Duplicate  Matrix Spike  Equip. Blank  No QA/QC Sample

Date and Time of Sample Collection: 0955 Sample Number (s): 12113004

Comments: DUPLICATE ID: 12113005, TIME: 1000

WELL LOCKED & IN GOOD CONDITION

PUMP INTAKE AT ~45' BTC

**TETRA TECH EM, INC.**  
**MONITORING WELL SAMPLING SHEET**

Monitoring Well No.: 7SHMW002 Date: 6/17/03

Personnel: H. CHENG, P. CALLAHAN

Organic Vapor Concentration TOC: N/A ppm Breathing Zone: N/A ppm

Depth to Well Bottom: 37.35.09 ft BTL Well Volume: 2-inch well = water column x 0.163 gal/ft

Depth to Water: 26.56 ft BTL 3-inch well = water column x 0.367 gal/ft  
4-inch well = water column x 0.652 gal/ft

Water Column: N/A ft Well Volume: N/A gal

Time	Vol. Purged	Water Level	pH	Conductivity <del>(µmhos/cm)</del> ms/cm	Temperature <del>(°C)</del> °F	Turbidity NTU	DO mg/L
1531	0	26.57	6.94	1.132	21.49	4.90	6.07
1533	1	26.57	6.90	1.136	20.76	3.30	6.90
1535	2	26.58	6.89	1.139	20.65	2.11	6.88
1537	3	26.60	6.90	1.145	20.35	1.62	6.90
1540	4	26.58	6.89	1.145	20.20	1.21	5.38
1542	5	26.62	6.87	1.144	20.16	1.04	5.36
1545	6	26.62	6.88	1.142	20.22	0.84	5.42
1547	7	26.61	6.91	1.142	20.16	0.76	5.47
1550	8	26.61	6.88	1.141	20.14	0.61	5.45

Begin Purge: 1530 Method of Purging  Pump  Bailer

End Purge: 1550 Purged Dry? No

Total Volume Purged: 8 L How Measured? GRADUATED CYLINDER

QA/QC Sample Collected Here?  Duplicate  Matrix Spike  Equip. Blank  No QA/QC Sample

Date and Time of Sample Collection: 6/17/03 1555 Sample Number (s): 12122005

Comments: PUMP INTAKE AT 32' BGS

WELL LOCKED & IN GOOD CONDITION

6/16 CONCORD SITE 13 PERCHLORATE

0830 Arrive onsite: H. Chery & P Callahan.

Go to badge office to register.

0900 Drive to pickup PE sample from Amedeo Andel. Sample has not arrived yet, will call when it arrives.

0930 Arrive at site 13. Phillip Benseney from EPA is onsite. Discuss sampling methods & spiked PE sample.

Health & Safety talk given modified level D PPE, slip/trip/fall, dehydration, heat exhaustion, insects & snakes.

Planned activities: begin groundwater sampling at Site 13 for perchlorate & explosive residues.

1000 Set up at BUAMW002

0.75" bladder pump set at 25' Lgs.

6 cycles per minute, 8 sec refill, 2 sec discharge.

Pump max flow rate is too slow. Continue purging of this well but arrange for new pump to be delivered.

(see)

6/16 CONCORD SITE 13

1300 Collect sample 12113001 at BUAMW002.

1315 Drive to front gate to pickup new pump: 2" bladder pump

1330 Offsite for lunch

1400 Go to hardware store to purchase supplies

1430 Arrive at BUAMW010 & setup equipment.

1516 Begin purge

1520 Water is not pumping correctly. Hose for air & water are switched. Recommend purging.

2" bladder pump, 1 cycle/minute.

40 sec. refill, 20 sec discharge.

1640 Collect sample 12113002 from BUAMW010.

1600 Spiked performance evaluation sample for perchlorate 12113009.

1700 Pack equipment & demobilize from site for the day. Source blank 12113007

1715 Offsite.

1730 Equipment onsite 12113008

(see)

6/17 CONCORD SITE 1B

0730 H. CHANG & P. CALLAHAN ONSITE  
H&S Tailgate: same topics covered as yesterday - emphasis on proper hydration & risk of heat exhaustion.  
Weather: clear, 80s

Planned activities: continue sampling 3 wells at Site B & 1 well at site 22 for explosives & perchlorate.

0745 Equipment inside: 3/4" & 2" bladder pumps, controller, compressor, water level meter, YSI 556, field meter, drum

0800 Calibrate YSI 556

pH 7.00 read 7.00 lot 2649  
Cond 1 ms/cm read 1 ms/cm lot 3102  
DO 100% sat read 100.0%

0830 Set up BUNW012

0850 Begin purge

Pump settings: 1 gpm 40 sec refill,  
16 sec discharge

0955 Collect sample 12113004

1000 Collect field duplicate 12113005

1035 Goto BUNW011

1040 Setup to sample. Air hose is not long enough for deep well. Bill from

(12)

6/17 CONCORD SITE 1B & 22

1040 Continued. - El will drop off coupling & extend hose.

1100 Meet Bill at front gate

1130 offsite for lunch

1200 Return onsite & recommence pumping at BUNW011.

1300 Pump is not pulling water adequately at this depth. Water level is ~100' static & pump is only pulling ~20 ml per minute.

1320 Bill advises to try 2" bladder pump even though compressor is too small

1330 Recommence pumping.

Pump set at 1 gpm, 35 sec refill, 25 sec discharge, ~240 psi.

1430 Collect sample 12113003 <sup>ms/msd</sup>

1500 Set up at BUNW002 in Site 22. 2" bladder pump at 1 gpm, 43 sec refill, 17 sec discharge.

1555 Collect sample 12122005  
110W drum w/ ~25 <sup>gallons</sup> →

(12)

6

6/17 CONCORD SITE 13 & 22.

1555 Continued... left onsite at 75H,  
Drum is sealed & labeled.

1630 Leave site & drive to purchase  
ice to ship samples. Pack samples  
for shipment

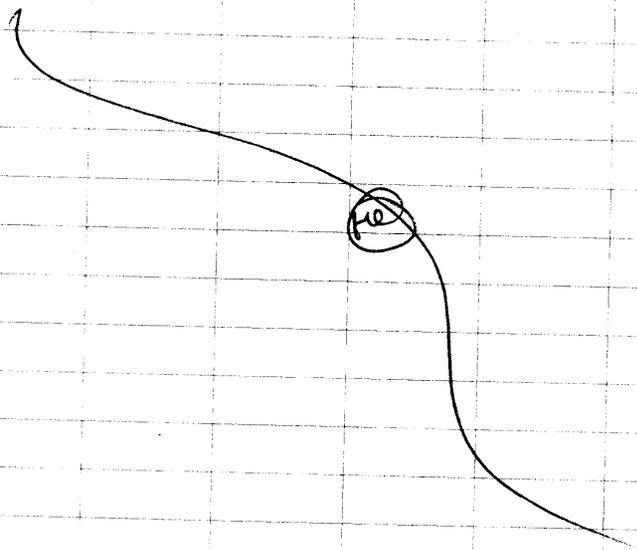
~~1630 Drop 3 coolers off at FedEx (FC)~~  
~~for east coast shipment (FC)~~

1700 Equipment onsite sample from  
water level meter.

1730 Drop 3 coolers off at FedEx  
for east coast shipment.

1800 Return rental equipment to El.

1900 Return to San Francisco





Tetra Tech EM Inc.  
San Francisco Office

# Chain of Custody Record No. 4615

135 Main St, Suite 1800  
San Francisco, CA 94105  
415-543-4880  
Fax 415-543-5480

Lab ID#: <b>03XF-P0012</b>	Lab: <b>GPL</b>
-------------------------------	--------------------

**4615**

No./Container Types

Preservative Added	
Analysis Required	

Project name: <b>SITE 13</b>	TETRA technical contact: <b>KEVIN HOCH</b>	Field samplers: <b>HWAJONG CHENG PATRICK CALLAHAN</b>
---------------------------------	---	--

Project (CTO) number: <b>G1058.3.4.01.121.03</b>	TETRA project manager: <b>PENELOPE WILSON</b>	Field samplers' signatures: <i>[Signatures]</i>
---	--	--

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS/MSD	40 ml VOA	1 Liter Amber	500 ml Poly	Stove	Class Jar	1 L POLY	VOA	SVDA	Pest/PCBs	Metals	TPH Purgeable	TPH Extractable	PERCHLORATE	S&P/SLVES
12113001		6/16/03	1300	H <sub>2</sub> O		2					1							XX	XX
12113002			1640			2					1							XX	XX
12113009			1600								1							XX	XX
12113007			1700			2					1							XX	XX
12113008			1730			2					1							XX	XX

Relinquished by:	Name (print)	Company Name	Date	Time
<i>[Signature]</i>	HWAJONG CHENG	TETRA TECH	6/17/03	1600
Received by:	<i>[Signature]</i>	Chen GPL	6/19/03	10:25
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:  
**14 DAY TAT**

Ref Lit #: **8409 5038 8711**      **306125**





FedEx Express USA **847007825128**

1 From: **HWAKONG CHENG** 943-4880  
 Date: **6/17/03**  
 Sender's Name: **HWAKONG CHENG**  
 Company: **TETRA TECH EM INC**  
 Address: **135 MAIN ST STE 1800**  
 City: **SAN FRANCISCO** CA **94105**  
 2 Your Internal Billing Reference: **61058340112103**  
 3 To:

**Recipient**

4a Express Package Service  
 FedEx Priority Overnight  
 FedEx Standard Overnight  
 FedEx 2Day  
 FedEx Express Saver  
 4b Express Freight Service  
 FedEx 1Day Freight  
 FedEx 2Day Freight  
 FedEx 3C  
 5 Packaging  
 FedEx Envelope  
 FedEx Pak  
 Other  
 6 Special Handling  
 SATURDAY Delivery  
 HOLD Warehouse  
 HOLD Store

252 FedEx USA Airbill Express **8409 5038 8711**

1 From: This portion can be removed for Recipient's records.  
 Date: **6/17/03** FedEx Tracking Number: **840950388711**  
 Sender's Name: **HWAKONG CHENG** Phone: **415 543-4880**  
 Company: **TETRA TECH EM INC**  
 Address: **435 MAIN ST STE 1800**  
 City: **SAN FRANCISCO** CA **94105**

**Recipient**

4a Express Package Service  
 FedEx Priority Overnight  
 FedEx Standard Overnight  
 FedEx 2Day  
 FedEx Express Saver  
 4b Express Freight Service  
 FedEx 1Day Freight  
 FedEx 2Day Freight  
 FedEx 3C  
 5 Packaging  
 FedEx Envelope  
 FedEx Pak  
 Other

252 FedEx USA Airbill Express **8409 5038 8755**

1 From: This portion can be removed for Recipient's records.  
 Date: **6/17/03** FedEx Tracking Number: **840950388755**  
 Sender's Name: **HWAKONG CHENG** Phone: **415 543-4880**  
 Company: **TETRA TECH EM INC**  
 Address: **135 MAIN ST STE 1800**  
 City: **SAN FRANCISCO** CA **94105**  
 2 Your Internal Billing Reference: **61058340112103**  
 3 To:  
 Recipient's Name: **AMY EDWARDS** Phone: **301 926 6802**  
 Company: **GPL LAB**  
 Address: **202 PERRY PARKWAY**  
 City: **GAITHERSBURG** MD **20877**

**Recipient**

4a Express Package Service  
 FedEx Priority Overnight  
 FedEx Standard Overnight  
 FedEx 2Day  
 FedEx Express Saver  
 4b Express Freight Service  
 FedEx 1Day Freight  
 FedEx 2Day Freight  
 FedEx 3C  
 5 Packaging  
 FedEx Envelope  
 FedEx Pak  
 Other  
 6 Special Handling  
 SATURDAY Delivery  
 HOLD Warehouse  
 HOLD Store  
 7 Payment Method:  
 Sender  
 Recipient  
 Third Party  
 Credit Card  
 Cash



0249130014

447

NO POUCH NEEDED. See back for peel and stick application instructions.

INSTRUCTIONS: PEEL HERE

PEEL HERE

By signing you authorize us to deliver the shipment without obtaining a signature and to sign for delivery and hold as permitted on any tracking status. Questions? Visit our Web site at fedex.com or call 1.800.FEDEX. ©2003 FedEx. FedEx and the FedEx logo are trademarks of FedEx Corporation. All rights reserved.

**GPL Laboratories, LLLP**

Figure 1  
SAMPLE RECEIPT CHECKLIST

W.O. No: 306125  
 Client Name: Tetra Tech  
 Date Received: 6/18/03  
 Time Received: 10:25  
 Received By: Chen

Carrier Name: Fedex  
 Prepared (Logged In) By: [Signature] / 6/18/03  
Initials Date  
 Project: \_\_\_\_\_  
 Site: \_\_\_\_\_  
 VOA Holding Blank I.D. No: \_\_\_\_\_

Airbill/Manifest Present? 841017825128  
 No. 8409 5038 8711, 8755

Shipping Container in Good Condition?  YES  NO

Custody Seals Present on Shipping Container?  
 Condition: Broken \_\_\_\_\_  
 Intact-not dated or signed \_\_\_\_\_  
 Intact-dated and signed

Usage of Tamper Evident Type  YES  NO

Chain-of-Custody Present?  YES  NO

Chain-of-Custody Agrees with Sample Labels?  YES  NO

Chain-of-Custody Signed?  YES  NO

Packing Present in Shipping Container?  YES  NO  
 Type of Packing Bubble w-af

Custody seals on Sample Bottles?  
 Condition: Good \_\_\_\_\_ Broken

Total Number of Sample Bottles \_\_\_\_\_

Total Number of Samples \_\_\_\_\_

Samples Intact?  YES  NO

Sufficient Sample Volume for Indicated Test?  YES  NO

YES	NO	Trip Blanks: No. of Sets _____	YES	NO
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Field Blanks: No. of Sets _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Equip. Blank: No. of Sets _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		Field Duplicate: No. of Sets _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>
		MS/MSD: No of Sets _____	<input type="checkbox"/>	<input checked="" type="checkbox"/>

VOA Vials Have Zero Headspace?  YES  NO

Preservatives Added to Sample?  YES  NO

pH Check Required?  
 Performed By? \_\_\_\_\_  YES  NO

Ice Present in Shipping Container?  YES  NO

Container #	Temp.	Container #	Temp.
<u>1</u>	<u>2.0</u>		
<u>2</u>	<u>2.0</u>		
<u>3</u>	<u>2.0</u>		

Project Manager Contacted?  
 Name: [Signature]  
 Date Contacted: 6/18/03

Any NO response must be detailed in the comments section below. If items are not applicable to particular samples or contracts, they should be marked N/A

COMMENTS: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Checklist Completed By: Chen  
 Date: 6/18/03

**CHAIN-OF-CUSTODY RECORD**

No. 8277

Order Number: *N/A*

Date: *6-13-03*

Airbill No(s): *790318909981*

From: *QATS Laboratory*  
*2700 Chandler Ave bldg C*  
*Las Vegas, NV 89120*  
*702-895-8730*

To: *Amado Andar*  
*Naval weapons station Seal Branch Detachment*  
*10 Delta St. Code NWS N45WD bldg 1A-1*  
*Concord, CA 94520*

Sample ID #	Qty	Description/Remarks	⇒ Catalogue Number
<i>R9A-1</i>	<i>1</i>	<i>Per chlorate PES.</i>	<i>N/A</i>

⇒ Please use the enclosed Sample Preparation Instructions. If catalogue number(s) are listed at the top of the Sample Preparation Instructions use the Sample Preparation Instructions with catalogue number(s) matching the catalogue number(s) of each of the samples listed above.

Relinquished by: (Signature) <i>[Signature]</i>	Date/Time <i>6-13-03/4:00pm</i>	Received by: (Signature) <i>[Signature]</i>	Date/Time <i>6/16/03/13:00</i>
Custody Seal(s): <u>Present</u> <del>Absent</del>	Remarks: <i>SAMPLE INTACT</i>		
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Date/Time

White: accompanies shipment.

Yellow: return to QATS.

Pink: QATS file copy

**APPENDIX E**  
**LABORATORY RESULTS AND DATA VALIDATION REPORT**

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# **Analytical Report For 306125**

**for**

**Tetra Tech EM Inc**

**Project Manager : Susan Gallagher**

**Project Name : Site 13 Explosives/Perchlorate**

**July 2, 2003**

***GPL***

**Laboratories**

**GPL Laboratories, LLLP Certifies that the test results meet all requirements of the  
NELAC Standards unless otherwise noted.**

**Reviewed by,  
Project Manager**

**Approved by,  
Laboratory Director**

**202 Perry Parkway Gaithersburg, MD 20877 Phone (301) 926-6802 Fax: (301) 840-1209  
www.gplab.com**

**Summary of Analytical Results**

Client ID: 12113001  
GPL ID: 306125-001-001-1/1  
Matrix: WATER  
Date Collected: 06/16/2003  
Date Received: 06/18/2003

Prep Method:  
Prep Date:  
Prep Time:  
Prep Batch:

Analytical Method: E314.0  
Date Analyzed: 06/26/2003  
Time Analyzed: 20:40  
Analysis Batch: 61302

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Perchlorate	1.3	0.50	ug/L		1

**Summary of Analytical Results**

Client ID: 12113002  
GPL ID: 306125-002-002-1/1  
Matrix: WATER  
Date Collected: 06/16/2003  
Date Received: 06/18/2003

Prep Method:  
Prep Date:  
Prep Time:  
Prep Batch:

Analytical Method: E314.0  
Date Analyzed: 06/26/2003  
Time Analyzed: 21:00  
Analysis Batch: 61302

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Perchlorate	0.57	0.50	ug/L		1

**Summary of Analytical Results**

Client ID: 12113009  
GPL ID: 306125-003-003-1/1  
Matrix: WATER  
Date Collected: 06/16/2003  
Date Received: 06/18/2003

Prep Method:  
Prep Date:  
Prep Time:  
Prep Batch:

Analytical Method: E314.0  
Date Analyzed: 06/26/2003  
Time Analyzed: 21:19  
Analysis Batch: 61302

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Perchlorate	1.6	0.50	ug/L		1

**Summary of Analytical Results**

Client ID: 12113007  
GPL ID: 306125-004-004-1/1  
Matrix: WATER  
Date Collected: 06/16/2003  
Date Received: 06/18/2003

Prep Method:  
Prep Date:  
Prep Time:  
Prep Batch:

Analytical Method: E314.0  
Date Analyzed: 06/26/2003  
Time Analyzed: 21:38  
Analysis Batch: 61302

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Perchlorate	BQL	0.50	ug/L	U	1

**Summary of Analytical Results**

Client ID: 12113008  
GPL ID: 306125-005-005-1/1  
Matrix: WATER  
Date Collected: 06/16/2003  
Date Received: 06/18/2003

Prep Method:  
Prep Date:  
Prep Time:  
Prep Batch:

Analytical Method: E314.0  
Date Analyzed: 06/26/2003  
Time Analyzed: 21:58  
Analysis Batch: 61302

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Perchlorate	BQL	0.50	ug/L	U	1

**Summary of Analytical Results**

Client ID: 12113003  
GPL ID: 306125-006-010-1/2  
Matrix: WATER  
Date Collected: 06/17/2003  
Date Received: 06/18/2003

Prep Method:  
Prep Date:  
Prep Time:  
Prep Batch:

Analytical Method: E314.0  
Date Analyzed: 06/26/2003  
Time Analyzed: 22:17  
Analysis Batch: 61302

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Perchlorate	BQL	0.50	ug/L	U	1

**Summary of Analytical Results**

Client ID: 12122005  
GPL ID: 306125-007-006-1/1  
Matrix: WATER  
Date Collected: 06/17/2003  
Date Received: 06/18/2003

Prep Method:  
Prep Date:  
Prep Time:  
Prep Batch:

Analytical Method: E314.0  
Date Analyzed: 06/26/2003  
Time Analyzed: 23:16  
Analysis Batch: 61302

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Perchlorate	0.56	0.50	ug/L		1

**Summary of Analytical Results**

Client ID: 12113010  
GPL ID: 306125-008-007-1/1  
Matrix: WATER  
Date Collected: 06/17/2003  
Date Received: 06/18/2003

Prep Method:  
Prep Date:  
Prep Time:  
Prep Batch:

Analytical Method: E314.0  
Date Analyzed: 06/26/2003  
Time Analyzed: 23:35  
Analysis Batch: 61302

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Perchlorate	BQL	0.50	ug/L	U	1

**Summary of Analytical Results**

Client ID: 12113004  
GPL ID: 306125-009-008-1/1  
Matrix: WATER  
Date Collected: 06/17/2003  
Date Received: 06/18/2003

Prep Method:  
Prep Date:  
Prep Time:  
Prep Batch:

Analytical Method: E314.0  
Date Analyzed: 06/27/2003  
Time Analyzed: 00:14  
Analysis Batch: 61302

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Perchlorate	2.0	0.50	ug/L		1

**Summary of Analytical Results**

Client ID: 12113005  
GPL ID: 306125-010-009-1/1  
Matrix: WATER  
Date Collected: 06/17/2003  
Date Received: 06/18/2003

Prep Method:  
Prep Date:  
Prep Time:  
Prep Batch:

Analytical Method: E314.0  
Date Analyzed: 06/27/2003  
Time Analyzed: 00:33  
Analysis Batch: 61302

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
Perchlorate	0.70	0.50	ug/L		1

**Summary of Analytical Results**

Client ID: 12113001  
GPL ID: 306125-001-018-1/2  
Matrix: WATER  
Date Collected: 06/16/2003  
Date Received: 06/18/2003

Prep Method: EXT\_SW8330  
Prep Date: 06/25/2003  
Prep Time: 00:00  
Prep Batch: 61086

Analytical Method: SW8330  
Date Analyzed: 07/01/2003  
Time Analyzed: 19:41  
Analysis Batch: 61249

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
1,3,5-Trinitrobenzene	BQL	0.26	ug/L	U	1
1,3-Dinitrobenzene	BQL	0.26	ug/L	U	1
2,4,6-Trinitrotoluene	BQL	0.26	ug/L	U	1
2,4-Dinitrotoluene	BQL	0.26	ug/L	U	1
2,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
2-Amino-4,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
4-Amino-2,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
HMX	BQL	0.52	ug/L	U	1
Nitrobenzene	BQL	0.26	ug/L	U	1
RDX	BQL	0.52	ug/L	U	1
Tetryl	BQL	0.52	ug/L	U	1
m-Nitrotoluene	BQL	0.52	ug/L	U	1
o-Nitrotoluene	BQL	0.52	ug/L	U	1
p-Nitrotoluene	BQL	0.52	ug/L	U	1

**Summary of Analytical Results**

Client ID: 12113002  
GPL ID: 306125-002-020-1/2  
Matrix: WATER  
Date Collected: 06/16/2003  
Date Received: 06/18/2003

Prep Method: EXT\_SW8330  
Prep Date: 06/25/2003  
Prep Time: 00:00  
Prep Batch: 61086

Analytical Method: SW8330  
Date Analyzed: 07/01/2003  
Time Analyzed: 20:36  
Analysis Batch: 61249

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
1,3,5-Trinitrobenzene	BQL	0.26	ug/L	U	1
1,3-Dinitrobenzene	BQL	0.26	ug/L	U	1
2,4,6-Trinitrotoluene	BQL	0.26	ug/L	U	1
2,4-Dinitrotoluene	BQL	0.26	ug/L	U	1
2,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
2-Amino-4,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
4-Amino-2,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
HMX	BQL	0.52	ug/L	U	1
Nitrobenzene	BQL	0.26	ug/L	U	1
RDX	BQL	0.52	ug/L	U	1
Tetryl	BQL	0.52	ug/L	U	1
m-Nitrotoluene	BQL	0.52	ug/L	U	1
o-Nitrotoluene	BQL	0.52	ug/L	U	1
p-Nitrotoluene	BQL	0.52	ug/L	U	1

**Summary of Analytical Results**

Client ID: 12113007  
GPL ID: 306125-004-022-1/2  
Matrix: WATER  
Date Collected: 06/16/2003  
Date Received: 06/18/2003

Prep Method: EXT\_SW8330  
Prep Date: 06/25/2003  
Prep Time: 00:00  
Prep Batch: 61086

Analytical Method: SW8330  
Date Analyzed: 07/01/2003  
Time Analyzed: 23:19  
Analysis Batch: 61249

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
1,3,5-Trinitrobenzene	BQL	0.26	ug/L	U	1
1,3-Dinitrobenzene	BQL	0.26	ug/L	U	1
2,4,6-Trinitrotoluene	0.27	0.26	ug/L		1
2,4-Dinitrotoluene	BQL	0.26	ug/L	U	1
2,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
2-Amino-4,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
4-Amino-2,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
HMX	9.0	0.52	ug/L		1
Nitrobenzene	BQL	0.26	ug/L	U	1
RDX	BQL	0.52	ug/L	U	1
Tetryl	BQL	0.52	ug/L	U	1
m-Nitrotoluene	BQL	0.52	ug/L	U	1
o-Nitrotoluene	BQL	0.52	ug/L	U	1
p-Nitrotoluene	BQL	0.52	ug/L	U	1

**Summary of Analytical Results**

Client ID: 12113008  
GPL ID: 306125-005-024-1/2  
Matrix: WATER  
Date Collected: 06/16/2003  
Date Received: 06/18/2003

Prep Method: EXT\_SW8330  
Prep Date: 06/25/2003  
Prep Time: 00:00  
Prep Batch: 61086

Analytical Method: SW8330  
Date Analyzed: 07/02/2003  
Time Analyzed: 00:14  
Analysis Batch: 61249

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
1,3,5-Trinitrobenzene	BQL	0.26	ug/L	U	1
1,3-Dinitrobenzene	BQL	0.26	ug/L	U	1
2,4,6-Trinitrotoluene	0.34	0.26	ug/L		1
2,4-Dinitrotoluene	BQL	0.26	ug/L	U	1
2,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
2-Amino-4,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
4-Amino-2,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
HMX	BQL	0.52	ug/L	U	1
Nitrobenzene	BQL	0.26	ug/L	U	1
RDX	BQL	0.52	ug/L	U	1
Tetryl	BQL	0.52	ug/L	U	1
m-Nitrotoluene	BQL	0.52	ug/L	U	1
o-Nitrotoluene	BQL	0.52	ug/L	U	1
p-Nitrotoluene	BQL	0.52	ug/L	U	1

**Summary of Analytical Results**

Client ID: 12113003  
GPL ID: 306125-006-026-1/4  
Matrix: WATER  
Date Collected: 06/17/2003  
Date Received: 06/18/2003

Prep Method: EXT\_SW8330  
Prep Date: 06/25/2003  
Prep Time: 00:00  
Prep Batch: 61086

Analytical Method: SW8330  
Date Analyzed: 07/02/2003  
Time Analyzed: 01:08  
Analysis Batch: 61249

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
1,3,5-Trinitrobenzene	BQL	0.26	ug/L	U	1
1,3-Dinitrobenzene	BQL	0.26	ug/L	U	1
2,4,6-Trinitrotoluene	BQL	0.26	ug/L	U	1
2,4-Dinitrotoluene	BQL	0.26	ug/L	U	1
2,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
2-Amino-4,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
4-Amino-2,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
HMX	BQL	0.52	ug/L	U	1
Nitrobenzene	BQL	0.26	ug/L	U	1
RDX	BQL	0.52	ug/L	U	1
Tetryl	BQL	0.52	ug/L	U	1
m-Nitrotoluene	BQL	0.52	ug/L	U	1
o-Nitrotoluene	BQL	0.52	ug/L	U	1
p-Nitrotoluene	BQL	0.52	ug/L	U	1

**Summary of Analytical Results**

Client ID: 12113004  
GPL ID: 306125-009-014-1/2  
Matrix: WATER  
Date Collected: 06/17/2003  
Date Received: 06/18/2003

Prep Method: EXT\_SW8330  
Prep Date: 06/25/2003  
Prep Time: 00:00  
Prep Batch: 61086

Analytical Method: SW8330  
Date Analyzed: 07/02/2003  
Time Analyzed: 02:03  
Analysis Batch: 61249

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
1,3,5-Trinitrobenzene	BQL	0.26	ug/L	U	1
1,3-Dinitrobenzene	BQL	0.26	ug/L	U	1
2,4,6-Trinitrotoluene	BQL	0.26	ug/L	U	1
2,4-Dinitrotoluene	BQL	0.26	ug/L	U	1
2,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
2-Amino-4,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
4-Amino-2,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
HMX	BQL	0.52	ug/L	U	1
Nitrobenzene	BQL	0.26	ug/L	U	1
RDX	BQL	0.52	ug/L	U	1
Tetryl	BQL	0.52	ug/L	U	1
m-Nitrotoluene	BQL	0.52	ug/L	U	1
o-Nitrotoluene	BQL	0.52	ug/L	U	1
p-Nitrotoluene	BQL	0.52	ug/L	U	1

**Summary of Analytical Results**

Client ID: 12113005  
GPL ID: 306125-010-016-1/2  
Matrix: WATER  
Date Collected: 06/17/2003  
Date Received: 06/18/2003

Prep Method: EXT\_SW8330  
Prep Date: 06/25/2003  
Prep Time: 00:00  
Prep Batch: 61086

Analytical Method: SW8330  
Date Analyzed: 07/02/2003  
Time Analyzed: 02:57  
Analysis Batch: 61249

Parameter	Result	Rep Limit	Units	Qualifier	D.F.
1,3,5-Trinitrobenzene	BQL	0.26	ug/L	U	1
1,3-Dinitrobenzene	BQL	0.26	ug/L	U	1
2,4,6-Trinitrotoluene	BQL	0.26	ug/L	U	1
2,4-Dinitrotoluene	BQL	0.26	ug/L	U	1
2,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
2-Amino-4,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
4-Amino-2,6-Dinitrotoluene	BQL	0.26	ug/L	U	1
HMX	BQL	0.52	ug/L	U	1
Nitrobenzene	BQL	0.26	ug/L	U	1
RDX	BQL	0.52	ug/L	U	1
Tetryl	BQL	0.52	ug/L	U	1
m-Nitrotoluene	BQL	0.52	ug/L	U	1
o-Nitrotoluene	BQL	0.52	ug/L	U	1
p-Nitrotoluene	BQL	0.52	ug/L	U	1

GPL LABORATORIES, LLP  
ANALYTICAL RESULTS

Project Name : Site 13 Explosives/Perchlorate

Date Printed July 2, 2003

<b>GPL ID</b>	<b>Client ID</b>
306125-001-001-1/1	12113001
306125-001-018-1/2	12113001
306125-002-002-1/1	12113002
306125-002-020-1/2	12113002
306125-006-010-1/2	12113003
306125-006-026-1/4	12113003
306125-009-008-1/1	12113004
306125-009-014-1/2	12113004
306125-010-009-1/1	12113005
306125-010-016-1/2	12113005
306125-004-004-1/1	12113007
306125-004-022-1/2	12113007
306125-005-005-1/1	12113008
306125-005-024-1/2	12113008
306125-003-003-1/1	12113009
306125-008-007-1/1	12113010
306125-007-006-1/1	12122005

# DATA VALIDATION REPORT

Site: Concord  
Contract Task Order (CTO) No.: G1058-340112103 TV-121  
Laboratory: GPL  
Data Reviewer: Joan Heath, *ETHIX*  
Review Date: 7/18/03

Sample Delivery Group (SDG) No.:

Sample Nos.:	12113001	12113004 *	12113008	12122005
	12113002	12113005	12113009	<i>not included (PE sample)</i>
	12113003	12113007	12113010	

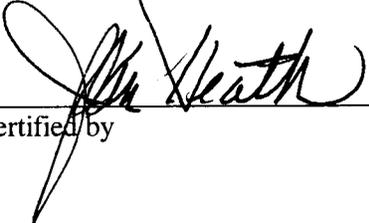
\* Full Validation Sample

Matrix: Water

Collection Date(s): 6/16/03 and 6/17/03

The data were qualified according to the U.S. Environmental Protection Agency (EPA) documents "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" (October 1999) and "USEPA Contract Laboratory Program National Functional Guidelines For Inorganic Data Review" (February 1994). In addition, the Tetra Tech EM Inc. (TtEMI) documents "Data Validation Guidelines for CLP Organic Analyses," "Data Validation Guidelines for CLP Inorganic Analyses," "Data Validation Guidelines for Non-CLP Organic Analyses," "Data Validation Guidelines for Non-CLP Inorganic and Physical Analyses" (August, 1 2001), and the document entitled "TtEMI Comprehensive Long-term Environmental Action Navy II Analytical Services Statement of Work" (May 2000) were used along with other specified criteria in EPA methods. Data validation requirements are presented on page 2.

I certify that all data validation criteria outlined in the above referenced documents were assessed, and any qualifications made to the data were in accordance with those documents.

  
\_\_\_\_\_  
Certified by

## DATA VALIDATION REQUIREMENTS

Full validation includes all parameters listed below. Cursory validation parameters are indicated by an asterisk (\*).

### CLP Organic Parameters

- \* Holding times
- GC/MS instrument performance check
- \* Initial and continuing calibrations
- \* Blanks
- \* Surrogate recovery
- \* Matrix spike/matrix spike duplicate
- \* Laboratory control sample or blank spike \*
- \* Field duplicates
- \* Internal standard performance
- Target compound identification
- Tentatively identified compounds
- Compound quantitation
- Reported detection limits
- System performance
- \* Overall assessment of data for the SDG

### CLP Inorganic Parameters

- \* Holding times
- \* Initial and continuing calibrations
- \* Blanks
- \* Matrix spike
- \* Laboratory control sample or blank spike
- Field duplicates
- \* Matrix duplicates
- ICP interference check sample
- GFAA quality control
- \* ICP serial dilution
- Sample result verification
- Analyte quantitation
- Reported detection limits
- \* Overall assessment of data for the SDG

### Non-CLP Organic and Inorganic Parameters

- \* Method compliance
- \* Holding times
- \* Initial and continuing calibrations
- \* Blanks
- \* Matrix spike/matrix spike duplicate
- \* Laboratory control sample or blank spike
- \* Field duplicates
- \* Matrix duplicates
- \* Surrogate recovery
- Analyte quantitation
- Reported detection limits
- \* Overall assessment of data for the SDG

## DATA VALIDATION QUALIFIERS AND CODES

### Data Validation Qualifiers

- UJ** Estimated nondetected result
- J** Estimated detected result
- R** Rejected result
- NJ** Tentatively Identified Compound (TIC)

### Data Validation Qualifier Codes

- a** Surrogate recovery exceedance
- b** Laboratory method blank and common blank contamination
- c** Calibration exceedance
- d** Duplicate precision exceedance
- e** Matrix spike/laboratory control sample (LCS) recovery exceedance
- f** Field blank contamination
- g** Quantification below reporting limit
- h** Holding time exceedance
- i** Internal standard exceedance
- j** Other qualifications

**TABLE 1  
CURSORY DATA VALIDATION SUMMARY**

Analysis	Holding Times	Surrogates	MS/MSD	Matrix Duplicates	LCS	Blanks	Calibrations	Internal Standards	Field Duplicates	Other
Explosives	Pg. 7	Pg. 7	Pg. 7	N/A	Pg. 8	✓	✓	N/A	Pg. 8	N/A
Perchlorate	✓	N/A	✓	N/A	✓	✓	✓	N/A	Pg. 9	N/A

Notes:

- ✓ indicates that all quality control criteria were met for the parameter as specified in the prescribed methods and data validation guidelines.
- N/A indicates the parameter is not applicable to an analysis.
- If criteria were not met and the data were qualified, a page number is indicated where the qualification is detailed.
- The data were evaluated for all validation criteria and were found to be in control except where noted. Any outliers are described in the text.



## EXPLOSIVES METHOD 8330

### I. Holding Times

A. Due to holding time problems, the following nondetected results are qualified as estimated (UJh).

- All target compounds in sample 12113010

The extraction holding time of 7 days was exceeded by 7 days.

### II. Surrogate Recovery

B. Due to surrogate recovery problems, the following nondetected results are qualified as estimated (UJa).

- All target compounds in samples 12113007 and 12113010

The surrogates outside of QC limits are listed below.

<u>Sample ID</u>	<u>Surrogate</u>	<u>% R</u>	<u>QC Limits</u>
12113007	4-nitroaniline	16	60 - 140%
12113008	4-nitroaniline	55	60 - 140%

Low recoveries indicate that false nondetects may have been reported.

### III. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

A. Due to accuracy problems in the MS/MSD analysis, the following nondetected result is qualified as estimated (UJe).

- 1,3,5-trinitrobenzene in matrix spike sample 12113003

The recoveries that did not meet the QC limits are listed below.

<u>Sample ID</u>	<u>Compound</u>	<u>%R</u>	<u>QC Limits</u>
12113003	1,3,5-trinitrobenzene	46, 69	50 - 150%

Only the spiked sample was affected by this outlier. False nondetects for 1,3,5-trinitrobenzene may have been reported.

### IV. Blank Spike or Laboratory Control Sample (LCS)

A. Due to a problem in the LCS analysis, the following nondetected results are qualified as estimated (UJe).

- 1,3,5-trinitrobenzene and tetryl in samples 12113001, 12113002, 12113003, 12113004, 12113005, 12113007, 12113008 and 12113010

The results obtained in the analysis of the LCS were not within the control limits as shown below.

<u>LCS ID</u>	<u>Compound</u>	<u>% R</u>	<u>QC Limits</u>
BSK61086	1,3,5-trinitrobenzene	44	60 - 140%
	tetryl	27	60 - 140%
BSK61205	1,3,5-trinitrobenzene	32	60 - 140%
	tetryl	21	60 - 140%
BSK61208	1,3,5-trinitrobenzene	49	60 - 140%
	tetryl	22	60 - 140%

False nondetects may have been reported for the compounds listed above.

## VI. Field Duplicate

A. All target compounds were reported as nondetected in field duplicate samples 12113004/dup12113005

For water samples, the field RPD guideline is  $\pm 25\%$ . The data are not qualified on the basis of field duplicate results.

### *Full Validation Criteria for Sample 12113004*

## VII. Compound Quantitation and Reported Detection Limits

A. Sample results were recalculated, with the proper dilution factors and volumes used to calculate the sample results. The sample was nondetect for all 8330 compounds. The reported detection limits were consistent with TTEMI's required report limits and reflect any dilutions and volumes utilized.

## VIII. System Performance

A. The sample was evaluated for baseline shifts, extraneous peaks, loss of resolution, and peak tailing. The sample chromatogram was free of interfering peaks, however, retention times were beginning to shift at the end of the analytical sequence and the matrix spikes were manually integrated.

## PERCHLORATE METHOD 314.0

## I. Field Duplicate

A. The following RPD was obtained for the field duplicate samples 12113004/dup 12113005:

- 96.3% for perchlorate

For water samples, the field RPD guideline is  $\pm 25\%$ . The data are not qualified on the basis of field duplicate results.

***Full Validation Criteria for Sample 12113004***

**II. Compound Quantitation and Reported Detection Limits**

A. Sample results were recalculated, with the proper dilution factors and volumes used to calculate the sample results. The sample was found to be correctly quantitated. Project required report limits for perchlorate were not specified.

**III. System Performance**

A. The samples were evaluated for baseline shifts, extraneous peaks, loss of resolution, and peak tailing. Although all samples were pre-treated prior to analysis common anion effect was observed in chromatography.

## OVERALL ASSESSMENT OF DATA

### I. Method Compliance and Additional Comments

- A. The original extract for sample 12113010 was lost during the analytical process and was therefore re-extracted, however the re-extraction was performed outside of holding time. Sample 12113007 was re-extracted due to low surrogate recovery; surrogate recovery was much better in the re-extract, however the re-extract was performed outside of holding time and on a confirmation instrument. The lab reported the re-extract results for QC purposes only.

### II. Usability

- A. Due to holding time exceedance in the explosives analysis, all target compounds in sample 12113010 are qualified as estimated. All 8330 target compounds in two samples were qualified as estimated due to low surrogate recovery. Due to low LCS recoveries, 1,3,5-trinitrobenzene and tetryl results in all samples are qualified as estimated. Results should be considered as biased low in all cases of qualification.
- B. The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable. Sample results that were found to be rejected (R) are unusable for all purposes. Sample results that were found to be estimated (J) are usable for limited purposes only. Based upon the cursory and full data validation all other results are considered valid and usable for all purposes. In general, the absence qualifiers added to the perchlorate data indicate high usability. The high number of qualifications made to the explosives data indicate several analytical and/or matrix problems that limit the usability of the data.

**APPENDIX F**  
**RESPONSES TO AGENCY AND RESTORATION ADVISORY BOARD COMMENTS**

**RESPONSES TO AGENCY AND RESTORATION ADVISORY BOARD COMMENTS ON THE  
DRAFT GROUNDWATER SAMPLING SUMMARY REPORT FOR  
SITES 13 AND 22  
NAVAL WEAPONS STATION SEAL BEACH DETACHMENT CONCORD  
CONCORD, CALIFORNIA**

This document presents the U.S. Department of the Navy (Navy) responses to comments from the regulatory agencies and Restoration Advisory Board (RAB) on the Draft Groundwater Sampling Summary Report for Sites 13 and 22, Naval Weapons Station Seal Beach Detachment Concord, California, dated September 4, 2003. The comments addressed in the following document were received from the U.S. Environmental Protection Agency (EPA) on October 9, 2003, the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) on October 21, 2003, and RAB Member, Christopher Boyer on September 24, 2003.

Agency and RAB Member comments are presented in boldface type.

**RESPONSE TO COMMENTS FROM EPA**

1. **EPA Comment:** **Executive Summary and Section 1.1, Purpose of the Investigation: A more detailed description of the regulatory agencies involvement with the draft Groundwater Sampling Report and site decisions that led to the subject report needs to be provided. In the Executive Summary third paragraph, U.S. EPA recommends the following text to replace the third sentence:**

**“Pursuant to the Concord Federal Facilities Agreement, U.S. EPA, in correspondence dated January 29, 2003, invoked informal dispute with the Navy on a December 2002, Revised Draft Final (No-Action) Record of Decision (ROD) for Sites 13 and 17. This dispute was over a possible data gap associated with characterization of perchlorate in groundwater at Site 13, which was subsequently confirmed. Informal dispute discussions, including a U.S. EPA - Navy conversation documented in U.S. EPA’s February 26, 2003 electronic message to Mr. Tony Tactay (Navy) resulted in the Navy’s April 30, 2003 letter to U.S. EPA agreeing to conduct necessary groundwater assessments at Site 13 and 22.”**

**Response:** While not using the exact recommended text, information regarding the regulatory agencies’ involvement with the sampling at Sites 13 and Site 22 has been added to the text.

2. **EPA Comment:** **Executive Summary and Section 4, Conclusions: The description of future CERCLA activities for both IR Site 13 and Site 22 should be updated and expanded to reflect current site strategies and deliverable schedules. U.S. EPA recommends the following text to accurately describe the current status of the sites based upon the initial sampling results:**

**“Based upon Navy-Regulatory Agencies discussions on Site 13 and as documented in the August 11, 2003, draft final Site Management Plan (SMP) Amendment, the Navy will conduct additional groundwater assessments at Site 13, with a Sampling and Analysis Plan due December 1, 2003, and a draft Remedial Investigation Report Addendum scheduled for August 23, 2004. A draft Feasibility Study is also scheduled in the August 2003, draft final SMP Amendment, and is scheduled for release on February 21, 2005. Over the next couple of months, the Navy will be coordinating with the regulatory agencies on the scope of the Groundwater Supplemental RI Sampling and Analysis Plan.**

**For Site 22, the Navy has prepared an August 15, 2003, draft Supplemental Remedial Investigation Sampling and Analysis Plan and is scheduled to finalize the plan on January 14, 2004. A Revised Draft Supplemental Remedial Investigation Report is scheduled for release to the public on May 13, 2004, with a final version to be issued on October 11, 2004, and a Draft Feasibility Study scheduled for release on April 1, 2005.”**

**Response:**

While not using the exact recommended text, the general status of the sites has been added to the text.

**3. EPA Comment:**

**Section 5, References: Several documents that are associated with significant site decisions need to be included in the Reference section and as described above, discussed in text. These include: U.S. EPA’s January 29, 2003 correspondence to the Navy invoking informal dispute resolution on the December 2002 ROD for Sites 13 and 17; the Navy’s April 30, 2003 letter written in response to U.S. EPA’s January 29, 2003 letter; and lastly, U.S. EPA’s February 26, 2003 electronic message to Tony Tactay regarding a phone conversation between Mr. Walter Sandza (Navy manager with SWDIV) and U.S. EPA Program staff on Site 13 informal dispute and perchlorate data gap (see Enclosure B).**

**Response:**

References regarding the correspondences listed above have been added to the text. The 30 April 2003 letter and 26 February 2003 electronic mail message have also been included in the Enclosure section to this response to comments.

**4. EPA Comment:**

**Figure 1, Site 13 Monitoring Well Locations and Perchlorate Concentrations: Two existing piezometers at Site 13 should be considered for integration with any future Site 13 groundwater assessments. As discussed between the U.S. EPA and the Navy prior to developing the Sampling and Analysis Plan for the draft Groundwater Sampling Report, two existing piezometers at Site 13 should be evaluated for groundwater sampling. The Navy’s preliminary response was that these wells may not be acceptable for groundwater sampling (because screen intervals were unknown); however, they should be acceptable for water elevation measurements. For the December 1, 2003, Site 13 draft Sampling**

**and Analysis Plan, please evaluate the piezometers for integration into the monitoring well network.**

**Response:** Integration of the piezometers into the monitoring well network will be evaluated during the preparation of the Site 13 Draft Sampling and Analysis Plan (SAP).

**5. EPA Comment:** **Appendix D, Chain of Custody Sheets: In response to preliminary U.S. EPA concerns that Chain of Custody (CoC) was not intact and a U.S. EPA provided performance evaluation or “PE” sample was identified as such on the CoC, U.S. EPA requested and received a copy of the Chain of Custody that was sent to the laboratory. This copy documents that the Chain of Custody was intact (signed by receiving lab) and correctly tracks the PE sample (as a double blind performance sample). No changes are required.**

**Response:** Comment noted. All chain of custodies for the site have been included in [Appendix D](#).

## RESPONSE TO COMMENTS FROM SFBRWQCB

### General Comments

**1. SFBRWQCB Comment:** **The site’s 13 piezometers should be assessed to determine if hydrological sampling can be conducted at these locations. These piezometers should be mapped and their characteristics (such as depth, outer/inner diameters, water level) reported. The Navy’s preliminary response that they do not have information on the construction of these sampling points does not preclude their use as sampling points. Monitoring well BUAMW002 was sampled despite the absence of boring and construction logs.**

**Response:** As discussed above in the response to EPA comment 4, integration of the monitoring wells into the monitoring well network will be evaluated during preparation of the Site 13 Draft SAP. Although the well construction and borings logs are not available for Well BUAMW002, there is information regarding the surrounding lithology and construction of the well on the hydrogeologic cross section (Figure 5-3 in [Appendix B](#)).

**2. SFBRWQCB Comment:** **The Navy needs to include regulatory comments and the Navy’s response to comments on the Draft Sampling Assessment Workplan in an appendix to the current report.**

**Response:** Comments from regulatory agencies on the Draft Sampling Plan and responses to those comments were submitted to the Concord team and RAB on June 16, 2003 ([U.S. Navy 2003](#)). Agency comments regarding draft sampling plans are generally not included in summary reports. Thus, these comments will not be repeated as a separate appendix in this report.

3. **SFBRWQCB Comment:** **The Navy should outline why N-Nitrosodimethylamine, a product generated by the decomposition of unsymmetrical hydrazine (component used in the production of rocket fuel), was not to be sampled at Site 22. Furthermore, the Navy needs to include the results of their records review indicating if hydrazine was used at this military base.**

**Response:**

Neither hydrazine or N-Nitrosodimethylamine are appropriate constituents for analysis at the site as described below. N-Nitrosodimethylamine is a component used in the production of liquid rocket fuel ([ASTDR 2003](#); [SWRCB 2002](#)) and has been detected in groundwater at facilities that produce liquid rocket fuel ([ATSDR 2003](#)). Since liquid rocket fuel was not produced at the Naval Weapons Station Seal Beach Detachment (NWSSBD) Concord, it is unlikely that a release of N-Nitrosodimethylamine would have occurred at the base.

Building 7SH5 was used (1) as a storehouse for inert equipment; (2) to test missile components (vibration and environment testing); (3) to maintain missile wings and fins (including paint stripping, cleaning, and painting of missile wings and fins); and (4) for manufacturing mobile laboratories to be used during explosive ordnance disposal activities. The type of inert equipment stored at Building 7SH5 included bomb and missile fins, shipping containers, wood pallets, nails, metal strapping materials, and empty bullets (without explosive equipment inside). Explosive materials were not stored, tested, or used in Building 7SH5 ([TiEMI 2003a](#)). Therefore, no suspected source of hydrazine exists at building 7SH5.

However, to address munitions-related concerns at military installations, the Department of Defense initiated a Military Munitions Response Program (MMRP) program in September 2001 that is designed to evaluate the potential of munitions-related components on military bases, including rocket fuels. "Traditional" contaminants will still be addressed under the mature Installation Restoration Program (IRP). At Concord, eight MMRP sites have been identified. These sites will be investigated following the CERCLA process with the Preliminary Assessments to begin in the Fall/Winter 2003 timeframe.

4. **SFBRWQCB Comment:** **The Navy needs to acknowledge in this report that the sampling results obtained from Sites 13 and 22 will be integrated into an overdue response to the SWRCB (State Water Resources Control Board) source evaluation request for emergent chemicals at the base (correspondence sent to the Navy on July 3rd 2003).**

**Response:**

The Navy is participating in discussions with the SWRCB and other regulatory agencies to establish state-wide methods to address emergent chemicals of concern at military installations, and will comply with whatever agreements are reached through the interagency working group.

5. **SFBRWQCB Comment:** **Due to the detections of perchlorate in the groundwater at sites 13 and 22, Board Staff requests the conducting of a site wide evaluation of this contaminant. Iso-concentration maps of this contaminant should be established to non detect values.**

**Response:** Based on the detection of perchlorate at Site 13, a separate sampling and analysis for Site 13 is being developed to characterize perchlorate contamination at that site. The Navy will be discussing its conceptual plans for this sampling as the sampling plan is being developed. At Site 22, the Navy is proposing collection of perchlorate samples from the four Site 22 wells as part of the Supplemental Remedial Investigation at that site ([Tetra Tech 2003c](#)). It is the Department of Defense's policy to conduct perchlorate investigations at sites where there is a reasonable basis to suspect that a release has occurred as a result of DOD activities and where a complete human exposure pathway is likely to exist ([DOD 2003](#)).

### Specific Comments

1. **SFBRWQCB Comment:** **Executive Summary, p ES-1: Indicate why Site 22 was not sampled for explosives and their associated by-products in groundwater.**

**Response:** Building 7SH-5 was formerly used for repairing missile wings and fins. No explosives were contained within these devices at the time of repair; therefore, there are no known sources of explosives at Site 22. It is unlikely that explosive residue would be present in groundwater.

2. **SFBRWQCB Comment:** **Section 1.2, Site History, p 4: Clarify the following statement: "The Inland Area is in a transition phase."**

**Response:** [Section 1.3](#), Page 6 will be revised to state, "Since 1999, the Inland Area has been on reduced operational status and is mostly inactive (mothballed), with no immediate plans to resume active operations."

3. **SFBRWQCB Comment:** **Section 1.2.2, Geology and Hydrogeology, p 6: Indicate if any of the monitoring wells sampled for perchlorate and explosive residues are screened within the perched groundwater area.**

**Response:** None of the wells sampled as part of this investigation are screened within the perched groundwater areas as shown on the hydrogeologic cross sections in [Appendix B](#).

4. SFBRWQCB Comment: **Section 3.1, Analytical Results, p 13: Clarify the 1.3 ppb (parts per billion) concentration difference found between two samples retrieved from BUAMW012.**

**Response:** As discussed in [Section 3.2](#), a field duplicate sample was collected from well BUAMW012. The original sample contained perchlorate at a concentration of 2 µg/L, and the duplicate sample contained perchlorate at a concentration of 0.7 µg/L. The relative percent difference (RPD) between these concentrations is greater than 25 percent, which indicates some inconsistency with the sample collection. However, the validator did not flag or qualify the result as estimated.

The RPD may be the result of low level-matrix interference that was present in the original samples but not in the duplicate sample. The analytical method is a chromatography method, and interfering peaks could co-elute with perchlorate, thus giving a higher value. Sampling techniques were also reviewed to see if there was a change in sample collection technique between the original and duplicate samples. However, no change in sample collection technique was reported.

5. SFBRWQCB Comment: **Figure 1 Site 13 Monitoring Well Locations and Perchlorate Concentrations in Groundwater: Clarify the statement: “Original/Duplicate Sample.”**

**Response:** Two samples from the same well were collected as part of the quality assurance control program. The first sample collected is labeled the original sample, and the second sample collected is labeled the duplicate sample.

#### Editorial Comments

1. SFBRWQCB Comment: **Figures 1 and 2 Sites 13/ 22 Monitoring Wells Locations: Map the site’s topography, groundwater elevations, areas of documented perched groundwater on these figures.**

**Response:** The site topography and groundwater elevations have been added to [Figures 1](#) and [2](#). None of the wells sampled as part of this investigation are screened within perched groundwater areas. Thus, no areas of perched groundwater are shown on the figures.

2. SFBRWQCB Comment: **Tables: Include a comprehensive analytical table reporting all sampling results collected up to this date for the chemicals of concern sampled in this report.**

**Response:** The analytical table for all chemical of concerns sampled as part of this field effort are presented in [Appendix E](#).

## RESPONSE TO COMMENTS FROM RAB MEMBER CHRISTOPHER BOYER

- 1. RAB Comment:** **Page ES-1 / Third Paragraph:** Please add the RAB to the list of agencies that recommended perchlorate testing for the sites. This reinforces that the Navy is listening to and considering the RAB's recommendations.

**Response:** The following sentence has been added to Page ES-1, Third Paragraph:  
*The Restoration Advisory Board (RAB) also requested that perchlorate be analyzed at the site.*
- 2. RAB Comment:** **Page ES-1 / Third Paragraph:** Please change “Explosive residue samples were collected” to Samples were collected to test for explosive residue”. The current sentence structure lends one to be that explosive residue does exist and a sample of it was collected.

**Response:** The sentence structure was revised as requested.
- 3. RAB Comment:** **Page 2 / Section 1.2 / Third Paragraph:** Please change “small-arms ammunition, power, and” to “small-arms ammunition, powder, and”.

**Response:** The word “power” was changed to powder.
- 4. RAB Comment:** **Page 2 / Section 1.2 / Last Paragraph:** Please change “for 5-caliber” to “for 50 caliber”.

**Response:** The text was revised from 5-caliber to 50 caliber.
- 5. RAB Comment:** **Page 4 / Section 1.2 / Last Paragraph:** Please deliver a better textual description of the site. It is not instantly clear how sequentially numbered avenues would intersect (under normal circumstances they would be assumed to be parallel). Perhaps adding the something that reveals that the NE boundary is 16<sup>th</sup> St., the NW boundary is P St., the SW boundary is 17<sup>th</sup> St., and the SW boundary is Wildon Rd.

**Response:** The text was revised to include a better description of the location and boundaries of the site.
- 6. RAB Comment:** **Data Validation Report:** It appears that there were a number of problems with the explosive detection samples including “holding time” and “surrogate recovery problems” and that their results are qualified as “estimated”. Are the agencies satisfied that a qualified estimated sample result is adequate or should this be retested?

**Response:**

The Data were validated following EPA's Contract Laboratory Program National Functional Guidelines for Organic Data Review (EPA 1994). EPA's "Risk Assessment Guidance for Superfund" (RAGS) was used to evaluate the usability of the validated data (EPA 1989). Exhibit 5-5 in RAGS states that data qualified as estimated (J) based on data validation reports should be used in quantitative risk assessments. Although this guidance is specifically for human health risk assessments, the same data usability criteria was applied to evaluate the data for Sites 13 and 22. Because the explosive residue data were all estimated (J) during data validation, the data is considered adequate. Only data qualified as rejected (R) is considered unsuitable for risk assessment purposes.

## REFERENCES

Agency for Toxic Substances and Disease Registry (ASTDR). ASTDR Web Page. <http://www.atsdr.cdc.gov/tfacts141.html>. Viewed on May 26, 2003.

San Francisco Bay Regional Water Quality Control Board (SFBRWQCB). 2002. "Draft Groundwater Information Sheet for Nitrosodimethylamine." Prepared by John Borkovich, R.G. October 23.

Department of Defense (DOD). Office of the Under Secretary of Defense. Memorandum for Assistant Secretary of the Army, Navy, Air Force and Defense Logistics on the Interim Policy on Perchlorate Sampling. September 29, 2003.

Tetra Tech EM Inc. (Tetra Tech). 2003a. Record of Telephone Conversation Regarding Building 7SH5, NWS SBD Concord. Between Joanna Canepa, Environmental Scientist, and Richard Pieper, Site Director, NWS SBD Concord. May 19.

Tetra Tech. 2003c. "Draft Addendum 01. Draft Final Sampling and Analysis plan (Field Sampling Plan and Quality Assurance Project Plan) Investigation of Arsenic in Soil at Installation Restoration Site 22, Naval Weapons Station Seal Beach Detachment Concord, Concord, California." August 18. U.S. Environmental Protection Agency (EPA). 1989. "Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual, Part A." Office of Solid Waste and Environmental Response. December.

U.S. Environmental Protection Agency. 1994. "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review." Document Number EPA-540/R-94/012. February.

U.S. Navy. Naval Facilities Engineering Command, Engineering Field Activity West (EFA West). "Response to Comments on the Draft Addendum Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) Additional Groundwater Investigation at Sites 13 and 22. An Addendum to the Draft Final Field Sampling Plan and Quality Assurance Project Plan Remedial Investigation OF Groundwater at SWMU Sites 1, 2, 5, 7, and 18, Naval Weapons Station Seal Beach Detachment Concord, Concord, California." June 16.

**ENCLOSURES**



**DEPARTMENT OF THE NAVY**  
ENGINEERING FIELD ACTIVITY, WEST  
NAVAL FACILITIES ENGINEERING COMMAND  
2001 JUNIPERO SERRA BOULEVARD, SUITE 600  
DALY CITY, CALIFORNIA 94014-1976

IN REPLY REFER TO:

30 April 2003

Ms. Michelle Shutz, Group 1 Chief  
Federal Facilities and Site Cleanup Branch  
U. S. Environmental Protection Agency  
Region IX  
75 Hawthorne Street  
San Francisco, CA 94105

**Subject: PERCHLORATE SAMPLING; SITE 13/17 RECORD OF DECISION INFORMAL  
DISPUTE, NAVAL WEAPONS STATION CONCORD**

Encl: (1) Draft Addendum Sampling and Analysis Plan Additional Groundwater Investigation at Sites 13 and 22, an Addendum to "Draft Final Field Sampling Plan and Quality Assurance Project Plan for Remedial Investigation for Groundwater for SMWUs 1, 2, 5, 7, and 18 Inland Area, NWSSB Detachment Concord" (Tetra Tech, 2001a and b).

Dear Ms. Schutz,

This letter responds to your 29 January 2003 letter to Mr. Tony Tactay, and seeks to confirm the understanding that Mr. Phillip A. Ramsey of your office and I reached during our phone conversation of 28 February 2003 regarding the subject matter. I am replying in lieu of Mr. Tactay because I have recently (10 March 2003) accepted the position as Lead Remedial Project Manager for the Naval Weapons Station Concord, a position previously held by Mr. Gil Rivera.

Confirming the 28 February conversation between Mr. Ramsey and myself, the Navy agrees to sample and analyze for perchlorate in the four ground-water monitoring wells at Site 13. Specifically, after receiving your office's concurrence, the Navy will promptly plan and execute the gauging, sampling, and analysis for perchlorate in the three down-gradient and single upgradient ground-water monitoring wells at Site 13; namely, wells BUAMW002, BUAMW010, BUAMW012, and BUAMW011. During our discussion, Mr. Ramsey requested that we also sample the two piezometers on site and I promised to investigate that potential. After some research, I have learned that we do not have construction data for these piezometers, and have no records indicating any prior sampling. The piezometers were installed prior to 1992 and their past security is not known. Given these facts, the Navy recommends forgoing sampling of the piezometers; however, we will attempt to gauge their water levels. We feel confident that the monitoring well sampling and analysis will achieve our collective goal of assessing the site ground water for perchlorate, thus allowing furtherance of the Site 13/17 ROD in the case of favorable results.

30 April 2003

During a related conversation between Mr. Ramsey and Mr. Walter Sandza of Navy Engineering Field Division Southwest on 26 February 2003, Mr. Ramsey raised the question of whether the site ground water had been tested for explosives (EPA Method 8330). In response to that concern, review of our records shows that the Navy did test the ground water for explosives using EPA Method 8330 during the Site Investigation [SI](PRC and Montgomery Watson, 1996). Explosive compounds were not detected in the two rounds of sampling from down-gradient well BUAMW002. However, recognizing Mr. Ramsey's concern with the length of time that has passed since the SI fieldwork, the Navy will include analysis for the EPA Method 8330 constituents to reconfirm their absence at Site 13.

In summary, the Navy proposes to sample and analyze for perchlorate and EPA Method 8330 constituents the four monitoring wells listed above in accordance with the "Draft Final Field Sampling Plan and Quality Assurance Project Plan for Remedial Investigation for Groundwater for SMWUs 2, 5, 7, and 18 Inland Area, NWSSB Detachment Concord" (Tetra Tech 2001a and b) as amended by enclosure (1).

The Navy seeks your concurrence on this proposal as a means of resolving the subject informal dispute. We appreciate your continued cooperation and I personally look forward to working with Mr. Ramsey and your staff.

#### REFERENCES

PRC Environmental Management, Inc. and Montgomery Watson. 1996. "Draft Naval Weapons Station Concord, Site Investigation Report, Inland Area Sites." March.

Tetra Tech. 2001a. Draft Final Field Sampling Plan for Remedial Investigation for Groundwater for SMWUs 1, 2, 5, 7, and 18 Inland Area, NWSSB Detachment Concord." January 23.

Tetra Tech. 2001b. "Draft Quality Assurance Project Plan for Remedial Investigation for Groundwater for SMWUs 1, 2, 5, 7, and 18 Inland Area, NWSSB Detachment Concord." January 23.

Phillip Ramsey  
02/26/2003 04:27 PM

To: tactayt@efawest.navy.mil,  
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tyahlasf@efawest.navy.mil  
cc: Michelle Schutz/R9/USEPA/US@EPA, jpinasco@dtsc.ca.gov,  
lm@rb2.swrcb.ca.gov  
Subject: Concord, Site 13/Perchlorate, call with Walter Sandza

Hello Tony et. al.,

U.S. EPA staff received a call today from Walter Sandza (Navy SWDIV) in response to U.S. EPA's January 29, 2003, letter to the Navy informing them that U.S. EPA will not be signing the Concord Site 13/17 ROD because of the Perchlorate issue. Walter suggested that staff document to the Navy information discussed in the call, in order to assist the Navy is making a decision. The following is a summary of the conversation and information presented by U.S. EPA staff:

U.S. EPA provided clarification on the scope of additional investigations for perchlorate (i.e., sampling the existing monitoring wells), and indicated that the agency believes the additional testing is essential and needs to be complete ASAP. In responds to Walter's questions regarding DOD's 2-point threshold for testing for this contaminant U.S. EPA indicated that: (1) there is basis to suspect perchlorate way have been disposed at Site 13 - which is not disputed by the Navy; and (2) that there is potential human health pathway. On the second point, U.S. EPA indicated that Concord groundwater is a potential drinking water supply, as defined by Federal Groundwater Classification Guidelines and may be considered a current drinking water supply ( U.S.EPA staff and the State have working to assist the Navy with assessing the existence of domestic (residential) drinking water, irrigation, and water supply production wells in the Concord area. Based on discussions with Contra Costa Environmental Health, DWR and comments provided by community and city representatives) city irrigation wells exist, domestic irrigation wells likely exist, domestic drinking water wells possibly exist, and Contra Costa Water District production wells [while inactive] exist.) U.S. EPA staff also informed Walter that there was strong public concern being voiced on this data gap, which would best to addressed by sampling the site wells ASAP and explained that if the Navy were to disagree or propose a sampling date in the too distant future, U.S. EPA would have to consider conducting the sampling ourselves. In the event U.S. EPA conducted the sampling, it would likely not represent good PR for the Navy and in actuality, U.S. EPA always prefers to work cooperative with the Navy to assess its CERCLA sites.

There is also another aspect of the data gap sampling which involves a possible need to analyze for other munitions-derived wastes. Based upon a preliminary assessment, one analysis may be appropriate: EPA Method 8330 ( for nitroaromatics and nitroamines). However, since our conversation I have had a discussion with U.S. EPA Quality Assurance Program chemist, and U.S. EPA anticipate a more comprehensive answer to the Navy on this matter as soon as possible and before our scheduled March 13, 2003, informal dispute resolution meeting. Also, U.S. EPA will check the RI to see what analyses were conducted for ordnance and explosives as the December 2002 ROD, Table 5 indicates "Explosives" were tests in groundwater and not detected.

U.S. EPA staff hope this information assists the Navy in considering the sampling issue at Site 13. If you need additional information please let staff know. U.S. EPA Is looking forward to meeting with the Navy on March 13, 2003, and expeditiously resolving this matter.

Sincerely, Phillip Ramsey

Enclosure B