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IN REPLY REFER TO :

12 December 2003

From: Commanding Officer, Engineering Field Activity West, Naval Facilities Engineering Command

To: Distribution

Subj: **DRAFT FINAL ADDENDUM 01, DRAFT FINAL SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN), INVESTIGATION OF ARSENIC IN SOIL AT INSTALLATION RESTORATION SITE 22, NAVAL WEAPONS STATION SEAL BEACH DETACHMENT CONCORD, CONCORD, CALIFORNIA**

Encl: (1) Draft Final Addendum 01, Draft Final Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Plan), Investigation of Arsenic in Soil at Installation Restoration Site 22, Naval Weapons Station Seal Beach Detachment Concord, Concord, California (12 December 2003)

1. In accordance with Section 10.7 (e) of the Federal Facility Agreement (FFA), enclosure (1) is forwarded for your review and consideration for acceptance. Appendix A of the document contains the Navy's responses to comments received on the draft version of the report. As specified in Sections 10.9 and 22 of the FFA, this draft final Primary Document will serve as the final document if the U.S. Environmental Protection Agency (EPA) does not invoke the dispute resolution provisions of Section 22 within thirty (30) days, or 14 January 2004.

2. If there are any questions or comments regarding the enclosure (1), please contact the undersigned at telephone no. 650-746-7451.

Sincerely

STEPHEN F. TYAHLA, P.E., CHMM
By Direction

12 December 2003

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GENERAL SERVICES ADMINISTRATION
CONTRACT NUMBER GS-10F-0076K
DELIVERY ORDER NUMBER N62474-01-F-6032

Draft Final Addendum 01 Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Investigation of Arsenic in Soil at Installation Restoration Site 22

Naval Weapons Station Seal Beach Detachment Concord Concord, California

GSA.0290.00014

DRAFT FINAL

December 12, 2003

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

TETRA TECH, INC.

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Investigation of Arsenic in Soil at Installation Restoration Site 22
Naval Weapons Station Seal Beach Detachment Concord
Concord, California

December 12, 2003

Prepared for

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DRAFT FINAL ADDENDUM 01
DRAFT FINAL SAMPLING AND ANALYSIS PLAN
(FIELD SAMPLING PLAN/QUALITY ASSURANCE PROJECT PLAN)
INVESTIGATION OF ARSENIC IN SOIL AT
INSTALLATION RESTORATION SITE 22

NAVAL WEAPONS STATION SEAL BEACH DETACHMENT CONCORD
CONCORD, CALIFORNIA

GSA Schedule Number GS-10F-0076K
Order Number N62474-03-F-4032

GSA.0290.00014

Prepared for:

DEPARTMENT OF THE NAVY

REVIEW AND APPROVAL

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Navy QA Officer: _____ Date: 12/4/03
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ACRONYMS AND ABBREVIATIONS

bgs	Below ground surface
DQO	Data quality objective
EPA	U.S. Environmental Protection Agency
FS	Feasibility Study
FSP	Field sampling plan
GSA	General Services Administration
MCL	Maximum contaminant level
µg/L	Micrograms per liter
mg/kg	Milligrams per kilogram
Navy	U.S. Department of the Navy
NWSSBD	Naval Weapons Station Seal Beach Detachment
PRG	Preliminary Remediation Goal
QAPP	Quality assurance project plan
RCRA	Resource Conservation and Recovery Act
RFA	Recourse Conservation and Recovery Act facility assessment
RI	Remedial investigation
ROD	Record of decision
RWQCB	California Regional Water Quality Control Board
SI	Site investigation
SVOC	Semivolatile organic compound
SWMU	Solid Waste Management Unit
Tetra Tech	Tetra Tech EM Inc.
TPH	Total petroleum hydrocarbons
VOC	Volatile organic compound

1.0 INTRODUCTION

Tetra Tech EM Inc. (Tetra Tech) is submitting this addendum to the "Draft Final Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) Investigation of Arsenic in Soil at Installation Restoration Site 22 Naval Weapons Station Seal Beach Detachment Concord, Concord, California." (Tetra Tech 2002) (hereinafter referred to as the SAP). This addendum was developed to present the approach for collection of additional data to (1) determine whether elevated arsenic concentrations at Site 22 are the result of widespread application of arsenic-containing herbicides throughout the magazine area, (2) determine whether pesticide or herbicide contamination is present at the site, (3) determine whether a former septic system at Site 22 is a source of volatile organic compound (VOC) contamination, (4) evaluate the uptake of arsenic in soil by plants and the subsequent ingestion by grazing cattle and tule elk, (5) determine whether a former septic system at Site 29 is a source of VOC contamination, and (6) assess the risk to human health and the environment. The results of the Site 22 investigation will be presented as an addendum to the existing remedial investigation (RI) report for Site 22. This addendum should be used in conjunction with the draft final SAP (Tetra Tech 2002) dated July 15, 2002, and approved by the Navy Quality Assurance Officer on July 1, 2002. Conditional approval was granted by the U.S. Environmental Protection Agency (EPA) on September 18, 2002. A letter addressing the conditions set forth by EPA finalized the Draft Final SAP on September 26, 2002. The Site 29 data will be included in a separate letter report prepared following receipt of the data.

This addendum describes proposed field activities at Sites 22 and 29 (Figure 1), which include the collection of additional soil, groundwater, and plant tissue analytical data required to evaluate potential risk to human health and the environment.

1.1 PURPOSE OF THE INVESTIGATION

The main purpose of this investigation is to further characterize arsenic, pesticide, and herbicide concentrations in soil within the magazine area and Site 22. These areas have been combined for this investigation and are referred to as the magazine study area. The magazine study area extends to the southwest to the Navy property boundary at the fence line and to the northeast, north, and east to include all magazines (Figure 1).

Previous investigations at Site 22 indicated the presence of arsenic in surface soil at concentrations exceeding human health screening criteria. The results of the human health risk assessment (Tetra Tech 2003) indicate that carcinogenic risks are within the upper bounds of the risk management range (1×10^{-4} to 1×10^{-6}) for the current industrial worker, future worker, and hypothetical future residential scenarios and that non-cancer risks are greater than the target value of 1 for the hypothetical future residential

scenario. Based on a May 10, 1947, newspaper article from the Contra Costa Gazette, which reported that "undergrowth on top and within 50 feet of munitions dumps in the H-E No. 3 area had been sprayed with an arsenate solution," the Navy hypothesizes that elevated arsenic levels at Site 22 are the result of a widespread application of arsenic-containing herbicides around the magazines in the late 1940s. The intent of the expansion of the Site 22 investigation into the area where the magazines are located is designed to test this hypothesis.

In addition to the assessment of arsenic, pesticides and herbicides in soil in the magazine area and Site 22, this investigation will also assess concentrations of VOCs, semivolatile organic compounds (SVOCs), perchlorate, metals, pesticides and herbicides in groundwater in existing wells at Site 22 and the potential presence of VOC contamination in groundwater associated with the septic system at the site.

The purpose of the Site 29 investigation (Figure 1) is to solely evaluate any potential VOC contamination associated with a septic system at this site. Sampling of the tank contents at Site 29 indicated that VOCs were present. No groundwater data are currently available in this area to evaluate whether VOCs were released to the environment from this septic system; thus VOCs will be sampled.

1.2 SITE HISTORY

The following sections present the histories of Site 22 and Site 29.

1.2.1 Site 22

A comprehensive history of Site 22 is presented in the draft final SAP and the RI (Tetra Tech 2003). A brief summary is presented below. Previous investigations at Site 22 have focused on Building 7SH5 as a possible source of contamination. Building 7SH5 was built in 1944 on a concrete slab with no plumbing or heating as a storehouse for inert equipment. Four different operations have been conducted in the building between 1944 and the present. Between 1944 and 1957, Building 7HS5 was used as storehouse for inert equipment. In 1957, the building was converted to test missile components. Testing included vibration and environmental testing, which was the main function of the building in the early 1970s, when maintenance operations began for the Guided Missile Division of the Ordnance Department (E&E 1983). During the maintenance operations phase, specific building activities included paint stripping, cleaning, and painting missile wings and fins. These activities primarily involved the use of acetone, tirchloroethane, methyl ethyl ketone, chloroethane, and several types of paint thinners (E&E 1983). Building 7SH5 was also used for manufacturing mobile laboratories to be used during explosive ordnance disposal activities. From 1970 to 1978, the Tidal Area Landfill reportedly received all wastes from Building 7SH5 (E&E 1983).

1.2.2 Site 29

Site 29 comprises Building IA-25 (Figure 6) and solid waste management unit (SWMU) 13. SWMU 13 consists of a septic tank, the inflow line to the septic tank, the drain field for the septic tank (located northeast of the Building IA-25), and an area where a storm drain from Building IA-25 discharges to the ground. Building IA-25 is an irregularly shaped building approximately 40 feet wide by 150 feet long. The structure is constructed over an open crawlspace on timber posts and beams.

Building IA-25 was reportedly used to manufacture and test military explosives. The building also included a paint spray booth for repainting components. The spray booth was located in the southwest corner of the building. The building was renovated significantly for rework of explosives in the late 1970s. The building is situated on concrete piles, so there is a crawl space of bare ground beneath the building.

The septic tank associated with SWMU 13 was cleaned out in 1997. The septic system remains operational, although the building is not currently in use.

1.3 PREVIOUS INVESTIGATIONS

The following section describes previous investigations at Site 22 and Site 29 subsequent to the draft final SAP.

1.3.1 Site 22

The following sections describe previous investigations conducted at Site 22; all previous investigations have been focused on Building 7SH5 as a possible source of contamination. Previous investigations include:

- An initial assessment study (IAS) (E&E 1983)
- A site investigation (SI) report (PRC 1993)
- An underground storage tank (UST) investigation (Harding Lawson Association [HLA] 1995)
- A Resource Conservation and Recovery Act (RCRA) facility assessment (RFA) that included a solid waste management unit (SWMU) investigation (PRC 1997)
- A Phase I RI (TtEMI 1997) and a Phase II RI (TtEMI 1998a)
- Draft ROD (TtEMI 1998b)
- Supplemental Remedial Investigation Installation Restoration Site 22 (Tetra Tech 2003)

Because the focus of this study is arsenic at Site 22, the following summary highlights metal concentrations in soil at the site. Concentrations of arsenic in all previous Site 22 investigations are presented in Figure 3.

1.3.1.1 Initial Assessment Study

A visual inspection of the site was conducted by E&E during the IAS in 1983. The IAS eliminated this site from consideration because of the small quantity of wastes that might be present. Because of changes in law since the IAS (that is, CERCLA and SARA) and the absence of records on the disposal activities, this site was included in the site investigation (SI) to evaluate whether it poses an environmental or health risk under current regulations.

1.3.1.2 Site Investigation

The SI at Site 22 was conducted by PRC in June 1992 and included the collection of soil samples from three soil borings within a suspected disposal pit and collection and analysis of one composite surface soil sample from the bottom of a drainage ditch.

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

Most metals detected in soil samples from the alleged pit area were not detected at concentrations greater than residential preliminary remediation goals (PRGs). Only arsenic (16.7 mg/kg), copper (332 mg/kg), lead (60.7 gm/kg), and mercury (1.10 mg/kg and 0.85 mg/kg) were detected at concentrations slightly above the PRGs. The results of the SI sampling at the suspected disposal pit did not detect evidence of paints, oils, or solvents; however, it was not certain if the sampling depth exceeded the pit depth or whether the samples were collected from relatively clean backfill material.

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

1.3.1.3 Resource Conservation and Recovery Act Facility Assessment

During the Resource Conservation and Recovery Act (RCRA) facility assessment (RFA) conducted by the California Department of Toxic Substances Control (DTSC) in 1992, Building 7SH5 was designated as SWMU 52 because hazardous waste may have leached into soil from the building's septic tank system.

Two deep soil borings were advanced in the septic leach field, and two shallow soil borings were advanced along the drainage ditch west of the leach field in 1995 for the RFA. In addition, one liquid sample from the septic tank and a surface water sample from the drainage ditch were collected. All samples were analyzed for VOCs, SVOCs, total oil and grease, and metals. Arsenic was detected at concentrations of 38.0 and 65.4 mg/kg in surface samples from borings 52-03 and 52-04 (Figure 3).

1.3.1.4 Underground Storage Tank Investigation

In September 1993, HLA conducted an investigation of the UST west of Building 7SH5. One soil boring was drilled to a depth of 16.5 feet bgs and sampled at 4.5, 8, and 16 feet bgs. Soil samples indicated that TPH as diesel was present in samples collected at depths of 4.5 feet bgs (7,700 mg/kg) and 8 feet bgs (1,600 mg/kg).

The HLA "Subsurface Investigation and Tank Removal Plan" called for the removal of the UST, associated piping, and all contaminated soils until the results indicate residual hydrocarbon levels in soil below 100 mg/kg (HLA 1995). The UST was removed and the surrounding area was investigated by Naval Weapons Station SBD Concord in January 1997. Results of the removal showed that the UST was heavily rusted and contained one small hole. Staining was observed on the southern portion of the UST. The soil was over excavated to approximately 12 feet bgs to remove diesel-contaminated soil (K.T.W. & Associates, Inc. 1998). The UST was replaced with an underground storage tank under the UST program (HLA 1995). A letter recommending no further action at the UST site was submitted by the Contra Costa County Health Services Department on April 8, 1997 (Contra Costa Health Services Department 1997).

1.3.1.5 Phase I Remedial Investigation

In 1995, three areas around Building 7SH5 were sampled as part of the Phase I RI/FS to assess whether past site activities have affected environmental media at the site. These areas included the drainage ditches, the alleged disposal pit area, and the UST and associated piping. The following description focuses on the results for arsenic, the primary constituent of concern for this investigation. The TPH and VOC results are discussed in the Phase I and II RI.

Arsenic concentrations detected in Site 22 soils are shown on Figure 3. Arsenic was detected at concentrations exceeding the residential and industrial PRG values (EPA 1995a) in the majority of the samples collected at Site 22; however, site ambient concentration of arsenic greatly exceeded the PRG value (15 mg/kg compared to 0.39 mg/kg). Because the source of arsenic surrounding the site has not been identified, other areas of elevated concentrations of arsenic cannot be ruled out. The spatial

distribution of the elevated arsenic concentrations suggests that arsenic is not present as a consequence of Building 7SH5 activities.

1.3.1.6 Phase II Remedial Investigation

In 1998, a Phase II RI was conduced to (1) confirm the presence of chlorinated hydrocarbons detected in grab groundwater samples collected during the Phase I RI and (2) locate the contamination source once detections were confirmed (TtEMI 1998a). Sampling was also conducted to assess the extent of TPH contamination in groundwater. During the investigation, four monitoring wells were installed in January 1997; soil and groundwater samples were analyzed for VOCs and TPH-extractables. The results of the sampling indicated no evidence of a contaminated groundwater plume.

1.3.1.7 Supplemental RI

The Navy initiated an additional field investigation in response to a concern regarding elevated concentrations of arsenic in soil at Site 22. This investigation (Tetra Tech 2003), conducted in October 2002, involved collection of additional soil data to determine the extent of arsenic in soil at Site 22 and to determine whether the source of arsenic is anthropogenic.

Results of the Supplemental RI indicate that arsenic is most elevated in surface soils collected from open grassland and ditch areas of the site relative to arsenic concentrations from samples collected near Building 7SH5, indicating that the potential source of arsenic may be related to application of arsenic containing herbicides, pesticides, or rodenticides to surface soils by the Navy or previous landowner or by railroad maintenance practices. Site features and previous sampling locations at Site 22 are presented in Figure 2; results of arsenic in soil at Site 22 are presented in Figure 3.

Groundwater during the RI was evaluated for VOCs and petroleum hydrocarbons based on historical use of the site. Constituents detected in groundwater samples collected from the four monitoring wells installed at the site included: trichloroethene (TCE), bis(2-ethylhexyl)phthalate (BEHP), and 1,1,-trichloroethane. These compounds were not detected consistently during the four quarters of groundwater sampling conducted at the site. Only BEHP was detected at concentrations that exceed the tap water PRG and MCL.

Soil borings completed at the site indicate that the geology consists primarily of silt and silty clay with varying amounts of sand and gravel. From 0 to 20 feet bgs, discontinuous lenses of gravel and sand were identified within the clay and silt matrix. From 20 to 30 feet bgs, the lithology consists mostly of clayey soil with thin sand gravel lenses. Groundwater flows to the west-northwest at a gradient of approximately 0.0036 as shown on potentiometric from the RI (Figure 4).

1.3.1.8 Potential Backfill Material for Area of Concern (AOC) 01 Construction

In July 2002 a mound located east of Building 7SH-5 (Figure 2) was identified as a possible source of soil to be used as backfill material during AOC 01 construction. Prior to use, two samples were collected and submitted for analysis for VOCs, SVOCs, metals, pesticides, and PCBs. Arsenic was detected in one sample at a concentration of 17 mg/kg, which exceeds the residential soil PRG (0.39 mg/kg) and Inland Area ambient arsenic value (15 mg/kg). The high arsenic concentrations precluded use of the soil as backfill.

1.3.2 Site 29

Three previous investigations at Site 29 span several areas and several investigation programs. The investigations are listed below and described in detail in the following subsections.

- Building and Crawl Space Surface Soil Sampling (IT 1990)
- RCRA Facility Assessment Confirmation Study (PRC 1997)
- Site Investigation Subsurface Soil Sampling Investigation (Tetra Tech 1999)

In terms of data used in developing this addendum to the Draft Final SAP, there were two main, distinct sampling events at Site 29, summarized in Sections 1.3.2.1 and 1.3.2.3. In addition, there was a Resource Conservation and Recovery Act (RCRA) Facility Assessment Confirmation Study (RFACS), which is summarized in Section 1.3.2.2. The investigation and dates of previous field activities are listed below:

1.3.2.1 Building Crawl Space Surface Soil Sampling

Initial investigations were conducted from 1988 through 1989 to evaluate potential soil contamination beneath Building IA-25, the building that along with the septic tank, is a primary focus of investigation at Site 29. In 1988, seven surface soil samples were collected in the crawl space beneath Building IA-25, and one surface soil sample was collected just west of Building IA-25. In 1989, eight shallow soil borings were completed beneath Building IA-25, and two soil borings were completed immediately west of Building IA-25. At each of the 10 soil boring locations completed in 1989, soil samples were typically collected at 6 inches and 12 inches below grade. A total of 27 soil samples were collected during these two sampling events (in the crawl space and immediately to the west of the crawl space), and these samples are collectively referred to as the "building crawl space surface soils" sampling event throughout this report and are considered representative of the surface and near surface soils that exist below the building crawl space.

The 27 shallow soil samples were collected from depths of between 0 and 18 inches. Sample analyses included metals, explosives, VOCs, SVOCs, pesticides, polychlorinated biphenyls (PCB), and chlorinated herbicides. Not all analyses were conducted on each sample.

Sampling results indicated that shallow soils beneath the building contain organic compounds including SVOCs (bis [2-ethylhexyl]phtalate), polynuclear aromatic hydrocarbons, total petroleum hydrocarbons (gasoline), VOCs (2-butanone;1,1,1-trichloroethane; methelyne chloride; and xylenes), pesticides (4,4'-DDD; 4,4'-DDT; and beta-BHC), chlorinated herbicides (2,3,5-TP; 2,4-DB; and dinoseb), and metals (primarily lead and zinc). A focused human health risk assessment (worker hazard assessment) concluded that no long-term health effects to construction and maintenance workers were anticipated from compounds found in the building crawl space surface soil samples (IT Corporation 1990).

1.3.2.2 RCRA Facility Assessment Confirmation Study

In June 1992, the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) performed a Resource Conservation and Recovery Act (RCRA) facility assessment (RFA) to investigate potentially contaminated areas throughout NWSSBD Concord. The RFA was performed to evaluate the potential for release of hazardous substances from 24 SWMUs. In 1996, the Navy performed a RCRA facility assessment confirmation study (RFACS) to further evaluate the RFA findings. The RFACS was issued in draft form on November 4, 1996, and in final form on August 8, 1997 (PRC Environmental Management, Inc. [PRC] 1997). The RFACS was reviewed by EPA and the San Francisco Bay Regional Water Quality Control Board (RWQCB). The Navy received comments from EPA and RWQCB on the draft RFACS and provided responses to agency comments in the final RFACS. Additional agency comments were not received by the Navy on the final RFACS.

The septic tank, storm drain discharge area, and septic tank drain lines were investigated as SWMU 13 during the RFACS (PRC 1997). Two soil borings (13-01 and 13-02) were advanced to a maximum depth of 16.5 feet bgs in the vicinity of the septic tank drain field, approximately 100 feet northeast of Building IA-25 during the RFACS. Soil samples collected from the leach field area contained oil and grease (O&G), SVOCs (phenol at 1 sampling location), and metals.

One shallow boring near the storm drain outfall (13-03) contained the most significant quantities of contaminants. The near-surface sample from this boring contained 920 milligrams per kilogram (mg/kg) of O&G, 0.004 mg/kg of endosulfan II, 0.1 mg/kg of 4-nitrotoluene, and concentrations of metals. The analytical results of adjacent soil samples in the same boring and adjacent borings show that these constituents are limited in both vertical and horizontal extents. Because of the immobility of these constituents in soil at Site 29 and the relatively low concentrations detected, the RFACS concluded that there is no evidence of a significant release of contaminants to soil. Because samples from the septic tank contained hazardous wastes including VOCs, an interim RCRA corrective action was conducted to remove the septic tank contents for off-site disposal and thoroughly cleanse the tank.

Based on the RFACS, SWMU 13 was recommended for no further action under RCRA. Further investigation of subsurface soils in the vicinity of Building IA-25 was recommended under CERCLA to evaluate the extent of detected contaminants in the vicinity of Building IA-25 and to evaluate the inflow line to the septic tank for potential breaks.

1.3.2.3 Site Investigation Subsurface Soils Sampling

The recommended site investigation sampling was conducted in January and February 1999. This sampling event was the beginning of the Navy's IRP CERCLA evaluation of the site.

The results of the sampling were presented in detail in the draft site investigation report. All soil samples described below are discrete samples. Three soil borings (S29SB01, S292SB02 and S29SB03) were advanced at Site 29 to a maximum depth of 15 feet bgs. Boring S29SB01 was placed immediately adjacent to the inflow line to the septic tank, as recommended by the RFACS study. Soil samples were collected for lithologic description using a continuous core barrel sampler lined with brass tubes. Soil samples were collected at 5-foot intervals for chemical analysis. Three soil samples were collected from each boring. The soil samples were collected in January and February 1999 and were analyzed for VOCs, SVOCs, pesticides, PCBs, total petroleum hydrocarbons (TPH) as extractables; TPH as purgeables; and metals. The three samples collected from boring SB-1 also were analyzed for explosive residue.

Metals were detected in all nine soil samples collected during the subsurface soils sampling event. The metals antimony, barium, beryllium, chromium, copper, mercury, selenium, and vanadium were detected in soil samples collected at Site 29 at concentrations exceeding Inland Area estimated ambient metals concentrations for soil but below their respective residential preliminary remediation goals (PRG). Samples collected from all three of the borings contained at least one metal at concentrations greater than the estimated ambient concentrations.

Arsenic, iron, manganese, and thallium were the only metals detected in soil at concentrations exceeding residential PRGs. None of these metals were detected at concentrations exceeding industrial PRGs except arsenic, which was detected at a concentration exceeding the industrial PRG in three samples. Although arsenic exceeded both residential and industrial PRGs, the maximum concentration (10 mg/kg) did not exceed the estimated ambient concentration of 15 mg/kg in any sample (the ambient concentration for arsenic exceeds both the residential and industrial PRGs).

Although an ambient limit for iron has not been established for the Inland Area soils at Concord NWSSBD, the maximum detected concentration of iron (42,400 mg/kg) is well within the background range of iron (10,000 to 87,000 mg/kg) reported for soils in California (Bradford and others 1996). The

maximum detected concentration of iron is also below the ambient limit (58,000 mg/kg) established for the Tidal Area.

Organic compounds, specifically trichloroethene (TCE) and TPH as purgeables, were also detected in soil samples collected during the subsurface soil sampling event. Pesticides, PCBs, SVOCs, TPH as extractables, and explosive compounds were not detected.

TCE was detected in one soil sample collected from boring S29SB01 at an estimated concentration of 2 micrograms per kilogram (µg/kg). This concentration is below both the residential and industrial PRGs. TPH as gasoline was detected in one sample at a concentration of 0.7 mg/kg.

1.4 TECHNICAL OR REGULATORY STANDARDS

Where applicable, maximum contaminant levels (MCL) will be the screening level applied to metals, VOCs, SVOCs, pesticides, and herbicides for groundwater samples. EPA Region IX residential soil PRGs will be used as the initial screening criteria for soil samples.

MCLs have not been established for perchlorate. A screening level of 1 microgram per liter (µg/L) will be used to evaluate whether perchlorate was present at concentrations of concern in site groundwater. The criterion is based on the EPA draft reference dose (RfD) for perchlorate presented in "Perchlorate Environmental Contamination: Toxicological Review and Risk Characterization (2002 External Review Draft)" (EPA 2002a).

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

2.0 PROJECT AND TASK DESCRIPTION

The following subsections discuss the project objectives and project measurements for the field event at Site 22 and Site 29.

2.1 PROJECT OBJECTIVES

As stated in Section 1.1, the primary objective of the field event at Site 22 is to obtain additional information to assess arsenic, pesticide, and herbicide concentrations in soil and groundwater and perchlorate in groundwater. The secondary objective is to evaluate the former septic systems at Site 22 and 29 as a potential source of VOCs.

To meet these objectives, the following field activities will be carried out at Site 22:

- Collect groundwater samples from four existing monitoring wells at Site 22 (Figure 5) for VOC, SVOC, pesticide, herbicide, metals, and perchlorate.
- Collect 34 surface soil samples for arsenic analysis from the magazine area (Figure 5), excluding the fence line at the base border.
- Collect 18 surface soil samples for pesticide and herbicide analysis from magazine area, excluding the fence line (Figure 5).
- Collect 10 surface soil samples for arsenic analysis and 5 surface soil for pesticide and herbicide analysis from the fence line at the base border, southwest of the magazine area (Figure 5).
- Collect 11 surface soil samples for arsenic analysis and 4 surface soil samples for pesticide and herbicide analysis to the northeast, north, northwest, and southeast of the magazine area (Figure 5).
- Collect three co-located surface soil and plant tissue samples for arsenic analysis; one location between previous boring 7SHB022/7SHB108 to the southwest of Building 7SH5 (location 7SHB116) and two locations (locations 7SHB121 and 7SHB123) in the magazine area (Figure 5).
- Advance one Geoprobe boring downgradient to the former septic system at Site 22. One grab groundwater sample will be collected and analyzed for VOC analysis (Figure 4).

At Site 29, the following field activities will be carried out.

- Advance one Geoprobe boring downgradient to the former septic system at Site 29. One grab groundwater sample will be collected and analyzed for VOC analysis (Figure 6).

Table 1 describes the sampling plan in detail. Location, sample identification number, matrix, depth, analytical suite, and rationale for collection are presented.

2.2 PROJECT MEASUREMENTS

Samples collected during this investigation will be analyzed for VOCs by EPA Method 8260B, SVOCs by EPA Method 8270C, pesticides by EPA Method 8081A, herbicides by EPA Method 8151A, arsenic by EPA Method 6010B and perchlorate by EPA Method 314.0. Table 1 summarizes the proposed investigation.

Tables 2 through 6 present the project-required reporting limits for each parameter and compares these limits to applicable screening criteria (PRGs and MCLs) if available. Tables 7 through 10 present the laboratory quality assurance (QA) and quality control (QC) goals for each parameter. Table 11 presents analytical methods, sample volume, sample container, preservative, and holding time requirements for each parameter.

2.3 SAMPLING PROCEDURES

The following sections describe the techniques to be used during the collection of groundwater and plant tissue samples.

2.3.1 Groundwater Sampling

Low flow-rate purging techniques will be used, where technically feasible, to obtain groundwater samples from wells. Low flow-rate purging will be considered technically unfeasible if the water level is more than 25 feet bgs or if the well cannot support a recharge rate of 0.1 liter per minute (L/min) as described in the following text. A principle objective of low flow-rate purging is to avoid entraining silt- and clay-sized particles in groundwater samples by purging wells at low velocities. Low velocity purging is intended to establish direct flow from the aquifer to the sample container at velocities and flow conditions comparable to *in situ* flow velocities. By using low flow-rate purging techniques, the sampling process more closely matches natural groundwater flow conditions and transport of suspended solids, thereby reducing analytical problems and uncertainties caused by increased turbidity. The field procedure for low flow-rate sampling techniques is described as follows:

1. The breathing zone will be monitored with a photoionization detector during removal of each well cap; the reading will be compared with the background reading for the site to select the appropriate level of personal protection.
2. The depth to water will be measured with an electric-sounder water level meter to determine the equilibrium water level.
3. A weighted Tygon or polyethylene tube will be gently lowered into the well to a depth of 3.5 feet below the equilibrium water level or 2 feet below the top of the well screen (whichever is greater) and secured to the outer well casing with tape or plastic ties.
4. Well purging will be initiated slowly and increased gradually to a rate of approximately 0.15 L/min using a peristaltic pump. Purge water stabilization parameters, including pH, temperature, electrical conductivity, dissolved oxygen, and turbidity, will be measured at intervals of a minimum of 1 liter (L) and recorded on well sampling sheets or in field notebooks. Purge water will be discharged into a graduated cylinder; the volume of water purged will also be measured and recorded on well sampling sheets. If the drawdown of the water level is 0.3 foot or greater at that pumping rate, procedures 5 and 6 will be initiated. If the water level drawdown is less than 0.3 foot at that pumping rate and the water level is stable, the rate will be

increased to the maximum rate at which a static water level is obtained (up to 0.25 L/min), and procedures 7 and 8 will be initiated.

5. When drawdown is more than 0.3 foot at a rate of 0.15 L/min, a modified low-flow purge protocol will be attempted. Using the modified low-flow purge protocol, the pump rate will be increased to a maximum of 1 L/min, and the water level will be drawn down to 1.5 to 3 feet from the equilibrium water level.

6. The pumping rate will then be adjusted within the range of 0.1 to 0.25 L/min until the water level in the well is stable and the recharge rate matches the discharge rate. If the water level continues to decrease at a pumping rate of 0.1 L/min, low flow-rate purging will be considered technically unfeasible, and the well will be purged by the alternative technique described in the text following step 8.

7. The purge water will be considered stabilized after the collection of a minimum of eight measurements (8 L purged) and three successive measurements of each of the stabilization parameters that fall within the following ranges:

pH:	± 0.1
Electrical conductivity:	± 3 percent microSiemens per centimeter
Temperature:	± 0.5 °C
Dissolved oxygen:	± 0.2 milligram per L
Turbidity:	± 15 percent relative percent difference or three successive measurements of less than 15 nephelometric turbidity units

8. Well stabilization parameters will be expected to asymptotically approach a constant value as the purge water begins to stabilize. If well stabilization parameters are within the ranges specified previously but still appear to be approaching an asymptotic value, well purging will be continued until the purge water appears to be at equilibrium or until a maximum of 20 L has been purged from the well.

In cases where recharge rates in the formation will not allow low flow-rate purging, the wells will be purged dry, allowed to recharge overnight, and sampled the following day, as described in the following steps:

1. All water will be purged from the well with disposable Teflon™ bailers. A weighted Tygon or polyethylene tube will then be gently lowered into the well to a depth of 3.5 feet below the equilibrium water level or the middle of the well screen (whichever is greater) and secured to the outer well casing with tape or plastic ties.

2. The well will be allowed to recharge and will be sampled with a peristaltic pump (if possible) after the well has recovered to within 80 percent of the initial water level, but not later than 24 hours after purging.

Well stabilization parameters, including temperature, pH, electrical conductivity, dissolved oxygen, and turbidity, will be measured immediately before sampling and recorded on well sampling sheets or in field notebooks.

The following procedures will be followed in collecting groundwater samples from monitoring wells after purging has been completed:

1. Measuring and sampling equipment will be decontaminated before samples are collected from each location.
2. During sampling, well purging equipment will be positioned so that potential VOC sources, such as vehicles, gasoline engines, or fuel tanks, are downwind of the location of the monitoring well.
3. When the low flow-rate purging techniques are used or if samples can be collected with a peristaltic pump, water samples will be collected directly from the discharge of the peristaltic pump. If samples cannot be collected with a peristaltic pump, disposable bailers will be used.
4. The bottles for VOCs will be filled first.

Electric-sounder water level meters used during groundwater sampling activities will be decontaminated before each use by washing the probe and the portion of the cable directly above the probe with distilled water and wiping those parts clean with a disposable paper towel.

The required volumes (Table 11) of groundwater will be placed in appropriate sample containers for shipment to the laboratory. Purged water will be placed in 55-gallon drums at the investigation derived waste (IDW) area until the water is transported off site for disposal.

2.3.2 Plant Tissue Sampling

Plant tissue samples will be systematically collected within an approximate 3-meter radius of the collocated soil sample location, using stainless-steel scissors. The 3-meter radius limit was based on the following rationale:

- Allows plant tissue chemistry data to be roughly correlated with a given sample location point.
- Allows for collection of adequate mass of plant tissue for chemical analysis.

Samplers will initially collect plant material within a 1-meter radius of the soil sample location and then work outward in 1-meter increments to the 3-meter radius limit or until the plant mass required is collected. Whenever possible, tissue will be collected such that the entire radius of the sample area is represented in the sample. A minimum of 10 grams of plant material is required for chemical analysis and percent moisture calculation. Collected plant tissue will be double bagged in zip-lock type plastic bags. The plant species selected for collection will be determined at the time of sampling as the dominant grass species present at the site. Based on historic plant surveys in the Inland Area, the grasses that are most likely candidates for sampling include wild oat (*Avena fatua*), ripgut grass (*Bromus diandrus*), Mediterranean barley (*Hordeum marinum*), and Italian rye grass (*Lolium multiflorum*). The selected

species for sampling will be reported in the field notebook. Plant roots will not be included in the sample. A description of the specimen sampled will also be recorded in the field notebook. Plant tissue sampling is planned to occur during the growing season for vegetation (spring).

2.3.3 Surface Soil Sampling

Surface soil samples will be collected using either stainless steel or disposable (Teflon™) trowels. Samples will be collected directly from the first 0.5 to 1.0 feet of soil and will be placed directly into the appropriate sample container.

2.4 FIELD QUALITY CONTROL SAMPLES

QC samples are collected in the field and analyzed to check sampling and analytical precision, accuracy, and representativeness. The following section discusses the types and purposes of field QC samples that will be collected for this project. Table 12 summarizes the types and frequency of collection of field QC samples.

2.4.1 Field Duplicates

Field duplicate samples are collected at the same time and from the same source and then submitted as separate samples to the laboratory for analysis. Field duplicates are collected for groundwater samples at a rate of 10 percent; this investigation will require one field duplicate sample. Analytical results for field duplicates with a relative percent difference of greater than 25 percent will be considered to be indicative of a problem with sample collection and the results will be qualified during data validation as such.

Although field duplicate soil samples are sometimes collected as soil samples from adjacent locations, such soil duplicate samples will not be collected for this project for two reasons. First, since adjacent soil samples incorporate some spatial variability, these samples cannot be used directly to assess sampling precision. Further, it is not practical to set QC limits for the RPD of such samples, which precludes the use of these samples for QC purposes. Second, while the spatial variability information that can be obtained from adjacent soil samples may be useful in assessing or implementing remedial options, no objectives relating to these data uses have been identified for this project. Rather, it has been determined that this type of spatial variability information will be obtained during subsequent investigations at this site, if required.

2.4.2 Equipment Rinsate Samples

Equipment rinsate samples will be collected during Geoprobe, surface soil (if stainless steel trowels are used), and plant tissue sampling at a frequency of once per day of sampling per team per type of tool used. An equipment rinsate is a sample collected after a sampling device is subjected to standard decontamination procedures. Water will be poured over or through the sampling equipment into a sample container and sent to the laboratory for analysis. Analytically certified, organic-free water or equivalent will be used for organic parameters. Because disposable sampling equipment will be used for samples collected from monitoring wells, no equipment rinsates will be required.

During data validation, the results of the equipment rinsate samples will be used to qualify data or to evaluate the levels of analytes in the field samples collected on the same day.

2.4.3 Source Water Blank Samples

One source water blank will be collected for each sampling event and for each source of water (distilled, deionized, or from an industrial or residential water source) and analyzed for the same suite of analytes as the field samples.

2.4.4 Trip Blanks

A trip blank demonstrates that contamination is not originating from sample containers or from any factor during the transport of samples. A trip blank originates at the laboratory as a 40-milliliter (mL) vial typically used for VOC analysis. The vial is filled at the laboratory with reagent-grade, organic-free water. The trip blanks are then transported to the site with the empty containers that are used for sample collection. The trip blanks are stored at the site until the proposed field samples have been collected. One trip blank will accompany each sample transport container containing water samples for VOC analysis back to the laboratory for analysis. The trip blank is not opened until it is returned to the laboratory at the time of analysis. Trip blanks are analyzed only for VOCs.

3.0 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

Table 13 presents the data quality objectives (DQO) identified for the additional site investigation for Sites 22 and 29. The DQO process is iterative, and the sampling design may be optimized as data are collected and evaluated.

4.0 SECTIONS NOT REVISED

All other sections of the draft final SAP (Tetra Tech 2002), as approved by the Navy on July 1, 2002 remain in effect and are applicable for this field event at NWSSBD Concord.

5.0 REFERENCES

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FIGURES

Figures 1 - 6

These detailed station maps have been deleted from the Internet-accessible version of this document as per Department of the Navy Internet security regulations.

TABLES

TABLE 1

SUMMARY OF ANALYTICAL PROGRAM
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Location	Sample ID	Matrix	Sample Depth	Analysis	Rationale
7SHMW001	02922GW001	Water	NA	VOC, SVOC, metals, pesticides, herbicides, perchlorate	Groundwater data gaps investigation
7SHMW002	02922GW002	Water	NA	VOC, SVOC, metals, pesticides, herbicides, perchlorate	Groundwater data gaps investigation
7SHMW003	02922GW003	Water	NA	VOC, SVOC, metals, pesticides, herbicides, perchlorate	Groundwater data gaps investigation
7SHMW004	02922GW004	Water	NA	VOC, SVOC, metals, pesticides, herbicides, perchlorate	Groundwater data gaps investigation
Dup of MW004	02922GW005	Water	NA	VOC, SVOC, metals, pesticides, herbicides	QA/QC sample (Duplicate sample of 02922GW004)
7SHSB115	02922SB001	Grab Groundwater	Depth of groundwater	VOC	Site 22 septic system investigation
7SHSB116	02922PT001	Plant Tissue	NA	Arsenic	Plant tissue for ERA/HHRA
7SHSB116	02922SB002	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB117	02922SB003	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB118	02922SB004	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Magazine area investigation
7SHSB119	02922SB005	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB120	02922SB006	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Magazine area investigation
7SHSB121	02922PT002	Plant Tissue	NA	Arsenic	Plant tissue for ERA/HHRA

TABLE 1 (Continued)

SUMMARY OF ANALYTICAL PROGRAM
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Location	Sample ID	Matrix	Sample Depth	Analysis	Rationale
	02922SB007	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB122	02922SB008	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Magazine area investigation
7SHSB123	02922PT003	Plant Tissue	NA	Arsenic	Plant tissue for ERA/HHRA
	02922SB009	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB124	02922SB010	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB125	02922SB011	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Magazine area investigation
7SHSB126	02922SB012	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB127	02922SB013	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB128	02922SB014	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB129	02922SB015	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Magazine area investigation
7SHSB130	02922SB016	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Magazine area investigation
7SHSB132	02922SB017	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Magazine area investigation
7SHSB133	02922SB018	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB134	02922SB019	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Magazine area investigation
7SHSB135	02922SB020	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Magazine area investigation
7SHSB136	02922SB021	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB137	02922SB022	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB138	02922SB023	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation

TABLE 1 (Continued)

SUMMARY OF ANALYTICAL PROGRAM
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Location	Sample ID	Matrix	Sample Depth	Analysis	Rationale
7SHSB139	02922SB024	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Magazine area investigation
7SHSB140	02922SB025	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB141	02922SB026	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Magazine area investigation
7SHSB142	02922SB027	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB143	02922SB028	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Magazine area investigation
7SHSB145	02922SB030	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB146	02922SB031	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Collocated soil/plant tissue sample
7SHSB147	02922SB032	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB148	02922SB033	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Magazine area investigation
7SHSB149	02922SB034	Soil	0-0.5 feet bgs	Arsenic	Magazine area investigation
7SHSB150	02922SB035	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Magazine area investigation
7SHSB151	02922SB036	Soil	0-0.5 feet bgs	Arsenic	Fence line border Investigation
7SHSB152	02922SB037	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Fence line border Investigation
7SHSB153	02922SB038	Soil	0-0.5 feet bgs	Arsenic	Fence line border Investigation
7SHSB154	02922SB039	Soil	0-0.5 feet bgs	Arsenic	Fence line border Investigation
7SHSB155	02922SB040	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Fence line border Investigation
7SHSB156	02922SB041	Soil	0-0.5 feet bgs	Arsenic	Fence line border Investigation

TABLE 1 (Continued)

SUMMARY OF ANALYTICAL PROGRAM
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Location	Sample ID	Matrix	Sample Depth	Analysis	Rationale
7SHSB157	02922SB042	Soil	0-0.5 feet bgs	Arsenic	Fence line border Investigation
7SHSB158	02922SB043	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Fence line border Investigation
7SHSB159	02922SB044	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Fence line border investigation
7SHSB160	02922SB045	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Fence line border investigation
7SHSB161	02922SB046	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Outside Study Area
7SHB162	02922SB047	Soil	0-0.5 feet bgs	Arsenic	Outside Study Area
7SHB163	02922SB048	Soil	0-0.5 feet bgs	Arsenic	Outside Study Area
7SHB164	02922SB049	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Outside Study Area
7SHB165	02922SB050	Soil	0-0.5 feet bgs	Arsenic	Outside Study Area
7SHB166	02922SB051	Soil	0-0.5 feet bgs	Arsenic	Outside Study Area
7SHB167	02922SB052	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Outside Study Area
7SHB168	02922SB053	Soil	0-0.5 feet bgs	Arsenic	Outside Study Area
7SHB169	02922SB054	Soil	0-0.5 feet bgs	Arsenic, pesticides, herbicides	Outside Study Area
7SHB170	02922SB055	Soil	0-0.5 feet bgs	Arsenic	Outside Study Area
7SHB171	02922SB056	Soil	0-0.5 feet bgs	Arsenic	Outside Study Area
29SB001	02929SB001	Grab Groundwater	Depth of groundwater	VOC	Site 29 septic system investigation
Source Blank	02922SB045	Water	NA	Same as field samples	QA/QC sample

TABLE 1 (Continued)

SUMMARY OF ANALYTICAL PROGRAM
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Location	Sample ID	Matrix	Sample Depth	Analysis	Rationale
Equipment Rinsate #1	02922SB046	Water	NA	Same as field samples	QA/QC sample
Equipment Rinsate #2*	02922SB047	Water	NA	Same as field samples	QA/QC sample
Equipment Rinsate #3*	02922SB048	Water	NA	Same as field samples	QA/QC sample

Notes:

*	If necessary	QA/QC	Quality assurance/Quality control
bgs	Below ground surface	SVOC	Semivolatile organic compound
ERA/HHRA	Environmental risk assessment/human health risk assessment	VOC	Volatile organic compound
NA	Not available		

TABLE 2

COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS (PRRL) AND SCREENING CRITERIA, METALS ANALYSIS
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Analyte	Residential Soil PRG (mg/kg)	Soil PRRL (mg/kg)	Soil PRRL Below PRG?	MCL (µg/L)	Water PRRL (µg/L)	Water PRRL Below MCL?
Aluminum	76,000	20	Yes	1000	0.2	Yes
Antimony	31	2.0	Yes	6.0	0.06	Yes
Arsenic	0.39	1.0	No[a]	50	0.06	Yes
Barium	5,400	10	Yes	1000	0.1	Yes
Beryllium	150	0.5	Yes	4.0	0.005	Yes
Cadmium	37	0.5	Yes	5.0	0.005	Yes
Calcium	NA	NA	NA	NA	NA	NA
Chromium	210	1.0	Yes	50	0.01	Yes
Cobalt	4,700	1.0	Yes	NA	0.01	NA
Copper	2,900	1.0	Yes	1000[b]	0.01	Yes
Iron	23,000	10	Yes	300[b]	0.1	Yes
Lead	400	0.3	Yes	NA	0.05	NA
Magnesium	NA	100	NA	NA	1.0	NA
Manganese	1,800	1.0	Yes	50[b]	0.01	Yes
Mercury	23	0.1	Yes	2.0	0.0002	Yes
Nickel	1,600	2.0	Yes	45	0.02	Yes
Selenium	390	0.5	Yes	50	0.1	Yes
Silver	390	1.0	Yes	100[b]	0.01	Yes
Sodium	NA	NA	NA	NA	NA	NA

TABLE 2 (Continued)

COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS (PRRL) AND SCREENING CRITERIA, METALS ANALYSIS ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Analyte	Residential Soil PRG (mg/kg)	Soil PRRL (mg/kg)	Soil PRRL Below PRG?	MCL (µg/L)	Water PRRL (µg/L)	Water PRRL Below MCL?
Thallium	5.2	1.0	Yes	2.0	0.2	Yes
Vanadium	550	1.0	Yes	NA	0.01	NA
Zinc	23,000	2.0	Yes	5000 [b]	0.02	Yes

Notes:

a The listed PRRL reflects the maximum sensitivity of current, routinely used analytical methods. The ambient value for arsenic in the inland area of the Concord NWS is 16 mg/kg, therefore the listed PRRL is acceptable for screening.

b Secondary maximum contaminant level.

MCL Maximum Contaminant Level (Title 22 California Code of Regulations (CCR) §64431-§64444)
µg/L Micrograms per liter
mg/kg Milligrams per kilogram
NA Not available
PRG Preliminary remediation goal (U.S. Environmental Protection Agency [EPA] 2002b)
PRRL Project-required reporting limit

TABLE 3

**COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS (PRRL)
AND SCREENING CRITERIA, PESTICIDES AND HERBICIDES ANALYSIS
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD**

Analyte	Residential Soil PRG (µg/kg)	Soil PRRL (µg/kg)	Soil PRRL Below PRG?	MCL (µg/L)	Water PRRL (µg/L)	Water PRRL Below MCL?
Pesticides						
Alpha-BHC	90	1.7	Yes	NA	0.05	NA
Gamma-BHC (Lindane)	440	1.7	Yes	0.2	0.05	Yes
Aldrin	29	1.7	Yes	NA	0.05	NA
Chlordane	1,600	1.7	Yes	0.1	0.05	Yes
4,4'-DDD	2,400	3.3	Yes	NA	0.1	NA
4,4'-DDE	1,700	3.3	Yes	NA	0.1	NA
4,4'-DDT	1,700	3.3	Yes	NA	0.1	NA
Dieldrin	30	3.3	Yes	NA	0.1	NA
Endrin	18,000	3.3	Yes	NA	0.1	NA
Heptachlor	110	1.7	Yes	0.01	0.1	No[a]
Heptachlor epoxide	53	1.7	Yes	0.01	0.1	No[a]
Methoxychlor	310000	17	Yes	30	0.5	Yes
Toxaphene	440	170	Yes	3.0	5.0	No[a]
Herbicides						
Coumaphos	NA	67	NA	NA	2.0	NA
Demeton O & S	2,400	33	Yes	NA	1.0	NA
Diazinon	55,000	33	Yes	NA	1.0	NA
Dichlorvos	1,700	33	Yes	NA	1.0	NA
Disulfoton	2,400	130	Yes	NA	4.0	NA

TABLE 3 (Continued)

**COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS (PRRL)
AND SCREENING CRITERIA, PESTICIDES AND HERBICIDES
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD**

Analyte	Residential Soil PRG (µg/kg)	Soil PRRL (µg/kg)	Soil PRRL Below PRG?	MCL (µg/L)	Water PRRL (µg/L)	Water PRRL Below MCL?
Herbicides (cont'd)						
Ethoprop	NA	33	NA	NA	1.0	NA
Fensulfothion	NA	33	NA	NA	1.0	NA
Fenthion	NA	33	NA	NA	1.0	NA
Merphos A & B	1,800	67	Yes	NA	2.0	NA
Methyl Azinophos	NA	67	NA	NA	2.0	NA
Methyl Parathion	NA	33	NA	NA	1.0	NA
Mevinphos	NA	33	NA	NA	1.0	NA
Naled	120,000	100	Yes	NA	3.0	NA
Phorate	12,000	33	Yes	NA	1.0	NA
Ronnel	3,100,000	33	Yes	NA	1.0	NA
Sulprofos	NA	33	NA	NA	1.0	NA
Tetrachlorvinphos	20,000	33	Yes	NA	1.0	NA
Tokuthion	NA	33	NA	NA	1.0	NA
Trichloronate	NA	33	NA	NA	1.0	NA
Dalapon	1,800,000	130	Yes	NA	4.0	NA
Dicamba	NA	6.6	NA	NA	0.2	NA
MCPP	61,000	3,300	Yes	NA	100	NA
MCPA	NA	3,300	NA	NA	100	NA
Dichloroprop	NA	33	NA	NA	1.0	NA

TABLE 3 (Continued)

COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS (PRRL) AND SCREENING CRITERIA, PESTICIDES AND HERBICIDES ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Analyte	Residential Soil PRG (µg/kg)	Soil PRRL (µg/kg)	Soil PRRL Below PRG?	MCL (µg/L)	Water PRRL (µg/L)	Water PRRL Below MCL?
Herbicides (cont'd)						
2,4-D	690,000	33	Yes	70	1.0	Yes
2,4,5-TP (Silvex)	NA	3.3	NA	50	0.1	Yes
2,4,5-T	NA	3.3	NA	NA	0.1	NA
2,4-DB	490,000	33	Yes	NA	1.0	NA
Dinoseb	61,000	33	Yes	7.0	1.0	Yes

Notes

a The listed PRRL reflects the maximum sensitivity of current, routinely used analytical methods. The listed PRRL will be used as the project screening criteria unless reasonable grounds are established for pursuing nonroutine methods.

µg/L Microgram per liter
mg/kg Milligrams per kilogram
NA Not available
PRG Preliminary remediation goal (EPA 2002b)
PRRL Project-required reporting limit
MCL Maximum contaminant level

TABLE 4

**COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS (PRRL)
AND SCREENING CRITERIA, SVOC ANALYSIS
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD**

Compound	Residential Soil PRG (µg/kg)	Soil PRRL (µg/kg)	Soil PRRL Below PRG?	MCL (µg/L)	Water PRRL (µg/L)	Water PRRL Below MCL?
1,2,4-Trichlorobenzene	650,000	330	Yes	NA	10	NA
1,2-Dichlorobenzene	370,000	330	Yes	600	10	Yes
1,3-Dichlorobenzene	NA	330	NA	NA	10	NA
1,4-Dichlorobenzene	3,400	330	Yes	5.0	10	No[a]
2,2'-Oxybis(1-chloropropane)	NA	330	NA	NA	10	NA
2,4,5-Trichlorophenol	6,100,000	1,700	Yes	NA	50	NA
2,4,6-Trichlorophenol	44,000	330	Yes	NA	10	NA
2,4-Dichlorophenol	180,000	330	Yes	NA	10	NA
2,4-Dimethylphenol	1,200,000	330	Yes	NA	10	NA
2,4-Dinitrophenol	120,000	3,300	Yes	NA	50	NA
2,4-Dinitrotoluene	120,000	330	Yes	NA	10	NA
2,6-Dinitrotoluene	61,000	330	Yes	NA	10	NA
2-Chloronaphthalene	NA	330	NA	NA	10	NA
2-Chlorophenol	63,000	330	Yes	NA	10	NA
2-Methylnaphthalene	NA	330	NA	NA	10	NA
2-Methylphenol	3,100,000	330	Yes	NA	10	NA
2-Nitroaniline	3,500	3,300	Yes	NA	50	NA
2-Nitrophenol	NA	330	NA	NA	10	NA

TABLE 4 (Continued)

**COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS (PRRL)
AND SCREENING CRITERIA, SVOC ANALYSIS
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD**

Compound	Residential Soil PRG (µg/kg)	Soil PRRL (µg/kg)	Soil PRRL Below PRG?	MCL (µg/L)	Water PRRL (µg/L)	Water PRRL Below MCL?
3,3'-Dichlorobenzidine	1,100	1,300	No[a]	NA	30	NA
3-Nitroaniline	N/A	3,300	NA	NA	50	NA
4,6-Dinitro-2-Methylphenol	N/A	3,300	NA	NA	50	NA
4-Bromophenyl-phenylether	N/A	330	NA	NA	10	NA
4-Chloro-3-methylphenol	N/A	330	NA	NA	10	NA
4-Chloroaniline	240,000	330	Yes	NA	10	NA
4-Chlorophenyl-phenylether	N/A	330	NA	NA	10	NA
4-Methylphenol	310,000	330	Yes	NA	10	NA
4-Nitroaniline	N/A	1,700	NA	NA	30	NA
4-Nitrophenol	490,000	330	Yes	NA	10	NA
Acenaphthene	3,700,000	330	Yes	NA	10	NA
Acenaphthylene	N/A	330	NA	NA	10	NA
Anthracene	22,000,000	330	Yes	NA	10	NA
Benzo(a)anthracene	620	330	Yes	NA	10	NA
Benzo(a)pyrene	62	330	No[a]	0.2	10	No[a]
Benzo(b)fluoranthene	620	330	Yes	NA	10	NA
Benzo(g,h,i)perylene	N/A	330	NA	NA	10	NA
Benzo(k)fluoranthene	6,200	330	Yes	NA	10	NA
Bis(2-chloroethoxy)methane	N/A	330	Yes	NA	10	NA

TABLE 4 (Continued)

**COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS (PRRL)
AND SCREENING CRITERIA, SVOC ANALYSIS
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD**

Compound	Residential Soil PRG (µg/kg)	Soil PRRL (µg/kg)	Soil PRRL Below PRG?	MCL (µg/L)	Water PRRL (µg/L)	Water PRRL Below MCL?
Bis(2-chloroethyl)ether	210	330	No[a]	NA	10	NA
Bis(2-chloroisopropyl)ether	N/A	330	NA	NA	10	NA
Bis(2-ethylhexyl)phthalate	35,000	330	Yes	7.0	10	No[a]
Butylbenzylphthalate	12,000,000	330	Yes	NA	10	NA
Carbazole	24,000	330	Yes	NA	10	NA
Chrysene	62,000	330	Yes	NA	10	NA
Di-n-butylphthalate	6,100,000	330	Yes	NA	10	NA
Di-n-octylphthalate	1,200,000	330	Yes	NA	10	NA
Dibenz(a,h)anthracene	62	330	No[a]	NA	10	NA
Dibenzofuran	290,000	330	Yes	NA	10	NA
Diethylphthalate	49,000,000	330	Yes	NA	10	NA
Dimethylphthalate	100,000,000	330	Yes	NA	10	NA
Fluoranthene	2,300,000	330	Yes	NA	10	NA
Fluorene	2,600,000	330	Yes	NA	10	NA
Hexachlorobenzene	300	330	No[a]	1.0	10	No[a]
Hexachlorobutadiene	6,200	330	Yes	NA	10	NA
Hexachlorocyclopentadiene	420,000	330	Yes	50	10	Yes
Hexachloroethane	35,000	330	Yes	NA	10	NA
Indeno(1,2,3-cd)pyrene	620	330	Yes	NA	10	NA
Isophorone	510,000	330	Yes	NA	10	NA

TABLE 4 (Continued)

COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS (PRRL) AND SCREENING CRITERIA, SVOC ANALYSIS ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Compound	Residential Soil PRG (µg/kg)	Soil PRRL (µg/kg)	Soil PRRL Below PRG?	MCL (µg/L)	Water PRRL (µg/L)	Water PRRL Below MCL?
N-nitroso-di-n-propylamine	69	330	No[a]	NA	10	NA
N-nitrosodiphenylamine	99,000	330	Yes	NA	10	NA
Naphthalene	56,000	330	Yes	NA	10	NA
Nitrobenzene	20,000	330	Yes	NA	10	NA
Pentachlorophenol	3,000	1,700	Yes	1.0	50	No[a]
Phenanthrene	N/A	330	NA	NA	10	NA
Phenol	37,000,000	330	Yes	NA	10	NA
Pyrene	2,300,000	330	Yes	NA	10	NA

Notes:

a The listed PRRL reflects the maximum sensitivity of current, routinely used analytical methods. The listed PRRL will be used as the project screening criteria unless reasonable grounds are established for pursuing nonroutine methods.

MCL Maximum Contaminant Level (Title 22 California Code of Regulations (CCR) §64431-§64444)
µg/kg Micrograms per kilogram
µg/L Micrograms per liter
NA Not available
PRG Preliminary remediation goal (EPA 2002b)
PRRL Project-required reporting limit
SVOC Semi-volatile organic compound

TABLE 5

**COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS (PRRL)
AND SCREENING CRITERIA, VOC ANALYSIS
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD**

Compound	Residential Soil PRG (µg/kg)	Soil PRRL (µg/kg)	Soil PRRL Below PRG?	MCL (µg/L)	Water PRRL (µg/L)	Water PRRL Below MCL?
1,1,1-Trichloroethane	770,000	5	Yes	200	2.0	Yes
1,1,2,2-Tetrachloroethane	380	5	Yes	1.0	2.0	No[a]
1,1,2-Trichloroethane	840	5	Yes	5.0	2.0	Yes
1,1-Dichloroethane	590,000	5	Yes	5.0	2.0	Yes
1,1-Dichloroethene	540	5	Yes	6.0	2.0	Yes
1,2-Dichloroethane	350	5	Yes	5.0	2.0	Yes
1,2-dichloroethene (total)	43,000	5	Yes	6.0	2.0	Yes
1,2-dichloropropane	350	5	Yes	5.0	2.0	Yes
2-Butanone	6,900,000	5	Yes	NA	5.0	NA
2-Hexanone	NA	5	Yes	NA	5.0	NA
4-Methyl-2-pentanone	750,000	5	Yes	NA	5.0	NA
Acetone	1,600,000	5	Yes	NA	5.0	NA
Benzene	670	5	Yes	1.0	2.0	No[a]
Bromodichloromethane	1,000	5	Yes	NA	2.0	Yes
Bromoform	62,000	5	Yes	NA	2.0	Yes
Bromomethane	3,900	5	Yes	NA	2.0	Yes
Carbon disulfide	360,000	5	Yes	NA	2.0	NA
Carbon tetrachloride	240	5	Yes	0.5	2.0	No[a]
Chlorobenzene	150,000	5	Yes	70	2.0	Yes
Chloroethane	N/A	5	Yes	NA	2.0	NA
Chloroform	240	5	Yes	NA	2.0	NA
Chloromethane	1,200	5	Yes	NA	2.0	NA

TABLE 5 (Continued)

COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS (PRRL) AND SCREENING CRITERIA, VOC ANALYSIS ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Compound	Residential Soil PRG (µg/kg)	Soil PRRL (µg/kg)	Soil PRRL Below PRG?	MCL (µg/L)	Water PRRL (µg/L)	Water PRRL Below MCL?
Cis-1,3-Dichloropropene	82	5	Yes	NA	2.0	NA
Dibromochloromethane	1,100	5	Yes	NA	2.0	NA
Ethylbenzene	230,000	5	Yes	300	2.0	Yes
Methylene chloride	8,900	5	Yes	5.0	5.0	Yes
Methyl-tert-butyl ether	17,000	5	Yes	5.0 [b]	2.0	Yes
Styrene	1,700,000	5	Yes	100	2.0	Yes
Tetrachloroethene	5,700	5	Yes	5.0	2.0	Yes
Toluene	520,000	5	Yes	15	2.0	Yes
Trans-1,3-Dichloropropene	82	5	Yes	NA	2.0	NA
Trichloroethene	2,800	5	Yes	5.0	2.0	Yes
Vinyl acetate	430,000	5	Yes	NA	2.0	NA
Vinyl chloride	22	5	Yes	0.5	2.0	No[a]
Xylene (total)	210,000	5	Yes	1750	2.0	Yes

Notes:

a The listed PRRL reflects the maximum sensitivity of current, routinely used analytical methods. The listed PRRL will be used as the project screening criteria unless reasonable grounds are established for pursuing nonroutine methods.

b Secondary maximum contaminant level.

MCL Maximum Contaminant Level (Title 22 California Code of Regulations (CCR) §64431-§64444)
µg/kg Micrograms per kilogram
µg/L Micrograms per liter
NA Not available
PRG Preliminary remediation goal (EPA 2002b)
PRRL Project-required reporting limit
VOC Volatile organic compound

TABLE 6

COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS (PRRL) AND SCREENING CRITERIA, PERCHLORATE ANALYSIS ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Analyte	Groundwater Screening Criterion (µg/L) [a]	Water PRRL (µg/L)	Water PRRL Below Screening Criterion?
Perchlorate	1.0	0.5	Yes

Notes:

a Based on U.S. EPA draft reference dose for perchlorate presented in "Perchlorate Environmental Contamination: Toxicological Review and Risk Characterization (2002 External Review Draft)" (EPA 2002a).

µg/L Micrograms per liter

PRRL Project-required reporting limit

TABLE 7

PRECISION AND ACCURACY GOALS, VOC ANALYSIS
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Laboratory and Matrix Spike Limits

Spike Compound	Water		Soil	
	% Recovery	RPD	% Recovery	RPD
1,1-Dichloroethene	61-145	14	59-172	22
Trichloroethene	71-120	14	62-137	24
Benzene	76-127	11	66-142	21
Toluene	76-125	13	59-139	21
Chlorobenzene	75-130	13	60-133	21

Surrogate Control Limits

Surrogate Compound	Water % Recovery	Soil % Recovery
Toluene-d_8	88-110	84-138
Bromofluorobenzene	86-115	59-113
1,2-dichloroethane-d_4	76-114	70-121

Notes:

RPD Relative percent difference
VOC Volatile organic compound

TABLE 8

PRECISION AND ACCURACY GOALS, SVOC ANALYSIS
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Laboratory and Matrix Spike Limits

Spike Compound	Water		Soil	
	% Recovery	RPD	% Recovery	RPD
Acenaphthene (B/N)	46-118	31	31-137	19
2,4-Dinitrotoluene (B/N)	24-96	38	28-89	47
Pyrene (B/N)	26-127	31	35-142	36
N-Nitroso-di-n-propylamine (B/N)	41-116	38	41-126	38
Pentachlorophenol (A)	9-103	50	17-109	47
Phenol (A)	12-110	42	26-90	35
2-Chlorophenol (A)	27-123	40	25-102	50
4-Chloro-3-methylphenol (A)	23-97	42	26-103	33
4-Nitrophenol (A)	10-80	50	11-114	50

Surrogate Control Limits

Surrogate Compound	Water % Recovery	Soil % Recovery
Nitrobenzene-d_5 (B/N)	35-114	23-120
2-Fluorobiphenyl (B/N)	43-116	30-115
p-Terphenyl-d_{14} (B/N)	33-141	18-137
1,2-Dichlorobenzene-d_4 (B/N)	16-110	20-130
Phenol-d_5 (A)	10-110	24-113
2-Fluorophenol (A)	21-110	25-121
2,4,6-Tribromophenol (A)	10-123	19-122
2-Chlorophenol-d_4 (A)	33-110	20-130

Notes:

A	Acid
B/N	Base/Neutral
RPD	Relative percent difference
SVOC	Semivolatile organic compound

TABLE 9

PRECISION AND ACCURACY GOALS, METALS, PESTICIDES, AND HERBICIDES ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Laboratory and Matrix Spike Limits

Analyses	Water		Soil	
	% Recovery	RPD	% Recovery	RPD
Metals – Method 6010B, SW-846				
All Metals	80-120	20	80-120	20
Pesticides – Method 8081A, SW-846				
Aldrin	74-122	20	70-127	20
BHC (Lindane)	77-120	20	67-127	20
4,4'-DDT	83-127	20	73-136	20
Dieldrin	79-137	20	80-134	20
Endrin	75-136	20	76-136	20
Heptachlor	66-135	20	71-140	20
Herbicides – Method 8151A, SW-846				
2,4-D	55-140	20	50-150	20
2,4,5-TP (Silvex)	50-120	20	50-150	20
2,4,5-T	65-120	20	50-150	20

Surrogate Control Limits

Spike Compound	Surrogate Compound	Water % Recovery	Soil % Recovery
8081	Tetrachloro-m-xylene	44-131	47-137
	Decachlorobiphenyl	48-143	34-129
8151A	2,4-D	47-154	47-154

Note:

RP Relative percent difference

TABLE 10

PRECISION AND ACCURACY GOALS, PERCHLORATE ANALYSIS ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Laboratory Control Spike Limits

Spike Compound	% Recovery
Perchlorate	85 to 115

Matrix Spike and Matrix Spike Duplicate Control Limits

Spike Compound	% Recovery	RPD
Perchlorate	80 to 120	20

Note:

RPD Relative percent difference

TABLE 11

SAMPLE CONTAINER, HOLDING TIME, AND PRESERVATIVE REQUIREMENTS
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Parameter	Method	Sample Volume	Sample Container	Preservative	Holding Time[a]
Soil					
Pesticides	EPA 8081A, SW-846	250-mL Jar	Clear Glass with Teflon™-lined lid	Cool, 4 ± 2 °C	14 days/40 days
Herbicides	EPA 8151A, SW-846	250-mL Jar	Clear Glass with Teflon™-lined lid	Cool, 4 ± 2 °C	14 days/40 days
Metals	EPA 6010B/7471, SW-846	250-mL Jar	Clear Glass with Teflon™-lined lid	Cool, 4 ± 2 °C	6 months, 28 days for Mercury
Plant Tissue					
Arsenic	EPA 6010B, SW-846	10-grams	Zip-lock bag	Cool, 4 ± 2 °C	6 months
Water					
VOC	EPA 8260B	3-40mL Vial	Clear Glass with Teflon™-lined lid	Cool, 4 ± 2 °C, pH < 2 with HCl	14 Days
SVOC	EPA 8270C, SW-846	Two 1-L bottles	Amber glass with Teflon™-lined lid	Cool, 4 ± 2 °C	7 days/40 days
Pesticides	EPA 8081A, SW-846	Two 1-L bottles	Amber glass with Teflon™-lined lid	Cool, 4 ± 2 °C	7 days/40 days
Herbicides	EPA 8151A, SW-846	Two 1-L bottles	Amber glass with Teflon™-lined lid	Cool, 4 ± 2 °C	7 days/40 days
Metals	EPA 6010B/7470 SW-846	1 Liter	Polyethylene	pH < 2 with HNO_3; Cool, 4 ± 2 °C	6 months, 28 days for Mercury

Notes:

a "x" days/"y" days refers to the maximum number of days from sampling to extraction/the maximum number of days from extraction to analysis

EPA U.S. Environmental Protection Agency
mL Milliliter
L Liter
SVOC Semivolatile organic compound
VOC Volatile organic compound

TABLE 12

FIELD QUALITY CONTROL SAMPLES
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

Sample Type	Frequency of Analysis	Matrix
Matrix spike and matrix spike duplicate	5 percent[a]	Soil and water
Equipment rinsate	1 per day per team per type of reusable sampling tool used	Water
Source water blank	1 per each water source used for decontamination	Water
Trip Blank	1 per each cooler containing groundwater samples for VOCs	Water
Field Duplicate	1 per 10 samples collected for groundwater analysis	Water

Notes:

a Matrix spikes and matrix spike duplicates (MSD) for soil samples will be selected by the laboratory. Matrix duplicates replace MSDs for inorganic analyses.

VOC Volatile organic compound

TABLE 13

DATA QUALITY OBJECTIVES
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

STEP 1: State the Problem

1. Previous investigations at Site 22 indicate the presence of arsenic in surface soil at concentrations exceeding screening criteria. The Navy hypothesizes that this is the result of a widespread application of arsenic-containing herbicides in the magazine area during the late 1940s. No analytical data have been collected to date to evaluate the use of other pesticides or herbicides in the Site 22 area.
2. A former septic tank has been identified at Site 22 and could possibly have been a route for release of solvents to the environment.
3. A former septic tank has been identified at Site 29 and could possibly have been a route for release of solvents to the environment.

To complete the remedial investigation for Site 22, the following data gaps must be addressed:

- Data and additional site background information (if available) are needed to evaluate concentrations of arsenic in the magazine area.
- Data are needed to bound arsenic concentrations in surface soil along the edge of the Navy property and neighboring properties.
- Data are needed to evaluate site groundwater for metals, volatile organic compounds (VOC), semivolatile organic compounds (SVOC), pesticides, and herbicides.
- Data are needed to evaluate pesticide and herbicide concentrations in surface soils.
- Data are needed to evaluate the uptake of arsenic from contaminated soil by plants, and subsequent digestion of contaminated plants by grazing cattle.
- Data are needed to evaluate whether VOCs entered the environment through the former septic systems.

STEP 2: Identify the Decisions

1. Are arsenic concentrations at Site 22 representative of conditions throughout the magazine area?
2. Are arsenic concentrations outside of the magazine study area greater than concentrations inside or at the boundary of the magazine area?
3. Are metals, VOCs, SVOCs, pesticides, herbicides and perchlorates present in groundwater at Site 22 at concentrations that pose an unacceptable risk to human health?
4. Is arsenic uptake by plant material occurring? If so, do concentrations present in soil and plant material ingested by grazing cattle or tule elk pose an ecological or human health risk?
5. Are VOCs present in groundwater near the septic tank in Site 22?
6. Are VOCs present in groundwater near the septic tank in Site 29?

TABLE 13 (Continued)

DATA QUALITY OBJECTIVES
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

STEP 3: Identify Inputs to the Decisions

A plot of surface soil in the inland area will be sampled for arsenic. Valid chemical analytical results for soil will be compared to ambient concentrations of arsenic and the concentrations observed at Site 22.

- Valid chemical analytical results for soil along the base border and interior of the ammunition magazine area will be compared to ambient concentrations of arsenic, the concentrations observed at Site 22, and samples collected outside the magazine study area on Navy property to assess whether elevated concentrations of arsenic are widespread across the site and bounded by the area selected for this investigation. To further address questions posed by the regulatory agencies concerning whether elevated concentrations of arsenic are adequately bounded by the sample-space described for this study (that is, the red border in Figure 5 that delineates the approximate boundary of the magazine area), an additional set of samples will be collected outside of the magazine area, along the northern, eastern, and southern borders.
- Additional soil samples will be collected and analyzed for pesticides and herbicides. Additional groundwater samples will be collected and analyzed for SVOCs, VOCs, pesticides, herbicides, metals and perchlorates. The site initially was not sampled for pesticides and herbicides, because the suspected source of contaminants was solvents that were used in Building 7SH-5. However, because arsenic was detected at elevated concentrations in surface soil and arsenate herbicides may have been applied at the site, additional soil and groundwater data will be collected for pesticide and herbicide analysis to assess whether widespread application of other herbicides or pesticides occurred in the area. In addition, groundwater samples were not previously analyzed for SVOCs, metals, pesticides, herbicides or perchlorates in all wells. Although it does not appear that the arsenic has leached into subsurface soil, additional groundwater data will be used to complete the HHRA and fully complete the characterization.

Sampling for arsenic at locations other than those described for the boundary, interior, and areas just outside of the northern, eastern, and southern borders of the magazine area, does not appear to be justified. The application of arsenic-containing herbicides is presumed to have been widespread, so sampling at a finer spatial-scale is unlikely to provide additional information on either the range or average concentration of arsenic in soils that would be useful for making management decisions at this site. Additionally, the estimated excess lifetime cancer risk from arsenic in soils, which was calculated to be within EPA's risk range of $1x10^{-4}$ to $1x10^{-6}$, is unlikely to change. Also, the Navy plans to use institutional controls for the inland area based on its former use as munitions storage.

- Valid arsenic chemical results of plant material will be collected to assess whether arsenic uptake by plants pose a risk to human or ecological receptors. Both soil and plant material will be collected from the fenceline border, magazine area, and the location of highest arsenic concentration detected in soil at Site 22.
- A grab groundwater sample is necessary to evaluate whether VOCs may have been discharged through a former septic system in the Site 22 area.
- A grab groundwater sample is necessary to evaluate whether VOCs may have been discharged through a former septic system in the Site 29 area.

TABLE 13 (Continued)

DATA QUALITY OBJECTIVES
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

STEP 4: Define Study Boundaries

The lateral extent of the study includes:

- Surface soil sample locations in the inland area, as shown on Figure 5.
- The area along the western border of the base, as shown on Figure 5.
- The former septic system area in Site 22 (Figure 4).
- The former septic system area in Site 29 (Figure 6).

Vertically, the study area extends from the soil surface to 0.5 feet below ground surface (bgs) for the inland area and base border investigations, and to the depth of groundwater (approximately 20 to 28 feet bgs) for the other investigation areas.

The field work is scheduled during the growing seasons for the annual grasses present at the site, so as not to occur in late summer when grasses typicall die off and become a fire hazard that require fire prevention burns.

STEP 5: Develop Decision Rules

1. If concentrations of arsenic in the magazine area are comparable to concentrations previously measured at Site 22, then it will be concluded that elevated concentrations of arsenic are ubiquitous across the site and that the likely source was widespread historical application of arsenate herbicides. Otherwise, further investigation into other potential sources of arsenic at Site 22 may be required.
2. If concentrations of arsenic are elevated in surface soil samples collected from both the interior and boundary of the magazine area, then concentrations in these areas will be compared to concentrations measured in the set of samples collected just outside of the northern, eastern, and southern border of the magazine area. If this comparison shows that concentrations within the magazine area are higher than concentrations measured just outside of the magazine area, then it will be concluded that the approximate border used to delineate the magazine area for this investigation is adequate for bounding the area of elevated arsenic concentrations. Otherwise, it will be concluded that elevated concentrations of arsenic may extend beyond the area described for this investigation.
3. If concentrations of additional analytes (VOCs, SVOCs, pesticides, herbicides, or perchlorates) result in an increased cumulative noncarcinogenic or carcinogenic risk above threshold levels, then other actions will need to be considered at the site. Otherwise, no further action will be required for these analytes.
4. If direct measurement of plant material suggests that arsenic uptake by the plant material poses a risk to human or ecological receptors, then further action may be necessary. Otherwise, no further action will be required.If VOCs are detected in the grab groundwater sample collected at the site of the former septic system in Site 22, then a further investigation of this area will be proposed. Otherwise, the former septic system will not be considered a site of VOC release.
5. If VOCs are detected in the grab groundwater sample collected at the site of the former septic system in Site 22, then a further investigation of this area will be proposed. Otherwise, the former septic system will not be considered a site of VOC release.
6. If VOCs are detected in the grab groundwater sample collected at the site of the former septic system in Site 29, then a further investigation of the area will be proposed. Otherwise, the former septic system will not be considered a site of VOC release.

TABLE 13 (Continued)

DATA QUALITY OBJECTIVES
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

STEP 6: Specify Tolerable Limits on Decision Errors

The number of sampling locations along the border area fence line, as well as the number of samples for characterizing arsenic uptake by plants (Decision 4) and groundwater concentrations at Site 22 (Decisions 2 and 5) and Site 29 (Decision 6), was selected based on professional judgment; therefore, tolerable limits on decision errors are not defined. For sampling along the border fence-line, a random starting location was selected for the first sample and subsequent samples were spaced at equal intervals, with a fixed distance separating adjacent locations (this distance was initially set at 900 feet, but subsequently changed to approximately 750 feet based on comments from the regulatory agencies). Because the samples are probability-based, it is assumed that measured soil concentrations will be generally representative of concentrations along the length of the border area separating Navy property and neighboring properties.

The number of sampling locations for the magazine area was determined based on both subjective (nominal spacing of 900 feet between samples) and quantitative criteria. Type I and II decision errors of 20 percent were established based on minimum requirements for comparing average soil concentrations of chemicals in the magazine area to average concentrations measured in existing samples collected from Site 22. The comparison of average soil concentrations will be accomplished using a parametric (if applicable) or nonparametric two-population test of the null hypothesis that the average concentrations are equal between the two areas. The objective is to only provide a "coarse" comparison between the two areas; therefore, lower rates for either the Type I (false rejection of the null hypothesis) or Type II (failure to correctly reject a false null hypothesis) errors are not warranted.

STEP 7: Optimize the Sampling Design

Sampling strategies were developed separately for the border area along the fence line, and the magazine area.

Sampling locations along the fence line that runs southeast to northwest, separating Navy property from neighboring properties, were determined subjectively by selecting a fixed distance of 900 feet between samples. This resulted in 8 sample locations along the approximately 7,422-foot border between the two properties. A random starting location was used for the first sample. Based on comments received from the regulatory agencies on the draft DQOs, two sampling locations proposed for the interior of the magazine area were subsequently relocated to the border fence-line. This decreased the separation between locations to approximately 750 feet, and increased the sample size from 8 to 10. It was also agreed that this set of samples would be placed as close to the fence line separating the Navy and neighboring property as practical.

The number of sampling locations for the magazine area was determined based on two criteria: (1) specifying a fixed distance between locations based on sampling on a triangular grid with a random starting point, and (2) establishing acceptable Type I and II decision error rates for comparing average chemical concentrations in soil between the magazine area and the existing data collected at Site 22. Since the sampling objective is to only "coarsely" characterize soil concentrations of chemicals in the magazine area, a grid spacing of 750 to 1,000 feet was initially chosen as a reasonable target range. Next, a prospective power analysis was conducted to determine the minimum number of samples needed to compare average soil concentrations between the magazine area and the existing data from Site 22 using a two-population test. Sample-size calculations were performed assuming that the data would be analyzed using a two-sample *t* test. The null hypothesis tested is that the mean concentrations between the two areas are equal. Type I and II error rates were set at 20 percent, and a moderate effect size (d= 0.65) was assumed. The effect size (d) is defined as follows:

TABLE 13 (Continued)

DATA QUALITY OBJECTIVES
ADDITIONAL INVESTIGATION AT SITES 22 AND 29, NWSSBD CONCORD

STEP 7: Optimize the Sampling Design (Cont'd)
$$d = \frac{\lvert Mean(1) - Mean(2) \rvert}{\sigma}$$, where σ is the standard deviation The effect size is equivalent to the minimum detectable difference or size of the gray region described in the data quality objective literature. The expected variability of the data was estimated using the existing data for arsenic concentrations in surface soil (0 to 0.5 feet bgs) at Site 22. The coefficient of variation (relative standard deviation) of arsenic in surface soil at Site 22 was calculated as 0.60. Using the criteria previously described, a minimum of 44 samples would be needed. A final sample size of 43 was chosen to correspond to a grid spacing of 900 feet. Following review of the Draft DQOs by the regulatory agencies, two proposed sampling locations from the interior of the magazine area were relocated to the fence-line border. An additional set of 11 samples was also added just outside of the northern, eastern, and southern border of the magazine area, increasing the sample size to 53. The additional 11 sampling locations were determined by extending the existing triangular grid one additional grid-element beyond the approximate border established for the magazine area. A sample of plant material and soil will be collected in the magazine area, along the fenceline and at the location with the highest concentration of arsenic at Site 22. The data will be used to assess the uptake of arsenic in the plant material that poses potential risk to human and ecological receptors. The three areas sampled will address the most likely exposure areas.

Notes:

EPA U.S. Environmental Protection Agency

HHRA Human health risk assessment

APPENDIX A
RESPONSE TO AGENCY AND RESTORATION ADVISORY BOARD COMMENTS

RESPONSES TO AGENCY COMMENTS ON THE DRAFT ADDENDUM 01 DRAFT FINAL SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN) INVESTIGATION OF ARSENIC AT INSTALLATION RESTORATION SITE 22 NAVAL WEAPONS STATION SEAL BEACH DETACHMENT CONCORD CONCORD, CALIFORNIA

This document presents the U.S. Department of the Navy (Navy) responses to comments from the regulatory agencies on the Draft Addendum 01 Draft Final Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan) Investigation of Arsenic at Installation Restoration Site 22, Naval Weapons Station Seal Beach Detachment Concord, California, dated August 18, 2003. The comments addressed in the following document were received from the U.S. Environmental Protection Agency (EPA) on October 16, 2003; the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) on October 30, 2003; the California Department of Toxic Substances Control (DTSC) on October 31, 2003; and Restoration Advisory Board (RAB) Member Chris Boyer on September 24, 2003.

Agency comments are presented in boldface type.

RESPONSE TO COMMENTS FROM EPA

EPA General Comments

1. EPA Comment: **Scope of the RI Insufficient: The scope of the supplemental Remedial Investigation (RI) appears insufficient to characterize the lateral and vertical extent of soil contamination in support of a Feasibility Study that will be needed to evaluate several remedial action alternatives including excavation and backfill, stabilization and solidification, and Institutional Controls. While some credit should be given to the Navy for proposing such an ambitious assessment of approximately 500 acres of open space utilizing less than fifty sampling locations, U.S. EPA does not believe that the scope addresses all the Data Quality Objective - site questions that need to be considered in this investigation. Consistent with past discussion with the Navy by U.S. EPA on conducting comprehensive RI's, U.S. EPA recommends the Navy expand the scope of the investigation, in order to ideally complete the soil characterization in one last RI phase.**

Response: The technical rationale for the Navy's proposed sampling plan was discussed in greater detail at a meeting with the regulatory agencies on November 13, 2003. The Navy explained that a "coarse" characterization of arsenic concentrations was appropriate to support the sampling objectives as stated in the data quality objectives (DQO) included in the draft sampling and analysis plan (SAP), and that sampling at a finer spatial-scale could not be justified unless there was evidence to suggest that elevated concentrations of arsenic were present as "hotspots," or that the objectives should be redefined to include an evaluation of the distribution of arsenic concentrations. The Navy's working hypothesis is that elevated arsenic concentrations are ubiquitous across the magazine area; therefore, sampling to discern the fine-scale pattern of arsenic concentrations is not warranted. Moreover, it is difficult to envision a scenario in which fine-

scale delineation of arsenic concentrations would aid in making management decisions at this site. That is, it is unlikely that excavation- on any scale- would be proposed as a remedial alternative at the site, especially considering that background levels of arsenic already pose an unacceptable risk to human health and, therefore, that removal actions would not result in appreciable risk reduction. The Navy also emphasized that the existing data indicate that elevated arsenic levels are present in surface soils, and does not indicate that arsenic levels are elevated at depth; therefore, collection of surface samples should be satisfactory for testing the hypothesis on the widespread pattern of elevated arsenic concentrations.

In order to further respond to agency concerns regarding the sampling design, it was agreed that several revisions would be incorporated into the DQOs. The Navy agreed to relocate two sampling locations from the interior of the magazine area to the fence-line border, and assure that all fence-line samples would be collected as close to the border between the Navy and neighboring properties as practicable. The Navy also agreed to extend the sampling grid beyond the approximate boundary of the magazine area, and add 11 additional sampling locations in areas outside of the magazine area along the northern, eastern, and southern borders. Concentrations of arsenic at the 11 additional sampling locations will be compared to concentrations along the border and interior of the magazine area in order to address the question of whether the elevated concentrations of arsenic are adequately bounded by the border being used to delineate the magazine area. The Navy also indicated that part of the data analysis would include an assessment of arsenic concentrations as a function of linear distance from the border of the magazine area (that is, in the direction toward the interior of the magazine area). This would be accomplished using a statistical test for linear trends, or a two- or multiple-population test, where sampling locations are pooled into groups distinguished by some fixed distance from the exterior border of the magazine area.

2. EPA Comment:

Innovative Technologies/Field Screening for Arsenic in Soils: As generally stated above, U.S. EPA believes considerably more soil sampling is required to characterize the lateral and vertical extent of soil contamination within the broader Site 22 boundary. U.S. EPA has assessed field screening technologies for assessing arsenic in soils and based upon a preliminary assessment, at least one vendor exists and may be suitable. The vendor identified is Industrial Test Systems, Inc. of Rock Hill, SC, and the field screening method is called "Arsenic Quick Soil". According to the Company's web site (http://www.sensafe.com) there are two methods that provide ranges of arsenic sensitivities and sensitivity ranges of the field tests appear compatible with the existing concentrations detected at Site 22. Also, according to the web site, the tests are inexpensive ($4.00 per sample) easy to conduct and quick. If the Arsenic Quick Soil Test method was determined to be suitable, the Navy could potentially collect something on the order of 250 - 300 screening samples for the cost of just a few fixed laboratory metals analysis. Consistent with teams

discussion on utilizing a soil gas screening technology at the Solid Waste Management Units (SWMUs) Sites, the arsenic screening data would allow the Navy to collect many more cost effective screening samples, that would subsequently be used to determine where to collect a smaller number of fixed laboratory-confirmation samples for arsenic and pesticides. If the Navy does not elect or determines that a suitable field screening technology does not exist, then the Navy must consider increasing the number of fixed laboratory samples collected (specific comments are provided below to help clarify U.S. EPA' concerns with the exist Draft Sampling Plan).

Response: The Navy appreciates EPA's cost-saving recommendations. As discussed above, the Navy does not feel that intensive arsenic sampling is warranted at the site at this time given that arsenic "hot spots" are unlikely based on the likely historic source of arsenic.

The Navy has contracted prices with several laboratories for individual metals analysis. The prices negotiated are within the $7-10 per analysis range. Therefore, the cost savings realized by using field test kits rather than the fixed laboratory would not justify the lower quality data that would be produced. Additionally, according to the manufacturer of the "Arsenic Quick Soil" kits, relatively high levels of iron (greater than 5,000 parts per million [ppm]) could negatively affect the arsenic results. If soils with high iron levels were present, the arsenic results would be biased low. Previous analytical results from Site 22 indicate iron is present in soil at levels that may bias sample results using that method. Another added cost to consider when using the field test kits is that confirmation samples would need to be collected and submitted to a fixed priced laboratory a 10 percent frequency (approximately 30 samples) to validate the results of the field test kit.

3. EPA Comment: **U.S. EPA does not believe the scope of the Supplemental RI as proposed in the draft Site 22 Sampling Plan address all the Data Quality Objective - site questions that need to be answered by this investigation. For example, over the past several months the Navy has briefed the regulators on a Munitions Response Program (MRP) that will be assessing several areas at Concord where munitions may have released to the environment. U.S. EPA is concerned that the Site 22 Supplemental RI is proceeding without involvement of the MRP and that the MRP may in the future provide additional data on munition handling and waste disposal that would reopen the RI. As the broader Site 22 boundary consists of closed munition storage magazines, the Navy should provide details regarding the Navy's CERCLA waste handling practices, in order that any potential contamination can be assessed. Again, U.S. EPA believes it is inefficient to undertake the assessment of a 500 acre site, without a close examination of chemical storage and waste handling practices that took place within its borders. Further, the scope of the supplemental RI as documented in the draft Site 22 SAP does not include collecting data to establish contaminant concentrations at all boundaries of the "Magazine Area". While it is physically and conceptually clear to U. S. EPA. the**

establishment of the southwest border of the "Magazine Area", U.S. EPA is not clear how the Navy has established borders at the northwest, northeast, and southeast, and then proposed limited data collection at these critical portions of the site.

Response: The Navy is researching operations and activities in the magazine area to see if more information is available that may pertain to CERCLA releases. The initial assessment study (IAS) prepared by Ecology and Environment (E&E) in 1983 did not identify the magazine area as an area of concern. The IAS reported that there were 200 magazines in the inland area capable of holding up to 94,000 short tons of munitions.

The study area selected for this investigation encompasses the munition bunkers within the magazine area. This study area was selected based on information provided in the 1947 Contra Costa Gazette newspaper article, which indicate that an arsenite-containing herbicide was sprayed around "igloos" to reduce fire risk; the term "igloo" was thought to be used for the ammunition storage magazine. Thus, the selected study area is focused on the area of "igloos" known as the magazine area. As discussed above in EPA General Comment 1, the Navy has agreed to collect samples outside the study area on Navy property to the northwest, northeast, and east of the magazine area. With regards to the MRP, based on the Navy's internal review of potential MRP areas of concern, the magazine area is not among the eight initial sites to be assessed during the MRP. The PA for the MRP initially identified eight sites is planned for fiscal year 2004, but has not yet been initiated.

4. EPA Comment: **The draft Site 22 Sampling Plan does not propose collecting subsurface soil samples (samples deeper than 0.5-feet) and does not explain a rationale for the elimination of deeper samples. U.S. EPA does not agree with this approach and requests that subsurface soil samples or subsurface soil screening samples be collected to also assess the vertical extent of contamination. As noted by U.S. EPA, previous data collected in the vicinity of Building 7SH5 has elevated arsenic concentrations in the surficial soils to 0.5-feet below ground surface (bgs), with concentrations generally lowered close to ambient concentrations in samples collected 3.0 - 3.5-feet bgs; however, the Navy should be interested in more precisely assessing the actual vertical extent of contamination, since this information will be necessary in the FS.**

Response: As discussed at the meeting on November 13, 2003, no soil samples were proposed at depth because elevated concentrations of arsenic were not detected at depth, with the exception of the sample collected from boring 7SHSB022 at 10 to 10.5 feet below ground surface (bgs). This depth is below the exposure concentrations used for human health or ecological risk assessment. The concentrations of arsenic detected in a sample collected at a 9.5 to 10 feet bgs from collocated boring 7SHSB022 was significantly lower (7.4 mg/kg), and less than the estimated background concentrations for the site. The distribution of arsenic in surface and

subsurface soil is shown on Figure 3. Please refer to the response to EPA General Comment 1 regarding the rationale for collecting surface soil samples.

EPA Specific Comments

1. EPA Comment: **<u>Section 2.1, Project Objectives; Perimeter Sampling Modifications</u>: In the event that field screening technologies are determined unsuitable, the following comments apply to collection of soil sampling at the perimeter "Fence Border" sampling:**

a. The eight proposed "Fence Border" sampling locations/sampling depth needs to be modified to better assess contaminant concentrations along the perimeter. As informally discussed by U.S. EPA during a site scoping meeting earlier this year, U.S. EPA suspects that the boundary fencing may have been a specific target of pest/herbicide applications and as a result, contaminant concentrations may be elevated directly at fence lines. As a result, U.S. EPA encouraged the Navy to determine precisely where its property boundary is in order to potentially collect additional samples on the other (neighborhood) side of the fence, where contaminant concentrations should not reflect Navy pest control practices. It is still unclear if the primary (outer) fence line represents the Navy property boundary precisely, but needs to be determined prior to implementing the subject Sampling Plan.

b. As shown on Figure 5, Proposed Sampling Locations in Magazine Area, the Navy has proposed to collect "Fence Border" samples that at each sampling location represents a random distance away from the fence line. While the Navy has made an attempt to incorporate informal Agency comments that the Navy sample along the perimeter, the proposal to collect eight samples near the fence line is insufficient. U.S. EPA believes a minimum of four fixed lab samples are needed from each of the proposed eight "Fence Boarder" sampling areas. With this approach, one sample would be collected from the community side of the fence, one sample at the outer fence, one sample from between the fence-lines, and one or more near the inner fence line. A discussion/description of the double fence-lines that exists at the southwest border is also needed.

c. The eight sampling locations proposed along the southwest border could be increased to ten, by moving sampling locations 7SHSB131 and 7SHSB144 approximately 500-feet southwest. Unless the Navy has identified data gaps that are satisfied by the original sampling locations, U.S. EPA recommends that these two sampling locations be moved towards the southwest border area.

d. Additional samples are also needed at the remaining (northwest, northeast, and southeast) border areas of the site. While the Navy has identified a boundary of the magazine area, there are only about five samples proposed to assess the remaining

extensive perimeter. Similar to U.S. EPA's comment on the southwest border, the Navy needs to reconsider the number and location of samples to assess the lateral and vertical extent of contamination. For the three remaining borders, the Navy should consider adding more samples within and outside of the defined boundary.

e. Regarding the alignment of the northeast border, please clarify why the Navy did not establish the boundary further northeast up to the fence line that parallels Seal Creek. Also, in the same general area, but outside the proposed boundary there exists a large open storage area. Since this area is immediately adjacent to the expanded site boundary, please clarify why the Navy does not believe this former storage area should be included.

Response: See responses to EPA General Comment 1 and EPA General Comment 3 for a discussion of modifications to the DQOs for sampling the border fence-line, interior of the magazine area, and areas located outside of the magazine area along the northern, eastern, and southern margins. The fence line shown on Figure 5 is the legal boundary of the site based on figures provided by the Navy.

2. EPA Comment: **<u>Section 2.1, Figure 5, Proposed Sampling Locations, and Table 11, Data Quality Objectives; Central Magazine Area Sample Modifications</u>: With regards to the characterizing the distribution of soil contamination within the central portion of the Magazine Area, U.S. EPA believes some additional Data Quality Objectives - site questions need to be asked and addressed. U.S. EPA believes it is important for the Navy to answer the following question: Are there differences in pesticide contaminant concentrations in Site 22 that are attributed to different site features? More specifically, are contaminant concentrations along roadways, in drainage ditches, in open (level) terrain, and munition storage magazine soil cover significantly different or not? In the event a field screening technology is used, the additional screening samples that would be available should be related to one of the four site features described above. Also there has been a public comment related to railroad ties possibly being a source of arsenic (if pressure treated). While U.S. EPA believes that the railroad ties within Site 22 are creosote treated, the Navy should determine if arsenic is a potential chemical of concern with the ties and modify the sampling locations accordingly.**

Response: Please see responses to EPA General Comment 1. As the Navy discussed at the meeting with the regulatory agencies on November 13, 2003, the fine-scale delineation of arsenic concentrations, including characterization of arsenic concentrations associated with particular physical features at the site, is not warranted given the sampling objectives presented in the DQOs. Moreover, existing measurements suggest that the highest concentrations of arsenic are found in open grasslands, and there is no evidence to suggest that herbicide application focused on the ditches or areas other than the perimeters of the individual ammunition storage magazines.

The railroad ties in the magazine area are creosote-treated wood, and as such should not be a source of arsenic.

The railroad tracks as a potential arsenic source was considered for the Supplemental Remedial Investigation at Site 22 (TtEMI 2003a). For that investigation, soil samples were collected from locations 7SHSB106 and 7SHSB108 next to the railroad. Concentrations of arsenic in soils at those locations were not elevated relative to concentrations throughout the rest of Site 22. The highest arsenic concentrations were detected in open grassland areas of the site, suggesting that the source of arsenic is related to grassland management practices rather than treated railroad ties.

3. **EPA Comment:** **<u>Section 1.3.1, Site 22 Previous Investigations</u>: The discussion of previous investigations at Site 22 should be expanded to provide a much more detailed discussion, which U.S. EPA notes is provided for Site 29 in Section 1.3.2. Suggested text for Section 1.3.1 could be provided from the Navy's February 12, 2003, "Draft Supplemental Remedial Investigation Site 22 Naval Weapons Station Seal Beach Detachment Concord", Section 1.3.4, Previous Environmental Assessment, pages 1-5 through 1-8.**

Response: The Navy has added text as suggested above. The reason this SAP addendum did not include a detailed history of Site 22 was because it was presented in the original SAP to which this is an addendum. Site 29, on the other hand, was not discussed previously in the SAP, so a detailed history was provided.

4. **EPA Comment:** **<u>Section 2.1, Project Objectives; First Bullet</u>: Based upon discussions with the Navy, U.S. EPA understands that the Navy will include perchlorate along with its assessment of VOCs, SVOCs, pesticides, herbicides, and metals from the four existing groundwater monitoring wells at Building 7SH5. Please update the analyte list to reflect this addition.**

Response: The Navy has updated the SAP text to include perchlorate on the sampling analyte list.

5. **EPA Comment:** **<u>Figure 5, Proposed Sampling Locations in Magazine Area</u>: Please add the third proposed sampling location for Proposed Soil and Tissue Sampling Location that is near Building 7SH5. Further, U.S. EPA recommends that the plant tissue sampling location be very close to previous sampling locations 7SHSB022/7SHSB108, where laterally continuous elevated arsenic concentrations of approximately 100 mg/kg was confirmed.**

Response: The third proposed sampling location was presented on Figure 4 of the draft SAP as 7SHB116 in the southeast corner of Site 22. As suggested, this sampling point was moved to a location between borings 7SHSB022/7SHSB108 (based on northings and easting for those locations) and was labeled boring 7SHB116 on Figure 5 of the draft final SAP.

6. **EPA Comment:** **In response to State and public comments regarding a need for dust monitoring to be conducted at Site 22, the Navy could collect some preliminary information using existing regional air monitoring data for the Concord area, to assess wind directions and speeds. Additional preliminary information could also be collected by the Navy, such as an assessment of surface soil coverage, to assess at some preliminary level the extent of plant coverage that exists across the site, as opposed to bare ground, in order to at least conduct a preliminary assessment of the potential for dust formation and transport. The Navy may determine that based on an assessment of wind direction, more shallow soil samples may be needed at the southern area of the site to assess fate and transport of dust. Also, as part of a preliminary dust assessment, the Navy could also assess its tenants grazing practices for the Magazine Area, as grazing practices may be related to dust generation.**

Response: Based on the maximum concentrations of arsenic currently detected at the site and conservative assumptions for the default parameters used in generation for the inhalation exposure pathways for the residential soil PRGs, dust modeling does not appear necessary at this time.

The Navy will evaluate the need for dust monitoring by comparing the exposure point concentration (EPC) for arsenic in soil to the EPA Region IX preliminary remediation goal (PRG) for arsenic in residential soil for the inhalation exposure pathway. The EPC will be based on the 95 percent upper confidence limit of the arithmetic mean (95_{UCL}) of soil arsenic results. Arsenic in both surface soil (0 to 2 feet below ground surface [bgs]) and subsurface soil (0 to 10 feet bgs) will be evaluated for the inhalation exposure pathway using the PRG. The residential soil PRG for arsenic for the inhalation exposure pathway is 590 milligrams per kilogram (mg/kg). The maximum concentration detected in soil at Site 22 is 210 mg/kg. If the inhalation pathway PRG is not exceeded, then site concentrations would not be expected to result in an excess cancer risk that exceeds 1E-06, based on on-site residential exposure. Potential risks from off-site residential exposure would be less, due to dispersion. If the inhalation pathway PRG is exceeded, then the Navy will evaluate if the assumptions for the default particulate emission factor (PEF) that are used to develop the inhalation pathway soil PRG for arsenic are appropriate for the site, and might consider conducting air dispersion modeling to estimate potential off-site air concentrations of arsenic. Modeled air concentrations will then be compared to the ambient air PRG for arsenic to determine if off-site residential risks would be expected to exceed 1E-06.

The PRGs used to evaluate on-site exposures are based on potential concurrent exposures from inhalation, incidental ingestion, and dermal contact with arsenic in soil.

EPA uses the following exposure assumptions to develop the residential soil PRG for arsenic, based on inhalation exposure:

- Inhalation rates of 0.42 cubic meters per hour (m^3/hr) (child) and 0.83 m^3/hr (adult)
- Residential exposure time of 24 hours per day (child and adult)
- Residential exposure frequency of 350 days per year (child and adult)
- Residential exposure duration of 30 years (6 years as a child, 24 years as an adult)
- Body weights of 15 kilograms (kg) (child) and 70 kg (adult)
- Lifetime (averaging time) of 70 years
- Indoor air particulate concentrations of arsenic are the same as outdoor air particulate concentrations of arsenic

To estimate the amount of contaminant concentrations in air from soil contaminant concentrations, EPA uses a particulate emission factor (PEF) model, which is a dispersion model that simulates the dispersion of the contaminant in the atmosphere. The model calculates a PEF that relates the contaminant concentration in soil with the concentration of respirable particulates in the air due to fugitive dust (erosion from wind) emissions from contaminated soils. The PEF model is based on a study by Cowherd (1985) for a rapid assessment procedure applicable to a typical hazardous waste site where the surface contamination provides a relatively continuous and constant potential for emission over an extended period of time.

Using the model, EPA derived a generic PEF of 1.319×10^9 cubic meters per kilogram. (m^3/kg) In developing the generic PEF, EPA assumes a 0.5-acre source, 50 percent of vegetative cover, and a mean annual wind speed of 4.60 meters per second. The PEF model also uses a dispersion term (Q/C) that is derived using dispersion modeling and meteorological data from 29 U.S. locations. Meteorological data from Minneapolis was selected as the 90^{th} percentile data set for fugitive dusts to develop the Q/C term in the PEF model. The generic PEF developed by EPA does not consider dust emissions from traffic or other forms of mechanical disturbance. Further information on the specific parameters used in the PEF model can be found in EPA's Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites (EPA 2001). Further information on the development of EPA's PRGs can be found in the Region IX PRGs Table 2002 Update (EPA 2002b).

7. EPA Comment: **U.S. EPA requests that the Navy identify the current boundary of Site 22 as there is some confusion as to what Installation Restoration Site the Magazine Area actually represents. The Navy needs to decide if the broader Magazine Area is an expansion to Site 22 or a new site. U.S. EPA's preference would be to expand the original boundary of Site 22 to the entire Magazine Area. Once the lateral and vertical extent of soil contamination has been determined, and at least some preliminary groundwater assessments have been completed, the site boundary could be adjusted.**

Response: The Navy is currently reviewing whether the investigation of the magazine area will be included as installation restoration (IR) Site 22 or as a separate IR site and will coordinate with the regulatory agencies when making a decision. The boundary drawn in red around the magazine area on Figure 5 of the draft final SAP is intended to represent the ammunition magazine study area, and is not a representation of IR site boundaries.

RESPONSE TO COMMENTS FROM RWQCB

A. General Comments

1. RWQCB Comment: **The Navy needs to clearly distinguish investigative work that will be held at Sites 22 and 29. These two sites have different site use histories and contamination impacts.**

- **Dedicated separate sections of the documents for Sites 22 and 29.**

Response: The text has been revised to distinguish more clearly the investigative work to be completed at Sites 22 and Site 29. In some cases, subheadings were added to the text or additional transitional phrases were added to clarify the two investigations.

2. RWQCB Comment: **The Navy will be testing their current hypothesis based on the application of arsenic containing herbicides in the proposed study. However:**

- **The Navy does not present how this hypothesis was derived.**
- **A record search outlining the potential commercial products candidates that were used as herbicides is missing from the report. Would these products contain other contaminants that might be found collocated with Arsenic?**
- **The testing of alternate hypothesis (such as the presence of Arsenic generated by ordnance handling activities) could also be presented in this report**

Response: The hypothesis for the site conceptual model is presented in Section 1.1 and is based on a historical record (newspaper article from the Contra Costa Gazette in 1947), which suggests that arsenic containing herbicides were sprayed around "igloos" for weed control. The Navy does not have complete records regarding the types of pesticides and herbicides applied in this area and is unaware of the use of arsenic in ordnance or any CERCLA releases. In any case, ordnance in the magazine area was stored in concrete bunkers and it is unlikely that any release occurred from the bunkers.

3. **RWQCB Comment:** **Include a section specifying the site's geology and hydrogeology.**

- **Describe if semi confined and/ or confined aquifer conditions are found at the site.**
- **Indicate the linear distance between the closest public/ private groundwater well and Building 7SH-5. The Navy should also indicate if the monitoring well is found up/ down/ cross gradient from Building 7SH-5.**
- **Report the site's stratigraphy and the potential for contaminants' subsurface fate and transport.**

Response: An abbreviated discussion of the Site 22 geology and hydrogeology have been added to Section 1.3.1.8. Detailed information regarding geology, hydrogeology, and fate and transport mechanisms at the site is presented in the RI report (Tetra Tech 2003a).

The closest off site groundwater well from Site 22 is located south of the site at Concord High School; this well is used for irrigation purposes only and is cross gradient from Building 7SH5. Another nearby groundwater irrigation well is located approximately 1,500 feet west from Building 7SH5 at the Gehringer pool club; this well is also used solely for irrigation purposes. Water levels in either well have not been measured by the Navy. Based on the groundwater data collected to date at Site 22, groundwater is expected to flow to the west, which is crossgradient from the Concord High School irrigation well, and upgradient from the Gehringer pool irrigation well. Drinking water in the vicinity is municipally supplied by the Contra Costa Water District (CCWD). The majority of CCWD drinking water is treated delta surface water, rather than groundwater. No drinking water wells are known to occur immediately downgradient of Building 7SH5.

4. **RWQCB Comment:** **It would be an extremely useful exercise if the Navy modeled the concentrations of contaminants of concern in site's soils using SADA (Spatial Analysis and Decision Assistance software http://www.tiem.utk.edu/~sada/). This effort would provide a better understanding of the probabilistic distribution of these contaminants in site's soils. It would aid the Navy in determining the probable extent of negatively impaired soils. Finally, these maps would support the locations of future additional samples that might help in the delineation of the lateral and vertical contaminations profiles.**

Response: Please see the response to EPA General Comment 1. Spatial modeling is useful in cases where the sampling objective is to determine the precise distribution of chemical concentrations. Given the sampling objectives stated in the DQOs, the level of sampling needed to support spatial modeling is not warranted for this particular investigation.

B. Specific Comments

1. **RWQCB Comment:** **Section 1.1, Purpose of the Investigation, p 1: Clarify the relationship between Site 22 and the magazine area both in terms of site use history and geographic delineation.**

Response: Additional text has been added to Section 1.1 to clarify the relationship between Site 22 and the magazine area.

2. **RWQCB Comment:** **Section 1.3, Previous Investigations, p 2: For clarity purposes, tabulate the dates when the various stages of the past field characterization took place.**

Response: The dates in which the Site 22 and Site 29 investigations were conducted have been added to the report in Section 1.3.

3. **RWQCB Comment:** **Section 1.3.2.1, Building Crawl Space Surface Soil Sampling, p 4: Outline the organic compounds and metals detected at Site 29.**

Response: The first sentence of the third paragraph in Section 1.3.2.1 will be revised as follows.

"Sampling results indicated that shallow soils beneath the building contain organic compounds, including SVOCs (bis [2-ethylhexyl]phtalate), polynuclear aromatic hydrocarbons, total petroleum hydrocarbons (gasoline), VOCs (2-butanone; 1,1,1-trichloroethane; methelyne chloride; and xylenes) pesticides (4,4'-DDD; 4,4'-DDT; and beta-BHC), chlorinated herbicides (2,3,5-TP; 2,4-DB; and dinoseb) and metals (primarily lead and zinc). A focused human health risk assessment (worker hazard assessment) concluded that no long-term health effects to construction and maintenance workers were anticipated from compounds found in the building crawl space surface soil samples."

4. RWQCB Comment: **Section 1.3.2.3, Site Investigation Subsurface Soils Sampling, p 6:**

- **Report the distance between Building 7SH-5 and the highest reported detection of Arsenic in soils.**
- **Board Staff distinguishes ambient from background concentrations. Board Staff recommends the latter values as they are not influenced by anthropogenic actions. Clarify if site-specific background concentrations are available for the Inland Area.**
- **Identify if the reported soil concentrations were generated from composite or discrete samples.**

Response:

All arsenic concentrations detected in soil surrounding Building 7SH5 are shown on Figure 3. Section 1.3.2.3 is about the SI for Site 29, so it is not appropriate to discuss Building 7SH5 in that section of the SAP.

Two background data sets for distinct geologic units within the Inland Area were prepared and are summarized in Appendix B of the RI (Tetra Tech 2003a). Background sampling locations were chosen in areas that were considered topographically updgradient from each site and not affected by Navy operations of other industrial activities.

EPA and the Navy appear to have a different definition of "background" than the board. EPA and the Navy use the term "background" to represent both natural and anthropogenic sources. Background is specifically defined in guidance provided by EPA (EPA 2002a) and the Navy (NAVFAC 2002) as substances or locations that are not influenced by releases from a site.

Section 1.3.2.3 was revised to indicate that soil samples collected during the site inspection were discrete samples (Tetra Tech 1999).

5. RWQCB Comment: **Section 2.1, Project Objectives, p 7:**

- **Following regulatory correspondence sent to the Navy on July 3rd 2003 (source evaluation of emergent chemicals), include site-specific emergent chemicals sampling in groundwater at the site. Board Staff specifically recommends these analytes: perchlorate and n-nitrosodimethylamine.**
- **Expand groundwater sampling to include the magazine area.**
- **Specify the methodology applied in laying out the proposed sampling points.**
- **Increase the amount of soil and plant biomass sampling locations.**
- **Collect soils samples at depth.**
- **Assess the potential for arsenic laden wind borne dusts to be entrained into air currents reaching neighboring properties.**

- **Include water sampling of Diablo Creek for the constituents of concern.**
- **Outline on which side of the fence the samples will be taken. Board Staff recommends taking samples between the double fence line, on the public property and military base sides.**

Response:

A number of these issues were discussed at the scoping meeting on November 13, 2003.

The Navy agreed to add perchlorate to the analyte list, but as discussed previously in the responses to comments on the SAP Addendum for Site 13 and Site 22 (Tetra Tech 2003c) and the response to comments on the Site 13 and Site 22 Draft Final Groundwater Sampling Summary Report (Tetra Tech 2003b), does not believe sampling for N-nitrosodimethlyalamine is necessary based on historical use of the site and primary use of the chemical.

Sampling methodologies and number of samples for collection were agreed to at the November 13, 2003, scoping meeting and have been outlined above in the response to EPA General Comment 1**.** The investigation of the magazine area is focused on surface soil sampling for arsenic. It is premature at this time to collect any groundwater samples in the magazine area. Groundwater sampling is planned for the existing monitoring wells that surround Building 7SH5 and at one hydropunch location downgradient from the septic tank.

Details regarding the approach and technical rationale for the sampling design for both the fence line and magazine area are provided in Step 7 (Optimizing Sampling Design) of the data quality objectives presented in the draft SAP. The triangular grid (and random starting location) for sampling the magazine area was generated using the Visual Sampling Plan Software (Hassig et al. 2002).

Revisions to the soil and plant sampling locations and numbers are discussed in the responses to EPA General Comments 1 and 5.

The depth at which samples were proposed for collection is discussed in the response to EPA General Comment 4.

Inhalation of airborne particulates and associated risks are discussed in the response to EPA Specific Comment 6.

Sampling the water of Seal Creek to yield pertinent information relative to the distribution of arsenic in the magazine area site would be difficult as there are potential upgradient sources that may contribute contamination to the creek that are unrelated to activities in the magazine area. As discussed during the November 13, 2003, scoping meeting, sampling in Seal Creek is not warranted at this time.

As discussed during the November 13, 2003, scoping meeting, fence line samples will be collected on Navy property as close as practicable to the fence line. No samples are proposed off site of Navy property.

6. RWQCB Comment: **<u>Section 2.3.2, Plant Tissue Sampling, p 10</u>:**

- **Identify plant species collected. Quantify the percentage of each species in the sample taken.**
- **Clarify if plant roots will be sampled.**
- **Describe the specimen sampled (flowering stage, color, percent leaf/ reproductive sections).**

Response: Plant tissues will be sampled in an approximate 3-meter radius of the collocated soil sample submitted for arsenic analysis. The plant species selected for collection will be determined at the time of sampling as the dominant grass species present at the site. Based on historic plant surveys in the Inland Area, the grasses that are most likely candidates for sampling include wild oat (*Avena fatua*), ripgut grass (*Bromus diandrus*), Mediterranean barley (*Hordeum marinum*), and Italian rye grass (*Lolium multiflorum*). The selected species for sampling will be reported in the field notebook. Plant roots will not be included in the sample. A description of the specimen sampled will also be recorded in the field notebook.

C. Editorial Comments

1. RWQCB Comment: **<u>Section 1.3.1.2, Potential Backfill Material For Area of Concern (AOC) 01 Construction, p 3</u>: Delineate on Figure 2 the area where a possible source of backfill soil was determined being contaminated with Arsenic.**

Response: The area that was excavated for potential use of backfill is shown on Figure 2.

2. RWQCB Comment: **<u>Section 1.3.2.1, Building Crawl Space Surface Soil Sampling, p 4</u>: Clarify the relationship between Building IA-25 and Site 29.**

Response: Text has been revised as suggested.

3. RWQCB Comment: **<u>Section 1.3.2.3, Site Investigation Subsurface Soils Sampling, p 6</u>: State the matrix sampled for the analytical results reported in the last paragraph of this section.**

Response: Text has been revised to indicate that the matrix of the samples collected was soil.

4. RWQCB Comment: **<u>Figure 3, Concentration of Arsenic in Surface Soil at Site 22</u>: This map could be improved by:**

- **Mapping Arsenic isoconcentrations points for Arsenic distribution in soils.**
- **Indicate which soil samples exceed the Arsenic UCL99 background concentration.**

Response: Comment noted. These recommendations will be considered during preparation of the RI addendum report.

5. **RWQCB Comment:** **<u>Figure 4, Proposed Sampling Locations and Potentiometric Surface Map</u>: Report the contaminant concentrations detected in groundwater at the site.**

Response: A discussion of contaminant concentrations detected in groundwater at the site has been added to Section 1.3.1.

6. **RWQCB Comment:** **<u>Figure 5, Proposed Sampling Locations in Magazine Area</u>:**

- **Specify which tissue will be collected in the legend.**
- **Provide the site topography and its relationship to the proposed sampling points.**
- **Map the locations of the monitoring wells.**

Response: The figure has been revised to indicate that the tissue sample to be collected is plant tissue. Site topography information was added to the figure, but with all the other lines on the figure it detracted from the original intent of the figure, so they were removed. The monitoring well locations at Site 22 have been added to the figure, as well as the Site 17 monitoring wells located to the north of the magazine area.

RESPONSE TO COMMENTS FROM DTSC

DTSC is concerned that the project scope will not be met by the proposed number of sampling locations as outlined in the SAP. The major areas of concern include Sites 22, 29 and the inland magazine area. The SAP reports these sites to encompass approximately 500 acres. The following concerns lead DTSC to conclude that additional sampling locations or a phased approach need to be considered for the following reasons.

1. **DTSC Comment:** **Depth of samples: The SAP proposes no samples below 0.5 feet. DTSC would propose that the vertical extent of contamination cannot be determined with out sampling at depth.**

Response: Please see the response to EPA General Comment 4.

2. **DTSC Comment:** **Air monitoring and/or wind blown dust analysis has been recommended in previous regulatory comments. DTSC would not consider the project scope complete without an analysis for the potential of wind blown dust containing arsenic.**

Response: Please see the response to EPA Specific Comment 6.

3. **DTSC Comment:** **The SAP proposes approximately 50 sampling locations to characterize 500 acres. DTSC is concerned that the ratio of samples to the area of concern is minimal. We recommend that alternatives to increase the ratio of sample locations to the total area of concern be considered. Suggestions include increasing the number of sample locations, using a phased approach, or using a screening technology.**

Response: Please see the responses to EPA General Comment 1.

4. **DTSC Comment:** **Sampling of the ground water is limited to four monitoring wells (Site 22) and two geoprobe grab samples. DTSC is concerned that the project scope will not be sufficiently determined by the number of samples proposed. With the determination that addition chemicals of concern are present (i.e., perchlorate), it is recommended that the Navy and regulatory agencies consider additional ground water objectives and sampling locations.**

Response: The Navy believes that the four monitoring wells are adequate to assess any potential groundwater contamination at the site resulting from activities at Building 7SH5. The additional groundwater sampling proposed will provide the data necessary to assess seasonal groundwater conditions. In addition, the wells are appropriately spaced to evaluate groundwater flow.

RESPONSE TO COMMENTS FROM RAB MEMBER CHRIS BOYER

Specific Comments

1. **RAB Comment:** **<u>Page 1 / Section 1.0</u> – Point (4) indicates we are checking uptake by ingestion into grazing cattle, the Tule Elk herd should be addressed here (either say we are or are not checking it's uptake).**

Response: Point 4 of Page 1, Section 1.0 has been revised to indicate that the tule elk ingestion of site vegetation will also be addressed in the study.

2. **RAB Comment:** **<u>Page 3 / Section 1.3.2</u> – There appears to be a fragmented word processing artifact in the last sentence "whwhich" which needs removal.**

Response: The text has been revised.

3. **RAB Comment:** **<u>Page 4 / Section 1.3.2.1</u> – It is difficult to visualize or logically extrapolate the architecture of Building IA-25 from any of the descriptions to this point in the report. Once discussions begin about "crawl spaces" it gets even more difficult. I recommend that a description of the building "a trailer on raised concrete piles" or something similar be included somewhere in here.**

Response: The text has been revised as suggested.

4. **RAB Comment:** **<u>Page 10 / Section 2.3.2</u> – Considering the annual fire prevention burns, and the seasonal nature of the plants in the area it would appear that the collection time period might play an important role in the collection results. If this is meant to show how bioaccumulation can occur in grazing mammals, then perhaps the target plants for grazing should be listed and they should represent the majority of the collection sample.**

Response: The proposed field work described in the SAP is currently scheduled to occur in Spring 2004, according to the September 30, 2003, version of the Site Management Plan (SMP). This field work is scheduled during the growing season for the annual grasses present at the site, so as not to occur in late summer when the grasses typically die off and become a fire hazard that require fire prevention burns.

The grasses that are most likely candidates for sampling include wild oat (Avena fatua), ripgut grass (Bromus diandrus), Mediterranean barley (Hordeum marinum), and Italian rye grass (Lolium multiflorum). The selected species for sampling will be reported in the field notebook. Plant roots will not be included in the sample. A description of the specimen sampled will also be recorded in the field notebook.

Section 2.3.2 of the draft final SAP has been modified accordingly.

5. **RAB Comment:** **<u>Figure 5 / Proposed Sampling Locations in the Magazine Area</u> – The drawing shows only two tissue sampling sites, both well away from Site 22. I think the collocated tissue/soil samples should be increased and include a soil sample closer to Site 22 (perhaps the soil sample sites at 7SHB131 and 7SHB144) and a sample on the fence border near 7SHSHB154(88).**

Response: Please see response to EPA Specific Comment 5.

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