ENCLOSURE

AREA OF CONCERN 1 (SITE 31) SUPPLEMENTAL SOIL SAMPLING SUMMARY REPORT
NAVAL WEAPONS STATION SEAL BEACH, DETACHMENT CONCORD
MARCH 21, 2003

CONTENTS

FIGURES

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ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

4-4'-DDT	Dichlorodiphenyltrichloroethane
AOC 1	Area of concern 1
bgs	Below ground surface
CLP	Contract laboratory program
EPA	U.S. Environmental Protection Agency
µg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
Navy	U.S. Department of the Navy
NWSSBD	Naval Weapons Station Seal Beach Detachment
PA	Preliminary assessment
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PID	Photoionization detector
PRG	USEPA Region 9 Preliminary Remediation Goal
PVC	polyvinyl chloride
RWQCB	Regional Water Quality Control Board
RI	Remedial investigation
SAP	Sampling and Aanalysis Pplan
SVOC	Semi-volatile organic compound
TCRA	Time-critical removal action
Tetra Tech	Tetra Tech EM Inc.
VOC	Volatile organic compound

1.0 INTRODUCTION

Area of concern 1 (AOC 1) (Site 31) is an undeveloped 17.2-acre site on Port Chicago Highway, about one half mile east of the eastern entrance to Naval Weapons Station Seal Beach Detachment (NWSSBD) Concord. The site is the former location of a nitrogen-phosphorus-potassium (N-P-K) fertilizer plant that operated from 1955 to 1976 by Union Oil Company of California. Past industrial activities at the site have resulted in contamination at AOC 1. The U.S. Department of the Navy (Navy) purchased the site in 1983, razed the buildings in 1986, and the site is currently vacant. Site features are illustrated in Figure E-1. The Navy conducted a preliminary assessment (PA) at the site in two phases to assess contamination at AOC 1 (Tetra Tech EM Inc. [Tetra Tech] 2001). Food-chain modeling conducted during the PA established that waste materials present at or near the surface at AOC 1 pose an unacceptable risk to ecological receptors. To address these risks, the Navy conducted a time-critical removal action (TCRA) at AOC 1 during the summer and fall of 2002 to remove the most contaminated soils and wastes from the site. The TCRA is documented in a March 10, 2003, report entitled, "Area of Concern 1 (Site 31) Draft Time-Critical Removal Action Summary Report" (Tetra Tech 2003).

In addition to the TCRA, the Navy and regulatory agencies agreed that supplemental soil and groundwater sampling was required to evaluate potential source areas at the site that were not investigated during the PA. The purpose of the supplemental soil and groundwater sampling at AOC 1 was to obtain additional data about other potential sources not addressed by the TCRA to guide further investigation at AOC 1 in the context of a remedial investigation (RI).

The additional sampling to investigate other potential sources was described in a sampling and analysis plan (SAP) (Tetra Tech 2002). The SAP described four types of sampling at AOC 1: delineation sampling, confirmation sampling, supplemental sampling, and optional sampling. The delineation and confirmation sampling results were reported in the draft TCRA summary report (Tetra Tech 2003). This letter report provides analytical results for the supplemental and optional soil sampling that was conducted at AOC 1 and also describes monitoring well installation. At the time the SAP was written, it was unclear whether the optional sampling would be performed; the Navy subsequently decided to conduct all of the sampling described as optional in the SAP. For brevity, the supplemental and optional sampling described in the SAP are hereafter referred to together as "supplemental sampling."

Muddy conditions at AOC 1 during winter 2003 have restricted site access by heavy machinery and prevented development of the monitoring wells. As a result, groundwater samples have not yet been collected from the site and are not reported in this document. Groundwater samples will be collected as soon as the site dries enough to allow development of the monitoring wells, and results will be reported in a separate letter report.

This document consists of five sections: this introduction (Section 1), a description of field activities conducted for the supplemental sampling described in the SAP (Section 2), a summary of analytical results for soils (Section 3), a description of monitoring well installation (Section 4), and a preliminary analysis of areas that may require further investigation as part of the RI (Section 5). References, figures and tables follow the text.

The data provided in this document are intended to provide a preliminary basis for developing a scope of work for the RI but do not serve as the basis for the entire scope of work for the RI. Instead, this document presents analytical results for soils from potential source areas and identifies whether these potential sources merit further investigation as part of the RI.

2.0 SUPPLEMENTAL SOIL SAMPLING

The objective of the supplemental soil sampling at AOC 1 was to obtain additional data to evaluate whether potential sources identified by the Navy and the regulatory agencies during a series of Remedial Project Manager meetings merit further delineation as part of the RI. Figure E-2 shows the supplemental soil sampling locations; analytical results for all supplemental soil samples are presented as Tables E-1 and E-2. Attachment E-2 includes the soil boring logs, and Attachment E-3 includes chain-of-custody forms for soil samples.

Potential sources that were not sampled during the PA investigation were identified by reviewing historical aerial photographs, facility drawings, and topographic maps that identify the direction of surface water runoff. Potential source areas that were identified include a former laboratory, a former warehouse area, former process tanks east and west of the central roadway, the northern boundary of the site, and a concrete slab of unknown use (Figure E-2). In addition, the Navy advanced borings 100 feet west of PA sampling locations GB27, GB28, GB35, and GB43 to extend the sampling grid that covers the eastern half of the site and collected deeper samples from the spent acid pond area in response to regulatory agencies concerns that existing samples collected during the PA were not collected from deep enough intervals.

As described in the SAP (Tetra Tech 2002), this supplemental soil sampling effort included both discrete and composite samples, depending on the objective of the sample. The types of samples collected from each location are indicated on Table E-3. Samples were collected with direct push (Geoprobe) sampling methods, except the samples from the spent acid pond area, which were collected using hollow-stem augers (HSA) and split spoons while installing a monitoring well at that location. Composite samples were created by mixing equal portions of soil from similar depth intervals in a stainless steel mixing bowl, in accordance with the SAP (Tetra Tech 2002). The individual discrete samples that were combined to make up composite samples were biased to include potential contaminated intervals as indicated by waste, discoloration, or odors. If a soil boring included a waste interval, the waste interval was sampled. If no waste interval was observed, samples were collected at predetermined depths detailed in the SAP. In some cases, composite samples included borings where waste was encountered and borings where waste was absent. In these cases, the shallow interval from each boring was mixed together to create a shallow composite, the middle intervals were mixed together to create a middle composite, and the deep intervals were mixed together to create a deep composite. The depth intervals reported for composite samples in Tables E-2 and E-3 included the shallowest and deepest depth of the individual samples combined to make up the composite sample.

All of the volatile organic compound (VOC) samples were discrete samples, because VOCs are not suitable for composite sampling methods. All soil cores were scanned with a photoionization detector (PID) to assess the presence of VOCs as soon as the acetate sample sleeve from the direct push sampler was cut away. Because the PID did not indicate the presence of VOCs in any soil core, a single discrete EnCore sample was collected for VOC analysis from each sample core from the soil interval most likely to be contaminated based on discoloration or other visual or olfactory cues. For composite soil samples, the most discolored interval in any core was chosen as the location for a discrete VOC sample to represent the group of sample cores. The VOC samples from other cores that made up the composite sample were discarded. Absent soil staining or odors, a soil interval was randomly chosen. In this way, the potential for VOC volatilization from the composite samples was minimized.

Samples were analyzed using the following analytical methods, as described in the SAP (Tetra Tech 2002):

- metals, VOCs, SVOCs, pesticides, and PCBs: contract laboratory program (CLP) low level methods
- chlorinated herbicides: EPA method 8151A
- fluoride: EPA Method 300.0
- pH: EPA Method 150.1

At the request of the California Regional Water Quality Control Board (RWQCB), discrete samples for each interval of each composite sample were also collected and sent to an RWQCB-contracted laboratory (Sequoia Analytical [Sequoia] in Petaluma, California) to allow the ability to analyze the individual discrete samples that were combined to make up each composite soil sample, if so directed by RWQCB. Of these discrete samples, only three samples from the former laboratory were analyzed, as discussed below.

Former laboratory: On December 10, 2002, soil borings were advanced from 0 to 6 feet below ground surface (bgs) at three locations in the former laboratory (designated LAB1, LAB2, and LAB3 on Figure E-2). At soil boring LAB1, black gravel (a potential waste material) was encountered from 0.04 to 1.4 feet bgs, and concrete fragments were encountered at 1.3 feet bgs. Soil samples were collected from depths of 1 to 1.5 feet bgs, 1.5 to 2 feet bgs, and 3 to 3.5 feet bgs. At soil borings LAB2 and LAB3, the black gravel was absent, and soil samples were collected from depths of 0 to 0.5 foot bgs, 3 to 3.5 feet bgs, and 5.5 to 6 feet bgs. A composite sample, composed of equal volumes of soil from the shallow, middle, and deepest interval in each boring, was analyzed for semivolatile organic compounds (SVOC), pesticides and polychlorinated biphenyls (PCB), chlorinated herbicides, metals, fluoride, and pH. Discrete soil samples collected from the deeper two intervals of boring LAB1 were analyzed for VOCs.

After reviewing analytical results from the composite samples, RWQCB directed Sequoia to analyze the three discrete samples that made up the composite sample from the 1.5 to 3.5 feet bgs interval for mercury, and the sample from location LAB1 for arsenic and lead. Analytical data quality for these samples has not been assessed. Analytical results reported by Sequoia are as follows:

- LAB1 (1.5 to 2.0 feet bgs): mercury (8.6 mg/kg), arsenic (6.9 mg/kg), lead (39 mg/kg)
- LAB2 (3.0 to 3.5 feet bgs): mercury (0.023 mg/kg)
- LAB3: (3.0 to 3.5 feet bgs): mercury not detected

Former warehouse area: On December 10, 2002, soil borings were advanced from 0 to 6 feet bgs at four locations in the former warehouse area (designated WA1 through WA4 on Figure E-2). Soil samples were collected from depths of 0 to 0.5 foot bgs, 3 to 3.5 feet bgs, and 5.5 to 6 feet bgs in all four soil borings. A composite sample of all four borings for each depth interval was analyzed for SVOCs, pesticides and PCBs, chlorinated herbicides, metals, and fluoride. Discrete soil samples collected from the deeper two intervals of one randomly selected boring were analyzed for VOCs.

Former process tanks east of central roadway: On December 10, 2002, soil borings were advanced from 0 to 6 feet bgs at four locations in the former east process tanks (designated EPT1 through EPT4 on Figure E-2). At soil boring EPT1, a white material, possibly gypsum or ash, was present in the silt from approximately 0.5 to 1.0 foot bgs. At soil boring EPT2, ash-like material was encountered at 1.1 to 1.6 feet bgs. At soil boring EPT3, no staining or odor was observed, and samples were collected from 0 to 0.5 foot bgs, 3 to 3.5 feet bgs, and 5.5 to 6 feet bgs. At soil boring EPT4, gypsum material and fine gravel were observed. In each boring where waste was encountered, a sample of the waste, the soil immediately beneath it, and the soil 2 feet beneath the base of the waste were collected. A composite sample for the shallow, middle, and deep interval from each boring was analyzed for SVOCs, pesticides and PCBs, chlorinated herbicides, metals, and fluoride. In addition, a discrete sample from each interval of EPT4 was analyzed for VOCs.

Former process tanks west of central roadway: On December 11, 2002, soil borings were advanced at four locations in the former west process tanks (designated WPT1 through WPT4 on Figure E-4). Concrete was encountered at all locations. At WPT1, the soil boring was not able to pass through the concrete at 1 foot bgs. At WPT2, concrete was encountered at 2 feet bgs, but the concrete was penetrated on December 12, 2002, and the boring was advanced from 0 to 6 feet bgs. Gypsum and fine gravel were encountered, and soil samples were collected from 1.5 to 2 feet bgs, 2 to 2.5 feet bgs, and 4 to 4.5 feet bgs. At WPT3 and WPT4, the soil borings were not able to pass through the concrete at 0.5 foot bgs. A composite sample from the shallow interval of all four borings (above the concrete) and discrete samples from the two deeper intervals of WPT2, the only boring to penetrate the concrete, were analyzed for VOCs, SVOCs, pesticides and PCBs, chlorinated herbicides, metals, and fluoride.

Northern boundary of the site: On December 11, 2002, the Navy combined soils from the 0 to 0.5 feet bgs depth interval at four locations along the northern boundary of the site (designated NB1 through NB4 on Figure E-2) to create a composite shallow soil sample. Because the sample from the northern boundary of the site was collected to assess the potential that surface runoff carried contaminated materials from the site, the sample was collected from the 0 to 0.5-foot interval only. Sample NB2 was located on the former railroad track, but no staining or odor was observed in any of the samples. One composite sample was analyzed for SVOCs, pesticides and PCBs, chlorinated herbicides, metals, and fluoride.

100 feet west of PA sampling locations GB28, GB35, GB36, and GB43: On December 10, 2002, soil borings were advanced from 0 to 6 feet bgs from locations approximately 100 feet west of sampling locations GB28, GB35, GB36, and GB43 (designated WG1 through WG4 on Figure E-2). A possible waste interval of silty gravel with angular fragments was detected in the interval from 0.5 to 1 foot bgs in boring WG3, and soil samples were collected from the possible waste interval, immediately beneath it (1 to 1.5 feet bgs) and 2 feet beneath it (3 to 3.5 feet bgs). No waste or other contamination was observed at locations WG1, WG2, and WG4, and samples were collected from 0 to 0.5 foot bgs, 3 to 3.5 feet bgs, and 5.5 to 6 feet bgs. Discrete samples from each interval of each boring were analyzed for VOCs, SVOCs, pesticides and PCBs, chlorinated herbicides, metals, and fluoride.

Concrete slab: At the concrete slab, four borings were advanced (one on each side of the slab), designated CS1 through CS4 on Figure E-2. The concrete slab is still present, so each boring was located about 1 foot from the edge of the slab in the soil, near the mid-point of the slab. The borings were advanced from 0 to 2 feet bgs. At soil boring CS1, a possible waste interval was encountered, and a sample was collected from 1.5 to 2 feet bgs. A discrete sample from this interval was analyzed for VOCs and moisture. At locations CS2 through CS4, a sample was collected from 0 to 0.5 foot bgs. A composite sample from all four borings was analyzed for metals, pesticides and PCBs, chlorinated herbicides, SVOCs, fluoride, and pH.

Additional soil boring through spent acid pond: At the spent acid pond, one boring (designated SAP on Figure E-2) was advanced to 20 feet bgs on January 9, 2003 using an HSA drill rig. The boring was logged continuously. Although no stained or discolored soil interval or clay liner that may correspond with the bottom of the acid pond was observed, tightly cemented, fine sand was observed in the interval from 8 to 10 feet bgs. Discrete samples were collected from 9 to 9.5 feet, 12 to 12.5 feet, and 15 to 15.5 feet bgs. These soil samples were analyzed for metals, VOCs, SVOCs, and pesticides and PCBs, and pH.

3.0 ANALYTICAL RESULTS

Analytical results for the supplemental soil samples are presented in Tables E-1 (VOCs) and E-2 (other analytes). Samples were analyzed using analytical methods described in the SAP (Tetra Tech 2002). A review of analytical data quality is included as Attachment E-1.

Results presented in the tables are consistent with results from the PA sampling. VOCs were detected in two of the 23 samples analyzed for VOCs (samples WPT2 and WG1) at low concentrations (Table E-1). Detected VOCs include carbon disulfide (4 micrograms per kilogram [µg/kg], estimated), 4-methyl-2-pentanone (8 µg/kg, estimated), xylenes (3 µg/kg, estimated), and the common laboratory contaminant methylene chloride (5 µg/kg).

With the exception of arsenic, metals concentrations in the potential source areas did not exceed U.S. Environmental Protection Agency (EPA) Region 9 Preliminary Remediation Goals (PRG) for industrial soils (industrial PRGs) (EPA 2003). Almost all of the arsenic concentrations exceeded the industrial PRG for the cancer endpoint (1.6 milligrams per kilogram [mg/kg]), but none of them exceeded the industrial PRG for the noncancer endpoint (260 mg./kg). Lead, selenium, and mercury were the main constituents of concern that motivated the TCRA that the Navy conducted from June through March 2003. Lead, selenium, and mercury concentrations in the supplemental samples were generally low, indicating that the potential source areas assessed by the supplemental sampling are not likely sources of the lead, selenium, and mercury addressed by the TCRA.

No SVOCs were detected in 25 of the 31 samples analyzed for SVOCs. The polycyclic aromatic hydrocarbon (PAH) benzo(a)pyrene was detected at concentrations above the industrial PRG at the northern boundary of the site and in the east process tank area. The PAHs benzo(a)anthracene and benzo(b)fluoranthene were detected at concentrations slightly above the industrial PRG in the east process tank area.

The compound dichlorodiphenyltrichloroethane (4,4'-DDT) was detected at low concentrations (up to 0.015 mg/kg) in about one-third of the samples. Concentrations of 4,4'-DDT were well below the industrial PRG of 7.02 mg/kg. Other pesticides, including aldrin, dieldrin, heptachlor epoxide, and methoxychlor, were detected at low concentrations (up to 0.055 mg/kg) in several other samples.

The herbicide dalapon was detected in about half of the samples at concentrations up to 0.16 mg/kg, well below the industrial PRG of 18,000 mg/kg. The PCB Aroclor 1248 was detected in five samples at concentrations up to 0.29 mg/kg, below the industrial PRG of 0.74 mg/kg.

Soils were tested for pH in samples collected from the spent acid pond and the concrete slab; pH in these areas ranged from moderately acidic to neutral (4.7 to 7.1).

Although some qualifiers were added to the data, a final review of the data set with respect to EPA data quality parameters indicated that the data are of high overall quality. Based on the overall assessment of the sampling program, quality assurance and quality control data, data review, and data validation results, the data obtained between June 2002 and January 2003 are of acceptable quality with respect to precision, accuracy, representativeness, completeness, and comparability (PARRC) parameters, as described in EPA (1997) guidance for quality assurance project plans. Except for three rejected acetone results, these data, therefore, are usable for risk assessment and site characterization. Supporting documentation and data are available on request, including cursory and full validation reports and the database that holds all sample results.

4.0 MONITORING WELL INSTALLATION

Four monitoring wells were installed at AOC 1 by Gregg Drilling, Inc., of Signal Hill, California, in January 2003 in the manner described in the SAP (Tetra Tech 2002). Locations for the monitoring wells were agreed on with regulatory agencies during a remedial project manager's meeting on October 1, 2002, and were modified slightly based on subsequent discussions with RWQCB on October 2 and 3, 2002. Monitoring well locations are shown on Figure E-3.

The wells were installed with a HSA drill rig using 8-1/4-inch hollow stem augers. The borings were sampled continuously with split-spoon samplers for lithologic logging. Lithologic logs for the wells are included as Attachment E-4. The monitoring wells are constructed of 4-inch polyvinyl chloride (PVC) riser pipe equipped with 10-foot 0.010-inch (10 slot) PVC well screens. The monitoring well screens intersected the water table at the time of drilling with about 2 feet of the 10-foot well screen in the unsaturated zone.

Based on wells in remedial action subsite RASS (RASS) 4, immediately east of AOC 1, groundwater was expected at about 20 feet bgs. The two monitoring wells in the south part of the site (MW01 and MW02) encountered water at about 43 to 45 feet bgs. The wells in the north part of the site encountered water at much more shallow depths (21 feet at MW03 and 6.5 feet at MW04). The difference in water levels between wells in the south part of the site and those 600 feet to the north and in RASS 4 suggests that there is likely to be a perched zone in the vicinity of AOC 1.

During well drilling, the site conditions were very muddy due to rainfall, and site access was difficult. The original drill rig became mired in mud and was replaced with a track-mounted rig, which also became mired. A separate vehicle was required to extricate both rigs from the mud. As a result, well development was postponed until site conditions become dry enough to allow heavy equipment mobility near the wells.

The wells in the southern part of the site were developed using a surge block and pump technique on February 11, 2003. Monitoring well MW04 could not be developed on February 11 because the well was dry; the significance of this loss of water during the 1-month period between when the well was drilled and when well development was first attempted is uncertain. The water level in well MW04 will be reassessed when the site is next visited. Monitoring well MW03 could not be developed on February 11 because of muddy conditions that limited access to the well. The Navy has considered developing the well manually with a surge block, but the bottom of the well is almost 30 feet bgs, and the formation around the well screen at MW03 contains a significant proportion of fine particles, which indicate that developing the well manually will be difficult and that a mechanical technique using a drill rig will produce better results. The Navy expects that the well will be developed during late March or early April of 2003.

5.0 RECOMMENDATIONS

The data provided in this document are intended to provide a basis for developing a scope of work for the RI, but do not serve as recommendations for the entire scope of work for the RI. This document presents analytical results for soils from potential source areas and identifies whether these potential sources merit further investigation as part of the RI.

Based on the analytical results presented in Tables E-1 and E-2, the Navy feels that most of the potential sources at AOC 1 that were investigated by the supplemental sampling described in this report do not require further delineation in the context of an RI. Based on these analytical results, the following specific recommendations are made for further investigation in the context of an RI:

- Widespread arsenic concentrations that exceed the industrial PRG for the noncancer endpoint (EPA 2003) are an issue that should be addressed by the RI.

- Further delineation of PAHs detected at the northern boundary of the site and near the east process tanks may be required to address potential human health concerns. The industrial PRGs, however, do not reflect actual human exposure at the site, and a sample that exceeded an industrial PRG does not necessarily correspond to a human health risk.

- Based on the detection of metals, SVOCs, herbicides, pesticides and PCBs in potential source areas, groundwater samples from the four new monitoring wells should be analyzed for these compounds. Groundwater samples will be collected as soon as conditions become dry enough to develop monitoring well MW03.

- Further assessment of ecological and human health risks is needed to evaluate whether contaminants at the site pose unacceptable risks to human or ecological receptors. Assessment of ecological and human health risks is an inherent part of a RI.

6.0 REFERENCES

Tetra Tech EM Inc. (Tetra Tech). 2001. "Preliminary Assessment Addendum, Area of Concern 1, Naval Weapons Station, Seal Beach Detachment Concord." September 28.

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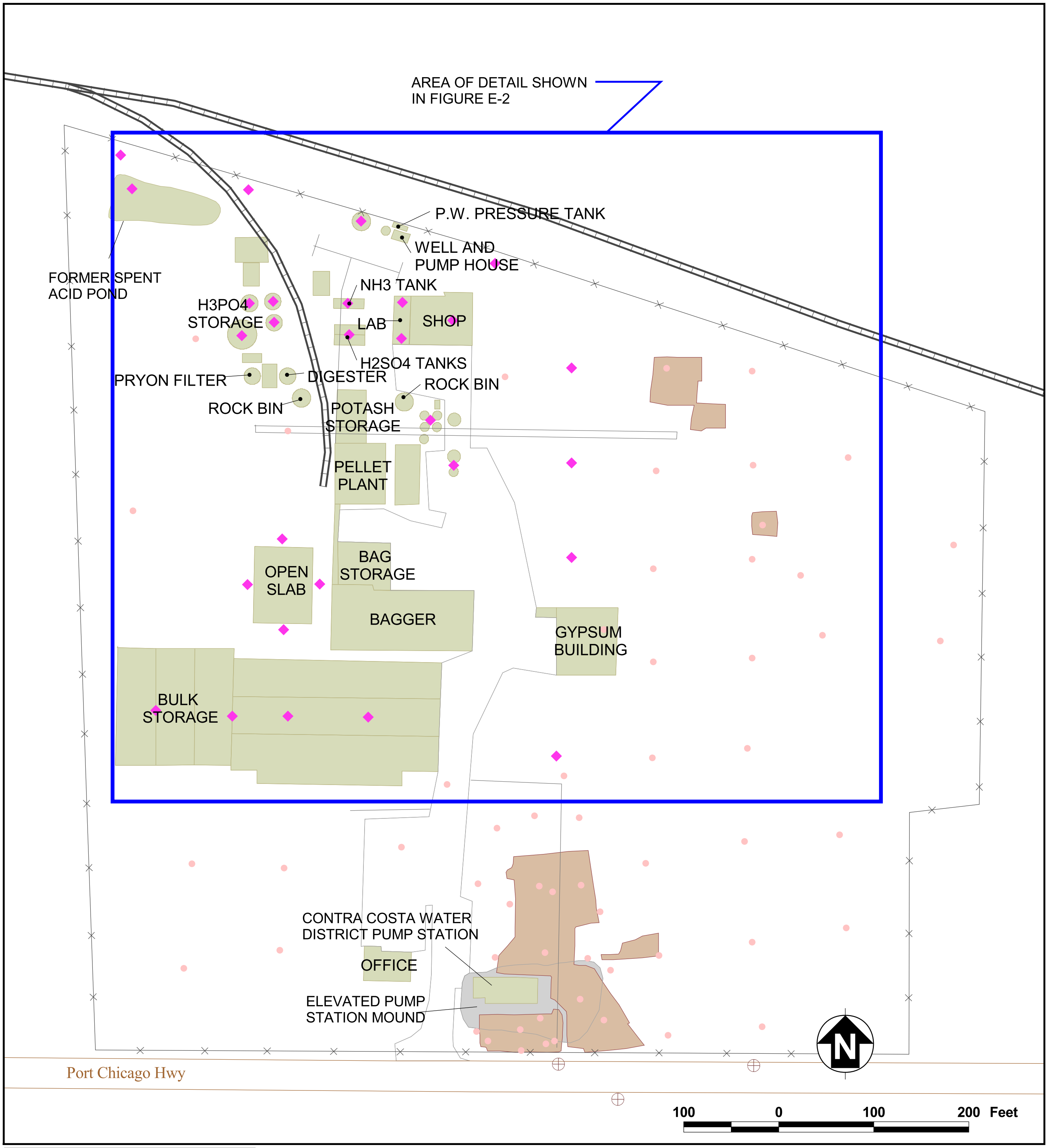
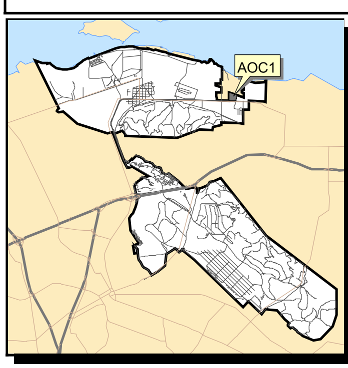
Tetra Tech. 2003. "Area of Concern 1 (Site 31) Draft Time-Critical Removal Action Summary Report." March 10.

U.S. Environmental Protection Agency (EPA). 1997. "EPA Guidance for Quality Assurance Project Plans." EPA QA/G-5. Final.

EPA. 2003. "Region 9 Preliminary Remediation Goals." Accessed on March 18. On-Line Address: http://www.epa.gov/region9/waste/sfund/prg/index.html

FIGURES





LEGEND:

- FORMER SITE FEATURES SHOWN ON 1974 AERIAL PHOTOGRAPH
- EXCAVATIONS
- SUPPLEMENTAL SAMPLE LOCATION
- EXISTING SAMPLE LOCATION
- TELEPHONE POLES

Tetra Tech EM Inc.

NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA

FIGURE E-1

AREA OF CONCERN 1
SITE FEATURES MAP

03-21-2003 v:\concord\projects\aecru\aoc1\aoc1_map.apr TtEMI-SF kevin.ernst

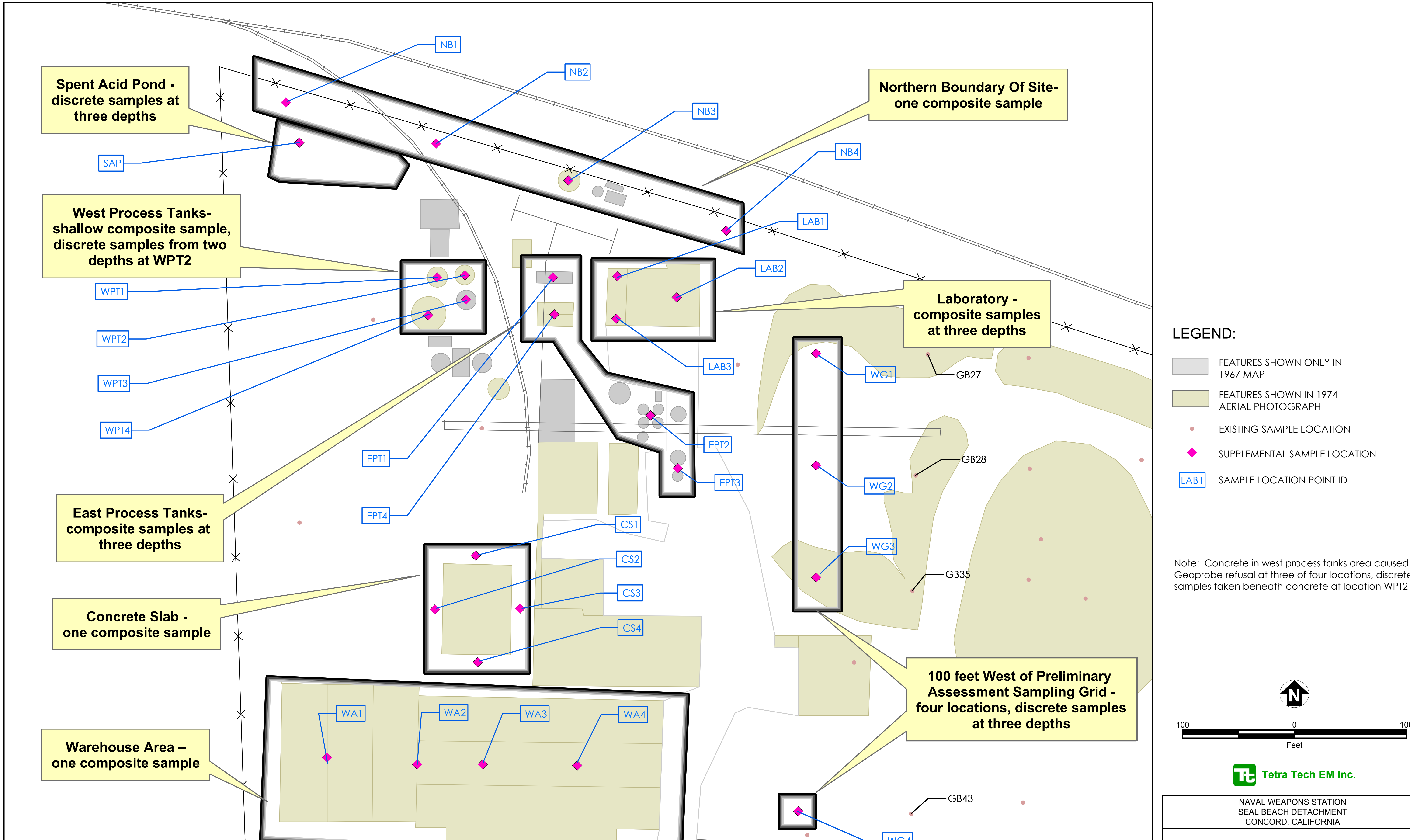
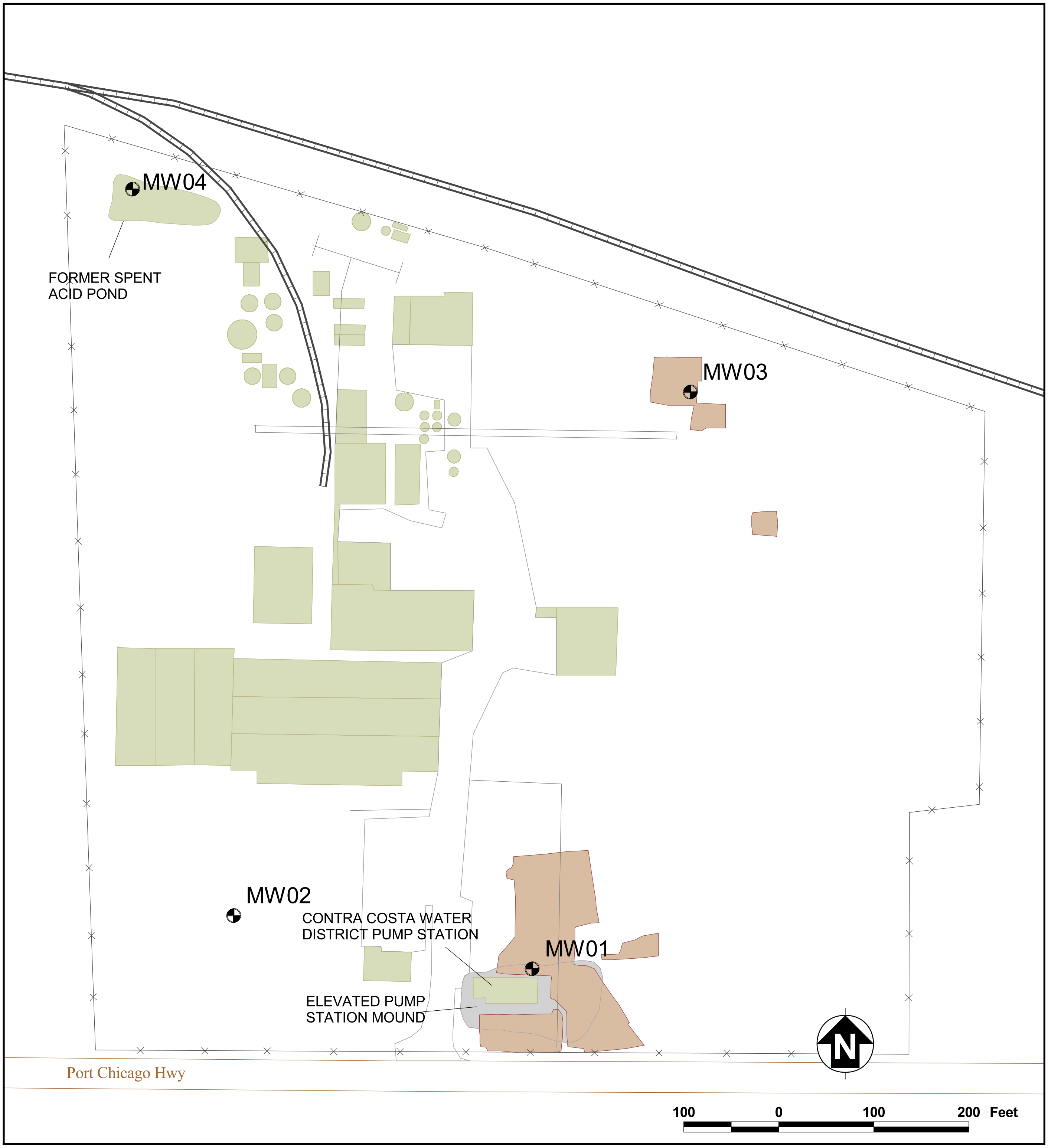


FIGURE E-2

SAMPLING LOCATIONS IN POTENTIAL SOURCE AREAS

05/15/02 V:/CONCORD/PROJECTS/CTO267/Additional_Samples_zoom.mxd AZ



Tetra Tech EM Inc.

LEGEND:

MONITORING WELL

FORMER BUILDINGS SHOWN ON 1974 AERIAL PHOTOGRAPH

EXCAVATIONS

NAVAL WEAPONS STATION
SEAL BEACH DETACHMENT
CONCORD, CALIFORNIA

FIGURE E-3

AREA OF CONCERN 1 MONITORING WELL LOCATIONS

03-19-2003 v:\concord\projects\aecru\aoc1\aoc1_map.apr TtEMI-SF kevin.ernst

TABLES

TABLE E-1: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLES – VOLATILE ORGANIC COMPOUNDS

AREA OF CONCERN 1, NWS SBD CONCORD

Sample Location Sample ID Sample type Depth Date	USEPA Region 9 PRG Industrial Soils[1]	CS1 001AOC1GB108 Discrete 1.5 - 2.0 12/11/2002	LAB1 001AOC1GB081 Discrete 1.0 - 1.5 12/10/2002	LAB1 001AOC1GB082 Discrete 1.5 - 2.0 12/10/2002	LAB1 001AOC1GB083 Discrete 3.0 - 3.5 12/10/2002	EPT4 001AOC1GB181 Discrete 3.0 - 3.5 12/10/2002	EPT4 001AOC1GB182 Discrete 3.5 - 4.0 12/10/2002
VOCs (micrograms per kilogran							
4-METHYL-2-PENTANONE	NA	--	--	--	--	--	--
CARBON DISULFIDE	720,000	--	--	--	--	--	--
METHYLENE CHLORIDE	20,527	--	--	--	--	--	--
XYLENE (TOTAL)	420,000	--	--	--	--	--	--

Sample Location Sample ID Sample type Depth Date	USEPA Region 9 PRG Industrial Soils[1]	EPT4 001AOC1GB183 Discrete 5.0 - 5.5 37600	WPT2 001AOC1GB087 Discrete 1.5 - 2.0 37602	WPT2 001AOC1GB088 Discrete 2.0 - 2.5 37602	WPT2 001AOC1GB089 Discrete 4.0 - 4.5 37602	WA 001AOC1GB104 Discrete 5.5 - 6.0 37600	WA 001AOC1GB103 Discrete 3.0 - 3.5 37600
VOCs (micrograms per kilogran							
4-METHYL-2-PENTANONE	NA	--	8 J	--	--	--	--
CARBON DISULFIDE	720,000	--	4 J	--	--	--	--
METHYLENE CHLORIDE	20,527	--	--	--	--	--	--
XYLENE (TOTAL)	420,000	--	3 J	--	--	--	--

Sample Location Sample ID Sample type Depth Date	USEPA Region 9 PRG Industrial Soils[1]	WG1 001AOC1GB094 Discrete 3.0 - 3.5 12/10/2002	WG1 001AOC1GB095 Discrete 5.5 - 6.0 12/10/2002	WG2 001AOC1GB097 Discrete 3.0 - 3.5 12/10/2002	WG2 001AOC1GB098 Discrete 5.5 - 6.0 12/10/2002	WG3 001AOC1GB100 Discrete 1.1 - 1.6 12/10/2002	WG3 001AOC1GB101 Discrete 3.1 - 3.6 12/10/2002
VOCs (micrograms per kilogran							
4-METHYL-2-PENTANONE	NA	--	--	--	--	--	--
CARBON DISULFIDE	720,000	--	--	--	--	--	--
METHYLENE CHLORIDE	20,527	5	--	--	--	--	--
XYLENE (TOTAL)	420,000	--	--	--	--	--	--

Sample Location Sample ID Sample type Depth Date	USEPA Region 9 PRG Industrial Soils[1]	WG4 001AOC1GB111 Discrete 3.0 - 3.5 12/10/2002	WG4 001AOC1GB112 Discrete 5.5 - 6.0 12/10/2002	SAP1 001AOCGB105 Discrete 9.0 - 9.5 1/9/2003	SAP1 001AOCGB106 Discrete 12.0 - 12.5 1/9/2003	SAP1 001AOCGB107 Discrete 15 .0 - 15.5 1/9/2003
VOCs (micrograms per kilogran						
4-METHYL-2-PENTANONE	NA	--	--	--	--	--
CARBON DISULFIDE	720,000	--	--	--	--	--
METHYLENE CHLORIDE	20,527	--	--	--	--	--
XYLENE (TOTAL)	420,000	--	--	--	--	--

Notes:

--	not detected
CS	concrete slab
EPT	process tanks east of central roadway
J	estimated concentration
LAB	laboratory
PRG	preliminary remediation goal
SAP	spent acid pond
WA	Warehouse area
WG1 - 4	borings to extend the sample grid 100 feet to the west
WPT	process tanks west of central roadway

[1]EPA. 2002. EPA Region 9 PRGs Table. October 1. On-Line Address: http://www.epa.gov/region09/waste/sfund/prg/files/02table.pdf. Accessed on March 18, 2003.

TABLE E-2: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLING - OTHER ANALYTES

AREA OF CONCERN 1, NWS SBD CONCORD

Sample Location Sample ID Type Depth Date	USEPA Region 9 PRG Industrial Soils[1]	LAB 001AOC1SS081 Composite 0 - 1.5 12/10/02	LAB 001AOC1GB082 Composite 1.5 - 3.5 12/10/02	LAB 001AOC1GB083 Composite 3.0 - 6.0 12/10/02	WA 001AOC1SS102 Composite 0 - 0.5 12/10/02	WA 001AOC1GB103 Composite 3.0 - 3.5 12/11/02	WA 001AOC1GB104 Composite 5.0 - 6.0 12/10/02
Metals (mg/kg)							
Aluminum	100,000	--	15,400 J	18,000 J	15,300 J	17,900 J	17,600 J
Arsenic (cancer endpoint)	1.6	--	**15.2**	**4.8**	**6**	**6.4**	**4.4**
Arsenic (noncancer endpoint)	260	--	15.2	4.8	6	6.4	4.4
Barium	67,000	--	195	222	188	212	229
Beryllium	1,900	--	0.38 J	0.43 J	0.38 J	0.4 J	0.52 J
Cadmium	450	--	--	--	--	--	--
Calcium	NA	192,000	5,610	2,780	4,090	7,680	3,880
Chromium	450	--	32.5 J	33.3 J	29.2 J	33.1 J	29.9 J
Cobalt	1,900	--	9 J	16.7	10.7	11.4	10.6
Copper	41,000	--	20.8	17.7	18.8	17.7	18
Fluoride (leached)	36,938	41	8.7	4.3	4.9	29	4.2
Iron	100,000	--	16,800	21,600	17,800	20,400	22,600
Lead	750	--	24.7	8.1	10.7	10.2	7.3
Magnesium	NA	1,760	2,140	5,270	2,890	4,270	6,170
Manganese	1,900	--	415	969	352	432	425
Mercury	310	--	4.1 J	--	0.15 J	0.069 J	0.028 J
Nickel	20,000	--	21.1	51.8	22.3	38.4	34.8
Potassium	NA	4,440 J	1,960 J	1,580 J	1,450 J	1,150 J	1,450 J
Selenium	5,100	--	1.1	1.5	1.1	1	0.8 J
Silver	5,100	--	--	--	--	--	--
Sodium	NA	4,730 J	--	--	--	--	--
Thallium	67	--	--	--	--	--	--
Vanadium	7,200	--	50.4	56.2	47.9	53.1	54.2
Zinc	100,000	--	49.8 J	37.3 J	41.5 J	36.8 J	38.6 J
SVOCs (mg/kg)							
1,1'-Biphenyl	350	--	--	--	--	--	--
2-Methylnaphthalene	NA	--	--	--	--	--	--
Acenaphthene	29,219	--	--	--	--	--	--
Anthracene	100,000	--	--	--	--	--	--
Benzo(a)anthracene	2.11	--	--	--	--	--	--
Benzo(a)pyrene	0.21	--	--	--	--	--	--
Benzo(b)fluoranthene	2.11	--	--	--	--	--	--
Benzo(k)fluoranthene	21.1	--	--	--	--	--	--
Benzo(g,h,I)perylene	NA	--	--	--	--	--	--
Bis(2-ethylhexyl)phthalate	123.1	--	--	--	--	--	--
Carbazole	86.2	--	--	--	--	--	--
Chrysene	210.96	--	--	--	--	--	--
Dibenz(a,h)anthracene	0.21	--	--	--	--	--	--
Dibenzofuran	3,127	--	--	--	--	--	--
Fluoranthene	22,000	--	--	--	--	--	--
Fluorene	26,281	--	--	--	--	--	--

TABLE E-2: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLING - OTHER ANALYTES
AREA OF CONCERN 1, NWS SBD CONCORD

Indeno(1,2,3-cd)pyrene	2.11	--		--		--		--		--		--	
Naphthalene	188	--		--		--		--		--		--	
Phenanthrene	NA	0.18	J	--		--		--		--		--	
Phenol	100,000	--		--		--		--		--		--	
Pyrene	29,126	--		--		--		--		--		--	
Pesticides (mg/kg)													
4,4'-DDT	7.02	--		0.013		--		--		--		--	
Aldrin	0.10	--		--		--		--		--		--	
Dieldrin	0.11	--		0.016		--		--		--		--	
Heptachlor epoxide	0.19	--		--		--		--		--		--	
Methoxychlor	3,078	--		--		--		--		--		--	
Herbicides (mg/kg)													
2,4-D	7,683	--		0.0077	J	--		--		--		--	
Dalapon	18,000	--		--		0.01	J	0.14	J	0.0034	J	0.0064	J
PCBs (mg/kg)													
Aroclor-1248	0.74	--		--		--		--		--		--	
pH													
pH (EPA 150.1)	NA	NA		NA		NA		NA		NA		NA	

TABLE E-2: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLING - OTHER ANALYTES

AREA OF CONCERN 1, NWS SBD CONCORD

Sample Location **Sample ID** **Type** **Depth** **Date**	**USEPA Region 9 PRG Industrial Soils[1]**	EPT 001AOC1SS084 Composite 0 - 2.5 12/10/02		EPT 001AOC1GB085 Composite 1.0 - 3.5 12/10/02		EPT 001AOC1GB086 Composite 3.0 - 4.5 12/10/02		WPT 001AOC1SS087 Composite 0 - 2.0 12/11/02		WPT2 001AOC1GB088 Discrete 2.0 - 2.5 12/12/02		WPT2 001AOC1GBO89 Discrete 4.0 - 4.5 12/12/02	
Metals (mg/kg)													
Aluminum	100,000	17,800	J	--		18,400	J	18,500		14,200	J	24,300	J
Arsenic (cancer endpoint)	1.6	**12**		--		**4**		**33.2**		**33.7**		**29.2**	
Arsenic (noncancer endpoint)	260	13		--		4		33.2		33.7		29.2	
Barium	67,000	135		--		175		179		127		155	
Beryllium	1,900	0.35	J	--		0.49	J	0.66	J	0.34	J	0.51	J
Cadmium	450	4		--		--		9.8		7.6		--	
Calcium	NA	--		19,200		4,020		47,200		10,600		8,800	
Chromium	450	96.9	J	--		30.6	J	158	J	26.5	J	35.1	J
Cobalt	1,900	8.9	J	--		12		7.2	J	18.5		35.9	
Copper	41,000	35.2		--		15.9		73.3		25.2		15.6	
Fluoride (leached)	36,938	--		9.2		22		68		6.6		2.5	
Iron	100,000	31,500		--		22,200		21,500		16,200		25,200	
Lead	750	67.5		--		6.8		63.6		14.2		7.6	
Magnesium	NA	--		4,520		6,450		3,110		2,100		3,800	
Manganese	1,900	270		--		390		213		820		1,680	
Mercury	310	0.31	J	--		0.17	J	0.22	J	0.064	J	0.035	J
Nickel	20,000	29.9		--		39.4		21.7		60		76.1	
Potassium	NA	--		--		1,450	J	3,870		1,570	J	1,360	J
Selenium	5,100	1.8		--		0.8	J	2.9		1.0	J	2.1	
Silver	5,100	--		--		--		0.9	J	--		--	
Sodium	NA	--		--		--		945		--		--	
Thallium	67	--		--		--		--		--		--	
Vanadium	7,200	108		--		52.9		165		43.5		56.8	
Zinc	100,000	175	J	--		37	J	209	J	273	J	33.9	J
SVOCs (mg/kg)													
1,1'-Biphenyl	350	--		0.08	J	--		--		--		--	
2-Methylnaphthalene	NA	--		6.00		--		--		--		--	
Acenaphthene	29,219	0.75		0.34	J	--		--		--		--	
Anthracene	100,000	0.63		0.16	J	--		--		--		--	
Benzo(a)anthracene	2.11	**2.80**		0.65		--		0.16	J	--		--	
Benzo(a)pyrene	0.21	**1.60**		**0.35**	**J**	--		0.12	J	--		--	
Benzo(b)fluoranthene	2.11	**2.50**		0.57		--		0.15	J	--		--	
Benzo(k)fluoranthene	21.1	0.95		0.21	J	--		0.14	J	--		--	
Benzo(g,h,I)perylene	NA	--		0.17	J	--		--		--		--	
Bis(2-ethylhexyl)phthalate	123.1	--		--		--		--		--		--	
Carbazole	86.2	0.82		0.15	J	--		--		--		--	
Chrysene	210.96	2.70		0.60		--		0.22	J	--		--	
Dibenz(a,h)anthracene	0.21	0.20	J	--		--		--		--		--	
Dibenzofuran	3,127	0.35	J	0.15	J	--		0.00		--		--	
Fluoranthene	22,000	7.50		1.70		--		0.44		--		--	
Fluorene	26,281	0.42		0.26	J	--		--		--		--	

TABLE E-2: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLING - OTHER ANALYTES

AREA OF CONCERN 1, NWS SBD CONCORD

Indeno(1,2,3-cd)pyrene	2.11	0.66		0.17	J	--		--		--		--	
Naphthalene	188	0.56		0.83		--		--		--		--	
Phenanthrene	NA	--		1.20		--		0.26	J	--		--	
Phenol	100,000	--		--		0.18	J	--		--		--	
Pyrene	29,126	5.80		1.70		--		0.40		--		--	
Pesticides (mg/kg)													
4,4'-DDT	7.02	--		--		--		0.015		--		--	
Aldrin	0.10	--		--		--		0.055		--		--	
Dieldrin	0.11	0.029	J	--		--		--		--		--	
Heptachlor epoxide	0.19	--		--		--		--		--		--	
Methoxychlor	3,078	0.039		--		--		--		--		--	
Herbicides (mg/kg)													
2,4-D	7,683	--		--		--		--		--		--	
Dalapon	18,000	--		0.014		--		--		--		--	
PCBs (mg/kg)													
Aroclor-1248	0.74	0.22		--		--		0.17		--		--	
pH													
pH (EPA 150.1)	NA	NA		NA		NA		NA		NA		NA	

TABLE E-2: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLING - OTHER ANALYTES
AREA OF CONCERN 1, NWS SBD CONCORD

Sample Location Sample ID Type Depth Date	USEPA Region 9 PRG Industrial Soils[1]	NB 001AOC1SS090 Composite 0 - 0.5 12/11/02		WG1 001AOC1SS093 Discrete 0 - 0.5 12/10/02		WG1 001AOC1GB094A Discrete 3.0 - 3.5 12/10/02		WG1 001AOC1GB095A Discrete 5.5 - 6.0 12/10/02		WG2 001AOC1SS96 Discrete 0 - 0.5 12/10/02		WG2 001AOC1GB97A Discrete 3.0 - 3.5 12/10/02	
Metals (mg/kg)													
Aluminum	100,000	16,800	J	25,800	J	35,200	J	20,100	J	15,900	J	22,700	J
Arsenic (cancer endpoint)	1.6	**37.4**		**102**	**J**	**239**	**J**	**196**	**J**	**179**	**J**	**120**	**J**
Arsenic (noncancer endpoint)	260	37.4		102	J	239	J	196	J	179	J	120	J
Barium	67,000	154		178		161		186		127		407	
Beryllium	1,900	0.42	J	0.46	J	0.69	J	0.45	J	0.46	J	0.53	J
Cadmium	450	3.2		5.8	J	--		--		12.5	J	--	
Calcium	NA	18,800		29,600		3,690		5,400		2,790		3,110	
Chromium	450	53.5	J	56.7	J	49.4	J	31.9	J	33.9	J	38	J
Cobalt	1,900	10.6		7.3	J	12.4	J	10.9	J	9.1	J	12.8	J
Copper	41,000	172		41.6		16.8		12.9		53.6		15.8	
Fluoride (leached)	36,938	76		180		23		26		10		3.8	
Iron	100,000	23,800		20,200		29,100		20,800		14,000		23,800	
Lead	750	120		80.5		7.3		5.7		22.5		4.1	
Magnesium	NA	2,760		2,540		4,830		5,320		1,480		6,290	
Manganese	1,900	188		184		555		597		245		535	
Mercury	310	0.26	J	0.61		--		--		0.074	J	--	
Nickel	20,000	36.3		30		59.2		48.9		30.5		60.2	
Potassium	NA	1,690		2,470	J	1,670	J	1,390	J	1,530	J	1,100	
Selenium	5,100	3.1		5		1.5		0.9	J	0.78	J	1.4	
Silver	5,100	--		--		--		--		--		--	
Sodium	NA	--		507	J	1,780	J	1,180	J	--		778	
Thallium	67	--		--		--		--		--		--	
Vanadium	7,200	77.9		77.2	J	67.3	J	50	J	53.2	J	55.8	J
Zinc	100,000	390	J	157	J	75.7	J	31.3	J	230	J	34.8	J
SVOCs (mg/kg)													
1,1'-Biphenyl	350	--		--		--		--		--		--	
2-Methylnaphthalene	NA	--		--		--		--		--		--	
Acenaphthene	29,219	--		--		--		--		--		--	
Anthracene	100,000	0.09	J	--		--		--		--		--	
Benzo(a)anthracene	2.11	1.2		0.11	J	--		--		--		--	
Benzo(a)pyrene	0.21	**0.72**		--		--		--		--		--	
Benzo(b)fluoranthene	2.11	1.3		0.11	J	--		--		--		--	
Benzo(k)fluoranthene	21.1	0.41		--		--		--		--		--	
Benzo(g,h,I)perylene	NA	0.3		--		--		--		--		--	
Bis(2-ethylhexyl)phthalate	123.1	0.69		--		--		--		--		--	
Carbazole	86.2	0.14	J	--		--		--		--		--	
Chrysene	210.96	1.4		0.13	J	--		--		--		--	
Dibenz(a,h)anthracene	0.21	0.11	J	--		--		--		--		--	
Dibenzofuran	3,127	--		0		--		--		--		--	
Fluoranthene	22,000	2.8		0.37	J	--		--		--		--	
Fluorene	26,281	--		--		--		--		--		--	

TABLE E-2: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLING - OTHER ANALYTES

AREA OF CONCERN 1, NWS SBD CONCORD

Indeno(1,2,3-cd)pyrene	2.11	0.31	J	0		--		--		--		--	
Naphthalene	188	--		0		--		--		--		--	
Phenanthrene	NA	0.67		0.13	J	--		--		--		--	
Phenol	100,000	--		--		--		--		--		--	
Pyrene	29,126	3.1		0.28	J	--		--		--		--	
Pesticides (mg/kg)													
4,4'-DDT	7.02	0.013		0.012		--		--		--		--	
Aldrin	0.10	--		--		--		--		--		--	
Dieldrin	0.11	--		0.016		--		--		--		--	
Heptachlor epoxide	0.19	--		--		--		--		--		--	
Methoxychlor	3,078	0.05	J	--		--		--		--		--	
Herbicides (mg/kg)													
2,4-D	7,683	--		--		--		--		--		--	
Dalapon	18,000	--		0.011	J	0.0069		--		--		0.008	J
PCBs (mg/kg)													
Aroclor-1248	0.74	0.14		0.1		--		--		--		--	
pH													
pH (EPA 150.1)	NA	NA		NA		NA		NA		NA		NA	

TABLE E-2: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLING - OTHER ANALYTES

AREA OF CONCERN 1, NWS SBD CONCORD

Sample Location **Sample ID** **Type** **Depth** **Date**	**USEPA Region 9 PRG Industrial Soils[1]**	WG2 001AOC1GB98A Discrete 5.5 - 6.0 12/10/02		WG3 001AOC1SS099 Discrete 0.3 - 0.8 12/10/02		WG3 001AOC1GB100 Discrete 0.8 - 1.3 12/10/02		WG3 001AOC1GB101 Discrete 3.1 - 3.6 12/10/02		WG4 001AOC1SS110 Discrete 0 - 0.5 12/10/02		WG4 001AOC1GB111 Discrete 3.0 - 3.5 12/10/02	
Metals (mg/kg)													
Aluminum	100,000	24,000	J	30,200		17,100		22,700	J	18,700	J	21,100	J
Arsenic (cancer endpoint)	1.6	**57.2**	**J**	**191**		**114**		**4.3**		**59.1**		**4.5**	
Arsenic (noncancer endpoint)	260	57.2	J	191		114		4.3		59.1		4.5	
Barium	67,000	249		28.6		130		150		155		299	
Beryllium	1,900	0.51	J	0.17		0.35		0.64	J	0.39	J	0.48	J
Cadmium	450	--		44.7		1.7		--		9.9		--	
Calcium	NA	3,690		36,600		7,400		2,910		2,800		5,890	
Chromium	450	36.7	J	49.2		31.9		37.4	J	34	J	36.9	J
Cobalt	1,900	11.5	J	30.7		10.7		10.5	J	9.5	J	10.6	
Copper	41,000	21.8		213		26.7		14.3		30.5		16.5	
Fluoride (leached)	36,938	3.9		17		6.9		4.4		44		6.5	
Iron	100,000	27,100		49,600		16,900		23,800		18,000		24,300	
Lead	750	8.1		7.3		15.2		7.3		15.2		6.9	
Magnesium	NA	8,530		16,600		2,900		6,110		1,730		5,930	
Manganese	1,900	448		518		274		409		292		337	
Mercury	310	--		0.49		0.086		0.035	J	0.034	J	--	
Nickel	20,000	30.1		31.1		26.2		55.1		27.4		39.2	
Potassium	NA	2,010	J	1,800		1,400	J	965	J	1,820	J	1,250	J
Selenium	5,100	1.5		1.5		1.8		1.1	J	1.3		0.67	J
Silver	5,100	--		--		--		--		--		--	
Sodium	NA	1,180	J	1,700		--		626	J	--		--	
Thallium	67	--		--		--		--		--		--	
Vanadium	7,200	63.2	J	165		52.1		53.4		55.1		60.1	
Zinc	100,000	46.8	J	461		44.4		32.8	J	157	J	36.6	J
SVOCs (mg/kg)													
1,1'-Biphenyl	350	--		--		--		--		--		--	
2-Methylnaphthalene	NA	--		--		--		--		--		--	
Acenaphthene	29,219	--		--		--		--		--		--	
Anthracene	100,000	--		--		--		--		--		--	
Benzo(a)anthracene	2.11	--		--		--		--		--		--	
Benzo(a)pyrene	0.21	--		--		--		--		--		--	
Benzo(b)fluoranthene	2.11	--		--		--		--		--		--	
Benzo(k)fluoranthene	21.1	--		--		--		--		--		--	
Benzo(g,h,I)perylene	NA	--		--		--		--		--		--	
Bis(2-ethylhexyl)phthalate	123.1	--		--		--		--		--		--	
Carbazole	86.2	--		--		--		--		--		--	
Chrysene	210.96	--		--		--		--		--		--	
Dibenz(a,h)anthracene	0.21	--		--		--		--		--		--	
Dibenzofuran	3,127	--		--		--		--		--		--	
Fluoranthene	22,000	--		--		--		--		--		--	
Fluorene	26,281	--		--		--		--		--		--	

TABLE E-2: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLING - OTHER ANALYTES
AREA OF CONCERN 1, NWS SBD CONCORD

Indeno(1,2,3-cd)pyrene	2.11	--	--	--	--	--	--
Naphthalene	188	--	--	--	--	--	--
Phenanthrene	NA	--	--	--	--	--	--
Phenol	100,000	--	--	--	--	--	--
Pyrene	29,126	--	--	--	--	--	--
Pesticides (mg/kg)							
4,4'-DDT	7.02	--	--	0.0047	--	0.004	--
Aldrin	0.10	--	--	--	--	--	--
Dieldrin	0.11	--	--	--	--	--	--
Heptachlor epoxide	0.19	--	--	--	--	--	--
Methoxychlor	3,078	--	--	--	--	--	--
Herbicides (mg/kg)							
2,4-D	7,683	--	--	--	--	--	--
Dalapon	18,000	--	0.0079	--	0.0089 J	0.16 J	0.0071 J
PCBs (mg/kg)							
Aroclor-1248	0.74	--	--	--	--	--	--
pH							
pH (EPA 150.1)	NA	NA	NA	NA	NA	NA	NA

TABLE E-2: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLING - OTHER ANALYTES

AREA OF CONCERN 1, NWS SBD CONCORD

Sample Location / Sample ID / Type / Depth / Date	USEPA Region 9 PRG Industrial Soils[1]	WG4 / 001AOC1GB112 / Discrete / 5.5 - 6.0 / 12/10/02		CS / 001AOC1SS108 / Composite / 0 - 2.0 / 12/11/02		SAP / 001AOC1GB105 / Discrete / 9.0 - 9.5 / 01/09/03		SAP / 001AOC1GB106 / Discrete / 12.0 - 12.5 / 01/09/03		SAP / 001AOC1GB107 / Discrete / 15.0 - 15.5 / 01/09/03	
Metals (mg/kg)											
Aluminum	100,000	21,400	J	15,900	J	28,700		20,700		27,700	
Arsenic (cancer endpoint)	1.6	**4.7**		**8.3**		**8.7**		**5.4**		**8**	
Arsenic (noncancer endpoint)	260	4.7		8.3		8.7		5.4		8	
Barium	67,000	195		171		187		242		411	
Beryllium	1,900	0.5	J	0.38	J	1.4	J	0.39	J	0.61	J
Cadmium	450	--		--		10		52.7		2.1	J
Calcium	NA	3,790		5,620		4,890	J			11,700	J
Chromium	450	36.1	J	34.5	J	54.6		36.6		50.1	
Cobalt	1,900	10.7		6.9	J	14.8	J	23.3	J	16.3	J
Copper	41,000	18.9		16.9		28.9		17.2		27.1	
Fluoride (leached)	36,938	4.4		14		--		--		--	
Iron	100,000	25,000		18,300		26,000		22,000		28,700	
Lead	750	7.2		10.7		8.2		7.8		9.6	
Magnesium	NA	6,070		2,690		4,670		--		8,720	
Manganese	1,900	403		228		281	J	620	J	1,040	J
Mercury	310	--		0.046	J	0.043	J	0.021	J	0.046	J
Nickel	20,000	37.6		21.6		26.6		36.1		92.5	
Potassium	NA	1,530	J	1,530	J	2,100	J	--		2,610	J
Selenium	5,100	0.66	J	1.3		--		1.4	J	--	
Silver	5,100	--		--		--		--		--	
Sodium	NA	--		--		--		--		--	
Thallium	67	--		--		4.9	J	--		--	
Vanadium	7,200	58.8		51.2		113		49.2		73.2	
Zinc	100,000	41.3	J	71.5	J	215		355		73.2	
SVOCs (mg/kg)											
1,1'-Biphenyl	350	--		--		--		--		--	
2-Methylnaphthalene	NA	--		--		--		--		--	
Acenaphthene	29,219	--		--		--		--		--	
Anthracene	100,000	--		--		--		--		--	
Benzo(a)anthracene	2.11	--		--		--		--		--	
Benzo(a)pyrene	0.21	--		--		--		--		--	
Benzo(b)fluoranthene	2.11	--		--		--		--		--	
Benzo(k)fluoranthene	21.1	--		--		--		--		--	
Benzo(g,h,I)perylene	NA	--		--		--		--		--	
Bis(2-ethylhexyl)phthalate	123.1	--		--		--		--		--	
Carbazole	86.2	--		--		--		--		--	
Chrysene	210.96	--		--		--		--		--	
Dibenz(a,h)anthracene	0.21	--		--		--		--		--	
Dibenzofuran	3,127	--		--		--		--		--	
Fluoranthene	22,000	--		--		--		--		--	
Fluorene	26,281	--		--		--		--		--	

TABLE E-2: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLING - OTHER ANALYTES
AREA OF CONCERN 1, NWS SBD CONCORD

Indeno(1,2,3-cd)pyrene	2.11	--		--	--	--	--
Naphthalene	188	--		--	--	--	--
Phenanthrene	NA	--		--	--	--	--
Phenol	100,000	--		--	--	--	--
Pyrene	29,126	--		--	--	--	--
Pesticides (mg/kg)							
4,4'-DDT	7.02	--		0.0062	--	--	--
Aldrin	0.10	--		0.0022	--	--	--
Dieldrin	0.11	--		0.054	--	--	--
Heptachlor epoxide	0.19	--		0.0054	--	--	--
Methoxychlor	3,078	--		--	--	--	--
Herbicides (mg/kg)							
2,4-D	7,683	--		--	--	--	--
Dalapon	18,000	0.0061	J	--	--	--	--
PCBs (mg/kg)							
Aroclor-1248	0.74	--		0.29	--	--	--
pH							
pH (EPA 150.1)	NA	NA		5.4	4.7	6.3	7.1

TABLE E-2: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLING - OTHER ANALYTES

AREA OF CONCERN 1, NWS SBD CONCORD

Sample Location Sample ID Type Depth Date	USEPA Region 9 PRG Industrial Soils[1]
Metals (mg/kg)	
Aluminum	100,000
Arsenic (cancer endpoint)	1.6
Arsenic (noncancer endpoint)	260
Barium	67,000
Beryllium	1,900
Cadmium	450
Calcium	NA
Chromium	450
Cobalt	1,900
Copper	41,000
Fluoride (leached)	36,938
Iron	100,000
Lead	750
Magnesium	NA
Manganese	1,900
Mercury	310
Nickel	20,000
Potassium	NA
Selenium	5,100
Silver	5,100
Sodium	NA
Thallium	67
Vanadium	7,200
Zinc	100,000
SVOCs (mg/kg)	
1,1'-Biphenyl	350
2-Methylnaphthalene	NA
Acenaphthene	29,219
Anthracene	100,000
Benzo(a)anthracene	2.11
Benzo(a)pyrene	0.21
Benzo(b)fluoranthene	2.11
Benzo(k)fluoranthene	21.1
Benzo(g,h,I)perylene	NA
Bis(2-ethylhexyl)phthalate	123.1
Carbazole	86.2
Chrysene	210.96
Dibenz(a,h)anthracene	0.21
Dibenzofuran	3,127
Fluoranthene	22,000
Fluorene	26,281

Notes:

Bold, highlighted results exceeded industrial PRGs.

Metals, VOCs, SVOCs, pesticides, and PCBs were analyzed by contract laboratory program (CLP) low level methods

Chlorinated herbicides were analyzed by EPA method 8151A

Fluoride was analyzed by EPA Method 300.0

pH was analyzed by EPA Method 150.1

[1] = EPA. 2002. EPA Region 9 PRGs Table. October 1. On-Line Address: http://www.epa.gov/region09/waste/sfund/prg/files/02table.pdf. Accessed c

--	not detected
CS	concrete slab
EPT	process tanks east of central roadway
J	estimated concentration
LAB	laboratory
mg/kg	milligrams per kilogram
NA	not analyzed
PCB	polychlorinated biphenyl
PRG	USEPA Region 9 preliminary remediation goal
SAP	spent acid pond
SVOC	semivolatile organic compound
VOC	volatile organic compound
WA	Warehouse area
WG1 - 4	borings to extend the sample grid 100 feet to the west
WPT	process tanks west of central roadway

TABLE E-2: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLING - OTHER ANALYTES
AREA OF CONCERN 1, NWS SBD CONCORD

Indeno(1,2,3-cd)pyrene	2.11
Naphthalene	188
Phenanthrene	NA
Phenol	100,000
Pyrene	29,126
Pesticides (mg/kg)	
4,4'-DDT	7.02
Aldrin	0.10
Dieldrin	0.11
Heptachlor epoxide	0.19
Methoxychlor	3,078
Herbicides (mg/kg)	
2,4-D	7,683
Dalapon	18,000
PCBs (mg/kg)	
Aroclor-1248	0.74
pH	
pH (EPA 150.1)	NA

TABLE E-2: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLING - OTHER ANALYTES

AREA OF CONCERN 1, NWS SBD CONCORD

Sample Location Sample ID Type Depth Date	USEPA Region 9 PRG Industrial Soils[1]
Metals (mg/kg)	
Aluminum	100,000
Arsenic (cancer endpoint)	1.6
Arsenic (noncancer endpoint)	260
Barium	67,000
Beryllium	1,900
Cadmium	450
Calcium	NA
Chromium	450
Cobalt	1,900
Copper	41,000
Fluoride (leached)	36,938
Iron	100,000
Lead	750
Magnesium	NA
Manganese	1,900
Mercury	310
Nickel	20,000
Potassium	NA
Selenium	5,100
Silver	5,100
Sodium	NA
Thallium	67
Vanadium	7,200
Zinc	100,000
SVOCs (mg/kg)	
1,1'-Biphenyl	350
2-Methylnaphthalene	NA
Acenaphthene	29,219
Anthracene	100,000
Benzo(a)anthracene	2.11
Benzo(a)pyrene	0.21
Benzo(b)fluoranthene	2.11
Benzo(k)fluoranthene	21.1
Benzo(g,h,I)perylene	NA
Bis(2-ethylhexyl)phthalate	123.1
Carbazole	86.2
Chrysene	210.96
Dibenz(a,h)anthracene	0.21
Dibenzofuran	3,127
Fluoranthene	22,000
Fluorene	26,281

n March 18, 2003.

TABLE E-2: ANALYTICAL RESULTS FOR SUPPLEMENTAL SOIL SAMPLING - OTHER ANALYTES
AREA OF CONCERN 1, NWS SBD CONCORD

Indeno(1,2,3-cd)pyrene	2.11
Naphthalene	188
Phenanthrene	NA
Phenol	100,000
Pyrene	29,126
Pesticides (mg/kg)	
4,4'-DDT	7.02
Aldrin	0.10
Dieldrin	0.11
Heptachlor epoxide	0.19
Methoxychlor	3,078
Herbicides (mg/kg)	
2,4-D	7,683
Dalapon	18,000
PCBs (mg/kg)	
Aroclor-1248	0.74
pH	
pH (EPA 150.1)	NA

TABLE E-3: SUMMARY OF SOIL SAMPLES BY SAMPLE TYPE AND LOCATION

AREA F CONCERN 1, NWS SBD CONCORD

Investigation Area	Sample Location	Sample Type	Sample Depth (feet bgs)	Analytes					
				Metals	SVOC	Pesticides /PCBs	VOCs	Herbicides	pH
Laboratory	LAB 1, LAB 2, LAB 3	composite	0 - 1.5	1	1	1		1	
			1.5 - 3.5	1	1	1		1	
			3.0 - 6.0	1	1	1		1	
	LAB 1	discrete	1.0 - 1.5				1		
			1.5 - 2.0				1		
			3.0 - 3.5				1		
Warehouse Area	WA 1, WA2, WA3, WA4	composite	0 - 0.5	1	1	1		1	
			3.0 - 3.5	1	1	1		1	
			5.0 - 6.0	1	1	1		1	
	WA 1	discrete	3.0 - 3.5				1		
			5.5 - 6.0				1		
East Process Tanks	EPT1, EPT2, EPT3, EPT4	composite	0 - 2.5	1	1	1		1	
			1.0 - 3.5	1	1	1		1	
			3.0 - 4.5	1	1	1		1	
	EPT4	discrete	3.0 - 3.5				1		
			3.5 - 4.0				1		
			5.0 - 5.5				1		
West Process Tanks	WPT1, WPT2, WPT3, WPT4	composite	0 - 2.0	1	1	1		1	
	WPT2	discrete	1.5 - 2.0				1		
			2.0 - 2.5	1	1	1	1	1	
			4.0 - 4.5	1	1	1	1	1	
Northern Boundary	NB1, NB2, NB3, NB4	composite	0 - 0.5	1	1	1		1	
Western Grid	WG1	discrete	0 - 0.5	1	1	1		1	
			3.0 - 3.5	1	1	1	1	1	
			5.5 - 6.0	1	1	1	1	1	
	WG2	discrete	0 - 0.5	1	1	1		1	
			3.0 - 3.5	1	1	1	1	1	
			5.5 - 6.0	1	1	1	1	1	
	WG3	discrete	0.3 - 0.8	1	1	1		1	
			0.8 - 1.3	1	1	1	1	1	
			3.1 - 3.6	1	1	1	1	1	
	WG4	discrete	0 - 0.5	1	1	1		1	
			3.0 - 3.5	1	1	1	1	1	
			5.5 - 6.0	1	1	1	1	1	
Concrete Slab	CS1, CS2, CS3, CS4	composite	0 - 2.0	1	1	1		1	1
	CS1	discrete	1.5 - 2.0				1		
Spent Acid Pond	SAP	discrete	9.0 - 9.5	1	1	1	1	1	1
			12.0 - 12.5	1	1	1	1	1	1
			15.0 - 15.5	1	1	1	1	1	1
Totals:				**29**	**29**	**29**	**23**	**5**	**4**

Notes:

ft. bgs	Feet below ground surface
PCB	Polychlorinated biphenyl
SVOC	Semivolatile organic compound
VOC	Volatile organic compound

ATTACHMENT E-1

QUALITY CONTROL SUMMARY REPORT

ENCLOSURE

AREA OF CONCERN 1 (SITE 31) SUPPLEMENTAL SOIL SAMPLING SUMMARY REPORT

NAVAL WEAPONS STATION SEAL BEACH, DETACHMENT CONCORD

MARCH 21, 2003

CONTENTS

ABBREVIATIONS AND ACRONYMS

%D	Percent difference
%R	Percent recovery
%RSD	Percent relative standard deviation
AOC 1	Area of Concern 1
CC	Continuing calibration
CCV	Continuing calibration verification
40 CFR	Title 40 of the *Code of Federal Regulations*
CLP	Contract Laboratory Program
CRDL	Contract-required detection limit
CRQL	Contract-required quantitation limit
EPA	U.S. Environmental Protection Agency
GPC	Gel permeation chromatography
ICPES	Inductively coupled plasma emission spectrometer
IC	Initial calibration
ICV	Initial calibration verification
LCS	Laboratory control sample
MS	Matrix spike
MSD	Matrix spike duplicate
NWSSBD	Naval Weapons Station Seal Beach Detachment
PARCC	Precision, accuracy, representativeness, completeness, and comparability
PCB	Polychlorinated biphenyl
PQL	Practical quantitation limit
QA/QC	Quality assurance and quality control
QCSR	Quality control summary report
r	Correlation coefficient
RPD	Relative percent difference
RRF	Relative response factor
RT	Retention time
SAP	Sampling and analysis plan
SVOC	Semivolatile organic compound

ABBREVIATIONS AND ACRONYMS (Continued)

TIC	Tentatively identified compound
TCX	Tetrachloro-m-xylenes
Tetra Tech	Tetra Tech EM Inc.
VOC	Volatile organic compound

1.0 INTRODUCTION

This quality control summary report (QCSR) discusses a review of analytical data quality for samples from eight sample delivery groups (CONC1, CONC2, and CONC4 through CONC9) collected by Tetra Tech EM Inc. (Tetra Tech) from Area of Concern 1 (AOC 1) at Naval Weapons Station Seal Beach Detachment Concord, Concord, California (NWSSBD Concord), between June 2002 and January 2003. This QCSR presents methodologies, results, and conclusions of both cursory and full quality assurance and quality control (QA/QC) reviews of chemical data gathered during this investigation.

2.0 VALIDATION METHODOLOGY

Data validation is a systematic process for reviewing and qualifying data against a set of criteria to verify whether they are adequate for their intended use. Laboratory analytical data were validated according to procedures outlined in the following documents:

- U.S. Environmental Protection Agency (EPA) "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review" (EPA 1999)

- "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review" (EPA 1994a)

- "Draft Final Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Time-critical Removal Action and Supplemental Sampling Activities, Site 31 (Area of Concern 1), NWSSBD Concord, California" (hereinafter referred to as the SAP) (Tetra Tech 2002)

Data were validated in two stages: (1) a cursory review of analytical reports and QA/QC information for 100 percent of the chemical data and (2) a full review of analytical reports, QA/QC information, and associated raw data for a minimum of 10 percent of the chemical data. The cursory review evaluated QA/QC information such as holding times, calibration requirements, and spiking accuracy. During the full review, additional QA/QC criteria were evaluated, and the raw data were used to check calculations and analyte identifications. At both stages of validation, qualifiers were assigned to the results in the electronic database in accordance with EPA guidelines, the SAP (Tetra Tech 2002), and associated analytical methods.

The overall objective of data validation was to determine whether the quality of the chemical data set was adequate for its intended purpose, as defined by precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters in EPA guidance (EPA 1997). By completing the following tasks, PARCC parameters were assessed:

- Reviewing precision and accuracy of laboratory QC data
- Reviewing precision and accuracy of field QC data
- Reviewing the overall analytical process, including holding times, calibrations, analytical or matrix performance, and analyte identification and quantitation
- Assigning qualifiers to data affected when QA/QC criteria were not achieved
- Reviewing and summarizing the implications of the frequency and severity of qualifiers in validated data

Between June 2002 and January 2003, 113 soil samples were collected and analyzed from NWSSBD Concord. In addition, 6 QC samples were collected and analyzed, including 4 equipment rinsate blanks and 2 equipment rinsate blanks.

3.0 CURSORY REVIEW

Cursory review of analytical reports for Contract Laboratory Program (CLP) organic, CLP inorganic, and non-CLP methods included evaluating the following parameters, as applicable: holding times, initial and continuing calibrations, laboratory and field blanks, accuracy, laboratory precision, analytical or matrix performance, and overall assessment of the data. Cursory review components and the results of each specific review are discussed in Sections 3.1 through 3.6 of this appendix. Section 3.7 discusses results that were reported below the contract-required quantitation limit (CRQL), the contract-required detection limit (CRDL), and the practical quantitation limit (PQL).

3.1 HOLDING TIMES

Technical holding times were defined as the maximum time allowable between sample collection and, as applicable, sample extraction, preparation, and analysis. The Clean Water Act authorized EPA to establish technical requirements for water holding times and preservation set forth in Title 40 of the *Code of Federal Regulations* (40 CFR) 136. For methods not covered by 40 CFR 136, holding times used for validation purposes either were recommended in specific analytical methods, such as CLP, or were specified in the SAP (Tetra Tech 2002).

For analytical methods with required holding times longer than 1 week, samples extracted, prepared, or analyzed outside of specified holding times were qualified as "Jh," indicating that the results were estimated values (EPA 1994a, 1994b). When these holding times were grossly exceeded (more than double the specified holding time), nondetected results were qualified as "Rh," indicating that the results were rejected, and detected results were qualified as estimated (Jh). No sample results required qualification as estimated or rejected.

3.2 CALIBRATION

Requirements for laboratory instrument calibration were established to help ensure that analytical instruments produce acceptable qualitative and quantitative data for target compounds. Initial calibration demonstrates that the instrument is capable of acceptable performance at the beginning of an analytical run by producing a linear curve. Continuing calibration demonstrates that the instrument is capable of repeating the performance established in the initial calibration (EPA 1994a, 1994b).

3.2.1 Organic Analysis

Initial calibration review for organic analysis included evaluating percent relative standard deviation (%RSD), relative response factors (RRF), and retention times (RT). The %RSD indicates the analytical system's linearity over an established concentration range. The RRF indicates the sensitivity of the analytical system to a particular target analyte. RT reflects the analytical system's stability. The review of continuing calibration included an evaluation of percent difference (%D) in lieu of %RSD. The %D measures the analytical system's precision and was calculated by comparing the daily RRF with the RRF established in the initial calibration.

Samples analyzed when calibration requirements were not met were qualified as "Jc," indicating that the results were estimated (EPA 1994b). Samples for volatile organic compound (VOC) and semivolatile organic compound (SVOC) analyses with nondetected results, analyzed when RRF requirements were not met, were qualified as "Rc," indicating that the results were rejected. Detected results were estimated (Jc) (EPA 1994b). Of the organic analytical data, 3.18 percent was qualified as estimated, and 0.70 percent was qualified as rejected as a result of calibration violations. The rejected results were due to calibration problems with acetone, which is known to exhibit poor performance.

3.2.2 Inorganic Analysis

Review of initial calibration for inorganic analysis included evaluating criteria for the curve's correlation coefficient (r) and initial calibration verification (ICV) percent recoveries (%R). The ICV %R verifies that the analytical system is operating within established calibration criteria at the beginning of an analytical run. Metals are analyzed using an inductively coupled plasma emission spectrometer (ICPES), which is inherently linear over a wide concentration range; therefore, it does not require multiple initial calibration standards, which are mandatory for most other methods. The continuing calibration review included an evaluation of the criteria for continuing calibration verification (CCV) %Rs. The CCV %R verifies that the analytical system is operating within the established calibration throughout the analytical run.

Samples analyzed when calibration requirements were not met were qualified as "Jc," indicating that the results were estimated (EPA 1994a). In general, inorganic data are not rejected when calibration requirements are exceeded, except based on the professional judgment of the data reviewer. Of the inorganic analytical data, no data were estimated or rejected because of calibration violations.

3.3 LABORATORY AND FIELD BLANKS

Laboratory and field blank samples were analyzed to evaluate the existence and magnitude of contamination resulting from sample collection or laboratory activities (EPA 1994a, 1994b). Blanks prepared and analyzed in the laboratory consisted of calibration, method, and preparation blanks. Field blanks consisted of equipment rinsate and trip blanks. If a problem with any blank existed, all associated data were carefully evaluated to assess whether sample data were affected. The following table summarizes the purpose of each laboratory and field blank:

Blank Type	Purpose of Blank
Calibration	Evaluate analytical instruments for possible laboratory contamination.
Method and Preparation	Evaluate extraction or preparation procedures for possible laboratory contamination.
Equipment Rinsate	Evaluate decontamination procedures as a possible route for field contamination.
Trip	Evaluate whether cross-contamination from other samples or the shipping containers occurs during shipping of samples for analysis of VOCs

At a minimum, a calibration or a method and preparation blank was analyzed once every analytical period for each instrument. Method and preparation blanks were extracted (or prepared) at a frequency of one per extraction or preparation batch per matrix or per 20 samples, whichever frequency was greater (EPA 1994b, 1995, 1996). Because each sampling task employed different sample collection devices, equipment rinsate blanks for a specified set of sample analyses were collected weekly for each sampling task. Equipment rinsate blanks were analyzed for the same analytes of concern as samples collected with the sampling equipment. Trip blanks were shipped with coolers containing samples for VOC analysis.

When laboratory blank contamination was identified, sample results were compared with an action level of 5 times the highest level detected in the associated laboratory blank. Detected results less than the action level for the laboratory blank contaminant were considered nondetected, either at the level of the original result or at the CRQL (organic samples only), whichever was higher (EPA 1994a, 1994b). The data were qualified as “UJb,” indicating that the results were nondetected, and reflected a detection or quantitation limit that may have been raised as a result of low-level laboratory blank contamination.

EPA (1994b) has identified some compounds, including acetone, methylene chloride, and phthalates, as common laboratory contaminants. These compounds were qualified as “UJb,” indicating that the result is considered to be nondetected in samples that contained reported concentrations of less than 5 times the reporting limit for those compounds (EPA 1994b).

After laboratory blank contamination was assessed, equipment rinsate and trip blanks were evaluated. Where field blank contamination was identified, sample results were compared with an action level. For most compounds, the action level was set at 5 times the highest concentration detected in the associated equipment rinsate or trip blank. For common laboratory contaminants, the action level was set at 10 times the highest concentration detected in the associated equipment rinsate or trip blank. Detected results that were less than an action level based on field blank contaminants were considered to be nondetected either at the action level or at the CRQL (organic samples only), whichever was higher (EPA 1994a, 1994b). Data were qualified as "UJf," indicating that the results were considered to be nondetected and reflected a detection or quantitation limit that may have been raised by low-level equipment rinsate or trip blank contamination.

Of the analytical data obtained between June 2002 and January 2003, 2.30 percent was qualified as nondetected as a result of laboratory contamination, and only 0.19 percent was qualified as nondetected as a result of field contamination. The field blank contamination consisted of low-level selenium contamination. Based on the low percentage of qualified data, the quality of analytical data was not compromised significantly by laboratory or field contamination.

3.4 ACCURACY

One objective of data validation was to assess the accuracy of the chemical data set. Laboratory accuracy was evaluated using recoveries of surrogate spikes, matrix spikes (MS), and laboratory control samples (LCS) or blank spikes. For organic analyses using surrogate spikes, laboratory accuracy could be evaluated for individual samples; however, matrix effects frequently present unique problems in evaluating laboratory accuracy for organic analysis (EPA 1994b). In some cases, professional judgment was used in qualifying data. Any such decisions were clearly identified and documented in data validation reports.

Organic data affected by surrogate recoveries outside of QC limits were qualified as "Ja," indicating that the results were estimated, or in severe cases "Ra," indicating that the results were rejected (EPA 1994b). Organic data affected by MS or blank spike problems were qualified "Je," indicating that the results were estimated, or "Re," indicating severe matrix problems that resulted in rejected data. For inorganic analyses, laboratory accuracy was evaluated using LCS spike and MS recoveries. In general, data affected by LCS or MS recoveries outside of QC limits were qualified as "Je," indicating that the results were estimated. In a few isolated cases where LCS or MS recoveries were very low (less than 50 and 30 percent, respectively), affected, nondetected data were qualified as "Re," indicating that the results were rejected (EPA 1994b). Of the analytical data obtained between June 2002 and January 2003, 1.10 percent was qualified as estimated, and no data were rejected as a result of surrogate spike criteria violations. This very low frequency of accuracy criteria violations is evidence of the high technical quality of organic data.

Of the analytical data, 3.85 percent was qualified as estimated, and no data was rejected as a result of accuracy criteria violations. Most of the estimated qualifications were assigned because of LCS recovery problems in the metals MS recoveries outside of QC limits. This type of accuracy problem reflects matrix interference and not analytical performance issues.

3.5 PRECISION

Laboratory precision was evaluated by the relative percent differences (RPD) of MS and matrix spike duplicates (MSD) in organic analyses and by RPDs of sample and sample duplicates in inorganic analyses. For organic analyses, RPDs were used to evaluate overall precision and were not used specifically to qualify data. Precision goals for organic analyses are identified in the SAP (Tetra Tech 2002). For inorganic analyses, sample and sample duplicate RPDs were used to indicate the laboratory's analytical precision within a sample delivery group. Inorganic sample and sample duplicates were reviewed according to the following criteria (EPA 1994a):

- An RPD criterion of plus or minus 20 percent was used for aqueous sample values greater than 5 times the CRDL.

- An absolute difference of plus or minus the CRDL was used for aqueous sample values less than 5 times the CRDL.

Inorganic data affected by sample and sample duplicate RPDs outside of QC limits were qualified as "Jd," indicating that the results were estimated (EPA 1994a). No data were rejected as a result of precision criteria violations. Of the analytical data obtained between June 2002 and January 2003, only 1.36 percent was qualified as estimated as a result of precision criteria violations. The data qualified as estimated was attributed to problems with precision criteria with lead, manganese, mercury, and selenium.

3.6 ANALYTICAL AND MATRIX PERFORMANCE

In addition to data quality requirements identified and discussed in previous text, further laboratory QA/QC criteria were evaluated in the cursory review. These additional criteria were concerned primarily with analytical and matrix performance including internal standard recovery and instrument performance check samples and ICPES serial dilutions.

For VOC and SVOC analyses, internal standard performance was evaluated. Internal standard performance criteria evaluate whether gas chromatography and mass spectrometry sensitivity and response are stable during every analytical run. Because matrix effects may affect internal standard performance, they may present unique problems in evaluating analytical performance. Internal standard area counts in the sample must be within 50 to 150 percent of the counts found in the associated daily calibration standard. Internal standard retention times must not vary by more than plus or minus 30 seconds from the internal standard in the associated daily calibration standard (EPA 1994b).

Organic data affected by internal standard criteria violations were qualified as “Ji,” indicating that the results were estimated. Organic data with any internal standard areas less than 10 percent of the internal standard’s area in the associated daily standard were qualified as “Ri” or “Ji.” “Ri” indicates that nondetected results were rejected, and “Ji” indicates that detected results were estimated. Of the analytical data obtained between June 2002 and January 2003, no data were qualified as estimated or rejected as a result of analytical or matrix performance violations.

In addition to analytical or matrix performance criteria discussed in the following text, some of the data were qualified with the general qualifiers (Jj or UJj) for other minor analytical or matrix problems encountered. These sample results were qualified during data validation, based on the professional judgment of the reviewer, and are well documented in validation reports. These sample results include some sample concentrations reported slightly above the highest calibration standard. These results should be considered qualitatively and quantitatively reliable, even though laboratory protocol requires sample dilution for results reported over the calibration range. Organic data affected by any of the criteria violations discussed previously were qualified as “Jj,” indicating that the results were estimated. Of the analytical data for organic compounds obtained between June 2002 and January 2003, 1.49 percent was qualified as estimated, and no data were rejected based on analytical or matrix performance violations.

3.7 RESULTS BELOW THE CONTRACT-REQUIRED QUANTITATION, THE CONTRACT-REQUIRED DETECTION LIMIT, AND THE PRACTICAL QUANTITATION LIMIT

For organic analyses, analytical instruments can make reliable, qualitative identification of compounds at concentrations below the CRQL for off-site analysis and below the PQL for on-site analysis. For CLP metals analysis, the ICPES can make reliable qualitative identification of analytes above the instrument detection limit but below the CRDL. Detected results below the CRQL, CRDL, and PQL are considered to be quantitatively uncertain. Sample results below the CRQL and CRDL were reported by the laboratory with a “J” qualifier (organic data) or a “B” qualifier (inorganic data) and were subsequently qualified in data validation as “Jg,” indicating that the results were estimated. Of the analytical data obtained between June 2002 and January 2003, 0.88 percent of the data was qualified as estimated because detected results were reported below the CRQL or CRDL. Nine percent of the metals results was reported below the CRDL but above the instrument detection limit. As noted previously, the ICPES can make reliable qualitative identification of analytes above the instrument detection limit but below the CRDL.

Tentatively identified compounds (TIC) are chromatographic peaks in volatile and semivolatile fraction analyses that were not target analytes, surrogates, or internal standards. TICs must be identified qualitatively by a National Institute of Standards and Technology mass spectral library search. The data reviewer assessed the identifications. All TICs were found to be artifacts, common blank contamination, or compounds identified in another fraction.

4.0 FULL REVIEW

A full review was conducted on a random 10 percent of the chemical data. Full review includes the elements of a cursory review, plus the following additional items, as applicable:

- Method compliance
- Instrument performance check samples
- Cleanup performance check samples
- System performance
- ICPES interference check samples
- Target analyte identification
- Analyte quantitation
- Detection and quantitation limit verification
- Overall assessment of the data

Criteria for data qualification during the full review are described in EPA guidelines (EPA 1994a, 1999), the SAP (Tetra Tech 2002), and associated analytical methods. Sections 4.1 through 4.4 discuss the full review components and the results of each specific assessment.

4.1 ADDITIONAL ANALYTICAL AND MATRIX PERFORMANCE

In addition to the cursory review of data quality requirements discussed in Section 3.0, full review includes additional verification against established QA/QC criteria. Additional full review requirements are concerned primarily with analytical and matrix performance. For organic analysis, the following requirements were evaluated: instrument performance check samples and cleanup performance check samples for florisil cartridges and gel permeation chromatography (GPC) (as applicable to SVOCs and polychlorinated biphenyls [PCB]). For VOC and SVOC analysis, gas chromatography and mass spectrometry instrument performance check samples were analyzed to ensure mass resolution, identification, and to some degree, sensitivity. Specifically, minimum and maximum ion abundance requirements must be met for bromofluorobenzene and decafluorotriphenylphosphine. Gas chromatography and electron capture detector instrument performance check samples (for PCBs) were analyzed to ensure adequate resolution and instrument sensitivity (EPA 1994b).

For SVOCs and PCB analyses, cleanup check samples were analyzed to verify the recovery of target analytes through cleanup processes. The GPC cleanup process removes matrix interferences from sample extracts before analysis. By running a blank spike through the GPC column and calculating the %R, these processes are checked. GPC is checked weekly (EPA 1994b).

For inorganic analyses, ICPES interference check samples were evaluated. The ICPES interference check sample verifies the validity of the laboratory’s interelement and background correction factors. High concentrations of the elements aluminum, iron, calcium, and magnesium can affect sample results if the interelement and background correction factors have not been optimized. Incorrect correction factors may result in false positives, false negatives, or biased results. In general, data affected by any of the criteria violations discussed previously were qualified as "Jj," indicating that the results were estimated. The additional analytical and matrix performance requirements resulted in only a small amount of estimated data and no rejected data.

4.2 ANALYTE IDENTIFICATION

Qualitative criteria have been established to minimize erroneous identification of compounds. An erroneous identification can be either a false positive (reporting a compound present when it is not) or a false negative (not reporting a compound that is present). By comparing the sample's mass spectra and retention time with the standard's mass spectra and retention time, analytes were identified for CLP volatile and semivolatile analysis. For positive identification, the compound's mass spectra must meet the following criteria: contain all of the standard's ions with relative intensities greater than 10 percent, agree within plus or minus 20 percent of the standard ion's relative intensities, and not contain any unaccounted ions with relative intensities greater than 10 percent. In addition, the retention time must be within plus or minus 0.06 relative retention time unit of the standard component's retention time (EPA 1994b).

PCBs were positively identified when a peak fell within the specified retention time "windows" on two dissimilar columns. Surrogates and MS/MSDs also were evaluated strictly to identify any retention time shifts by generating an RPD value. Single peak results were checked for quantitative agreement between the two columns. Detected results with RPDs greater than 50 percent and less than 100 percent were qualified as "Jj," indicating that the results were estimated. Because matrix effects frequently present unique problems in analyte identification, results with RPDs greater than 100 percent were sometimes considered to be misidentified and qualified as "UJj," indicating that the results were nondetected (EPA 1994b). Misidentified results below the CRQL were raised to the quantitation limit and considered to be nondetected. In some cases, professional judgment was used in qualifying the result as estimated (Jj) or nondetected (UJj). Any such decisions were clearly identified and documented in data validation reports.

Metals and other analyses were identified positively when the instrument registered a measurable response while operating under method-specified analytical parameters. In these cases, the instrument's accuracy in analyte identification is verified indirectly by assessing the instrument's performance. No organic or inorganic data were qualified or rejected because analytical and matrix performances were exceeded or as a result of analyte identification violations.

4.3 ANALYTE QUANTITATION

Applicable raw data were reviewed to verify positive results and reported detection or quantitation limits. Approximately 10 percent of the calculations was evaluated and recalculated for reproducibility. Raw data reviewed included, as applicable, the following sources: extraction and preparation logbooks, cleanup logbooks, spike and standard preparation logbooks, instrument printouts, strip chart recordings, chromatograms, and quantitation reports. The following data sources were also evaluated, as applicable: sample dilutions, concentrations, analytical split samples, cleanup activities, and percent moisture. Review of the raw data showed that the chemical analytical results obtained between June 2002 and January 2003 were quantitated properly.

4.4 ANALYTE REPORTING LIMITS

Analyte reporting limits are affected directly by dilutions. Detection or quantitation limits for water samples were raised by the dilution factor when samples required dilution for analysis. Sample dilution was necessary when high concentrations of an analyte were detected or when matrix problems occurred during sample extraction or analysis.

5.0 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPLETENESS, AND COMPARABILITY EVALUATION SUMMARY

The following paragraphs discuss overall data quality, including PARCC parameters, as determined during data validation.

5.1 PRECISION

Precision is a measure of the reproducibility of an experimental value without regard to the true or reference value. Primary indicators of data precision were the RPD of the MS/MSD in organic analyses and the RPD of the sample and sample duplicate in inorganic analyses. The following list summarizes data precision:

- For metals, over 98 percent of the sample and sample duplicate RPDs were within QA/QC criteria.

- For organic analyses, the MS/MSD RPDs were within QA/QC criteria.

5.2 ACCURACY

Accuracy assesses the closeness of an experimental value to the true or reference value. Primary accuracy indicators were the recoveries of surrogate spikes, MS, and LCS spikes. The following list summarizes the accuracy of the data:

- For VOCs, SVOCs, Pesticides, PCBs, and herbicides, over 97 percent of the surrogate spike, MS, and LCS spike recoveries were within QA/QC criteria.

- For metals, over 80 percent of the LCS spike and MS recoveries were within QA/QC criteria.

5.3 REPRESENTATIVENESS

Representativeness refers to the ability of sample data to reflect true environmental conditions. Factors that affect representativeness include sampling locations, frequency, collection procedures, and possible compromises to sample integrity (such as cross-contamination) that can occur during collection, transport, and analysis. Selection of representative sampling sites is important to ensure that the medium sampled is typical of the site. Correct sample collection, transport, and analytical procedures are important to ensure that samples closely resemble the medium sampled and to minimize contamination.

5.4 COMPLETENESS

Completeness is defined as the percentage of analytical results considered valid. Valid data are identified as acceptable or qualified as estimated (J) during the data validation process. Data qualified as rejected (R) are considered to be unusable and not valid.

Rejected and unusable data were qualified during the cursory review for the following reasons: exceeded holding time, calibration problems, low surrogate spike recovery, low LCS or MS recovery, or low internal standard areas. The full review of 10 percent of the data did not yield any additional rejected data.

The assessment of completeness consisted of comparing the amount of acceptable and usable results with the total number of expected results. For the data evaluated in this QCSR, completeness exceeding 99 percent was achieved. The SAP (Tetra Tech 2002) set a completeness goal of 90 percent for field samples and laboratory samples, which was exceeded. Over ninety-nine percent of analytical data obtained between June 2002 and January 2003 are valid and usable for site characterization, human health risk assessment, and ecological risk assessment purposes.

5.5 COMPARABILITY

Comparability is a qualitative assessment of how well one data set compares with another. Important determinants of comparability include uniformity of sampling activities, analytical procedures, data reporting, and data validation. The use of CLP protocol, specific and well-documented American Society for Testing and Materials, and other EPA analytical methods; approved laboratories; and the standardized process of data review and validation give the data a high degree of analytical comparability. The use of well-established analytical protocols ensures that the data are comparable with that collected during previous rounds of groundwater sampling.

6.0 CONCLUSIONS FOR DATA QUALITY AND DATA USABILITY

Although some qualifiers were added to the data, a final review of the data set with respect to EPA data quality parameters discussed in Section 5.0 indicated that the data are of high overall quality. Based on the overall assessment of the sampling program, QA/QC data, data review, and data validation results summarized in Sections 3.0 and 4.0, the data obtained between June 2002 and January 2003 are of acceptable PARCC parameters, as described in EPA (1997) guidance for quality assurance project plans. Except for the three rejected acetone results, therefore, these data are usable for risk assessment and site characterization. Supporting documentation and data are available on request, including cursory and full validation reports and the database that holds all sample results.

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ATTACHMENT E-2

SOIL BORING LITHOLOGIC LOGS

Tetra Tech EM Inc.

Log of Boring: CS1

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 3.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0–3	0–3	32		001AOC1GB108					Top Soil SAND: medium brown SILTY SAND: yellowish, 20-30% silt, loose, fine grained Concrete fragments and dust SILT: medium brown, 20% clay, 15% sand, stiff, no observed odor or staining
3									Total depth of boring = 3 feet

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

Tetra Tech EM Inc.

Log of Boring: CS2

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 3.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0		32		001AOC1GB108					Top Soil
									SILT: medium brown, dry, medium stiff, trace gravel, 20% clay, 15% sand
1									
2									Increase of clay with depth and decrease of sand, no observed staining or odor
3									Total depth of boring = 3 feet
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: CS3

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 2.50
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0		30		001AOC1GB108					Top Soil
									SILT: dark brown, dry, stiff, organic matter, base rock at 1 foot
1									CLAYEY SILT: yellowish brown, dry, stiff, trace gravel, 20% clay, 15% ultra fine yellow sand
									Base rock, 75% angular, descrease in sand at 2.5 feet
2									No observed staining or odor
									Total depth of boring = 2.5 feet
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: CS4

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 3.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0	0–3	36		001AOC1GB108					Top Soil
									SANDY SILT: medium brown, dry, stiff, trace gravel, 20% yellow sand
3									SILT: dark brown, dry, stiff, 15-20% clay
									No observed staining or odor
									Total depth of boring = 3 feet

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Tetra Tech EM Inc.

Log of Boring: EPT1

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0	0–6	30							Top Soil
0.5–1				001AOC1SS084					SILT: medium gray to dark gray brown, dry, medium soft, trace gravel, 10 to 15% clay, 5 to 10% sand, very fine sand
1–1.5				001AOC1GB085					
2.5									Becomes sandy with silt, light yellowish brown, moist at 4 feet, 60% silt, 40% sand
3–3.5				001AOC1GB086					
4		24							
6									Total depth of boring = 6 feet

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

Tetra Tech EM Inc.

Log of Boring: EPT2

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0	0–4	48							Top Soil
1									GRAVELLY SILTY SAND: trace gravel, 20-30% silts, 10% gravel, well graded interval
2									silts and ash looking material GRAVELLY SILT: light olive grey to light olive brown, well graded, fine angular gravels, 40-50% silts, dry, loose
3									
4	4–6	24							
5									
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: EPT3

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0	0–6	48							Top Soil
									Fine angular gravel, well graded becomes poorly graded with depth
1									SILTY SAND: dark grey brown, increase in silt content with depth, 30-40% silt
2									SANDY SILT: yellowish brown, dry, medium loose, very fine to fine sand, 40% to 50% sand, 30% to 45% silt, no observed staining or odor
3									
4		24							
5									
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: EPT4

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
0									Ground Surface
									Top Soil
									SILT: dark brown, dry, stiff, 15% clay, 15% sand, trace angular gravel
1	1–6	30							Gypsum material, white, changes to olive to yellowish red, fine gravel, no odor
2				001AOC1GB181					
				001AOC1GB182					
3									
4		24		001AOC1GB183					
									SILT: medium brown, dry, stiff, 25% to 10% sand
5									
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: LAB1

Logged By: DOUGLAS STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0		48							Top Soil
									SANDY SILT: dark gray brown, dry, very stiff, 20% sand
1				001AOC1GB081					
				001AOC1GB082					
2									Sand becomes yellowish, black fine concrete fragments for 16 inches
									Increase in sand and gravel content with depth, concrete fragments at 17 to 21 inches.
3				001AOC1GB083					
4		24							CLAYEY SILT: reddish brown, dry, medium stiff, 20% clay, 20% to 15% sand
5									Sand content increases with depth
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: LAB2

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0		48		001AOC1SS081					SILT: medium brown, dry, soft, 15% clay, 10% sand
1									
2									Increase in clay, stiffness, plasticity increases with depth
3				001AOC1GB082					
4		24							Increase in percentage of sand
5				001AOC1GB083					
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: LAB3

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0	0–6	48		001AOC1SS081					Top Soil
									SILT: dark brown, stiff, dry, organic matter
1									SILT: light brown, dry, soft low plasticity
2									
3				001AOC1GB082					Increase in clay and sand content with depth
4		24							
5				001AOC1GB083					
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: NB1

Logged By: DOUGLAS STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method: HAND AUGER
Boring Started:
Completed:
Boring Depth (feet bgs): 0.50
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
0									Ground Surface
				001AOC1SS090					SILTS: medium brown, dry, 20% clay, 5-10% sand, trace gravel, organics. No observed staining or odor.
									Total depth of boring = 0.5 feet
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: NB2

Logged By: DOUGLAS STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method: HAND AUGER
Boring Started:
Completed:
Boring Depth (feet bgs): 0.50
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
0									Ground Surface
0–0.5				001AOC1SS090					SILT: dark brown, dry, 20% clay, 5-10% sand, gravel organics. No observed staining or odor. Sample location is on the former R&R track.
0.5									Total depth of boring = 0.5 feet

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

Tetra Tech EM Inc.

Log of Boring: NB3

Logged By: DOUGLAS STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method: HAND AUGER
Boring Started:
Completed:
Boring Depth (feet bgs): 0.50
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
0									Ground Surface
0–0.5				001AOC1SS090					SILT: dark brown, dry, 20% clay, 5-10% sand, organic trace gravel. No observed staining or odor.
0.5									Total depth of boring = 0.5 feet
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: NB4

Logged By: DOUGLAS STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method: HAND AUGER
Boring Started:
Completed:
Boring Depth (feet bgs): 0.50
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
0									Ground Surface
0–0.5				001AOC1SS090					SILT: medium brown, dry, 20% clay, 5-10% sand. No observed staining or odor.
0.5									Total depth of boring = 0.5 feet

Depth scale: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15

Tetra Tech EM Inc.

Log of Boring: WA1

Logged By: DOUGLAS STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0		48		001AOC1SS102					Top Soil
									SILT: organic and non-organic matter
1									Gravelley sand, well graded, fine, 15% sand
2									SILT: medium yellow brown, dry, stiff, 20% clay, 10% sand, trace gravel
3				001AOC1GB103					
4		24							SANDY SILT: medium brown, dry, soft, 20% clay, 20% sand, trace gravel
5				001AOC1GB104					
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: WA2

Logged By: DOUGLAS STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0		36		001AOC1SS102					Top Soil
									SILT: dark brown, dry, very stiff
1									CLAYEY SILTS: medium brown, dry, stiff, increase of sand and clay
2									
3				001AOC1GB103					
4		24							SANDY SILT: yellowish brown, dry, soft, increase in sand to 20%
5				001AOC1GB104					
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: WA3

Logged By: DOUGLAS STERLING	***Project:*** REMEDIAL INVESTIGATION	***Drilling Method:***
Logging Consultant:	***Project No:*** AECRU	***Boring Started:***
Drilling Company:	***Location:*** UNK	***Completed:***
	Ground Surface Elevation (feet MSL):	***Boring Depth (feet bgs):*** 6.00
		Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0		42		001AOC1SS102					Top Soil
1									SANDY SILT: medium brown, dry, medium stiff, trace gravel, 20% clay, 10-15% sand
2									Increase in sand content with depth
3				001AOC1GB103					
4		24							
5				001AOC1GB104					
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: WA4

Logged By: DOUGLAS STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0		36		001AOC1SS102					Top Soil
									Concrete for 3 inches
1									SILT: medium brown, dry, stiff, trace gravel, 20% clay, 15% sand
3				001AOC1GB103					Increase of sand to 40% with depth
4		24							
5				001AOC1GB104					
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: WG1

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0		30		001AOC1SS093					Top Soil
1									Trace gravel lens
									SILT: medium to dark brown, dry, soft, trace fine gravel, 20% clay, 10% sand
2									
3				001AOC1GB094 001AOC1GB094A					Increase in clay to dark brown, hard, dry
4		24							CLAYEY SILTS: yellowish brown, dry, soft, increase of clay with depth. Pockets of white sand deposits, 20% clay, 15-20% sand
5				001AOC1GB095 001AOC1GB095A					
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: WG2

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0				001AOC1SS096					Top Soil
1									SILT: medium brown, dry, stiff, trace gravel, 20-15% sand
2									
3				001AOC1GB097 001AOC1GB097A					CLAYEY SILT: medium yellow brown, dry, very, stiff, clay increases with depth to 4.5 feet, 20% clay
4									
5				001AOC1GB098 001AOC1GB098A					SANDY SILT: yellow brown, dry, 20% sand, loose, trace fine gravel.
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: WG3

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0		48							
				001AOC1SS099					Top Soil
1				001AOC1GB100					SILTY GRAVEL: light yellowish green to light olive, dry, soft, angular half inch gravel, fragments below topsoil
									SANDY SILT: medium brown, trace gravel, 20% clay, 15% sand
2									Increase in clay content at 4 feet to 30%, light reddish brown
3				001AOC1GB101					
4		24							SANDY SILT: yellowish brown, dry, medium stiff, trace gravel, sand content increases to 20%
5									
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: WG4

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0	0–6	48		001AOC1SS110					Top Soil
1									SILT: dark brown, dry, medium stiff, 20% clay with sand
2									SANDY SILT: yellowish brown, dry, medium stiff, trace gravel, 25% sand
3				001AOC1GB111					Sand content increases with depth No observed waste or contamination.
4		24							
5				001AOC1GB112					
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: WPT1

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 2.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0				001AOC1SS087					CLAYEY SILT: yellowish brown to medium brown, dry, stiff, organic matter, 20% clay, 15% sand
1									CONCRETE: unable to go through. No observed staining or odor.
									No observed staining or odor
2									Total depth of boring = 2 feet
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: WPT2

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 6.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0		24							TOPSOIL.
1									SANDY SILT: medium brown, stiff, trace of fine gravel
				001AOC1GB087					GYPSUM: light gray, 16 to 19 inches, fine flour
2				001AOC1GB088 001AOC1GB088A					GYPSUM: medium gray, 19 to 22 inches, fine flour
3									SILTY SAND: dark gray brown, moist at 3 feet
4		24		001AOC1GB089 001AOC1GB089A					CLAYED SILT: olive brown, dry, very stiff, 25% clay
5									
6									Total depth of boring = 6 feet
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: WPT3

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 2.00
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0				001AOC1SS087					Top Soil
									Fine angular gravel
1									SILT: medium brown, concrete fragments and flour
									Unable to pass through concrete. No observed staining or odor
2									Total depth of boring = 2 feet
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Tetra Tech EM Inc.

Log of Boring: WPT4

Logged By: DOUG STERLING
Logging Consultant:
Drilling Company:

Project: REMEDIAL INVESTIGATION
Project No: AECRU
Location: UNK
Ground Surface Elevation (feet MSL):

Drilling Method:
Boring Started:
Completed:
Boring Depth (feet bgs): 0.70
Boring Diameter (inches):

DEPTH (FEET)	DRIVE INTERVAL	RECOVERY (IN)	BLOW COUNTS	SAMPLE ID	OVM (PPM)	WATER LEVEL	GRAPHIC LOG	USCS SOIL TYPE	DESCRIPTION
									Ground Surface
0				001AOC1SS087					Top Soil
1									Silty gravel Unable to pass through concrete at 6 inches. No observed staining or odor
									Total depth of boring = 0.7 feet
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

ATTACHMENT E-3

CHAIN OF CUSTODY FORMS

Tetra Tech EM Inc.
San Francisco Office

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

Chain of Custody Record No. 3724

Page ___ of ___

3724

Lab PO#:	
Lab:	Laucks
Project name:	TCEA 4 Sup. Sampling
TtEMI technical contact:	Sara Woolley
Field samplers:	Doug Sterling
Project (CTO) number:	G9016001040102049
TtEMI project manager:	Rik Lantz
Field samplers' signatures:	

Preservative Added

Sample ID	Sample Location (Pt. ID)		Date	Time	Matrix	MS / MSD	40 ml VOA	1 liter Amber	500 ml Poly	Sleeve	Glass Jar	Encore		VOA VOC	SVOA	Pest/PCBs	Metals	TPH Purgeables	TPH Extractables	moisture
ØØ1AOC1TBØØ2	Trip Blank		12/11	0700	H_2O		2							X						
ØØ1AOC1GB108	CS1		12/11	0800	Soil						1	3		X						X
ØØ1AOC1GB181	EPT 4	T	12/10	1330	↓						1	3		X						X
ØØ1AOC1GB182	EPT 4	M	↓	↓	↓						1	3		X						X
ØØ1AOC1GB183	EPT 4	B	↓	↓	↓						1	3		X						X
ØØ1AOC1GBØ31	LAB1	T	↓	1450	↓	X					1	9		X						X
ØØ1AOC1GBØ32	LAB1	M	↓	↓	↓						1	3		X						X
ØØ1AOC1GBØ33	LAB1	B	↓	↓	↓	X					1	9		X						X

	Name (print)	Company Name	Date	Time
Relinquished by: [signature]	Doug Sterling	TtEMI	12/11/02	1600
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:

Fed Ex #: [illegible]

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Chain of Custody Record No. 3726

Page ____ of ____

3726

Lab PO#:	
Lab:	Laucks
Project name:	TI RA & Sup. Sampling
TtEMI technical contact:	Sara Wadey
Field samplers:	Douglas Sterling & Eric Martin
Project (CTO) number:	G90160010401020491
TtEMI project manager:	Rik Lantz
Field samplers' signatures:	[signature]

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS/MSD	40 ml VOA	1 liter Amber	500 ml Poly	Sleeve	Glass Jar	VOA	SVOA	Pest/PCBs	Metals	TPH Purgeables	TPH Extractables	Pb, Se, Hg &	[illegible] Metals	Chlorinated Herbicides	Floride	Pb, Se, Hg
QQ1AOCISSQ23	F9	12/9/02	0930	soil						1								X			X
QQ1AOCISSQ24	F10	↓	1230	↓						1								X			X
QQ1AOCISSQ25	F11	↓	1345	↓						1								X			X
QQ1AOCISSQ26	D11	↓	1545	↓						1								X			X
QQ1AOCISSQ27	E11	↓	1445	↓						1								X			X
QQ1AOCISS73	WG1 (T)	12/10/02	0815	soil						1		X	X	X					X	X	
QQ1AOCIGB74	WG1 (m)	↓	0815	↓						1		X	X	X					X	X	
QQ1AOCIGB75	WG1 (B)	↓	0815	↓						1		X	X	X					X	X	
QQ1AOCISS76	WG2 (T)	↓	0805	↓						1		X	X	X					X	X	
QQ1AOCIGB77	WG2 (m)	↓	0805	↓						1		X	X	X					X	X	
QQ1AOCIGB78	WG2 (B)	↓	0805	↓						1		X	X	X					X	X	

Preservative Added

	Signature	Name (print)	Company Name	Date	Time
Relinquished by:	[signature]	Douglas Sterling	TtEMI	12/11/02	1600
Received by:					
Relinquished by:					
Received by:					
Relinquished by:					
Received by:					

Turnaround time/remarks:

Fed Ex #: 8385 1213 1358

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Chain of Custody Record No. 3727

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3727

Lab PO#:	
Lab:	Lauck's
Project name:	TCRA & Sup Sampling
TtEMI technical contact:	Sara Wooley
Field samplers:	Doug Sterling & Eric Nonthcain
Project (CTO) number:	G9016001040102049
TtEMI project manager:	Kirk Lantz
Field samplers' signatures:	[signature]

Preservative Added

Sample ID	Sample Location (Pt. ID)		Date	Time	Matrix	MS / MSD	40 ml VOA	1 liter Amber	500 ml Poly	Sleeve	Glass Jar	VOA	SVOA	Pest/PCBs	Metals & Hg	TPH Purgeables	TPH Extractables	Herbicide	Fluoride
001AOC1SS99	WG3	(T)	12/10/02	0840	Soil						1		X	X	X			X	X
001AOC1GB100	WG3	(M)	12/10/02	0840	Soil						1		X	X	X			X	X
001AOC1GB101	WG3	(B)	12/10/02	~~0840~~ 0855	Soil						2		X	X	X			X	X
~~001AOC1SS110~~ 001AOC1GB111	WG4	(T)	↓	0855	↓						2		X	X	X			X	X
001AOC1GB111	WG4	(M)	↓	0855	↓						2		X	X	X			X	X
001AOC1GB112	WG4	(B)																	
001AOC1SS102	WA	(T)	12/10/02	0940	Soil						2		X	X	X			X	X
001AOC1GB103	WA	(M)	↓	↓	↓						2		X	X	X			X	X
001AOC1GB104	WA	(B)	↓	↓	↓						2		X	X	X			X	X

DS

	Name (print)	Company Name	Date	Time
Relinquished by: [signature]	Doug Sterling	TtEMI	12/13/02	1600
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:

Fed Ex #:

WHITE Laboratory Copy YELLOW Sample Tracker PINK File Copy

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Chain of Custody Record No. 3728

Page 1 of

3728

Lab PO#:	Lab: Laucks

Project name: ICRA & Sup Sampling	TtEMI technical contact: Sara Woolley	Field samplers: Doug Stanley
Project (CTO) number: 69016001040102049l	TtEMI project manager: Rik Lantz	Field samplers' signature: [signature]

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS / MSD	40 ml VOA	1 liter Amber	500 ml Poly	Sleeve	Glass Jar	Encore	VOA VOC	SVOA	Pest/PCBs	Metals	TPH Purgeables	TPH Extractables
001AOC1TB003		12/12/02	0800	H_2O		3						X					
001AOC1GB87	WPT2 (T)		1400	soil							3	X					
001AOC1GB88	WPT2 (M)										3	X					
001AOC1GB89	WPT2 (B)	↓	↓	↓							3	X					

Preservative Added

No./Container Types

Analysis Required

	Name (print)	Company Name	Date	Time
Relinquished by: [signature]	Doug Stanley	TtEMI	12/13/02	1600
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:

Fed Ex #: 830335544280

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Chain of Custody Record No. 3729

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3729

Lab PO#:	Lab: Laucks

Project name: TCRA & Sup. Sampling	TtEMI technical contact: Sam Woolley	Field samplers: Doug Sterling & Erik Monschein
Project (CTO) number: G9016001040102049	TtEMI project manager: Rik Lantz	Field samplers' signatures: [signature]

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS / MSD	40 ml VOA	1 liter Amber	500 ml Poly	Sleeve	Glass Jar	Encore	VOA VOC	SVOA	Pest/PCBs	Metals (+Hg)	TPH Purgeables	TPH Extractables	Herbicides	Floride	pH
001AOC1SS90	NB1,2,3,4 0-.5	12/11/02	1400	soil						2			X	X	X			X	X	X
001AOC1SS87	WPT 0- T	↓	1400	↓						2			X	X	X			X	X	X
001AOC1GB88	m									2			X	X	X			X	X	X
001AOC1GB89	B	↓	↓							2			X	X	X			X	X	X
~~001AOC1GB87~~	~~WPT2 T~~										~~3~~	~~X~~								
~~001AOC1GB88~~	~~WPT2 m~~										~~3~~	~~X~~								
~~001AOC1GB89~~	~~WPT2 B~~										~~3~~	~~X~~								
001AOC1SS084	EPT T	12/10/02	1215							2			X	X	X			X	X	X
001AOC1GB085	EPT m		1215							2			X	X	X			X	X	X
001AOC1GB086	EPT B	↓	1215	↓						2			X	X	X			X	X	X

Preservative Added

	Name (print)	Company Name	Date	Time
Relinquished by: [signature]	Doug Sterling	TtemI	12/13/02	1600
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:

8385 1213 1369

Fed Ex #: ~~830335444306~~

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Chain of Custody Record No. 3731

Page ___ of ___

3731

Lab PO#:	Lab: Laucks
Project name: TCRA + ... Sampling	TtEMI technical contact:
Field samplers: Douglas Sterling	Field samplers' signatures: [signature]
Project (CTO) number: G9016/001 04010 20491	TtEMI project manager: Rik Lantz

No./Container Types: MS / MSD, 40 ml VOA, 1 liter Amber, 500 ml Poly, Sleeve, Glass Jar, Encore

Preservative Added

Analysis Required: VOA, SVOA, Pest/PCBs, Metals, TPH Purgeables, TPH Extractables, VOC

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	40 ml VOA	Encore	VOA (VOC)
001AOC1TB001		12/10/02	0800	water	3		X
001AOC1GB94	WG1 3-3.5 (m)	↓	0815	soil		3	X
001AOC1GB95	WG1 5-5.6 (B)	↓	↓	↓		3	X
001AOC1GB97	WG2 3-3.5 (m)	↓	0805	↓		3	X
001AOC1GB98	WG2 5.5-6 (B)	↓	↓	↓		3	X
001AOC1GB100	WG3 13"-19" (m)	↓	0840	↓		3	X
001AOC1GB101	WG3 37"-41" (B)	↓	↓	↓		3	X
001AOC1GB111	WG4 3-3.5 (m)	↓	0855	↓		3	X
001AOC1GB112	WG4 5.5-6 (B)	↓	↓	↓		3	X
001AOC1GB104	WA 5.5-6 (B)	12/10/02	0940	soil		3	X
001AOC1GB103	WA 3-3.5 (m)	↓	↓	↓		3	X

	Name (print)	Company Name	Date	Time
Relinquished by: [signature]	Douglas Sterling	TtEMI	12/10/02	1600
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:

Fed Ex #: 8385-1213-1233

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3849

Chain of Custody Record

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PO#	022288
Lab:	Laucks Testing
Project name:	Concord NWS ADC-1
TtEMI technical contact:	~~RW~~ Sarah Wodzy
Field samplers:	Greg Mason
Project number:	9016001 04501 020491
TtEMI project manager:	Rick Lantz
Field samplers' signatures:	[signature]

Preservative Added: NA

Sample ID	Sample Description/Notes	Date	Time	Matrix	40 ml VOA	1 Liter Amber	1 Liter Poly	Brass Tube	Glass Jar	CLP VOA - low	CLP SVOA - low	CLP Pest/PCBs - low	CLP Metals	TPH Purgeables	TPH Extractables	PH
~~001ADC1GB105~~ GM																
~~MW-04 9-9½~~ 001ADC1GB105	SAP 1 9-9.5'	1/9/03	11:45	SOIL					2	X	X	X	X			X
~~MW-04 12-12½~~ 001ADC1GB106	SAP 1 12-12.5'	1/9/03	12:00	SOIL					2	X	X	X	X			X
~~MW-04 15-15½~~ 001ADC1GB107	SAP 1 15-15.5'	1/9/03	12:15	SOIL					2	X	X	X	X			X

[signature] 1/10/03

	Name (print)	Company Name	Date	Time
Relinquished by: [signature]	Greg Mason	TTEMI	1/10/03	12:30
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:

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Chain of Custody Record No. 5913

Page ___ of ___

5913

Lab PO#:		Lab: Lucks
Project name: TCRA 4 Sup. Sampling	TtEMI technical contact:	Field samplers: Doug Sterling
Project (CTO) number: G90160010401020491	TtEMI project manager: Rik Lantz	Field samplers' signatures: [signature]

Sample ID	Sample Location (Pt. ID)	Date	Time	Matrix	MS / MSD	40 ml VOA	1 liter Amber	500 ml Poly	Sleeve	Glass Jar			VOA VOC	SVOA	Pest/PCBs	Metals	TPH Purgeables	TPH Extractables	Flouride	PH	Chl Herb					
001AOCITB004	Trip	12/13	0900	water		3							X													
001AOC1ER002	Equip Rinsate	↓	0900	↓		3	6	3		1			X	X	X	X			X	X	X					

Preservative Added: (blank)

	Signature	Name (print)	Company Name	Date	Time
Relinquished by:	[signature]	Doug Sterling	TtEMI	12/13/02	1600
Received by:					
Relinquished by:					
Received by:					
Relinquished by:					
Received by:					

Turnaround time/remarks:

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Chain of Custody Record No. 5915

5915

Page ____ of ____

Lab PO#:	Lab: Lanck	
Project name: TCRA I Sup. Sampling	TtEMI technical contact: Sara Woolley	Field samplers: Douglas Sterling & Eric Monschein
Project (CTO) number: G9Ø16ØØ1Ø4Ø1Ø2Ø491	TtEMI project manager: Rik Lantz	Field samplers' signatures:

Preservative Added

No./Container Types / **Analysis Required**

Sample ID	Sample Location (Pt. ID)		Date	Time	Matrix	MS / MSD	40 ml VOA	1 liter Amber	500 ml Poly	Sleeve	Glass Jar	VOA	SVOA	Pest/PCBs	Metals Hg	TPH Purgeable	TPH Extractables	Chl Herbs	[illegible]	Fluoride	pH
ØØ1AOC1SS1Ø8	CS	T	12/11/02	0745	soil	X				2	5		X	X	X			X	X	X	X
ØØ1AOC1SSØ81	LAB	T	12/10/02	1450	|	X				2	5		X	X	X			X	X	X	
ØØ1AOC1GBØ82	LAB	M	|	|	|					2			X	X	X			X	X	X	
ØØ1AOC1GBØ83	LAB	B	|	|	|					2			X	X	X			X	X	X	

	Name (print)	Company Name	Date	Time
Relinquished by: [signature]	Doug Sterling	Ttemi	12/13/02	1600
Received by:				
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Turnaround time/remarks:

Fed Ex #: 8385 1213 1369

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ATTACHMENT E-4

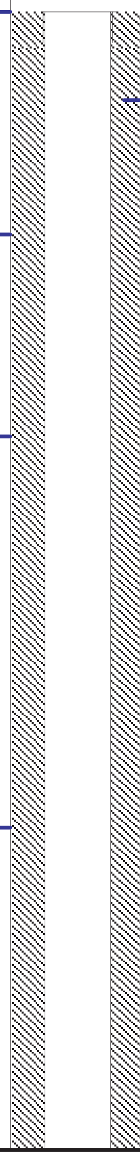
MONITORING WELL CONSTRUCTION AND LITHOLOGY LOGS

Well ID: MW-01

Project: NWSSBD Concord AOC 1 (Site 31)

Client: U.S. Department of Navy

Depth	Description	Well Construction	Remarks
0	Ground Surface		
	Sandy SILT with dark brown organic material		Annular seal is Basalite Type I-II with Portland cement
	Increased sand content, soft 20% fine- to medium-grained, no organic material		
5			
	Sandy SILT, light yellowish brown dense, dry		
	Black speckling and reddish spotting		
	Increased sand (25%), no speckling or spotting		
10			
	Sandy SILT, light gray and brown		
15			
	Increased clay, stiff with black speckling		
20			
	Silty SAND, gray and brown, dense, approximately 60% sand, medium- to coarse-grained, dry, black speckling		
25	Color change to weak red, approximately 70% sand		
	Finer grained SAND		
30			



Drilled By: Gregg Drilling

Hole Size: 4" monitoring well

Drill Method: Hollow-stem auger

Drill Date: 1-8-03

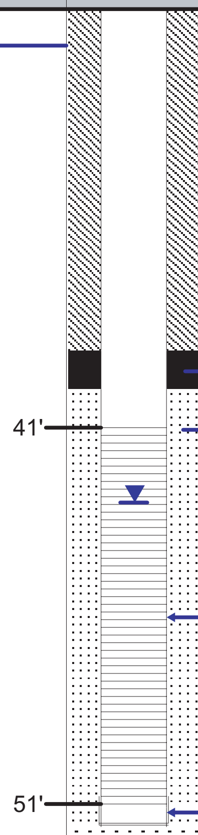
Sheet: 1 of 2

Well ID: MW-01

Project: NWSSBD Concord AOC 1 (Site 31)

Client: U.S. Department of Navy

Depth	Description	Well Construction	Remarks
	Silty SAND, fine grained		
	SAND, light gray to reddish brown, dry, loose, medium- to coarse-grained, poorly sorted		
35			
	Weak red banding		
			3/8-inch chip bentonite seal
40			
	Banding dissipates	41'	#2/12 filter pack (Lapis Lustre)
	Damp @ 42'		
	Saturated @ 43'		
45			
			Screen slot size = 0.010
50			
		51'	6-inch sump
	End of Borehole		
55			
60			



Drilled By: Gregg Drilling

Drill Method: Hollow-stem auger

Drill Date: 1-8-03

Hole Size: 4" monitoring well

Sheet: 2 of 2

Well ID: MW-02

Project: NWSSBD Concord AOC 1 (Site 31)

Client: U.S. Department of Navy

Depth	Description	Well Construction	Remarks
0	Ground Surface		
	Sandy SILT with clay, light yellow brown,		Annular seal is Basalite Type I-II with Portland cement
5	Sand content increased to 40%		
10	Increased clay content		
	Silty SAND with clay, yellow brown 60% sand, fine- to coarse-grained, loose		
	Increased clay content		
15	Slightly moist		
	Silty SAND with clay, olive brown, dense, fine-grained		
	Increased sand with black/white speckling, dry		
20	Clayey SILT with sand, olive greenish brown, dry		
25			
	Sandy SILT(40% sand), light brownish gray, loose with red and dark brown speckling		
30	Silty SAND, (60% sand), loose, dry		

Drilled By: Gregg Drilling

Hole Size: 4" monitoring well

Drill Method: Hollow-stem auger

Drill Date: 1-7-03

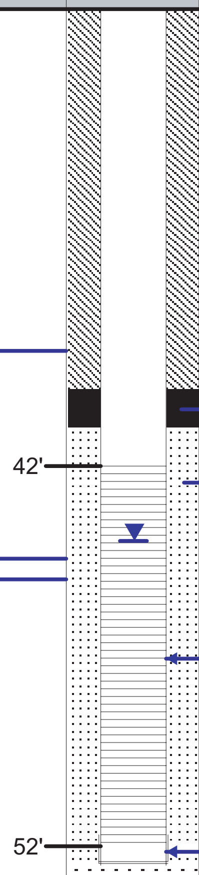
Sheet: 1 of 2

Well ID: MW-02

Project: NWSSBD Concord AOC 1 (Site 31)

Client: U.S. Department of Navy

Depth	Description	Well Construction	Remarks
	Silty SAND w/ clay, (60% sand), loose, dry		
	Mica flakes @ 34'		
35			
	Increased sand content (85%), dry, medium- to coarse-grained, loose, poorly sorted		
40	Sandy SILT, 40% sand, loose, dry, fine- to medium-grained with weak red banding		Medium Pure Gold chip bentonite seal
	Color change to medium brown, loose, dry	42'	#2/12 filter pack (Lapis Lustre)
	Damp @ 43'		
	6-inch saturated perch zone		
45	dense CLAY w/ mica flakes		
	Sandy SILT saturated (40% sand)		Screen slot size = 0.010
50			
		52'	6-inch sump
	End of Borehole		
55			
60			



Drilled By: Gregg Drilling

Hole Size: 4" monitoring well

Drill Method: Hollow-stem auger

Drill Date: 1-7-03

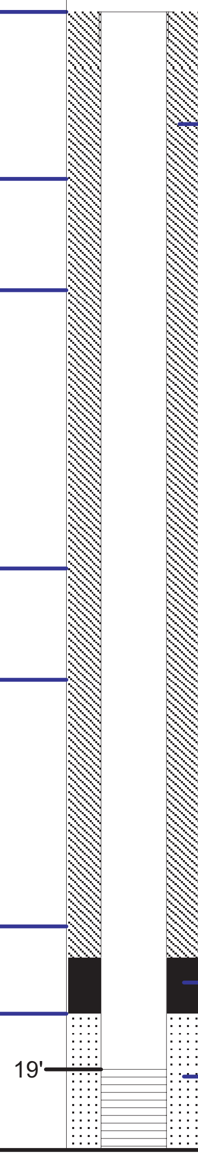
Sheet: 2 of 2

Well ID: MW-03

Project: NWSSBD Concord AOC 1 (Site 31)

Client: U.S. Department of Navy

Depth	Description	Well Construction	Remarks
0	Ground Surface		
	Clayey SAND, yellow brown, 10% sand, fine-grained		Annular seal is Basalite Type I-II
	Gravely SILT, light yellow tan, 15% gravel, loose		
5	SILT, light yellow tan		
	Dark gray speckling		
10	Sandy SILT, light brown, 20% sand, medium-grained, dry, loose, medium density		
	Clayey SAND, 50% sand, light brown, fine-grained, increased moisture		
15	very dense, dry		
	Sandy CLAY, yellow tan, 30% sand, fine-grained		Medium Pure Gold chip bentonite seal
	Clayey SAND, light brown, 60% sand, mica flakes	19'	#2/12 filter pack (Lapis Lustre)
20			



Drilled By: Gregg Drilling

Hole Size: 4" monitoring well

Drill Method: Hollow-stem auger

Drill Date: 1-9-03

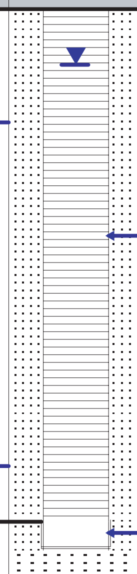
Sheet: 1 of 2

Well ID: MW-03

Project: NWSSBD Concord AOC 1 (Site 31)

Client: U.S. Department of Navy

Depth	Description	Well Construction	Remarks
	clayey SAND		
	fine SAND w/ clay, brown, saturated, 90% sand		
	brown, gray banding @ 24'		Screen slot size = 0.010
25			
	increased mica @ 26-28'		
	clayey SAND, brown to light gray yellow,	29'	6-inch sump
	rust colored banding, fine grained, 50% sand		
30	End of Borehole		
35			
40			



Drilled By: Gregg Drilling

Hole Size: 4" monitoring well

Drill Method: Hollow-stem auger

Drill Date: 1-9-03

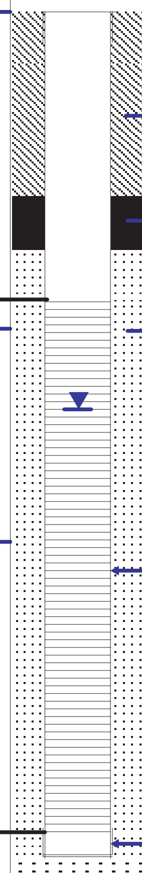
Sheet: 2 of 2

Well ID: MW-04

Project: NWSSBD Concord AOC 1 (Site 31)

Client: U.S. Department of Navy

Depth	Description	Well Construction	Remarks
0	Ground Surface		
	Clayey GRAVEL, medium brown, maleable		Annular seal is Basalite Type I-II with Portland cement
			Medium Pure Gold chip bentonite seal
5	3-inch lens of white gypsum/sand	5.5'	
	Silty coarse GRAVEL, dark brown		#2/12 filter pack (Lapis Lustre)
	Saturated @ 7.5'		
	Coarse GRAVEL, light brown, thin layers of cemented sand or calcite		
10	Silty SAND, light brown, 40% calcite inclusions, fine- to medium-grained		Screen slot size = 0.010
	Increase in sand content, less calcite		
15	Increase in sand content (90%), light brown, fine-grained	15.5'	6-inch sump
	Clayey SAND, yellow to light brown, plastic clay		
20	End of Borehole		Over-drilled to 20 feet bgs and backfilled to 16 feet



Drilled By: Gregg Drilling

Hole Size: 4" monitoring well

Drill Method: Hollow-stem auger

Drill Date: 1-9-03

Sheet: 1 of 1