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Work Plan for Site Inspection Installation Restoration Program Sites 32, 34b, 34d, and 34e and Munitions Response Program Sites UXO1, UXO2, UXO3, UXO4, UXO6, and UXO7

Naval Weapons Station Seal Beach Detachment Fallbrook Fallbrook, California

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REVIEW AND APPROVAL

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ACRONYMS AND ABBREVIATIONS

AECRU	Indefinite Quantity Contract for Architectural-Engineering Services to Provide CERCLA/RCRA/UST Studies
AOC	Area of concern
APP	Accident prevention plan
bgs	Below ground surface
Cal/EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
ChaduxTt	Chadux Tetra Tech Joint Venture
COPC	Chemical of potential concern
COPEC	Chemical of potential ecological concern
CSM	Conceptual site model
DDS	Dunnage Disposal Site
Det	Detachment
DGPS	Differential global positioning system
DMM	Discarded military munitions
DO	Dissolved oxygen
EOD	Explosive ordnance disposal
EPA	U.S. Environmental Protection Agency
ESQD	Explosives safety quantity distance
ESS	Explosives Safety Submission
ESSL	Ecological Soil Screening Level
^{o}F	Degrees Fahrenheit
FSP	Field sampling plan
GPS	Global positioning system
HMX	High melting explosive
IAS	Initial assessment study
IDW	Investigation-derived waste
in	Inch
IRP	Installation Restoration Program
LAW	Light anti-tank weapon
MC	Munitions constituents
MCB	Marine Corps Base
MEC	Munitions and explosives of concern
mm	Millimeter
MRP	Munitions Response Program

NAD	Naval Ammunition Depot
NAVFAC SW	Naval Facilities Engineering Command, Southwest Division
NAVWPNSTA	Naval Weapons Station
NAVWPNSTA Seal Beach	Naval Weapons Station Seal Beach
NEESA	Naval Energy and Environmental Support Activity
NFA	No further action
NHPA	National Historic Preservation Act
NOSSA	Naval Ordnance Safety and Security Activity
ORP	Oxidation-reduction potential
PA	Preliminary assessment
PAH	Polynuclear aromatic hydrocarbons
PBX	Polymer-bonded explosive
PETN	Pentaerythritol tetranitrate
PID	Photoionization detector
PPE	Personal protective equipment
PRG	Preliminary remediation goal
QAPP	Quality assurance project plan
QE	Quality evaluation
RCRA	Resource Conservation and Recovery Act
RDX	Research Department explosive
SAP	Sampling and analysis plan
SI	Site inspection
SKR	Stephens' kangaroo rat
SHPO	State Historic Preservation Officer
SVOC	Semivolatile organic compound
Tetra Tech	Tetra Tech EM Inc.
TDS	Total dissolved solids
TOC	Total organic carbon
TNT	Trinitrotoluene
USFWS	United States Fish and Wildlife Service
UST	Underground storage tank
VOC	Volatile organic compound
XRF	X-ray fluorescence

1.0 INTRODUCTION

ChaduxTt is performing a site inspection (SI) at Installation Restoration Program (IRP) Sites 32, 34b, 34d, and 34e, and Munitions Response Program (MRP) Sites UXO1, UXO2, UXO3, UXO4, UXO6, and UXO7 at Naval Weapons Station Seal Beach Detachment Fallbrook (NAVWPNSTA Seal Beach Det Fallbrook). The field, laboratory, and data reporting efforts associated with the SI are detailed in this work plan, which includes a sampling and analysis plan (SAP) as Attachment 1. The SAP includes a field sampling plan (FSP) and a quality assurance project plan (QAPP) in an integrated format.

Because of sensitive natural resources within NAVWPNSTA Det Fallbrook, a biological avoidance and minimization plan has been developed for the proposed Site Investigation. The plan identifies specific procedures to which field teams will adhere as they execute the work described in the Work Plan. The plan is provided as Appendix A of this report. In addition to the planned biological avoidance and minimization activities, a cultural avoidance and minimization program will also be implemented for two sites (34d, UXO1) where cultural resources have been identified either within or nearby the areas.

The purpose of the SI is summarized below. This introductory section also provides information on the organization of the SI work plan; a facility description; the regional setting, including geology, hydrogeology, and ecology; previous investigations; and descriptions of each site and associated history. Much of the information provided below was first presented in the 2006 preliminary assessment (PA) for NAVWPNSTA Seal Beach Det Fallbrook performed by Malcolm Pirnie, Inc. (Malcolm Pirnie).

1.1 PURPOSE

The objective of the SI for all the sites is to characterize soil and water to evaluate whether chemicals of potential concern (COPC) to human health, chemicals of potential ecological concern (COPEC), or both have been released. An additional objective for the MRP sites is to determine whether munitions and explosives of concern (MEC) are present. Based on the findings of the field investigation, the SI report will recommend either further action, such as additional characterization or a remedial response, or no further action.

1.2 REPORT ORGANIZATION

This SI work plan is divided into the following sections:

- Section 1, Introduction, includes the purpose, report organization, facility description, regional setting of NAVWPNSTA Seal Beach Det Fallbrook, previous investigations, and site descriptions and history.

- Section 2, Conceptual Site Models, presents the conceptual site model (CSM) for each site.

- Section 3, Data Generation and Acquisition, describes the investigation methods and sampling design.

- Section 4, Human Health and Ecological Risk Evaluations, summarizes the technical approach for the screening-level risk evaluations for each site.

- Section 5, Health and Safety Requirements, provides a brief summary of the health and safety aspects of the planned field work for the SI.

- Section 6, Schedule, presents the anticipated schedule for the SI effort.

- Section 7, References, lists the references cited in this work plan.

1.3 FACILITY DESCRIPTION

Naval Ammunition Depot (NAD) Fallbrook was commissioned in February 1942. The depot's mission was to receive, store, and guard large quantities of explosives and ammunition, and to distribute and deliver these as needed to other installations. NAD Fallbrook was put on caretaker status in 1947 but was reactivated in 1950 with the onset of the Korean War. In 1958, NAD Fallbrook was designated an annex of the Naval Ammunition and Net Depot, Seal Beach. In the 1960s, Detachment Fallbrook's primary duty was to support the Pacific Marine Forces. It also stored, tested, and maintained several types of missiles. As of October 1, 1997, the installation's name changed to Detachment Fallbrook, and the installation reported to the present NAVWPNSTA Seal Beach. It currently inspects, maintains, and recertifies air-launched missiles such as the Phoenix, Sidewinder, Maverick, and high-speed anti-radiation missiles. The installation has 190 magazines that store pyrotechnics, high explosives, fuses, detonators, and small arms (Malcolm Pirnie Inc. [Malcom Pirnie] 2006). No active firing ranges are within the installation.

1.4 REGIONAL SETTING

NAVWPNSTA Seal Beach Det Fallbrook is 53 miles north of San Diego, California, in northern San Diego County. It is 9 miles inland from the Pacific Ocean and is immediately adjacent to the eastern border of Marine Corps Base (MCB) Camp Pendleton. Elevation at the installation varies from 200 to 840 feet above mean sea level, and the topography is characterized by low hills and alluvial bottomlands. The installation occupies 8,852 acres and is secured by a chain-link fence (Malcolm Pirnie 2006). The location of the installation and the sites addressed by the SI are shown on Figure 1.

1.4.1 Regional Geology

NAVWPNSTA Seal Beach Det Fallbrook is located in the Peninsular Ranges geomorphic province, which is dominated by the igneous and metamorphic rocks of the Peninsular Range

batholith. Metasediments now preserved in the Peninsular Range region include marbles, slates, schists, quartzites, and gneisses. Nearly flat lying sedimentary formations unconformably overlie the granitic and metasedimentary bedrock in the central to coastal portions of the province, which includes Det Fallbrook. The primary surface unit observed at NAVWPNSTA Seal Beach Det Fallbrook is the granitic bedrock that displays various levels of weathering, ranging from fresh or unweathered to moderately weathered. Locally, the bedrock is overlain or mantled by colluvium and alluvium. The thickest accumulations of these recent (Holocene age) deposits are generally associated with the lower elevations of the westerly flowing drainages that have dissected the granitic terrain.

1.4.2 Regional Hydrogeology

Hydrogeological conditions within NAVWPNSTA Seal Beach Det Fallbrook vary significantly due to the hydrogeologic properties of underlying bedrock. Although a majority of the sites are underlain by weathered granitic or metasedimentary materials of the southern California batholith, weathering and fracturing have physically modified these units—in turn, locally affecting groundwater conditions at each site. The groundwater in the bedrock generally occurs at depths to 100 feet in fractures with laminar to turbulent flow. Flow in the bedrock depends on the fracture patterns and, therefore, may be at any angle to the groundwater gradient.

In topographically low areas such as drainages, groundwater occurs within the alluvium, colluvium, or thin near surface (weathered) bedrock layers. This perched water occurs seasonally, primarily after storm events or periods of prolonged precipitation, and may be present at relatively shallow depths of less than 10 feet. Specific groundwater data within the Detachment are minimal. Although groundwater within the detachment is considered beneficial use by the Regional Water Quality Control Board, NAVWPNSTA Seal Beach Det Fallbrook receives all of its potable water from the San Diego County Water Authority.

During installation of three monitoring wells at IRP Site 27, groundwater was measured at approximately 17 to 29 feet below ground surface (bgs) after equilibration (Marrs Services, Inc. [Marrs] 2007). IRP Site 27 is located approximately 1000 feet north of UXO1 and at approximately the same elevation. Depths to water in three other monitoring wells installed at Buildings 230 and 232 on Ammunition Road were measured at between 50 and 60 feet bgs in 2003 (Malcolm Pirnie 2006). The investigation was conducted near IR Site 30, located approximately 1400 feet southwest of the Paint Shop Building IR site 32, which is part of this investigation. The wells had been installed during an underground storage tank (UST) investigation. Based on the data from these wells, direction of groundwater flow was toward the southwest.

Two man-made reservoirs, Depot Lake (UXO6) and Lower Lake (UXO7), are located within NAVWPNSTA Seal Beach Det Fallbrook. Both Depot Lake and Lower Lake are located in the Santa Margarita-Upper Ysidora watershed. They are currently used for fire suppression and have also been used in the past for livestock watering. MCB Camp Pendleton and the City of Oceanside are located downgradient of NAVWPNSTA Seal Beach Det Fallbrook. Both extract and use groundwater as a part of their potable water supplies.

1.4.3 Ecological and Environmental Setting

The area around NAVWPNSTA Seal Beach Det Fallbrook and MCB Camp Pendleton provides the largest remaining wildlife habitat in coastal southern California. The native plant communities of NAVWPNSTA Seal Beach Det Fallbrook are varied and include perennial grassland, coastal sage scrub, chamise chaparral, coast live oak riparian woodland, and willow riparian woodland. Several threatened and endangered species are associated with Det Fallbrook. Threatened and endangered species that have been documented at NAVWPNSTA Seal Beach Det Fallbrook include the coastal California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, and Stephens' kangaroo rat (SKR). Suitable habitat of one or more protected species was found at all sites during a field visit conducted June 11 through 13, 2007. A report prepared by Davenport Biological Services provides an endangered species assessment for the sites, and is included as Appendix B.

1.5 PREVIOUS INVESTIGATIONS

An initial assessment study (IAS) for NAVWPNSTA Seal Beach, including the Fallbrook Annex and Corona Annex, was completed by Naval Energy and Environmental Support Activity (NEESA) in February 1985 (NEESA 1985). In 1989, NAVWPNSTA Seal Beach requested that NEESA update the IAS, which was revised and issued in August 1990 (NEESA 1990). Sites addressed in the IAS include IRP Site 26 Ordnance Burn Pits and Burial Pits by the Drop Test Tower, Building 348, which is now MRP Site UXO1 Quality Evaluation (QE) Test Area. Other sites in the IAS that are part of this SI include Site 32 Paint Shop Disposal Area and the Site 34 Dunnage Disposal Sites (DDS) 34b, 34d, and 34e—previously referred to as DDS 2, DDS 4, and DDS 5, respectively. Site UXO2 Small Arms Range was not addressed in the IAS. The IAS recommended a SI at the QE Test Area and Paint Shop Disposal Area, but not at the Dunnage Disposal Sites.

A PA for the munitions response program was completed in 2006 (Malcolm Pirnie 2006). The report addressed all the sites included in this SI, except for Site 32. The PA recommended a SI for MEC and munitions constituents (MC) at Sites UXO1 (QE Test Area), UXO3 (DDS 1), UXO4 (DDS 3), UXO6 (Depot Lake), and UXO7 (Lower Lake). A SI for MC, but no further action (NFA) for MEC, was proposed for Site UXO2 (Small Arms and Trap/Skeet Ranges). Based upon the results of the PA, NFA for MEC and MC was recommended for Sites 34b, 34d, and 34e; therefore, those sites remain within the IRP program and are not addressed as MRP sites.

1.6 SITE DESCRIPTIONS AND HISTORY

A physical description of each site and its history are provided in this section. The location of each site within the Detachment is shown on Figure 1. This report presents information regarding the four IRP sites followed by the six MRP sites.

1.6.1 IRP Site 32

IRP Site 32, the Paint Shop disposal area, is located in the extreme eastern portion of NAVWPNSTA Seal Beach Det Fallbrook near the Ammunition Road entrance gate (Figure 2). The site is located south of Ammunition road in a developed portion of the base and covers an area of approximately 0.5 acre. Starting in the mid-1950s, a small aboveground storage tank that contained about 50 gallons of caustic soda was used to loosen paint from various painting tools. Items were lowered into in the tank, removed, and hosed off on an area next to the tank. The tank was located on the southwestern side of Building 351. About every six months, the tank was drained using a 15- to 20-foot-long pipe. The solution was drained down the hill behind the building until about 1977. At that time, a perforated seepage drum was installed at the pipe outfall. Solution drained into the drum and then into the surrounding soil. This practice stopped in 1983.

1.6.2 IRP Site 34b

IRP Site 34b (DDS 2), is located in the north-central portion of the installation, west of Walleye Road (Figure 3); it encompasses approximately 9 acres of shallow sloping natural topography covered with native vegetation. IRP Site 34b was used as a disposal or burial area for dunnage from 1942 until 1978. The dunnage disposal area was initially considered a possible munitions burial site because of evidence of MEC and munitions scrap found at two similar dunnage disposal sites at NAVWPNSTA Det Fallbrook (DDS 1 and DDS 3). However, the PA investigation of IRP Site 34b that included a detailed review of historical installation records, reconnaissance surveys, and follow-up interviews (Malcolm Pirnie 2006), found no evidence of munitions burial.

1.6.3 IRP Site 34d

IRP Site 34d (DDS 4) is located in the central portion of the installation (Figure 4) along the south side of the Fallbrook creek drainage and immediately north of Ammunition Road. The site encompasses approximately 1.8 acres and was used as a burial area for dunnage from 1942 until 1978. The site was also initially considered a possible munitions burial site due to evidence of MEC and munitions scrap found at DDS 1 and DDS 3. Further investigation of the site (installation record reviews, visual surveys, and interviews) during the PA (Malcolm Pirnie 2006) determined that DDS 4 had not been a munitions burial site.

1.6.4 IRP Site 34e

IRP Site 34e (DDS 5) is essentially a road embankment located in the southwestern portion of the installation (Figure 5) at the intersection of Ammunition Road and Harm Road. The site encompasses approximately 0.7 acre and was reportedly used for dunnage disposal from 1942 until 1978. Similar to the previously mentioned two sites, IRP Site 34e was initially considered a

possible munitions burial site because of evidence of munitions scrap found at DDS 1 and DDS 3. Detailed investigation of the installation records, along with follow-up interviews by Malcolm Pirnie (2006), indicated no evidence of munitions burial.

1.6.5 MRP Site UXO1

MRP Site UXO1, QE Test Area, is located in the southeastern portion of the installation (Figure 6). The site encompasses 60 acres and is covered with sparse to moderate native vegetation; it has been used for a variety of purposes, and, therefore, the sampling approach and analytical suite will vary by subarea. The subareas based upon various uses of the site are as follows:

- Munitions Burn and Disposal Areas – Portions of the QE Test Area were originally used for burning and disposal of rocket fuel and munitions. The disposal practices started in 1942 and continued through 1985, according to personnel interviews and historical records (Malcolm Pirnie 2006). At several areas within the site, burn and disposal operations occurred.

  The central or main burn disposal/firing range area includes the two small round metal burn barrels used for munitions, a visible burn/slit trench, and the central firing range area with buried trenches. Reports indicated that the central disposal/firing range area was used for disposal or burning of black powder and other ordnance; the surface was entirely graded in 1977. A geophysical survey was completed in this area by Sub Surface Surveys (2004) as part of the investigation for the nearby IRP Site 27 (Marrs 2007). The survey appeared to identify the presence of two buried trenches in the central portion of the area.

  Unconfirmed rocket fuel disposal trenches reportedly are located in the northwestern portion of the site (reportedly used in 1969 to bury 423 pounds of liquid rocket fuel and 142 pounds of map-4 amine fuel). Historical aerial photographs indicate the presence of possibly three trenches in the area.

  A Burn/Slit Trench (2) is located in the southeastern portion of the site, and another outlying Burn/Slit Trench (3) is north of the northern access road to the site. In addition, an unconfirmed disposal trench was possibly identified using geophysical survey methods in an area located approximately 400 feet to the northwest of the Burn/Slit Trench 3 (Subsurface Surveys 2004).

- Drop Test Tower – A drop test tower (Building 348) was used from the 1950s through the early 1980s to test bomblets from cluster bombs (such as Rockeyes) and other munitions. QE Laboratory personnel used it as a munitions testing area from 1977 to 1989 because it was already in use for other ordnance activities.

- Weapons Firing and Target Area – The central portion of the site was used for practice firing of various weapons that included rifle grenades and rockets. The firing line(s)

were reportedly located on the north side of the central burn/disposal area, with the main target located to the south. The target area consists of a 40-foot-long vertical steel plate backed by a soil berm. A low natural hillside is located further south of the berm and is considered to have been a possible impact area for fired munitions.

- Building Debris – Building debris is located in the southwestern corner of the site, and the remnants of several concrete huts that were used for shelter, viewing platforms, and target storage are present at the site.

1.6.6 MRP Site UXO2

MRP Site UXO2, which includes two subareas of concern, is a Small Arms Range that lies within the footprint of a Skeet/Trap Range, and is located near the eastern edge of NAVWPNSTA Seal Beach Det Fallbrook (Figure 7). MRP Site UXO2 encompasses approximately 31 acres of mixed grassland and coastal sage scrub adjacent to Fallbrook Creek.

The Small Arms Range occupies 0.4 acre and lies to the west of the firing line for the Skeet/Trap range. The Small Arms Range was used by both the Marine Security forces (from 1945 to 1988) and Civilian Security Forces (from 1987 to 1991) for handgun marksmanship training. It was also used by station civilians and local law enforcement officers. It was closed because of its proximity to the main administration areas of the installation and the Town of Fallbrook.

The recreational Skeet/Trap Range was used by security forces and other station personnel from 1950 to 1987. Reportedly, the munitions used at the range were limited to 12-gauge shotgun shells, with the targets consisting of clay pigeons.

1.6.7 MRP Site UXO3

MRP Site UXO3 (DDS 1) is located in the north-central portion of the installation and occupies approximately 3.3 acres (Figure 8). The site encompasses two drainage swales that join and flow to the southwest. This "Y" shaped drainage area was used for surface disposal and burial of dunnage and munitions from 1942 until 1978.

1.6.8 MRP Site UXO4

MRP Site UXO4 (DDS 3), is located in the central portion of the installation, just south of Terrier Road (Figure 9). The site occupies 1.5 acres. DDS 3 is a burial area for dunnage and possibly for munitions. The site was used from 1942 until 1978. A 1978 memorandum from Tom Curtis, a former Commanding Officer at NAVWPNSTA Seal Beach Det Fallbrook, states that numerous cases of dummy rifle-propelled grenades were buried in the area. Visual observations within the site support the information provided in the memorandum.

1.6.9 MRP Site UXO6

MRP Site UXO6 (Depot Lake) is an artificial lake located just north of Terrier Road in the western part of NAVWPNSTA Seal Beach Det Fallbrook. The lake is known to fluctuate seasonally in extent, with the historical high water mark encompassing about 12 acres. Depot Lake was constructed some time after 1944. The lake is fed by two tributaries from the north and east, and is held by an earthen dam at the southern end. Water is released from the lake by a spillway running beneath Terrier Road to the south. A small pier previously located at the southwest corner of the lake is currently evidenced by the footings located adjacent to the lake.

The lake was identified as a disposal site for munitions in a 1958 memorandum. The 1958 memorandum from the officer in charge to the commanding officer stated that certain munitions (20-millimeter [mm], 40-mm, and 60-mm cartridges, and 7.2-inch projector charges) had been dumped into "Main lake and West lake" during WWII. According to Mr. Robbie Knight, former Natural Resource Manager, Main Lake referred to in the memorandum is currently known as Depot Lake. Moreover, the memorandum indicated that other types of munitions might have been dumped, and that munitions had been recovered from the lake in the past during dry summer seasons. The memorandum also requested that explosive ordnance disposal (EOD) technicians perform diving operations at the lake to salvage MEC. Recent communication with the Base EOD officer indicated that no records had been found to confirm if diving operations took place or if munitions had been found and removed from the lake.

Personnel interviewed during the site visit in 2004 stated that before 1953, the Marine Security Forces might have dumped unexpended shells into the lake instead of turning them in to be inventoried. Currently, Depot Lake is used to store water on the installation for fish and wildlife enhancement, and for wildfire protection. The fire department (Station 9) uses a helicopter and bucket method to remove water from Depot Lake. The bucket holds 300 gallons of water and goes down only 4 feet into the water. This action is performed on average twice a year during wildfire season. The water is used only to fight fires inside NAVWPNSTA Seal Beach Det Fallbrook. The lake was also used in the past for recreational boating and fishing (strict catch and release policy). In 2004, all recreational activities were discontinued at Depot Lake.

1.6.10 MRP Site UXO7

MRP Site UXO7 (Lower Lake) is an artificial lake located in the southwestern portion of NAVWPNSTA Seal Beach Det Fallbrook, approximately 300 feet north of Shaike Road and just west of the Group 13 magazines. The lake has historically covered roughly 3 acres, but is known to fluctuate seasonally in its extent. Lower Lake is fed by tributaries from the north, east, and west, and is retained by an earthen dam that supports the access road at the western end. Water is discharged from the lake through a vertical drain that passes below the embankment and outlets in the drainage downstream from the lake. A secondary concrete-lined spillway is located on the south side of the embankment and access road.

The lake was identified as a disposal site for munitions in a 1958 memorandum. The 1958 memorandum from the officer in charge to the commanding officer stated that certain munitions (20-mm, 40-mm, and 60-mm cartridge, and 7.2-inch projector charges) had been dumped into two lakes during WWII, and that other types of munitions might also have been dumped into the lakes. According to Mr. Knight, former Natural Resource Manager, Lower Lake is one of the lakes referred to in the memorandum. The 1958 memorandum stated that munitions had been recovered from the lake in the past during dry summer seasons. The same memorandum also requested that EOD technicians perform diving operations at the lake to salvage MEC. No records were found to indicate whether diving operations took place or whether additional munitions were found in the lake.

Personnel interviewed during the site visit in 2004 stated that before 1953, the Marine Security Forces might have dumped unexpended shells into the lake instead of turning them in to be inventoried. Lower Lake is currently used to store water on the installation for fish and wildlife enhancement, and for wildfire protection. The Station 9 fire department uses a helicopter and bucket method to remove water from Lower Lake. The bucket holds 300 gallons of water and goes down only 4 feet into the water. On average, this action is performed twice a year during wildfire season. The water is used only to fight fires inside NAVWPNSTA Seal Beach Det Fallbrook. The lake was also used for recreational boating and fishing (strict catch and release policy). In 2004, all recreational activities were discontinued at Lower Lake.

2.0 CONCEPTUAL SITE MODELS

This section provides CSMs for each of the IRP and MRP sites. Except for Site 32, the CSMs are based on the PA (Malcolm Pirnie 2006) and initial SI activities, including site walk-throughs. The CSMs have been developed using current knowledge of historical activities that may have contaminated the site. They include possible sources and release mechanisms, exposure pathways, and potential ecological and human receptors.

2.1 SITE 32

Table 2.1: Conceptual Site Model Information Profiles – Site 32

Information Category	Information Descriptor	Preliminary Assessment Findings
General Information	Installation Name	NAVWPNSTA Seal Beach Det Fallbrook
	Site Name	IRP Site 32 (Paint Shop Disposal Area)
	Site Area and Layout	The Paint Shop Disposal Area is 0.2 acre.
	Site Boundaries	The site boundaries encompass the former tank, drain pipe, seepage drum, and likely drainage area below the tank and seepage drum. Figure 2 shows the location of the Paint Shop Disposal site and outfall area.

	Site Security	The site is located on Detachment Fallbrook, which is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order and for implementing access control policies and procedures.
Physical Profile	Climate	The climate at NAVWPNSTA Seal Beach Det Fallbrook is typical of the prevailing coastal southern California Mediterranean climate and is characterized by mild winters, temperate summers, and infrequent rainfall. The annual average temperature is 63 degrees Fahrenheit (°F). Precipitation ranges from 13.7 to 17.1 inches per year, with January being the wettest month and July the driest. Summer and fall at the installation are punctuated by the Santa Ana (offshore) winds.
	Topography	The area immediately behind the former paint shop consists of a concrete slab that extends out from the building about 5 feet. Beyond the concrete is relatively flat asphalt pavement that extends to the southeast about 20 feet from the building. Beyond the asphalt is an undocumented fill slope that drops about 10 feet in elevation. Subjacent to the slope is an unimproved, relatively flat graded area that extends 160 feet to the Fallbrook Creek drainage.
	Geology	The region is underlain by granitic and metasedimentary rocks of the Peninsular Ranges physiomorphic province. Visual reconnaissance indicates undocumented fill, alluvium, and moderately weathered granitic bedrock underlie the site.
	Soil	The soil at the Paint Shop Disposal Area is classified as a sandy loam of granitic origin and is moderately well drained.
	Hydrogeology	No site-specific groundwater depth data are available.
	Hydrology	The former paint shop area is in the Santa Margarita watershed. The Fallbrook Creek drainage is located 200 feet southeast of the former paint shop. Fallbrook Creek would normally be an intermittent stream, but in this area it is considered a perennial stream because of runoff from off-site irrigation.
	Vegetation	The unimproved graded area southeast of the asphalt paved area supports little vegetative cover.
Land Use	Current Land Use	The site is located on the south side of Building 351,

and Exposure Profile		which is a paint shop that supports the Public Works operations. Disposal practices at the paint shop were halted in 1983. The graded area is often used for staging of containers that are used by contractors working on the Detachment.
	Current Human Receptors	Navy personnel and Navy-permitted visitors/contractors.
	Current Activities (frequency, nature of activity)	Activities at the site include the Public Works operations in Building 351 and infrequent movement and storage of enclosed metal containers that have been temporarily stored in the area of concern by contractors.
	Potential Future Land Use	No change in land use is planned. Other likely activities at the site include environmental and ecological surveys.
	Potential Future Human Receptors	Under current land use, only Navy personnel and Navy contractor personnel conducting subsurface excavation work would be likely receptors.
	Potential Future Land Use-Related Activities	Beyond the current Public Works use, other Public Works operations could be located in this area. Other likely future activities at the site include environmental and ecological surveys.
	Zoning/Land Use Restrictions	None.
	Demographics/Zoning	The Detachment Fallbrook has a workforce of Command personnel made up of approximately 63 military, 65 civilian, and 12 contractors, as well as Tenant personnel composed of approximately 9 military, 126 civilian, and 90 contractors. Demographic data include the following: Town of Fallbrook, population 29,100; and San Diego County, population 2,813,833 (United States Census 2000).
	Beneficial Resources	The disturbed area behind the former paint shop is potentially suitable for SKR; however, no sign of SKR was noted during the June 11, 2007 site visit, and habitat occupied by this species does not occur adjacent to the site.
Ecological Profile	Habitat Type	See Beneficial Resources, above.
	Degree of Disturbance	Current and anticipated future activities at the site, such as Public Works operations in the vicinity, may disturb habitat.
	Ecological Receptors	
	General	Common fauna to NAVWPNSTA Seal Beach Det

		Fallbrook include mammals (kangaroo rats, voles, deer, mice, ground squirrels, opossum, rabbits, and coyotes), amphibians (tree frogs), reptiles (orange-throated whiptails, rattlesnakes, and horned lizards), and birds (burrowing owls, kites, quails, sparrows, kingbirds, and hawks).
	Federal Endangered or Threatened Species	SKR (potentially) (Note: none identified in recent visual assessments [Davenport 2007].)
	Relationship of Contaminant Sources to Habitat and Potential Receptors	Potential human receptors at the site include Navy personnel and Navy contractors who might perform subsurface excavation activities. Ecological receptors may come into direct contact with contaminants in soil while foraging or burrowing in the area southeast of the asphalt. Ecological receptors may also come into contact with contaminants that have been incorporated into the food chain (bioaccumulated in plants and prey).

2.2 SITE 34b

Table 2.2: Conceptual Site Model Information Profiles – Site 34b

Information Category	Information Descriptor	Preliminary Assessment Findings
General Information	Installation Name	NAVWPNSTA Seal Beach Det Fallbrook
	Site Name	IRP Site 34b (DDS 2)
	Site Area and Layout	IRP Site 34b encompasses approximately 9 acres and is roughly triangular in shape.
	Site Boundaries	Figure 3 shows the location of Site 34b. • The northern boundary of the site extends in a southeasterly direction from Walleye Road on the west to a ridgeline on the east. An unimproved road follows the ridge that defines the southern boundary of the site. • The western boundary parallels the eastern side of Walleye Road for a distance of approximately 1000 feet north of the unimproved road.
	Site Security	The site is located on NAVWPNSTA Seal Beach Det Fallbrook, which is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order, and for implementing

		access control policies and procedures.
Physical Profile	Climate	The climate at NAVWPNSTA Seal Beach Det Fallbrook is typical of the prevailing coastal southern California Mediterranean climate and is characterized by mild winters, temperate summers, and infrequent rainfall. The annual average temperature is 63 °F. Precipitation ranges from 13.7 to 17.1 inches per year, with January being the wettest month and July the driest. Summer and fall at the installation are punctuated by the Santa Ana (offshore) winds.
	Topography	Site 34b is located primarily in a shallow northwest-descending natural slope area below a low west-trending ridge.
	Geology	The region is underlain by granitic and metasedimentary rocks of the Peninsular Ranges physiomorphic province. A brief visual reconnaissance indicates the site is primarily underlain by moderately weathered granitic bedrock.
	Soil	The soil is classified as a sandy loam of granitic origin and is moderately well drained.
	Hydrogeology	No site-specific groundwater depth data are available.
	Hydrology	Site 34b lies within the Santa Margarita watershed, with no surface water bodies within or adjacent to the site. Tributaries that receive runoff from the site flow to Depot Lake, which is a man-made reservoir. The drainage then continues on to the Santa Margarita River.
	Vegetation	The vegetation in the area is considered mostly coastal sage scrub. Common species in coastal sage scrub habitat include coastal sagebrush, flatopped buckwheat, laurel sumac, sage, goldenbush, and native grasses.
Land Use and Exposure Profile	Current Land Use	The site is not developed and has no current land use other than open space. Dunnage disposal at the site ceased in 1978.
	Current Human Receptors	Navy personnel and Navy contractors. A potentially complete exposure pathway exists for the public to come into contact with contaminants migrating off the installation through the surface water system.
	Current Activities (frequency, nature of activity)	The only current activities at the site include environmental and ecological surveys.
	Potential Future Land	No change in land use is planned; however, cattle

	Use	grazing remains a possible future land use. The area has been grazed in the past.
	Potential Future Human Receptors	Navy personnel and Navy-permitted visitors/contractors. A potential complete exposure pathway exists for the public to come into contact with contaminants migrating off the installation through the surface water system.
	Potential Future Land Use-Related Activities	Likely future activities at the site include environmental and ecological surveys, fence installation and maintenance, as well as cattle grazing. Any other potential future land use activities would have to follow Navy explosive safety quantity distance (ESQD) Arc safety policies.
	Zoning/Land Use Restrictions	ESQD arc restrictions have been imposed based on the proximity of the site to some of the installation's munitions storage bunkers. The site is also part of a critical habitat for the coastal California gnatcatcher, which is a federally protected species.
	Demographics/Zoning	NAVWPNSTA Seal Beach Det Fallbrook has a workforce of Command personnel made up of approximately 63 military, 65 civilian, and 12 contractors, as well as Tenant personnel composed of 9 military, 126 civilian, and 90 contractors. Demographic data include the following: Town of Fallbrook, population 29,100; and San Diego County, population 2,813,833 (United States Census 2000).
	Beneficial Resources	The coastal sage scrub and mixed grasslands habitats offer roosting and foraging resources for raptors.
Ecological Profile	Habitat Type	Coastal sage scrub habitat is present. Additionally, suitable habitat exists for the SKR in open areas such as along the edges of paved roads and along unimproved roads.
	Degree of Disturbance	Current and anticipated future activities at the site, such as environmental and ecological surveys, may disturb habitat and ecological receptors known or potentially present within site areas.
	Ecological Receptors	
	General	Common fauna NAVWPNSTA Seal Beach Det Fallbrook include mammals (kangaroo rats, voles, deer, mice, ground squirrels, opossum, rabbits, and coyotes), amphibians (tree frogs), reptiles (orange-throated whiptails, rattlesnakes, and horned lizards), and birds (burrowing owls, kites, quails, sparrows,

		kingbirds, and hawks).
	Federal Endangered or Threatened Species	SKR, coastal California gnatcatcher.
	Relationship of Contaminant Sources to Habitat and Potential Receptors	Potential human receptors at the site include Navy personnel and contractors. Ecological receptors may come into direct contact with contaminants in soil while foraging or burrowing. Ecological receptors may also come into contact with contaminants that have been incorporated into the food chain (bioaccumulated in plants and prey).

2.3 SITE 34d

Table 2.3: Conceptual Site Model Information Profiles – Site 34d

Information Category	Information Descriptor	Preliminary Assessment Findings
General Information	Installation Name	NAVWPNSTA Seal Beach Det Fallbrook
	Site Name	IRP Site 34d (DDS 4)
	Site Area and Layout	The irregularly shaped site encompasses approximately 1.8 acres of nearly flat to shallow north-sloping terrain located adjacent to Fallbrook Creek.
	Site Structures	The foundation of what may once have been Building 338 remains on the site. The remains of what is probably a septic tank adjacent to the former building are present. Asphalt paving associated with Maverick Road and the former crossing of Fallbrook Creek traverses through the northern boundary of the site.
	Site Boundaries	Figure 4 shows the location of Site 34d. • The northern boundary of the site extends along 400 feet of the southeastern limit of Maverick Road. Riparian area associated with Fallbrook Creek is northeast and east of the site. • Ammunition Road is located 400 feet south of the site. • The southeast boundary is not well defined, but is indicated to be 50 feet west of the former structure.
	Site Security	The site is located on NAVWPNSTA Seal Beach Det Fallbrook, which is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order and for implementing

		access control policies and procedures.
Physical Profile	Climate	The climate at NAVWPNSTA Seal Beach Det Fallbrook is typical of the prevailing coastal southern California Mediterranean climate and is characterized by mild winters, temperate summers, and infrequent rainfall. The annual average temperature is 63 °F. Precipitation ranges from 13.7 to 17.1 inches per year, with January the wettest month and July the driest. Summer and fall at the installation are punctuated by the Santa Ana (offshore) winds.
	Topography	34d encompasses a portion of the Fallbrook Creek drainage along with an unnamed tributary drainage that enters Fallbrook Creek within the site along with shallow north sloping terrain on the south side of Fallbrook Creek.
	Geology	The region is underlain by granitic and metasedimentary rocks of the Peninsular Ranges physiomorphic province. A brief visual reconnaissance indicates the site is primarily underlain by moderately weathered to fresh granitic bedrock. Alluvial soils and undocumented fill related to the former Maverick Road and possibly dump fills are present adjacent to the drainage channel.
	Soil	The soil is classified as a sandy loam of granitic origin and is moderately well drained.
	Hydrogeology	No site-specific groundwater depth data are available; however Fallbrook Creek often contains flowing surface water, suggesting shallow perched groundwater is present within the channel sediments.
	Hydrology	The site is located adjacent to Fallbrook Creek, which is considered an intermittent stream with seasonal flow. Fallbrook Creek is within the Santa Margarita watershed
	Vegetation	Vegetation in the area is considered mostly riparian with some coastal sage scrub. Common species in coastal sage scrub habitat include coastal sagebrush, flattopped buckwheat, laurel sumac, sage, goldenbush, and native grasses. Common species in riparian habitat include mulefat, arroyo willows, and elderberry.
Land Use and Exposure	Current Land Use	The former structure was located along Maverick Road, but is currently not in use and is essentially overgrown with vegetation. The site has no current

Profile		land use other than open space. Dunnage disposal at the site ceased in 1978.
	Current Human Receptors	Navy personnel and Navy-permitted visitors.
	Current Activities (frequency, nature of activity)	The only current activities at the site may include environmental and ecological surveys.
	Potential Future Land Use	No change in land use is planned.
	Potential Future Human Receptors	Navy personnel and Navy contractors.
	Potential Future Land Use-Related Activities	Likely future activities at the site include environmental and ecological surveys. Any other potential future land use activities would have to follow any Navy ESQD Arc safety policies.
	Zoning/Land Use Restrictions	ESQD arc restrictions have been imposed based on the proximity of the site to some of the installation's munitions storage bunkers.
	Demographics/Zoning	The NAVWPNSTA Seal Beach Det Fallbrook has a workforce of Command personnel made up of approximately 63 military, 65 civilian, and 12 contractors, as well as Tenant personnel composed of 9 military, 126 civilian, and 90 contractors. Demographic data include the following: Town of Fallbrook, population 29,100; and San Diego County, population 2,813,833 (United States Census 2000).
	Beneficial Resources	The coastal sage scrub and riparian habitats offer roosting and foraging resources for raptors.
Ecological Profile	Habitat Type	The site contains suitable habitat for the coastal California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher. Additionally, suitable habitat exists for the SKR in open areas such as along the edges of paved roads. The disposal area is within a zone suitable as a habitat for the federally endangered least Bell's vireo.
	Degree of Disturbance	Current and anticipated future activities at the site, such as environmental and ecological surveys, may disturb habitat and/or ecological receptors known or potentially present within range areas.
	Ecological Receptors	
	General	Common fauna to NAVWPNSTA Seal Beach Det Fallbrook include mammals (kangaroo rats, voles, deer, mice, ground squirrels, opossum, rabbits, and

		coyotes), amphibians (tree frogs), reptiles (orange-throated whiptails, rattlesnakes, and horned lizards), and birds (burrowing owls, kites, quails, sparrows, kingbirds, and hawks).
	Federal Endangered or Threatened Species	Least Bell's vireo, SKR, southwestern willow flycatcher, and coastal California gnatcatcher.
	Relationship of Contaminant Sources to Habitat and Potential Receptors	Potential human receptors at the site include Navy personnel and contractors. Ecological receptors may come into direct contact with contaminants in soil while foraging or burrowing. Ecological receptors may also come into contact with contaminants that have been incorporated into the food chain (bioaccumulated in plants and prey).

2.4 SITE 34e

Table 2.4: Conceptual Site Model Information Profiles – Site 34e

Information Category	Information Descriptor	Preliminary Assessment Findings
General Information	Installation Name	NAVWPNSTA Seal Beach Det Fallbrook
	Site Name	IRP Site 34e (DDS 5)
	Site Area and Layout	The site encompasses approximately 0.7 acre that includes primarily the road embankments located on the north and south sides of Harm Road for a distance of 290 feet. The embankments achieve a maximum height of approximately 20 feet at a ratio of 2:1 (horizontal:vertical).
	Site Structures	The site includes the asphalt paved road (Harm Road) with a culvert located in the lowest elevation of the drainage that the road traverses. A security fence is located at the eastern limit of the area, near the intersection with Ammunition Road.
	Site Boundaries	Figure 5 shows the site location. • The site includes the embankments that support Harm Road to a distance of approximately 20 feet beyond the toe of the slopes. • Ammunition Road is located east of the site. • North and south of the site are mixed grassland and coastal sage scrub habitat located in an unnamed drainage that flows north.
	Site Security	The site is located on NAVWPNSTA Seal Beach Det

		Fallbrook, which is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order and for implementing access control policies and procedures.
Physical Profile	Climate	The climate at NAVWPNSTA Seal Beach Det Fallbrook is typical of the prevailing coastal southern California Mediterranean climate and is characterized by mild winters, temperate summers, and infrequent rainfall. The annual average temperature is 63 °F. Precipitation ranges from 13.7 to 17.1 inches per year, with January the wettest month and July the driest. Summer and fall at the installation are punctuated by the Santa Ana (offshore) winds.
	Topography	The site includes the descending embankments (2 horizontal:1 vertical) that support Harm Road.
	Geology	The region is underlain by granitic and metasedimentary rocks of the Peninsular Ranges physiomorphic province. The site primarily consists of man-placed embankments that support Harm Road. Below the embankments lies weathered granitic bedrock and possibly a minor amount of alluvial soils in the lower elevations of the drainage.
	Soil	The soil is classified as a sandy loam of granitic origin and is moderately well drained.
	Hydrogeology	No site-specific groundwater depth data are available.
	Hydrology	IRP Site 34e is within the Santa Margarita watershed. No surface water bodies are within or adjacent to the site. Runoff within the site drains northward from the site and into Fallbrook Creek, which flows to the Lower Lake reservoir and then through MCB Camp Pendleton and the City of Oceanside before joining the San Luis River.
	Vegetation	The vegetation in the area is considered mostly mixed grassland, with sparse coastal sage scrub. Common species in coastal sage scrub habitat include coastal sagebrush, flattopped buckwheat, laurel sumac, sage, goldenbush, and native grasses. Common species in mixed grassland habitat include native perennial bunch grasses mixed with nonnative annuals.
Land Use and Exposure Profile	Current Land Use	Harm Road provides access to the munitions bunkers.
	Current Human Receptors	Navy personnel and Navy contractors.
	Current Activities	This site consists of the paved access road, which is

	(frequency, nature of activity)	utilized to gain access to the munitions bunkers north of Ammunition Road. There are no other current activities except for environmental and ecological surveys.
	Potential Future Land Use	No change in land use is planned. Dunnage disposal at this site was stopped in 1978.
	Potential Future Human Receptors	Navy personnel and Navy contractors.
	Potential Future Land Use-Related Activities	Likely future activities at the site include environmental and ecological surveys, as well as normal traffic on Harm Road. Any other potential future land use activities would have to follow any Navy ESQD arc restrictions.
	Zoning/Land Use Restrictions	ESQD arc restrictions have been imposed based on the proximity of the site to some of the installation's munitions operations. The site is also suitable as a habitat for the SKR, which is a federally endangered species.
	Demographics/Zoning	The NAVWPNSTA Seal Beach Det Fallbrook has a workforce of Command personnel made up of approximately 63 military, 65 civilian, and 12 contractors, as well as Tenant personnel composed of 9 military, 126 civilian, and 90 contractors. Demographic data include the following: Town of Fallbrook, population 29,100; and San Diego County, population 2,813,833 (United States Census 2000).
	Beneficial Resources	The coastal sage scrub and mixed grasslands habitats offer roosting and foraging resources for raptors.
Ecological Profile	Habitat Type	The site contains mixed grasslands and some coastal sage scrub habitat. Suitable habitat for the coastal California gnatcatcher and SKR occurs on and immediately adjacent to the site. The site is in a zone suitable as a habitat for the federally endangered SKR.
	Degree of Disturbance	Current and anticipated future activities at the site, such as environmental and ecological surveys, may disturb habitat and/or ecological receptors known or potentially present within the site.
	Ecological Receptors	
	General	Common fauna to NAVWPNSTA Seal Beach Det Fallbrook include mammals (kangaroo rats, voles, deer, mice, ground squirrels, opossum, rabbits, and coyotes), amphibians (tree frogs), reptiles (orange-throated whiptails, rattlesnakes, and horned lizards),

		and birds (burrowing owls, kites, quails, sparrows, kingbirds, and hawks).
	Federal Endangered or Threatened Species	Coastal California gnatcatcher and SKR
	Relationship of Contaminant Sources to Habitat and Potential Receptors	Potential human receptors at the site include Navy personnel and contractors. Ecological receptors may come into direct contact with contaminants in soil while foraging or burrowing. Ecological receptors may also come into contact with contaminants that have been incorporated into the food chain (bioaccumulated in plants and prey).

2.5 SITE UXO1

Table 2.5: Conceptual Site Model Information Profiles – Site UXO1

Information Category	Information Descriptor	Preliminary Assessment Findings
General Information	Installation Name	NAVWPNSTA Seal Beach Det Fallbrook
	Site Name	UXO1 (QE Test Area)
	Site Area and Layout	UXO1 occupies approximately 63 acres and contains several subareas where various range-related, munitions testing, and munitions disposal activities were conducted. The site primarily occupies the upper elevations of a broad drainage with intermittent surface flow.
	Site Structures	The remnants of several concrete huts that were used for shelter, viewing platforms, and storage of the targets remain within the former test area. The 40-foot-long vertical steel plate and backup earthen berm that served as a target is also intact on the site. Half-cylinder covers for two of the three burn/slit trenches remain on the site, as do the two small round metal burn barrels and the drop test tower.
	Site Boundaries	Figure 6 shows the location of UXO1. Unnamed, unimproved roads coincide with the site boundaries, except for the southwestern limits of the site. The boundary to the west and south extends from the end of the unimproved road near the drop test tower, crosses a small drainage, and joins the unimproved

		road along the southeast side of the site.
	Site Security	The site is located on NAVWPNSTA Seal Beach Det Fallbrook, which is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order and for implementing access control policies and procedures. The QE Test Range is also located within a restricted area guarded by the security force.
Munitions/ Release Profile	Munitions Types	UXO1 was originally used as burn and disposal area, then as a testing area for the QE Laboratory, and finally as a range. The types of munitions fired at the range included rifle grenades (both live and smoke), 3.5-inch (in) rockets, 75- mm shells, and 60- and 81-mm mortars. The drop test tower (Building 348) was used to test bomblets from cluster bombs (such as Rockeyes) and other munitions. The majority of the ordnance was reportedly picked up or destroyed by EOD after each test.
	Maximum Probability Penetration Depth	The maximum probability penetration depths for the munitions of concern within the test firing range impact area are approximately: rifle grenades – 0.3 foot, 3.5-in rockets – 1 foot, 75-mm shells – 6.4 feet, 60-mm mortars – 1.5 feet, 81-mm mortars – 3.5 feet, bomblets – 2.4 feet. For the buried munitions and fuels, the anticipated depth of burial is less than 10 feet.
	MEC Density	UXO1 is a known MEC area. The site has a medium MEC density.
	MEC Field Observations	The following munitions were observed during a site visit in 2004: 40-mm cartridges fired from grenade launchers, several impulse cartridges, and several pyrotechnic items such as flares. Several blasting caps, igniters, and small arms ammunition were observed in the two small round metal burn barrels. During a visit by ChaduxTt in June 2007, large amounts of debris from 60-mm, 81-mm, and 4.2-in illumination mortars were observed throughout the site. Rocket motors and tail fins from 66-mm and M72 light anti-tank weapon (LAW) rockets were also observed. A 40-mm target practice grenade was noted at the base of the target area, and the components of several 40-mm smoke grenades were scattered throughout the site.

	Munitions Constituents	The primary MC of concern are: • Rifle grenades: trinitrotoluene (TNT), Royal Demolition Explosive (RDX), zinc oxide smoke, hexacloroethane smoke, aluminum powder, white phosphorus, potassium chlorate, colored smoke, and pentaerythritol tetranitrate (PETN) • 75-mm projectiles: ammonium picrate (Explosive D), ammonium nitrate, iron, and TNT • 60-mm and 81-mm mortars: black powder pellets, smoke mix, zinc oxide smoke, hexacloroethane smoke, aluminum powder, RDX, and TNT • Bomblets: octol, RDX, and TNT • 3.5-in rocket: TNT, RDX, and rocket propellant • Pyrotechnics/blasting caps: titanium tetrachloride, white phosphorus, pyrotechnic composition, lithium hydride, magnesium, RDX, lead styphnate, lead azide, barium, and strontium • Small arms: lead, arsenic antimony, copper, chromium, cadmium, black or smokeless powder constituents, nickel, and zinc
	Migration Routes/Release Mechanisms	The primary potential migration route for MEC and MC is through surface soil erosion (driven by wind or runoff). Potential future construction and particularly excavation activities at the QE Test Area are potential release mechanisms. MC in runoff could migrate to surface water or sediment. Some MC could also leach through soils or surface waters to groundwater.
Physical Profile	Climate	The climate at NAVWPNSTA Seal Beach Det Fallbrook is typical of the prevailing coastal southern California Mediterranean climate and is characterized by mild winters, cool summers, and infrequent rainfall. The annual average temperature is 63 °F. Precipitation ranges from 13.7 to 17.1 inches per year, with January the wettest month and July the driest. Summer and fall at the installation are punctuated by the Santa Ana (offshore) winds.
	Topography	The area is characterized by low perimeter hills that shoulder the head of the south flowing Pilgrim Creek drainage. The central portion of the nearly flat main test area lies immediately west of Pilgrim Creek drainage channel. Local areas of surface disturbance are related to areas that were graded in this area.
	Geology	The region is underlain by granitic and

		metasedimentary rocks of the Peninsular Ranges physiomorphic province. The site appears to be underlain by weathered granitic bedrock with minor amounts of alluvium, colluvium, and shallow undocumented fill related to previous ground disturbance activities at the site (brushing for fire control and construction of berms).
	Soil	The soil at UXO1 is classified as a sandy loam of granitic origin and is moderately well drained.
	Hydrogeology	No site-specific groundwater depth data are available.
	Hydrology	The area is within both the San Luis Rey and Santa Margarita watersheds. The Pilgrim Creek drainage carries seasonal flow south to the southwest corner of the site during the wet season. The drainage continues to flow through MCB Camp Pendleton and into the limits of the City of Oceanside, where it joins the San Luis Rey River.
	Vegetation	The vegetation is considered mostly mixed grassland with some coastal sage scrub. Common species in coastal sage scrub habitat include coastal sagebrush, flattopped buckwheat, laurel sumac, sage, goldenbush, and native grasses. Common species in mixed grassland habitat include native perennial bunch grasses mixed with non-native annuals. The vegetation along the creek is generally considered willow riparian.
Land Use and Exposure Profile	Current Land Use	Site UXO 1 is not developed. Other than the Drop Test Tower structure and a few unimproved roads, it has no current land use other than open space. The site was closed as a range and munitions testing/disposal area in 1989 because the QE Laboratory no longer needed the site as a testing area.
	Current Human Receptors	Navy personnel and Navy-permitted visitors.
	Current Activities (frequency, nature of activity)	The only current activities at the site include environmental and ecological surveys.
	Potential Future Land Use	No change in land use is currently planned; however, due to the significant land area of this site, some other Navy use of the site might occur.
	Potential Future Human Receptors	Navy personnel and Navy contractors.
	Potential Future Land	Likely future activities at the site include fencing,

	Use-Related Activities	along with environmental and ecological surveys. Any other potential future land use activities would have to comply with Navy ESQD restrictions.
	Zoning/Land Use Restrictions	ESQD arc restrictions have been imposed at the site based on the proximity of the site to some of the installation's munitions storage operations. The site also contains known habitat for the SKR, which is a federally listed endangered species.
	Demographics/Zoning	The NAVWPNSTA Seal Beach Det Fallbrook has a workforce of Command personnel made up of approximately 63 military, 65 civilian, and 12 contractors, as well as Tenant personnel composed of 9 military, 126 civilian, and 90 contractors. Demographic data include the following: Town of Fallbrook, population 29,100; and San Diego County, population 2,813,833 (United States Census 2000).
	Beneficial Resources	The coastal sage scrub and mixed grasslands habitats offer roosting and foraging resources for raptors.
Ecological Profile	Habitat Type	UXO1 contains mixed grasslands and some coastal sage scrub habitat. Suitable habitat for the coastal California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher occurs on and immediately adjacent to the site. Suitable habitat exists for the SKR in open areas of the coastal sage scrub, along unimproved roads, and along the edges of paved roads.
	Degree of Disturbance	A portion of the area was graded before its closure in 1989. Also, at least three burn slit trenches (estimated to be a maximum of 10 feet deep) are within the site. Historical photos suggest at least three other buried trenches exist in the central and northwestern portions of the site. Current and anticipated future activities at the site, such as fencing and environmental and ecological surveys, may disturb habitat and/or ecological receptors known or potentially present within the range areas.
	Ecological Receptors	
	General	Common fauna to NAVWPNSTA Seal Beach Det Fallbrook include mammals (kangaroo rats, voles, deer, mice, ground squirrels, opossum, rabbits, and coyotes), amphibians (tree frogs), reptiles (orange-throated whiptails, rattlesnakes, and horned lizards), and birds (burrowing owls, kites, quails, sparrows,

		kingbirds, and hawks).
	Federal Endangered or Threatened Species	Coastal California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, and SKR.
	Relationship of Contaminant Sources to Habitat and Potential Receptors	Potential human receptors at the site include Navy personnel, visitors, and private contractors. Ecological receptors may come into direct contact with contaminants in soil while foraging or burrowing. Ecological receptors may also come into contact with contaminants that have been incorporated into the food chain (bioaccumulated in plants and prey).

2.6 SITE UXO2

Table 2.6: Conceptual Site Model Information Profiles – Site UXO2

Information Category	Information Descriptor	Preliminary Assessment Findings
General Information	Installation Name	NAVWPNSTA Seal Beach Det Fallbrook
	Site Name	UXO2 (Small Arms and Skeet/Trap Ranges)
	Site Area and Layout	UXO2 (Small Arms Range subarea) is located on the south side of Fallbrook Creek, at the western limit of a small meadow area, and occupies 0.4 acre. The range was oriented for firing to the southwest. The guns were fired at targets positioned in front of a natural soil embankment. The firing line was observed during a site survey conducted in 2007 by ChaduxTt. Superimposed over the footprint of the Small Arms Range is the Skeet/Trap Range subarea. The trap and skeet range was located in the central and eastern portion of the meadow, with the firing line located at the base of a low hill that surrounds the area. The Skeet/Trap Range occupied 31 acres and was oriented for firing to the northwest. This SI will address the former Skeet/Trap Range as part of UXO2.
	Site Structures	Some of the wooden target frames and the soil berm are relatively intact on the former Small Arms Range. The remnants of a shed that was used to store the targets can also be seen adjacent to the range. No other structures are present on the former Skeet/Trap Range.
	Site Boundaries	Figure 7 shows the location of the Small Arms Range

		and Skeet/Trap Range. Site features include: • A line of eucalyptus trees gives way north to Fallbrook Creek, which is 40 feet away from the Small Arms Range's northern boundary. • Shrubs and grassland extend southwest toward Building 366, which is approximately 2,790 feet away from the Small Arms Range's southern boundary. • Trees, shrubs, and grassland extend west toward Fallbrook Creek, which is approximately 65 feet away from the Small Arms Range's western boundary. • Trees, shrubs, and grassland extend to the eastern boundary of NAVWPNSTA Seal Beach Det Fallbrook, which is 1,395 feet away from the Small Arms Range's eastern boundary.
	Site Security	The site is located on NAVWPNSTA Seal Beach Det Fallbrook, which is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order and for implementing access control policies and procedures. The Small Arms Range is also located within a restricted area guarded by the security force.
Munitions/ Release Profile	Munitions Types	The former Small Arms Range was used for handgun marksmanship training. The munitions types used at the range include .38- and .45-caliber and 9-mm rounds. Munitions used at the Skeet/Trap range were limited to 12-gauge shotgun shells.
	Maximum Probability Penetration Depth	The penetration depths into the natural berm range from zero to 12 in. Expended shells were observed on the natural berm during site visits in 2004 and 2007. Pellets dispersed from a shotgun at the Skeet/Trap range would not typically penetrate the ground surface. However, the area was reportedly disked for fire control purposes and, as a result, the potential depth of the pellets may have been increased to 24 inches
	MEC Density	No MEC; small arms use only.
	MEC Field Observations	Only bullets and bullet fragments from small arms use were observed during the 2007 site visit. No unexpended rounds were observed.
	Munitions Constituents	Bullets in small arms rounds are mainly composed of lead (approximately 85 percent by weight). Other

		MCs include antimony, arsenic, copper, nickel, zinc, and constituents associated with black or smokeless powder, including nitrocellulose and nitroglycerin. Polynuclear aromatic hydrocarbons (PAH) are potentially present as residue from targets used at the Skeet/Trap Range.
	Migration Routes/Release Mechanisms	MC may migrate through surface soil erosion caused by runoff and wind. Future construction and particularly excavation activities at the site are also potential release mechanisms. MC in runoff could migrate to surface water or sediment. MC could also leach through soils or surface waters to groundwater.
Physical Profile	Climate	The climate at NAVWPNSTA Seal Beach Det Fallbrook is typical of the prevailing coastal southern California Mediterranean climate and is characterized by mild winters, cool summers, and infrequent rainfall. The annual average temperature is 63 °F. Precipitation ranges from 13.7 to 17.1 inches per year, with January the wettest month and July the driest. Summer and fall at the installation are punctuated by the Santa Ana (offshore) winds.
	Topography	The Small Arms Range is essentially flat, except for a natural embankment behind the target butt. The Skeet/Trap Range area consists of low hills to the south and behind the former firing line. The shooting ranging area is essentially flat for a distance of approximately 350 feet where Fallbrook Creek traverses the range.
	Geology	The region is underlain by granitic and metasedimentary rocks of the Peninsular Ranges physiomorphic province. The site appears to be underlain by weathered granitic bedrock with relatively thick accumulations of alluvial soils exposed in the channel walls of the Fallbrook Creek drainage. Relatively fresh granitic exposures were observed in the bottom of the drainage at the time of the site walk by ChaduxTt (2007).
	Soil	The soil at UXO 2 is classified as a sandy loam of granitic origin and is moderately well drained
	Hydrogeology	No site-specific groundwater depth data are available; however, Fallbrook Creek appears to carry surface flow nearly year round. Local perched groundwater is believed present at or immediately above the alluvium

		to bedrock contact.
	Hydrology	The Small Arms Range and Trap/Skeet Range are in the Santa Margarita watershed. The site is located adjacent to and encompasses a portion of Fallbrook Creek, which receives runoff from the Community of Fallbrook.
	Vegetation	The vegetation in the area of UXO2 range is partial mixed grassland with some coastal sage scrub and riparian (adjacent to the Fallbrook Creek).
Land Use and Exposure Profile	Current Land Use	The site is undeveloped and has no current land use except open space. Both the Small Arms Range and Trap/Skeet Range are closed and no longer in use.
	Current Human Receptors	Navy personnel and Navy contractors.
	Current Activities (frequency, nature of activity)	The only current activities at the site include environmental and ecological surveys.
	Potential Future Land Use	Future land use may include cattle grazing.
	Potential Future Human Receptors	Navy personnel and Navy contractors.
	Potential Future Land Use-Related Activities	Potential future land use activities at the site include environmental and ecological surveys, as well as cattle grazing and maintenance.
	Zoning/Land Use Restrictions	No zoning or land use restriction is imposed on this site. However, the site is suitable as habitats for several federally protected and listed species.
	Demographics/Zoning	The NAVWPNSTA Seal Beach Det Fallbrook has a workforce of Command personnel made up of approximately 63 military, 65 civilian, and 12 contractors, as well as Tenant personnel composed of 9 military, 126 civilian, and 90 contractors. Demographic data include the following: Town of Fallbrook, population 29,100; and San Diego County, population 2,813,833 (United States Census 2000).
	Beneficial Resources	The coastal sage scrub vegetation, grasslands, and the nearby eucalyptus grove (riparian area) offer roosting, foraging, and nesting resources for raptors.
Ecological Profile	Habitat Type	The types of habitats associated with the former Small Arms and Skeet/Trap Ranges include mixed grasslands and some coastal sage scrub with riparian adjacent to Fallbrook Creek. Habitats suitable for the coastal California gnatcatcher, least Bell's vireo, and

		southwestern willow flycatcher occur on and immediately adjacent to the site.
	Degree of Disturbance	Current and anticipated future activities at the site, such as fencing and environmental and ecological surveys, may disturb habitat and/or ecological receptors known or potentially present within range areas.
	Ecological Receptors	
	General	Common fauna include mammals (kangaroo rats, voles, deer, mice, ground squirrels, opossum, rabbits, and coyotes), amphibians (tree frogs), reptiles (orange-throated whiptails, rattlesnakes, and horned lizards), and birds (burrowing owls, kites, quails, sparrows, kingbirds, and hawks).
	Federal Endangered or Threatened Species	Least Bell's vireo, coastal California gnatcatcher, and southwestern willow flycatcher.
	Relationship of Contaminant Sources to Habitat and Potential Receptors	Potential human receptors at the site include Navy personnel and contractors. Ecological receptors may come into direct contact with contaminants in soil while foraging or burrowing. Ecological receptors may also come into contact with contaminants that have been incorporated into the food chain (bioaccumulated in plants and prey).

2.7 SITE UXO3

Table 2.7: Conceptual Site Model Information Profiles – Site UXO3

Information Category	Information Descriptor	Preliminary Assessment Findings
General Information	Installation Name	NAVWPNSTA Seal Beach Det Fallbrook
	Site Name	UXO3 (DDS 1)
	Site Area and Layout	UXO3 covers approximately 7.8 acres. It extends north and east in a "Y" shape and encompasses two intermittent stream drainages that join and drain to the west. The area includes the drainage beds, the bank, and immediately adjacent ground that parallel the drainages.
	Site Structures	No structures currently are on DDS 1.
	Site Boundaries	Figure 8 shows the location of DDS 1. • An unpaved road borders the site to the north, with an open area of coastal sage scrub beyond. Farther

		north is Redeye Road, Building 301, and a magazine area. • The site is bordered to the south by coastal sage scrub habitat. Magazine and parking areas are located farther south. • The site is bordered to the west by coastal sage scrub habitat. Magazine areas are located further west. • East of the site is Redeye Road and a magazine area.
	Site Security	The site is located on NAVWPNSTA Seal Beach Det Fallbrook, which is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order and for implementing access control policies and procedures. DDS 1 is also located within a restricted area guarded by the security force.
Munitions/ Release Profile	Munitions Types	The following munitions were observed during the Malcolm Pirnie 2004 site visit: inert rocket motors, practice 2,000-pound bombs, a suspected HE 20-mm projectile, several igniters, and other scrap. Several 20-mm projectiles, along with several empty cartridge cases, were observed during the ChaduxTt 2007 visit. Also, a large amount of 5.56-mm and 7.62-mm ammunition was on the ground in the same vicinity. Three fire bombs found on the site were identified as 750-pound napalm bombs. The bombs were empty with no fusing observed. The area also contained large numbers of expended igniter tubes and igniter cartridges.
	Maximum Probability Penetration Depth	Munitions at DDS 1 would be below surface because of burial and not through penetration. The depth of MEC would depend on how disposal was accomplished.
	MEC Density	DDS 1 has known and suspected areas of MEC. The site is assigned a medium MEC density; however, some areas of the site may have a higher or lower density, depending on disposal practices.
	MEC Field Observations	The following munitions were observed during the 2004 site visit: inert rocket motors, practice 2,000-pound bombs, an HE 20-mm projectile, several igniters, and other scrap. Munitions observed during the 2007 site visit included 20-mm projectiles, along

		with several empty cartridge cases. Also, a large amount of 5.56-mm and 7.62-mm ammunition was on the ground in the same vicinity. Three 750-pound apparently empty napalm bombs were identified. Large numbers of expended igniter tubes and igniter cartridges were also present.
	Munitions Constituents	The primary MC of concern are: • 20-mm projectile: polymer-bonded explosive (PBX), high melting explosive (HMX), zirconium pellets, fluoroelastomers, RDX, aluminum • Pyrotechnics: white phosphorus, pyrotechnic composition, lithium hydride, magnesium, titanium tetrachloride, RDX, lead styphnate, lead oxide, barium, and strontium
	Migration Routes/Release Mechanisms	MEC and MC may migrate through surface soil erosion caused by runoff and wind. Future construction, excavation, and maintenance at the site are also potential release mechanisms. MC in runoff could migrate to surface water or sediment. MC could also leach through soils or surface waters to groundwater.
Physical Profile	Climate	The climate at NAVWPNSTA Seal Beach Det Fallbrook is typical of the prevailing coastal southern California Mediterranean climate and is characterized by mild winters, cool summers, and infrequent rainfall. The annual average temperature is 63 °F. Precipitation ranges from 13.7 to 17.1 inches per year, with January the wettest month and July the driest. Summer and fall at the installation are punctuated by the Santa Ana (offshore) winds.
	Topography	UXO3 is characterized by a "y" shaped drainage in which dunnage was disposed of. The drainage ranges in depth from 5 feet in the east to 20 feet at the western limit of the site. The banks of the drainage are relatively steep to near vertical in some areas. The area surrounding the drainage is primarily shallow to moderately sloping natural grades.
	Geology	The region is underlain by granitic and metasedimentary rocks of the Peninsular Ranges physiomorphic province. The drainages expose moderately weathered to unweathered granite in the bottoms that is, in turn, overlain by alluvial and colluvial soils, as well as minor amounts of

		undocumented fill and debris.
	Soil	The soil is classified as a sandy loam of granitic origin and is moderately well drained.
	Hydrogeology	No site-specific groundwater depth data are available.
	Hydrology	UXO3 is within the Santa Margarita watershed. No permanent surface water bodies are within the area, but intermittent flow is likely within the existing drainages.
	Vegetation	The vegetation is considered mostly coastal sage scrub with some riparian habitat. Common species in coastal sage scrub habitat include coastal sagebrush, buckwheat, laurel sumac, sage, goldenbush, and native grasses. Common species in riparian habitat include mulefat, arroyo willows, and elderberry.
Land Use and Exposure Profile	Current Land Use	There is no current use of this site other than open space. Dunnage disposal activities at this site ceased in 1978.
	Current Human Receptors	Navy personnel and Navy contractors.
	Current Activities (frequency, nature of activity)	The only current activities at the site include environmental and ecological surveys.
	Potential Future Land Use	Future land use may include cattle grazing.
	Potential Future Human Receptors	Navy personnel and Navy contractors.
	Potential Future Land Use-Related Activities	Likely potential future activities at the site include fencing, environmental and ecological surveys, as well as maintenance for cattle grazing. Any other potential future land use activities would have to follow any Navy ESQD arc restrictions.
	Zoning/Land Use Restrictions	ESQD arc restrictions apply to the area.
	Demographics/Zoning	The NAVWPNSTA Seal Beach Det Fallbrook has a workforce of Command personnel made up of approximately 63 military, 65 civilian, and 12 contractors, as well as Tenant personnel composed of 9 military, 126 civilian, and 90 contractors. Demographic data include the following: Town of Fallbrook, population 29,100; and San Diego County, population 2,813,833 (United States Census 2000).
	Beneficial Resources	The coastal sage scrub habitat offers roosting and foraging resources for raptors.

Ecological Profile	Habitat Type	UXO3 contains coastal sage scrub habitat and some riparian habitat.
	Degree of Disturbance	Current and anticipated future activities at the site, such as environmental and ecological surveys, may disturb habitat and/or ecological receptors known or potentially present within the site.
	Ecological Receptors	
	General	Common fauna include mammals (kangaroo rats, voles, deer, mice, ground squirrels, opossum, rabbits, and coyotes), amphibians (tree frogs), reptiles (orange-throated whiptails, rattlesnakes, and horned lizards), and birds (burrowing owls, kites, quails, sparrows, kingbirds, and hawks).
	Federal Endangered or Threatened Species	SKR and coastal California gnatcatcher.
	Relationship of Contaminant Sources to Habitat and Potential Receptors	Potential human receptors at the site include Navy personnel and contractors. Ecological receptors may come into direct contact with MEC or MC in surface or subsurface soil while foraging or burrowing. Ecological receptors may also come into contact with contaminants that have been incorporated into the food chain (bioaccumulated in plants and prey).

2.8 SITE UXO4

Table 2.8: Conceptual Site Model Information Profiles – Site UXO4

Information Category	Information Descriptor	Preliminary Assessment Findings
General Information	Installation Name	NAVWPNSTA Seal Beach Det Fallbrook
	Site Name	UXO4 (DDS 3)
	Site Area and Layout	UXO4 is roughly triangular in shape and occupies 1.8 acres on the north side of the intersection of Terrier and Sidewinder Roads. The roads were constructed in 1945.
	Site Structures	No structures currently are on UXO4.
	Site Boundaries	Figure 9 shows the location of UXO4. • Terrier Road bounds the site to the north, with magazine storage facilities beyond. • Sidewinder Road bounds the site to the south, with grassland beyond.

		• Grassland bounds the site to the west.
	Site Security	The site is located on NAVWPNSTA Seal Beach Det Fallbrook, which is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order and for implementing access control policies and procedures. UXO4 is also located within a restricted area guarded by the security force.
Munitions/ Release Profile	Munitions Types	The following munitions were observed during the 2004 site visit: inert rifle grenades, a 60-mm mortar, and other munitions scrap. A rifle grenade was observed during the 2007 site visit. The grenade appeared inert and was broken apart, with no apparent fusing. A small amount of metal debris, some partially buried, was in the same vicinity. Interviews and documentation relating to the site indicate that only inert ordnance was buried at the site. Possibly, other live ordnance is buried at the site (Malcolm Pirnie 2006).
	Maximum Probability Penetration Depth	Munitions are anticipated below surface because of burial and not penetration. The depth of MEC would depend on the reported disposal activities; however, burial depths are believed less than 10 feet.
	MEC Density	UXO4 has a small known area of MEC. The site is suspected to have a low density of MEC.
	MEC Field Observations	The following munitions were observed during the 2004 site visit: inert rifle grenades and other munitions scrap. An inert rifle grenade was also observed during the 2007 site visit.
	Munitions Constituents	Live ordnance may be buried at the site, including the following specific munitions and associated MEC/MC: • 60-mm mortars: RDX, black powder pellets, zinc oxide smoke, hexacloroethane smoke, aluminum powder, and TNT • Rifle grenades: TNT, RDX, zinc oxide smoke, hexacloroethane smoke, aluminum powder, white phosphorus, potassium chlorate, colored smoke, and PETN
	Migration Routes/Release Mechanisms	MEC and MC may migrate through surface soil erosion caused by runoff and wind. If development or construction activities (particularly excavations) occur at the site, this would represent a potential release mechanism. MC in runoff could migrate to surface water or sediment. MC could also leach through soils

		or surface waters to groundwater.
Physical Profile	Climate	The climate at NAVWPNSTA Seal Beach Det Fallbrook is typical of the prevailing coastal southern California Mediterranean climate and is characterized by mild winters, cool summers, and infrequent rainfall. The annual average temperature is 63 °F. Precipitation ranges from 13.7 to 17.1 inches per year, with January the wettest month and July the driest. Summer and fall at the installation are punctuated by the Santa Ana (offshore) winds.
	Topography	UXO4 is a relatively flat area, subjacent to Terrier and Sidewinder Roads. A shallow drainage swale traverses the site in a northwesterly direction. The swale extends from a corrugated metal pipe culvert below Sidewinder Road.
	Geology	The region is underlain by granitic and metasedimentary rocks of the Peninsular Ranges physiomorphic province. Weathered granitic bedrock underlies the site with man-placed embankments related to the adjacent roads located to the east and south.
	Soil	The soil may be classified as a sandy loam of granitic origin and is moderately well drained.
	Hydrogeology	No site-specific groundwater depth data are available.
	Hydrology	UXO4 is located within the Santa Margarita watershed. No permanent surface water bodies are within or adjacent to the site.
	Vegetation	The vegetation in the area is considered mostly mixed grassland. Common species in mixed grassland habitat include native perennial bunch grasses such as *Nassella* spp. mixed with nonnative annuals.
Land Use and Exposure Profile	Current Land Use	The site is undeveloped and the only current land use is open space. Dunnage disposal activities at the site ceased in 1978.
	Current Human Receptors	Navy personnel and Navy contractors.
	Current Activities (frequency, nature of activity)	The only current activities at the site include environmental and ecological surveys.
	Potential Future Land Use	No change in land use is planned.
	Potential Future Human Receptors	Navy personnel and Navy-permitted visitors.

	Potential Future Land Use-Related Activities	Any potential future land use would have to follow any Navy ESQD arc restrictions. Other potential future activities at the site include fencing, along with environmental and ecological surveys.
	Zoning/Land Use Restrictions	ESQD arc restrictions apply to this site because of its proximity to some of the installation's munitions storage operations. The site is also a suitable habitat for the SKR, a federally listed endangered species.
	Demographics/Zoning	The NAVWPNSTA Seal Beach Det Fallbrook has a workforce of Command personnel made up of approximately 63 military, 65 civilian, and 12 contractors, as well as Tenant personnel composed of 9 military, 126 civilian, and 90 contractors. Demographic data include the following: Town of Fallbrook, population 29,100; and San Diego County, population 2,813,833 (United States Census 2000).
	Beneficial Resources	Mixed grasslands habitats offer roosting and foraging resources for raptors.
Ecological Profile	Habitat Type	DDS #3 contains mixed grasslands and coastal sage scrub habitat. Habitat suitable for the SKR and coastal California gnatcatcher occurs on and immediately adjacent to the site.
	Degree of Disturbance	Current and anticipated future activities at the site, such as fencing and environmental and ecological surveys, may disturb habitat and/or ecological receptors known or potentially present within the site.
	Ecological Receptors	
	General	Common fauna include mammals (kangaroo rats, voles, deer, mice, ground squirrels, opossum, rabbits, and coyotes), amphibians (tree frogs), reptiles (orange-throated whiptails, rattlesnakes, and horned lizards), and birds (burrowing owls, kites, quails, sparrows, kingbirds, and hawks).
	Federal Endangered or Threatened Species	SKR and coastal California gnatcatcher.
	Relationship of Contaminant Sources to Habitat and Potential Receptors	Potential human receptors at the site include Navy personnel and contractors. Ecological receptors may come into direct contact with MEC or MC in surface or subsurface soil while foraging or burrowing. Ecological receptors may also come into contact with contaminants that have been incorporated into the food chain (bioaccumulated in plants and prey).

2.9 SITE UXO6

Table 2.9: Conceptual Site Model Information Profiles – Site UXO6		
Information Category	**Information Descriptor**	**Preliminary Assessment Findings**
General Information	Installation Name	NAVWPNSTA Seal Beach Det Fallbrook
	Site Name	UXO6 (Depot Lake)
	Site Area and Layout	Depot Lake is fed by two tributaries from the north and east, and held by an earthen dam at the southern end. Water is released from the lake by a spillway running beneath Terrier Road to the south.
	Site Structures	No structures are currently within or on the shores of Depot Lake. Remnants of wooden pier foundations may be observed on the northwest side of the Lake. The pier was reportedly burned during a wildfire that affected the area several years ago.
	Site Boundaries	Figure 10 shows the following: • Coastal sage scrub extends north of the lake. • Terrier Road follows the shoreline of the lake on the south and west. A spillway under Terrier Road to the south is used to release water from Depot Lake. Magazines are located within 200 feet south of the lake and within 850 feet west of the lake. • The northeast portion of the lake is bounded by grassland. Magazines are located within 200 feet east of the lake.
	Site Security	Det Fallbrook is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order, and for implementing access control policies and procedures. Once inside the installation, Depot Lake is located inside a controlled area. Portions of Depot Lake are fenced to protect habitat around the lake.
Munitions/ Release Profile	Munitions Types	Historical records indicate that 20-mm, 40-mm, and 60-mm cartridges, 7.2-in projector charges, and possibly other munitions were dumped into the lake during WWII.

	Maximum Probability Penetration Depth	Penetration from firing is not a factor at Depot Lake because it is a disposal site. MEC at Depot Lake could be partially buried in the sediment below the water surface. The depth of MEC would depend on sediment loading.
	MEC Density	Depot Lake is a suspected MEC area. The site is suspected to have a low MEC density; however, some areas of the site may have a higher or lower density depending on disposal practices.
	MECField Observations	No munitions or remnants thereof were observed during the 2007 site visit.
	Munitions Constituents	The primary MC of concern are: • 20-mm, 40-mm, and 60-mm cartridges: PBX, zirconium pellets, RDX, black powder, HMX, beryllium, chromium, cobalt, copper, lead, manganese, lead azide, lead styphnate, phosphorus, antimony sulfide, zinc, zinc stearate, aluminum, cadmium, copper salt, cumene hydroperoxide, methyl chloroform, sodium nitrate, toluene, triethylamine, xylenes, zinc phosphate, lead chromate (VI), 2-ethoxyethylacetate, and lead naphthenate • 7.2-inch projector charges: TNT, RDX, lead, and aluminum.
	Migration Routes/Release Mechanisms	Migration of MEC and MC may occur through sediment transport and deposition. Future construction, excavation, and maintenance at the site are also potential release mechanisms. MC could leach from the munitions into the lake, and the lake can carry contaminated water and sediments off the installation via the spillway. Potentially contaminated lake water could also migrate during its use for wildfire suppression. Lake water contaminated with MC might infiltrate into the groundwater directly, then transport to surface waters by surface water/groundwater interaction. Potentially contaminated lake water can also reach surface water as overflow from the lake.
Physical Profile	Climate	The climate at Detachment Fallbrook is typical of the prevailing southern California Mediterranean climate and is characterized by mild winters, cool summers, and infrequent rainfall. The annual average temperature is 63 °F. Precipitation ranges from 13.7 to 17.1 inches per year, with January being the wettest month and July

		the driest. Summers at the installation are punctuated by the Santa Ana (offshore) winds.
	Topography	Depot Lake is located within the lower elevations of a reservoir constructed in a natural drainage that is fed by two tributaries. The drainage is surrounded by low hills. Specific bathymetry for the lake is unknown; however, the maximum water depth when the reservoir is full is anticipated to be approximately 18 feet.
	Geology	The region is underlain by granitic and metasedimentary rocks of the Peninsular Ranges geomorphic province. Drainages in this area typically contain shallow accumulations of alluvial and/or colluvial soils. These natural materials are commonly mantled with sediments related to lake deposition after construction of the earthen embankment that formed the lake. Site-specific information was not available at the time of this plan preparation.
	Soil	The soil surrounding Depot Lake and the sediment in the lake are classified as course sandy loam of granitic origin.
	Hydrogeology	No site-specific groundwater depth data are available. However, groundwater is anticipated to be found at the interface of the overlying alluvium and underlying granitic bedrock. The depth of this interface may vary significantly; however, within the installation, the alluvial thickness typically is less than 20 feet in some of the more mature drainages.
	Hydrology	Depot Lake is within the Santa Margarita watershed. Depot Lake is used to store water on the installation for fish and wildlife enhancement, and for wildfire protection. The lake is approximately 4 to 10 feet deep in the summer months and 6 to 18 feet deep in the winter months. The lake is fed by two tributaries from the north and east, and held by an earthen dam at the southern end. Water is released from the lake by a concrete spillway that allows overflow to run across the dam embankment, which also supports Terrier Road. The surrounding topographically higher areas to the east would drain into Depot Lake.
	Vegetation	The vegetation in the area of Depot Lake is considered riparian on the shoreline, surrounded by mixed grassland to the north and east, and coastal sage scrub to the south and west. Common species in mixed grassland habitat include native, perennial bunch grasses mixed

		with nonnative annuals. Common species in coastal sage scrub habitat include coastal sagebrush, flat-topped buckwheat, laurel sumac, sage, goldenbush, and native grasses. Species common in riparian habitat include mulefat, arroyo willows, and elderberry.
Land Use and Exposure Profile	Current Land Use	Depot Lake is used to store water on the installation for fish and wildlife enhancement, and for wildfire protection. Depot Lake was used for recreational fishing by Navy personnel and visitors by boat and wading. As of 2004, all recreational activities on the lake were suspended until further investigation under IRP and MRP.
	Current Human Receptors	Navy personnel and Navy contractors.
	Current Activities (frequency, nature of activity)	Supplying water for wildfire suppression.
	Potential Future Land Use	Potential future land use could include providing a water supply for cattle grazing. No change in land use is planned.
	Potential Future Human Receptors	Navy personnel and Navy-permitted visitors (including contractors).
	Potential Future Land Use-Related Activities	Any potential future use activities would have to follow any Navy ESQD arc restrictions. Other potential future activities at the site include environmental and ecological surveys.
	Zoning/Land Use Restrictions	Due to the proximity of the site to some of the installation's munitions storage bunkers, ESQD arc restrictions apply to Depot Lake.
	Demographics/Zoning	Detachment Fallbrook has a workforce of command personnel comprised of 63 military, 65 civilian, and 12 contractors, as well as Tenant personnel comprised of 9 military, 126 civilian, and 90 contractors. Demographic data include the following: Town of Fallbrook, population 29,100; and San Diego County, population 2,813,833 (United States Census 2000).
	Beneficial Resources	Depot Lake is used for wildfire protection. The 1996 Integrated Natural Resources Management Plan reports the presence of sensitive riparian vegetative communities surrounding Depot Lake. Depot Lake is surrounded by habitat for the coastal California gnatcatcher, and a management area for the Least Bell's vireo.

Ecological Profile	Habitat Type	Depot Lake is a riparian habitat and is surrounded by mixed grasslands and some coastal sage scrub habitat.
	Degree of Disturbance	Disturbance at Depot Lake is expected to be low. The lake is used as a water supply. Disturbance below the water level is expected to be minimal. However, if the lake is used for grazing cow's water supply, the disturbance below the water level is anticipated to be high.
	Ecological Receptors	
	General	Common flora/fauna includes mammals (kangaroo rats, voles, deer, mice, ground squirrels, opossum, rabbits, and coyotes), amphibians (tree frogs and bull frogs), reptiles (orange-throated whiptails, rattlesnakes, and horned lizards), and birds (burrowing owls, kites, quails, sparrows, kingbirds, and hawks). Fish species occurring in the lake include catfish, sunfish, and bass.
	Federal Endangered or Threatened Species	Coastal California gnatcatcher, Least Bell's vireo, and southwestern willow flycatcher.
	Relationship of Contaminant Sources to Habitat and Potential Receptors	Potential human receptors at the Depot Lake include Navy personnel, visitors, and private contractors. Ecological receptors may come into direct contact with MEC and/or MC in the water. Receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). Also, a potentially complete exposure pathway exists for the general public coming into contact with MC migrating off the installation through the surface water system.

2.10 SITE UXO7

Table 2.10: Conceptual Site Model Information Profiles – Site UXO7

Information Category	Information Descriptor	Preliminary Assessment Findings
General Information	Installation Name	NAVWPNSTA Seal Beach Det Fallbrook
	Site Name	UXO7 (Lower Lake)
	Site Area and Layout	Lower Lake is fed by streams from the north, east, and west, and held by an earthen dam at the western end.
	Site Structures	No structures other than the dam embankment and drain inlet are currently on UXO7. Field fencing separates the lake from open access.

	Site Boundaries	Figure 11 shows the location of UXO7. • Coastal sage scrub extends north of the lake. • Mixed grassland and coastal sage scrub habitat are located south of the lake. • The boundary of the installation is within approximately 1,000 feet west of the lake. • Mixed grassland and coastal sage scrub habitat are located east of the lake. Magazines are located within approximately 1,500 feet east of the lake.
	Site Security	Detachment Fallbrook is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order, and for implementing access control policies and procedures. Once inside the installation, Lower Lake is located inside a controlled area.
Munitions/ Release Profile	Munitions Types	Historical records indicate that 20-mm, 40-mm, and 60-mm cartridges, 7.2-in projector charges, and possibly other munitions were dumped into the lake during WWII.
	Maximum Probability Penetration Depth	Penetration from firing is not a factor at Lower Lake because it is a reported disposal site. MEC at Lower Lake is anticipated to be below the water surface, covered with a relatively thin layer of sediment or organic debris, depending on sediment deposition rates.
	MEC Density	Lower Lake is a suspected MEC area. The site is suspected to have a medium MEC density; however, some areas of the lake may have a higher or lower density depending on disposal practices.
	MEC Field Observations	No munitions or remnants thereof were observed during the 2007 site visit.
	Munitions Constituents	The primary MC of concern are: • 20-mm, 40-mm, and 60-mm cartridges: PBX, zirconium pellets, RDX, black powder, HMX, beryllium, cobalt, copper, lead, manganese, lead azide, lead styphnate, phosphorus, antimony sulfide, zinc, zinc stearate, aluminum, cadmium, chromium, copper salt, cumene hydroperoxide, methyl chloroform, sodium nitrate, toluene, triethylamine, xylenes, zinc phosphate, lead chromate (VI), 2-ethoxyethylacetate, and lead naphthenate • 7.2-inch projector charges: TNT, RDX, lead, and

		aluminum.
	Migration Routes/Release Mechanisms	Migration of MEC and MC may occur through sediment transport and deposition. Future construction, excavation, and maintenance at the site are also potential release mechanisms. MC could leach from the munitions into the lake. Potentially contaminated lake water could also migrate during its use for fire suppression. Lake water contaminated with MC might infiltrate into the groundwater.
Physical Profile	Climate	The climate at Detachment Fallbrook is typical of the prevailing southern California Mediterranean climate and is characterized by mild winters, cool summers, and infrequent rainfall. The annual average temperature is 63 °F. Precipitation ranges from 13.7 to 17.1 inches per year, with January being the wettest month and July the driest. Summers at the installation are punctuated by the Santa Ana (offshore) winds.
	Topography	The area surrounding Lower Lake contains low hills. Specific bathymetry for Lower Lake is unknown.
	Geology	The region is underlain by granitic and metasedimentary rocks of the Peninsular Ranges geomorphic province. Drainages in this area typically contain shallow accumulations of alluvial and/or colluvial soils. These natural materials are commonly mantled with sediments related to lake deposition after construction of the earthen embankment that formed the lake. Site-specific information was not available at the time this plan was prepared.
	Soil	The soil surrounding Lower Lake and the sediment in the lake are classified as coarse sandy loam of granitic origin.
	Hydrogeology	No site-specific groundwater depth data are available. However, presence of groundwater is anticipated at the interface of the overlying alluvium and underlying granitic bedrock. The depth of this interface may vary significantly; however, within the installation, the alluvial thickness typically is less than 20 feet in some of the more mature drainages.
	Hydrology	Lower Lake is within the watershed of the Santa Margarita River. The lake is approximately 8 to 16 feet deep during the summer months and 12 to 25 feet deep during the winter months.

	Vegetation	The vegetation in the area of Lower Lake is considered riparian in the shoreline, surrounded by mixed grassland to the south and east and coastal sage scrub to the north and west. Common species in mixed grassland habitat include native, perennial bunch grasses such as *Nassella* spp. mixed with nonnative annuals. Common species in coastal sage scrub habitat include coastal sagebrush, flat-topped buckwheat, laurel sumac, sage, goldenbush, and native grasses. Species common in riparian habitat include mulefat, arroyo willow, and elderberry.
Land Use and Exposure Profile	Current Land Use	Lower Lake is used to store water on the installation for fish and wildlife enhancement, and for wildfire protection. Lower Lake was used for recreational fishing by boat and wading. As of 2004, all recreational activities on the lake were suspended until further investigation under IRP and MRP.
	Current Human Receptors	Navy personnel and Navy contractors.
	Current Activities (frequency, nature of activity)	Supplying water for wildfire suppression.
	Potential Future Land Use	Potential future land use may include providing water for cattle grazing activities.
	Potential Future Human Receptors	Navy personnel and Navy-permitted visitors (including contractors).
	Potential Future Land Use-Related Activities	Any potential future use activities would have to follow any Navy ESQD arc restrictions. Other potential future activities at the site include fencing, environmental and ecological surveys, as well as maintenance of water supply systems for cattle grazing.
	Zoning/Land Use Restrictions	Due to the proximity of the site to some of the installation's munitions storage bunkers, ESQD arc restrictions apply to Lower Lake.
	Demographics/Zoning	The Detachment Fallbrook has a workforce of Command personnel comprised of 63 military, 65 civilian, and 12 contractors, as well as Tenant personnel comprised of 9 military, 126 civilian and 90 contractors. Demographic data include the following: Town of Fallbrook, population 29,100; and San Diego County, population 2,813,833 (United States Census 2000).
	Beneficial Resources	Least Bell's vireo habitat and water storage.

Ecological Profile	Habitat Type	Lower Lake is a riparian habitat and is surrounded by mixed grasslands and coastal sage scrub habitat.
	Degree of Disturbance	Disturbance at Lower Lake is expected to be low. The lake supplies water for wildfire suppression. Disturbance below the water level is expected to be minimal. However, if the lake is used for grazing cow's water supply, the disturbance below the water level is anticipated to be high.
	Ecological Receptors	
	General	Common flora/fauna includes mammals (kangaroo rats, voles, deer, mice, ground squirrels, opossum, rabbits, and coyotes), amphibians (tree frogs and bull frogs), reptiles (orange-throated whiptails, rattlesnakes, and horned lizards), and birds (burrowing owls, kites, sparrows, kingbirds, and hawks). Fish species occurring in the lake include catfish, sunfish, and bass.
	Federal Endangered or Threatened Species	Coastal California gnatcatcher, Least Bell's vireo, and Southwestern willow flycatcher.
	Relationship of Contaminant Sources to Habitat and Potential Receptors	Potential human receptors at the Lower Lake include Navy personnel, visitors, and private contractors. Ecological receptors may come into direct contact with MEC and/or MC in the water or with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). Also, a potentially complete exposure pathway exists for the general public coming into contact with MC migrating off the installation through the surface water system.

3.0 DATA GENERATION AND ACQUISITION

The following discusses the site inspection for each of the sites. Investigation methods are presented first, followed by a site-by-site discussion of how these will be employed.

3.1 INVESTIGATION METHODS

This section briefly describes the methods that will be employed during the SI. Additional information on field methods is provided in the SAP (Attachment 1).

3.1.1 Site Access

Access for some the IRP and MRP sites requires biological avoidance and minimization measures and may require the use of a brush hog for the clearance of vegetation to provide access routes to the sites. A detailed description of the planned biological avoidance and minimization measures and site access for each of the IRP and MRP sites is provided in Appendix B. The site locations, proposed vehicle access routes, staging areas, habitat information, and proposed fencing alignments for each of the sites are shown in Figures B-1 through B-11.

3.1.2 Fencing Installation

In order to prevent access to grazing cattle, installing a maximum of five-stand wire fencing is proposed at IRP Sites 34b and 34e, as well as MRP Sites UXO1, UXO 2, UXO3, UXO4, and UXO7 . The installation of fencing requires stringing wire and driving fence posts. Fencing installation activities for these sites require biological avoidance and minimization measures, and may require the use of a brush hog for the clearance of vegetation along the alignment in order to provide access. In natural areas, required brushing will occur along the fence alignment to a maximum width of 6 feet. Where existing roads are present, fencing activities are anticipated within a lateral distance of 3 to 6 feet of any existing improved or unimproved road surface. A detailed description of the planned biological avoidance and minimization measures and fencing installation for the IRP and MRP sites is provided in Appendix A. The location of the proposed fencing adjacent to road alignments and proposed fencing in natural areas that may require brush clearance are shown in Figures A-3, A-5 through A-9, and A-11 of Appendix A.

3.1.3 MEC Avoidance Measures

Sites UXO1, UXO3, UXO4, UXO6, and UXO7 require procedures to avoid disturbing MEC during the site inspection. A UXO technician will be present during field activity at these sites to provide clearance for sampling. Other duties of the UXO technician include clearing and restricting work areas, establishing necessary controls, and otherwise protecting personnel.

Prior to sampling, a Schonstedt Magnetic Locator GA-52Cx (magnetic gradiometer) or equivalent will be used to screen each proposed sample location. The Schonstedt Magnetic Locator GA-52Cx has two fixed fluxgate magnetic sensors spaced about 20 in apart that are passed closely to and over the ground. Audible frequency of the sound emitted from the instrument is a function of the magnetic field gradient between the two sensors. When not in close proximity to a magnetic object, where the instrument is primarily detecting the earth's magnetic field, a low frequency audible sound is emitted. When the instrument passes over buried iron-containing objects, the magnetic field is significantly different at the two sensors and the frequency of the emitted sound increases. The magnetic gradiometer can be used to detect magnetic anomalies to an approximate depth of 2 to 3 feet, depending on the size and orientation of the target . This instrument or its equivalent will therefore be used to clear the proposed

surface soil sampling locations. A magnetic gradiometer adapted for use in down-hole applications will also be used to screen the location for buried objects that might be munitions, prior to any deeper (subsurface) sampling. If an anomaly is detected, the sampling location will be marked and avoided, and an alternative sampling location will be designated.

3.1.4 Biological Avoidance and Minimization Measures

A Biological Avoidance and Minimization Plan has been prepared and is included as Appendix A of this Work Plan. The avoidance and minimization plan was developed based upon previous consultation with the United States Fish and Wildlife Ser and an "Endangered Species Assessment" prepared by Arthur Davenport in 2007, documentation of which are provided as Attachments 1 and 2 of Appendix A, respectively. In addition, the best available data from past and current Station surveys of federally listed species were reviewed for the assessment of potential effects and development of proposed avoidance and minimization measures.

In an effort to avoid impacts to endangered and threatened species, the Biological Avoidance and Minimization Plan provides guidance as to how the qualified biologist will monitor the SI field work at all sites. The plan defines the field team's approach at all IRP and MRP sites with the exception of IRP Site 32, which does not encroach upon sensitive species habitats. The qualifications of the biologist will include appropriate endangered species permits with the USFWS or will be subject to approval by the Station program manager and USFWS. The biologist will be involved in implementing biological avoidance and minimization measures and will ensure compliance with environmental protection measures for all SI fieldwork. Appendix A of this Work Plan provides the details for all planned biological avoidance and minimization measures.

3.1.5 Cultural Resources Avoidance and Minimization Measures

Cultural resources are historic or prehistoric objects, sites, buildings, or districts related to past human activity. Federal and state laws require their preservation and protection. Cultural resources are known to exist within and/or in the general vicinity of IRP Site 34d and MRP Site UXO1. As a result, the Navy plans to comply with the substantive requirements of Section 106 of the National Historic Preservation Act (NHPA), and is contacting the State Historic Preservation Officer (SHPO) and federally and non-federally recognized Native American Tribes affiliated with the NAVWPNSTA Seal Beach Detachment Fallbrook area.

In an effort to avoid impacts to cultural resources, the Navy is proposing that a qualified archeologist and a Native American monitor observe all ground disturbing SI fieldwork on these two sites (UX01, 34d)—if the services of a Native American monitor who meets the applicable health and safety requirements for work on IR/MRP sites can be secured. A Work Plan detailing the cultural resources requirements established by the Navy's substantive compliance effort shall be prepared and submitted to the Navy for acceptance prior to SI fieldwork.

Every effort will be made to avoid and preserve cultural resources. All on-site personnel will be briefed on the need for minimizing impacts on cultural resources before the start of any activities. The activities may include, but not be limited to, road or access clearance, geophysical surveys, visual surveys, soil sampling (hand auger or limited-access, track-mounted drill), and fence installation.

The qualified archeologist and Native American monitor is expected to perform surveys or visual site inspections of these sites prior to any ground disturbing fieldwork and all ground disturbing activity. Care will be taken during clearance activities to avoid disturbance of any possible cultural artifacts. Any discovered items of possible cultural significance will be marked, and the field personnel will be notified of the finding. Work in the immediate area of an artifact will be halted or diverted from the area until a qualified person properly inspects the item.

3.1.6 X-Ray Fluorescence

A portable X-ray fluorescence (XRF) unit will be employed at UXO2 (Small Arms and the Trap/Skeet Ranges). The unit will allow real-time analysis in the field for lead. The XRF unit uses spectrometry to identify and quantify lead in a prepared soil sample. Samples will be ground, dried, and sieved before they are analyzed. A minimum of 20 per cent of the soil samples collected and analyzed using the XRF methodology in the field will be sent a fixed laboratory for duplicate analysis.

3.1.7 Geophysical Surveying

3.1.7.1 Geophysical Surveys for MRP Sites UXO1 and UXO4

Geophysical surveys will be conducted at accessible portions of MRP Sites UXO1 and UXO4 to aid in the detection of possible subsurface munitions and in selection of soil sampling locations. Non-accessible portions of these sites include areas where there are biological avoidance issues, safety hazards, or obstructive dense vegetation that is not feasible to clear. The surveys will be conducted using an EM61 detector or equivalent. The EM61 is a time-domain device used for detecting buried electrically conductive objects. The instrument measures induced secondary magnetic fields in electrically conductive materials. Due to the instrument's unique coil arrangement, the response curve is a single, well-defined positive peak directly over a buried electrically conductive object. This facilitates quick and accurate location of targets, suitable for metallic munitions detection at Sites UXO1 and UXO4. In general, the EM61 can detect conductive objects to an approximate depth of 11 feet.

The EM61 surveys will be initiated from an established baseline with transects on 5-foot centers. The transects may vary laterally by a maximum of 2 feet to avoid vegetation disturbance or safety hazards. A field demonstration will be conducted as a quality control check prior to commencement of the surveys to ensure that any applied instrumentation will be capable of detecting MC. The demonstration will consist of an identification survey using the EM61 and/or other detectors to sweep over a "clean" area and an area with blind placement of test items.

Other instrumentation, such as a TW-6 M-Scope (metal locator), magnetic gradiometer, and differential global positioning system (DGPS), will also be used to aid in mapping or further investigating resulting EM anomalies. Any obstructive vegetation of significant lateral extent that compromises the integrity of the EM61 surveys will be inspected and approved by the permitted biologist before it is brushed by hand. Should brushing not be advised, the area where the deviation occurred will be evaluated using any of the hand-held equipment listed above.

3.1.7.2 Geophysical Surveys for MRP Sites UXO6 and UXO7

For the MRP Sites UXO6 (Depot Lake) and UXO7 (Lower Lake), magnetometer surveys will be conducted to aid in the identification of possible munitions buried in lake sediments and in selection of sampling locations. The proposed instrument for these surveys is either a Geometrics 882 marine magnetometer or a Geometrics 858 magnetometer. The choice of instrumentation will be made based on the logistics of the deployment, which largely depends on the water levels of the lakes at the time the surveys are to be conducted. However, if the lakes are dry, an EM61 or equivalent survey may be used to facilitate the identification of munitions. For the areas between the shoreline and the high water mark, a Schonstedt magnetic gradiometer with a DGPS will be used to aid in the selection of sampling locations.

The Geometrics 882 marine magnetometer is better suited to deeper water, while the 858 is better suited to shallow water (less than 1-2 meters). Both of these instruments use optically pumped cesium vapor sensors and have a measurement sensitivity of less than 0.1 nano-teslas. A real-time DGPS will be used to track the position of the boat and aid in navigation during the surveys.

The surveys will be conducted using roughly parallel transects separated by about 5 feet over all accessible areas of both lakes. The magnetometer data collection rate and boat speed will be such that at least one data point per 3 feet is collected along each transect. An additional magnetometer will be used to make measurements at a designated base station location (where no magnetic anomalies are observed) during the course of the surveys to assess diurnal variations of the earth's magnetic field. Solar geomagnetic activity will also be checked at the National Oceanic and Atmospheric Administration webpage (http://www.sec.noaa.gov/ftpdir/forecasts) to provide additional assessment of diurnal variations of the earth's magnetic field.

Magnetic anomalies are produced by the presence of ferrous metal objects. These anomalies can be detected by measuring the strength of the magnetic field at various points over and around metal objects using a magnetometer. The anomalies will vary depending on the size, shape, depth, and orientation of the objects.

3.1.8 Soil Sampling

IRP Sites — Surface soil samples will be collected from the 0- to 2-foot bgs interval using a stainless-steel hand auger or disposable trowel. Only discrete samples will be collected.

Subsurface samples are also planned at the IRP sites. A drilling rig will be employed at Site 32 to advance boreholes and collect samples to a depth of 10 feet bgs. At the other IRP sites, a hand auger will be used to collect samples to a maximum depth of 6 feet. If samples cannot be obtained using a hand auger, a limited access drilling rig will be employed.

MRP Sites —Surface soil samples from a depth of either 0-0.5 feet bgs (former range areas) or 0-2 feet bgs (disposal areas) will be collected for MC and other analysis. Subsurface samples will be collected from the interval of 4-6 feet bgs using a hand auger. If a hand auger cannot be advanced to 6 feet at a sample location, a sample will be collected at the depth of refusal. All shallow surface (0-0.5 feet bgs) soil samples will be collected as a composite from a minimum of three subsampling points in the immediate vicinity of the identified sampling location to assure that the likelihood of detecting any MC is maximized in a range-type setting. Deeper surface (0-2 feet bgs) and subsurface (4-6 feet bgs) soil samples will be collected as a single sample from the identified depth interval.

A total of 20 sediment samples will be collected to a maximum depth of 1.5 feet from the UXO6 (Depot Lake) and UXO7 (Lower Lake) sites (10 per site). Sediment sampling of the lakes will include analysis for total organic carbon (TOC) and grain size. If no specific targets are identified during the geophysical surveys, baseline sampling locations will be selected.

For samples collected at UXO2, any bullets/large lead fragments in the sample will be removed, and the respective weights of (1) the bullets and (2) the remaining soil sample will be recorded. The samples (soil matrix) collected at UXO2 will then be analyzed for lead using the XRF unit. Approximately 20 percent of the XRF samples will be split and submitted to a fixed-base analytical laboratory to establish a correlation between field and laboratory results.

3.1.9 Water Sampling

Lake water samples (surface and subsurface) will be collected at both the Depot Lake (UXO6) and Lower Lake (UXO7) sites. Surface water samples will be collected using a grab sampler, and subsurface (pore water) samples will be collected using a Trident and/or temporary piezometer samplers. The Trident probe is a flexible, multi-sensor water sampling probe for screening and mapping groundwater contamination at the surface water interface. The probe detects contrast in salinity and/or clay content in unconsolidated sediments. It also measures temperature to detect groundwater by thermal contrast with surface water. The Trident porewater sampler allows for contaminant characterization. Results from the Trident/piezometer survey will be used to determine if identified and verified source anomalies are currently associated with a MC release to the lakes or the groundwater beneath the lakes.

Fine-grained sediments can make collection of subsurface water samples difficult. This can be mitigated by use of sand-pack filters or use of an alternative sampling device such as a diffusion sampler. Potential refusal during insertion of the sampling probe can result in an inability to

collect a sample at same depth as the source target. Refusal during insertion of the sample probe can be overcome by attempting multiple push locations and/or collecting a sample as close to the target as possible at the depth where refusal is encountered.

An estimated 10 surface water samples and 5 pore water samples will be collected at each lake site and will be sent to a lab for metals and explosives analyses. The selected locations of these samples will be based on the magnetometer or magnetic gradiometer survey results. Water quality measurements of pore water and surface water samples will also include pH, conductivity, total dissolved solids (TDS), oxidation-reduction potential (ORP), dissolved oxygen (DO), and temperature.

3.1.10 Surveying

Surveying will include site boundaries, relevant cultural features such as buildings, sample locations and, for MRP sites, locations of MEC. Locations will be obtained using a DGPS, with an average horizontal accuracy of approximately 5 feet or less.

3.1.11 Investigation Derived Waste

Disposable equipment will be used to the maximum extent possible to limit the amount of investigation-derived waste (IDW) generated from the decontamination process. Soils from drilling and other sampling activities will be containerized and sampled, and will remain on site until analytical results are received. The analytical results will dictate the disposal requirements. The drums will then be shipped off site to an appropriate disposal facility.

At the remaining IRP sites, the soil cuttings will be returned to the hole unless visual observation or photo-ionization detector (PID) readings indicate potential contamination. If contamination is suspected, then the cuttings will be containerized and a characterization sample will be obtained. The containers will remain at each site until analytical results are received. Soil that is not contaminated will be spread on site in a manner that conforms to current grade.

Small quantities of water IDW will be generated from decontamination. The water generated at each site will be combined into a 55-gallon drum, which will be sampled for COPCs. All containers of IDW will be clearly marked with a label that describes the start of accumulation date, contents, point of contact, and a message stating that the drum contents are on hold pending analysis. All IDW will be disposed of in accordance with applicable federal, state, and local laws and regulations.

Personal protective equipment (PPE) and miscellaneous waste from sampling will be placed in garbage bags, sealed, and disposed of in on-site trash receptacles.

3.2 SAMPLING DESIGN

This section discusses the sampling approach and rationale for each of the sites. The IRP sites are addressed first, followed by the MRP sites.

The general approach to both the IRP and MRP sites is to utilize a combination of biased sampling and random grid sampling. The biased sampling will focus on locations where some evidence appears of waste or munitions disposal or other practices that would result in soil contamination. Both surface and subsurface samples will be collected at those locations to evaluate the possible penetration of contaminants into the subsurface. The random grid sampling will provide complete coverage of the site but will consist of surface soil sampling only. For the grid sampling, a grid will be laid out across each site and surface soil samples will be collected from randomly selected grid cells.

Figures 2 through 11 show initial locations of the biased samples and the sampling grid. However, a complete site walk will be conducted at the initiation of the field effort, and adjustments to the locations (and possibly the number) of the biased samples will be likely, based on field observations. Tables 1 and 2 are sample summary tables for the IRP and MRP sites based on current plans.

3.2.1 IRP Site 32

Aerial photographs were reviewed to help identify the location of the tank of caustic soda, the drainage pipe, and seepage drum (Figure 2). Based on this information, three borings will be advanced to a depth of 10 feet in the vicinity of the former tank. Soil samples will be collected for analysis at depths of 0-2, 4-6, and 8-10 feet. These sampling intervals may be revised in the field based on the presence of visual contamination or PID readings. A square sample grid, measuring 50 feet on each side, will be established on the unpaved portion of the site below the unimproved embankment. Ten surface samples (0-2 feet bgs) will be collected within selected cells from the grid. All samples will be analyzed for VOCs, semivolatile organic compounds (SVOC), and metals.

3.2.2 IRP Site 34b

No distinctive features were encountered at IRP Site 34b (DDS 2) during the June 2007 site walk, except for a probable borrow area in the northeastern corner of the site (Figure 3). However, biased samples will be collected at the nine locations judged the most likely possible disposal areas during the more complete site walk to occur at the beginning of the field effort. At these biased sampling locations, both surface (0-2 feet bgs) and subsurface (4-6 feet bgs) soil samples will be collected using a hand auger. A sampling grid will also be established across the 9-acre site. Surface (0-2 feet bgs) soil samples will be collected from nine randomly selected grid cells. The samples will be analyzed for VOCs, SVOCs, and metals.

3.2.3 IRP Site 34d

A distinctive feature encountered at IRP Site 34d (DDS 4) during the June 2007 site walk was a building foundation and adjacent possible former septic tank (Figure 4). As noted in the PA (Malcolm Pirnie 2006), this foundation is probably the remnants of Building 338. A creek cuts across the northern portion of the site. Biased samples will be collected at four locations adjacent to Building 338, two locations at creekside, and one additional location to be determined in the field. At these biased sampling locations, both surface (0-2 feet bgs) and subsurface (4-6 feet bgs) soil samples will be collected using a hand auger. A sample grid will be established across the 1.8-acre site. Surface (0-2 feet bgs) soil samples will be collected from 10 randomly selected grid cells. Only surface samples will be collected for analysis at the grid locations. All samples will be analyzed for VOCs, SVOCs, and metals.

3.2.4 IRP Site 34e

Historical information indicates that dunnage was thrown from Harm Road, which passes through the center of the site (Figure 5). Miscellaneous debris was noted at several spots during the 2007 site walk. Some of the debris appeared to travel about halfway down the slope, and some likely made it to the base of the slope. A corrugated metal pipe drain passes underneath the road toward the eastern end of the site, and evidence of past disposal of dunnage is along the embankment around this drainage pipe. Because disposal practices at this site were clearly limited to discarding dunnage from vehicles down the sides of the embankment, all samples collected at this site will be biased samples taken along and at the bottom of the embankment. Five soil borings will be advanced at IRP Site 34e (DDS #5) using a hand auger; two will be located on either side of the road at the drainage pipe inlet and outfall. The remaining three borings will be located near the toe of the slope near locations where dunnage is observed. At these biased sampling locations, both surface (0-2 feet bgs) and subsurface (4-6 feet bgs) soil samples will be collected using a hand auger. Six additional surface samples are proposed. These sample locations will be on the slope of the embankment and chosen based on visual observation of debris. All samples will be analyzed for VOCs, SVOCs, and metals.

3.2.5 MRP Site UXO1

As shown on Figure 6, Site UXO1 is a large site that contains several subareas based upon use. These include the following: (1) munitions burn and disposal area, burn/slit trenches, buried trenches, unconfirmed rocket fuel trenches, and burn barrels; (2) drop test tower; (3) weapons firing and target area; and (4) building debris. Most of the sample locations for UXO1 will be biased, although grid samples are also proposed. Each subarea is addressed separately, below.

3.2.5.1 Burn and Disposal Areas

Evidence of three burn/slit trenches and from geophysical surveys three buried trenches have been identified at the site (Figure 6). Half-cylinder steel covers remain on burn/slit trenches

located in the southeastern portion of the site and in an isolated area north of the main access road to the site. Three hand-augured soil borings will be advanced at each trench if suitable locations can be identified in the field using anomaly avoidance techniques. If a suitable location that avoids anomalies cannot be located within the area of the trench, the three borings will be located just outside the area of the trench. Both surface (0-2 feet bgs) and subsurface (4-6 feet bgs) soil samples will be collected. The samples will be analyzed for explosives, metals, VOCs, SVOCs, perchlorate, ammonium picrate, and strontium which could be associated with pyrotechnics and/or blasting caps. In addition, one sample from each trench will be analyzed for dioxins that are often associated with a history of open burning.

Reportedly, several rocket fuel slit trenches are located in the northwestern portion of the QE Test Area. These trenches were reportedly used in 1969 to bury 423 pounds of liquid rocket fuel and 142 pounds of map-4 amine fuel. Recent aerial photo reviews indicate the presence of at least three buried trenches in this area. A geophysical survey is planned for this area in an attempt to identify the location of the trenches. Upon completion of the survey, a combination of grid and judgmental samples will be collected in this area. However, the exact number of judgmental and grid samples will depend on the results of geophysical screening or visual observations.

Sampling is proposed around the burn barrels. The burn barrels contained munitions debris during the 2007 site visit and are located about 80 feet northeast of and topographically lower than the drop test tower. One hand-augured soil boring will be advanced adjacent to each burn barrel at a suitable location identified in the field using anomaly avoidance techniques. Both surface (0-2 feet bgs) and subsurface (4-6 feet bgs) soil samples will be collected. The samples will be analyzed for explosives, metals, depleted uranium, and perchlorate. One sample will also be analyzed for dioxins because of evidence of open burning.

During the site visit in 2007, munitions scrap was evident on the surface in the area between the drop test tower and the burn barrels. Therefore, five surface (0-0.5 feet bgs) samples will be collected from a grid established in this area. These samples will be analyzed for explosives, metals, depleted uranium, and perchlorate.

3.2.5.2 Drop Test Tower

Sampling is proposed near the foot of the drop test tower. The drop test tower was used to test bomblets and other munitions, which may have resulted in MC being dispersed in the immediate area of this tower. Collection of three surface (0-0.5 feet bgs) samples is planned for this area, to be analyzed for explosives, metals, depleted uranium, and perchlorate.

3.2.5.3 Weapons Firing and Target Area

The target area includes a 40-foot-long steel plate backed by an earthen berm. Substantial amounts of munitions fragments and scrap were observed in the target area during the 2007 site

visit, including a 40-mm target practice grenade. The earthen berm behind the steel plate is assumed to contain unexploded ordnance and will not be sampled. However, five surface (0-0.5 feet bgs) soil samples will be collected in front of the steel target to determine whether MC residues are present in this area. The samples will be analyzed for explosives, metals, depleted uranium, and perchlorate.

The main firing point observed in the field lies about 1,200 feet northwest of the target area. Five surface (0-0.5 feet bgs) soil samples will be collected at the firing point area: three located in front of the line, one at the line, and one behind the line. Samples will be collected behind the line because some weapons were likely shoulder launched, and propellant would be dispersed behind the line. Some earthen berms were noted about 500 feet north of the steel berm during the site visit (Figure 6). These may have been secondary firing points. Firing point samples may be collected in this region if the site walk reveals any munitions scrap or other evidence of such use. All identified firing point samples will be analyzed for explosives, metals, depleted uranium, and perchlorate.

A surface sampling grid will be constructed between the main firing point and the steel berm. Eighteen surface (0-0.5 feet bgs) samples are proposed for this grid. The samples will be analyzed for explosives, metals, depleted uranium, and perchlorate.

A visual survey will completed of the hillside area to the south of the target berm. The survey will be led by the UXO technician utilizing a hand-held magnetic gradiometer with a DGPS to record the transects and observed features and/or MCs.

3.2.5.4 Building Debris

Building debris, likely the remnants of several concrete huts, is located near the drainage in the extreme southwestern portion of the site. Three biased surface (0-2 feet bgs) samples are proposed for this area, with the exact locations based on field observations. The samples will be analyzed for metals.

3.2.6 MRP Site UXO2

Site UXO2 consists of the Small Arms Firing Range, which is in the footprint of the larger Skeet/Trap Range (Figure 7). The main contaminant of concern at the Small Arms Range is lead from expended bullets. A hand-held XRF unit will be used to evaluate the distribution of lead in the soil. Two sampling grids will be established at the site, one for the small arms range and one for the skeet range. The range use of this site would suggest that shallow surface (0-0.5 feet bgs) samples might be appropriate at this site; however, tilling apparently has occurred at the site, which suggests that deeper surface (0-2 feet bgs) soil samples are appropriate.

The exact number of soil samples collected at the Small Arms Range will be selected in the field based on site conditions. The amount of time required to collect and prepare each sample may also affect the sampling density. Soil samples will be weighed before any bullets in the sample are removed. The bullets will then be removed and weighed to calculate the percent by weight represented by bullets. The remaining sample matrix will then be prepared for XRF analysis of lead. Sample preparation includes grinding, drying, and sieving. Areas of particular interest include the firing line and target area (Figure 7). At least four surface samples will be collected at the firing line and analyzed for explosives as well as lead. A sampling grid will be set up between the firing line and the target area to characterize lead concentrations in this region. Approximately five surface samples will be collected from this area, which measures about 80 by 200 feet. Biased sampling will be conducted at the target area. Although a few samples will be collected in the main target region, the overall goal will be to define decreases in lead concentrations by moving laterally and higher on the berm behind the targets. Another goal will be to define the depth to which bullets have penetrated in the berm. Therefore, collection of 16 shallow surface (0-0.5 feet bgs) samples is planned along the target berm. At half of these sampling locations, a deeper surface (0.5-2.0 feet bgs) soil sample will be collected. Approximately 20 percent of the XRF samples will be split and submitted to a fixed-base analytical laboratory to establish a correlation between field and laboratory results.

The main feature noted at the Skeet/Trap Range during the 2007 site visit was the firing line located on a shelf at the top of a hill (Figure 7). At least four surface samples will be collected at the firing line and analyzed for explosives and lead. No lead shot or broken clay pigeons were observed with the rest of the range. Therefore, a grid sampling approach will be used for the range unless subsequent site observations during the site walk provide a basis for biased sampling. Approximately 30 surface (0-2 feet bgs) samples will be collected and analyzed for lead using the XRF technique, with 20 percent of these samples also submitted to a stationary laboratory for analysis. In collecting the grid samples, five samples will be collected from the area where clay pigeon debris likely landed, believed to be between 80 and 140 feet from the firing line. These samples will be analyzed for PAHs.

3.2.7 MRP Site UXO3

Site UXO3, DDS 1, is elongated and parallels a drainage west of Redeye Road (Figure 8). Metal banding was noted in several portions of the site, and munitions were observed in some areas during the June 2007 site walk. These munitions include several 20-mm projectiles, 5.56-mm and 7.62-mm ammunition, and three 750-pound napalm bomb casings. (The bombs were apparently empty, with no fuzing observed.) Expended igniter tubes and igniter cartridges were also noted at the site. The sampling approach will include biased sampling where munitions or debris are observed, and grid sampling to cover the broader area of the site. An area with a high concentration of munitions was noted in the upper eastern arm of the drainage. Five hand-augured soil borings will be advanced in this area using anomaly avoidance techniques. Both surface (0-2 feet bgs) and subsurface (4-6 feet bgs) soil samples will be collected from each boring. Given the varied nature of the munitions, the samples will be analyzed for explosives, metals, perchlorate, and strontium that could be associated with pyrotechnics. Large amounts of

metal banding but no munitions were observed in the central portion of the site. Four hand-augured soil borings will be advanced in this area using anomaly avoidance techniques. Both surface (0-2 feet bgs) and subsurface (4-6 feet bgs) soil samples will be collected from each boring and analyzed for metals and explosives. Four grid surface samples will be collected in the lower portion of the site beyond the last observed metal banding, and two grid surface samples will be collected from the northern part of the site. These six samples will be collected from near the bottom of the drainage and will be analyzed for metals and explosives. In addition, all soil samples will be analyzed for perchlorate.

3.2.8 MRP Site UXO4

Munitions observed during the 2007 site walk at this site consisted of a rifle grenade and a small amount of metal debris located in the center of the site (Figure 9). Three additional rifle grenades were noted in the PA. A hand-augured soil boring will be advanced in the area adjacent to each of these four rifle grenades using anomaly avoidance techniques. One additional hand-augured boring will be advanced at a munitions location to be determined in the field following the site walk. Both surface (0-2 feet bgs) and subsurface (4-6 feet bgs) soil samples will be collected from each boring. In addition, two biased surface soil samples (0-2 feet bgs) will be collected within the drainage, one at the outfall of the corrugated metal pipe that is located below Terrier Road and the second near the northwestern site boundary. The remainder of the site will undergo grid sampling. Approximately four grid surface samples will be collected. All samples will be analyzed for explosives, metals, and perchlorate.

3.2.9 MRP Site UXO6

Though no munitions or munitions scrap/fragments were observed during the site visit in March 2005, the lake is suspected to contain discarded military munitions (DMM). Historical records indicate that UXO6 (Depot Lake) was used for munitions (20-mm, 40-mm, and 60-mm cartridges and 7.2-inch projector charges) disposal during WWII. Records also show that other types of munitions may have been dumped as well and that, during past dry summer seasons, munitions have been recovered from the lake. Penetration from firing would not be a factor at the lake because historical records indicate that munitions were dumped into the lake. However, the DMM at Depot Lake could be buried or partially buried in the sediment below the water surface or just off of Terrier Road adjacent to the lake, which would be more accessible for dumping when the lake is full. Thus, the target areas are between Terrier Road and the lake, as well as in the lake sediments. An estimated 10 biased samples will be collected from the lake bottom sediments, and 15 biased samples will be collected between the high water mark and the shoreline along the lake. The location of these biased samples will be based on field observations from the site walk and historical information. Approximately 15 random grid samples will be taken from the broader area around Depot Lake to provide complete coverage of the site. All samples will be collected from 0-2 feet bgs and will be analyzed for explosives, metals, and perchlorate.

3.2.10 MRP Site UXO7

Historical records indicate that munitions (20-mm, 40-mm, and 60-mm cartridges and 7.2-inch projector charges) were dumped into UXO7 (Lower Lake) during WWII. Records also show that other types of munitions may have been dumped as well, and that munitions have been recovered from the lake during past dry summer seasons. No munitions or munitions scrap/fragments were observed during the site visit in March 2005; however, the lake is suspected to contain DMM. Penetration from firing would not be a factor at the lake because historical documentation indicates that munitions were dumped into the lake. However, DMM at the lake could be buried or partially buried in the sediment below the water surface or just off of the unimproved road adjacent to the lake, which would be more accessible for dumping when the lake is full. An estimated 10 biased samples will be collected from the lake bottom sediments, and 15 biased samples will be collected between the high water mark and the shoreline along the lake. The location of these biased samples will be based on field observations from the site walk and historical information. Approximately 15 random grid samples will be collected from the broader area around Depot Lake to provide complete coverage of the site. All samples will be collected from 0-2 feet bgs and will be analyzed for explosives, metals, and perchlorate.

4.0 HUMAN HEALTH AND ECOLOGICAL RISK EVALUATIONS

This section summarizes the methodology for the screening-level human health and ecological risk evaluations. Specific screening levels, source references, default screening values, and laboratory detection limits are tabulated in the SAP (Attachment 1).

4.1 SCREENING-LEVEL HUMAN HEALTH RISK EVALUATIONS

Analytical results from each sample will be compared with the U.S. Environmental Protection Agency (EPA) Region IX Industrial and Residential preliminary remediation goals (PRG) for soil. Risk-based PRG-like values are also available from the California Environmental Protection Agency (Cal/EPA) for arsenic and lead. These values are more stringent than the corresponding EPA Region IX PRGs and will be used for the screening-level human health risk evaluation. Metals detected at maximum concentrations that exceed the PRGs will also be compared with background concentrations from the Santa Margarita Basin. These values were used for a remedial investigation/feasibility study conducted at nearby Marine Corps Base Camp Pendleton (Jacobs Engineering Group, Inc. 1997).

4.2 SCREENING-LEVEL ECOLOGICAL RISK EVALUATION

Analytical results will be compared with ecological soil screening levels (ESSL). The ESSLs will be compiled from multiple sources. The primary values will be EPA ESSLs; secondary sources include values from the Oak Ridge National Laboratories Ecological Risk Division. The latter ESSLs are based on extremely conservative assumptions and will be used only for

screening purposes. PRGs will be used for chemicals without published screening values. If an analytical laboratory cannot report to a prescribed screening level, the laboratory's quantitation limit will be used instead.

5.0 HEALTH AND SAFETY REQUIREMENTS

A project-specific health and safety plan has been developed for this investigation. An accident prevention plan (APP) has also been prepared that includes activity hazard analyses relevant to site operations. These plans will be enforced by the on-site health and safety officer.

An explosives safety submission (ESS) waiver has been submitted to Naval Ordnance Safety and Security Activity (NOSSA) and approved for sampling at the MRP sites. Although subsurface soil sampling for MCs is considered an intrusive operation, an ESS was waived by NOSSA because a UXO technician will support the sampling using anomaly avoidance techniques. ChaduxTt will use anomaly avoidance techniques for all sampling at MRP sites, as specified in Section 3.1.3. A copy of the ESS waiver acceptance memo is included as Appendix B.

6.0 SCHEDULE

The current schedule for the investigation is shown on Figure 12. This schedule will be updated as necessary as the project progresses.

7.0 REFERENCES

Fairchild Aerial Photography Collection. 2007. Aerial photographs dated 1953 and 1958. Whittier, California. December 11.

Jacobs Engineering Group, Inc. 1997. Draft Final Remedial Investigation/Feasibility Study, Remedial Investigation for Group D sites, Marine Corps Base, Camp Pendleton, California. CLE-101-01F301-B7-0043, CTO 0301. July 16.

Malcolm Pirnie, Inc. (Malcol Pirnie). 2006. Preliminary Assessment for the Munitions Response Program, Naval Weapons Station Seal Beach Detachment Fallbrook, California. June.

Marrs Services, Inc. (Marrs). 2007. Draft Site Inspection Report, Installation Restoration Program Site 27, Seal Beach Naval Weapons Station Detachment Fallbrook, Fallbrook, California. November.

Naval Energy and Environmental Support Activity (NEESA). 1985. Initial Assessment Study of Naval Weapons Station Seal Beach, California. NEESA 13-062. February.

NEESA. 1990. Addendum to the Preliminary Assessment (Initial Assessment Study) of Naval Weapons Station Seal Beach, California. NEESA 13-062A. August.

Subsurface Surveys. 2004. Geophysical Investigation at IRP Sites 26 & 27, Naval Weapons Station, Fallbrook, California. February.

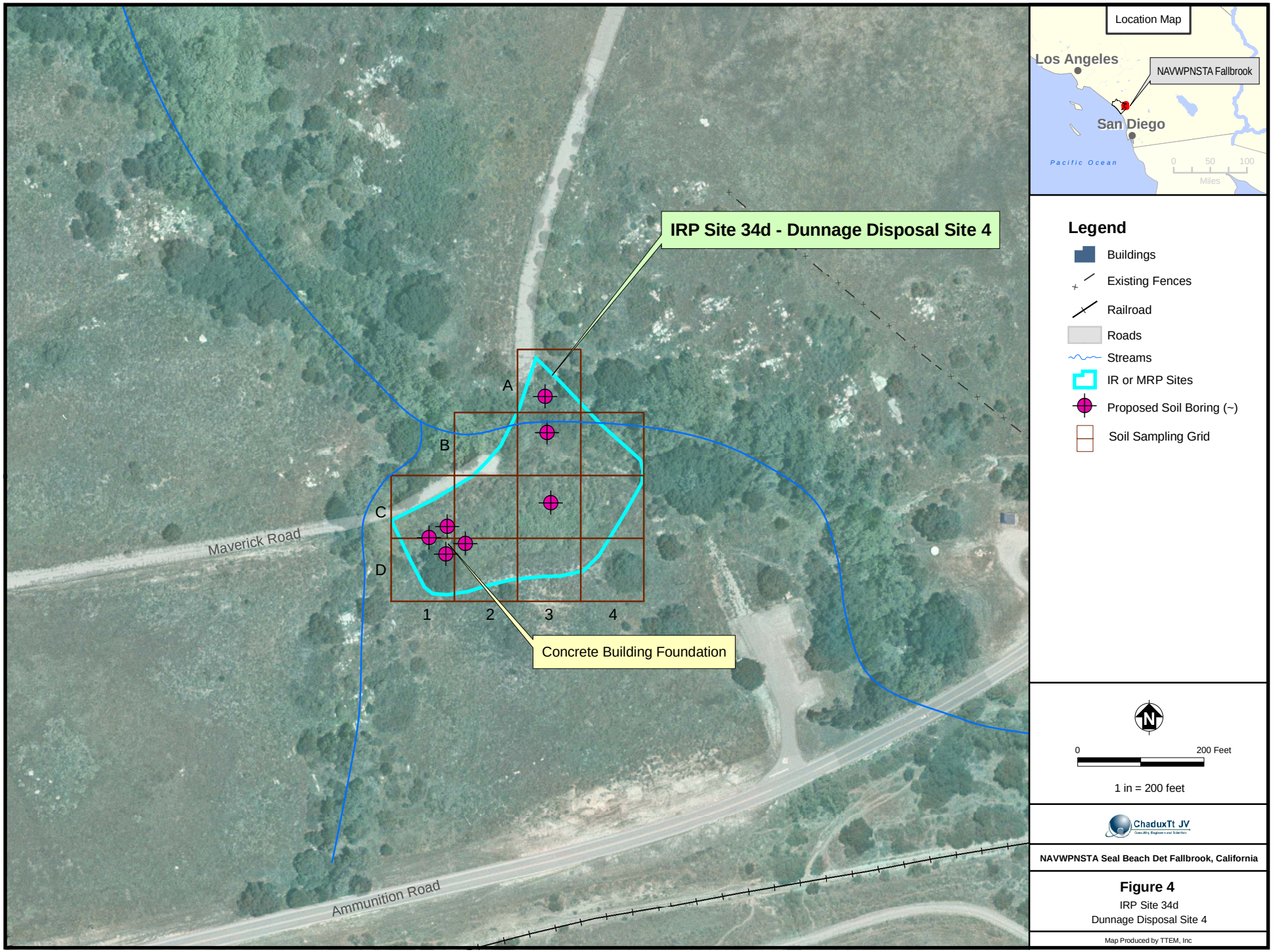
United States Census. 2000. Available online at http://www.census.gov

United States Fish and Wildlife Service. 2006. Fencing of Installation Restoration Program and Munitions Response Program Sites, Naval Weapons Station Seal Beach, Detachment Fallbrook, San Diego County, California. FWS-SD-4030.2. October.

FIGURES

Figures 1, 2, 3, 6, 8 and 10
have been removed.

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



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Legend

- Existing Fences
- Railroad
- Roads
- Streams
- IR or MRP Sites
- Proposed Soil Boring (~)
- Proposed Surface Soil Sample (~)

N

0 160 Feet

1 in = 160 feet

ChaduxTt JV

NAVWPNSTA Seal Beach Det Fallbrook, California

Figure 5

IRP Site 34e
Dunnage Disposal Site 5

Map Produced by TTEM, Inc

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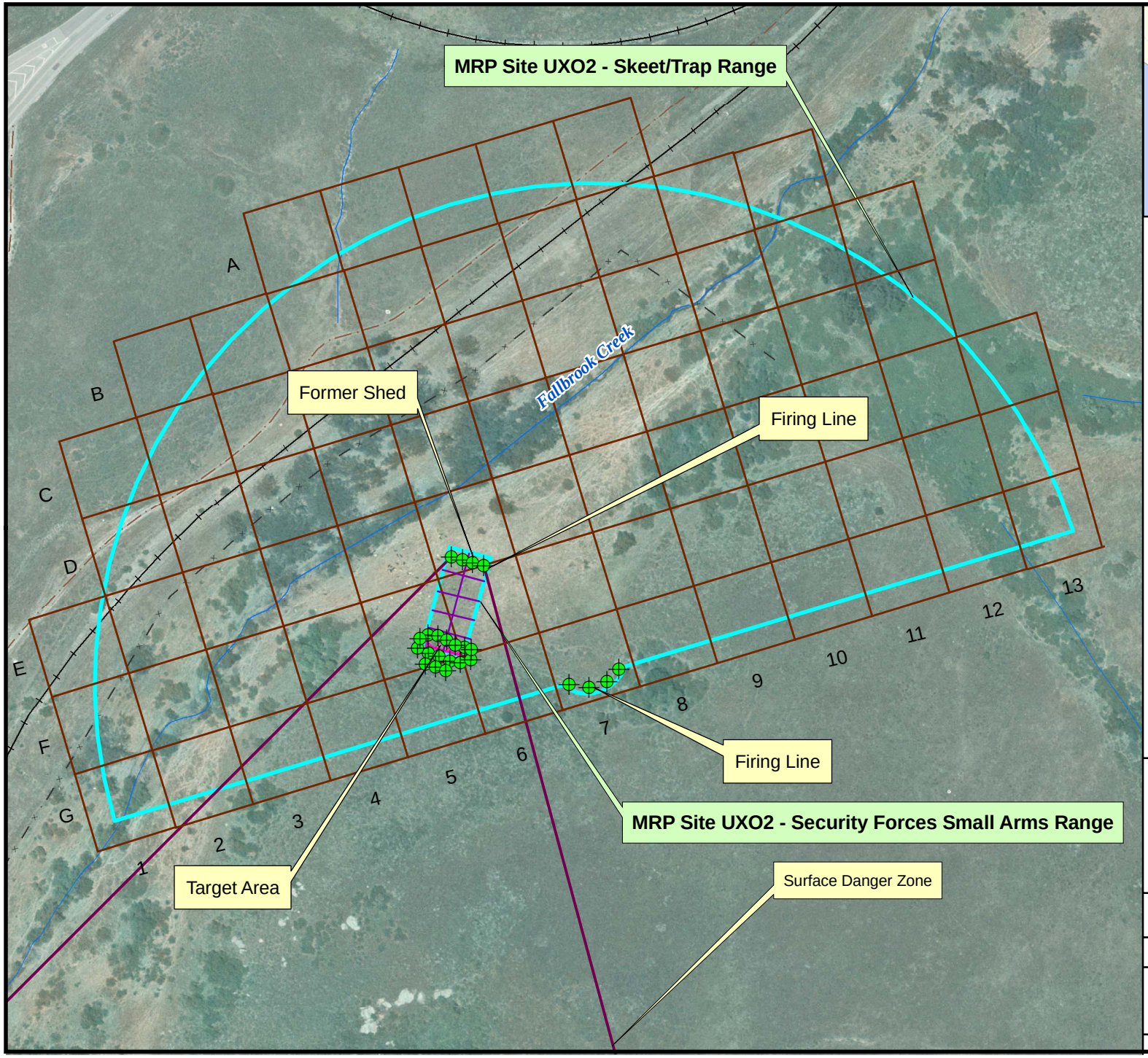

Legend

- Existing Fences
- Recreation Trail
- Railroad
- Roads
- Streams
- IR or MRP Sites
- Target Area
- Surface Danger Zone
- Proposed Surface Soil Sample (~)
- Soil Sampling Grid

0 300 Feet

1 in = 300 feet

ChaduxTt JV

NAVWPNSTA Seal Beach Det Fallbrook, California

Figure 7

MRP Site UXO2
Small Arms Range and Skeet/Trap Range

Map Produced by TTEM, Inc

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Legend

- Existing Fences
- Roads
- Streams
- IR or MRP Sites
- Evidence of Munitions Use
- Munitions Fragments/Scraps
- Proposed Soil Boring (~)
- Proposed Surface Soil Sample (~)
- Soil Sampling Grid

RPG - Rifle Propelled Grenade

** MEC (Munitions and Explosives of Concern) locations are based on the Preliminary Assessment (Malcolm Pirnie 2006).*

0 100 Feet

1 in = 100 feet

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NAVWPNSTA Seal Beach Det Fallbrook, California

Figure 9

MRP Site UXO4
Dunnage Disposal Site 3

Map Produced by TTEM, Inc

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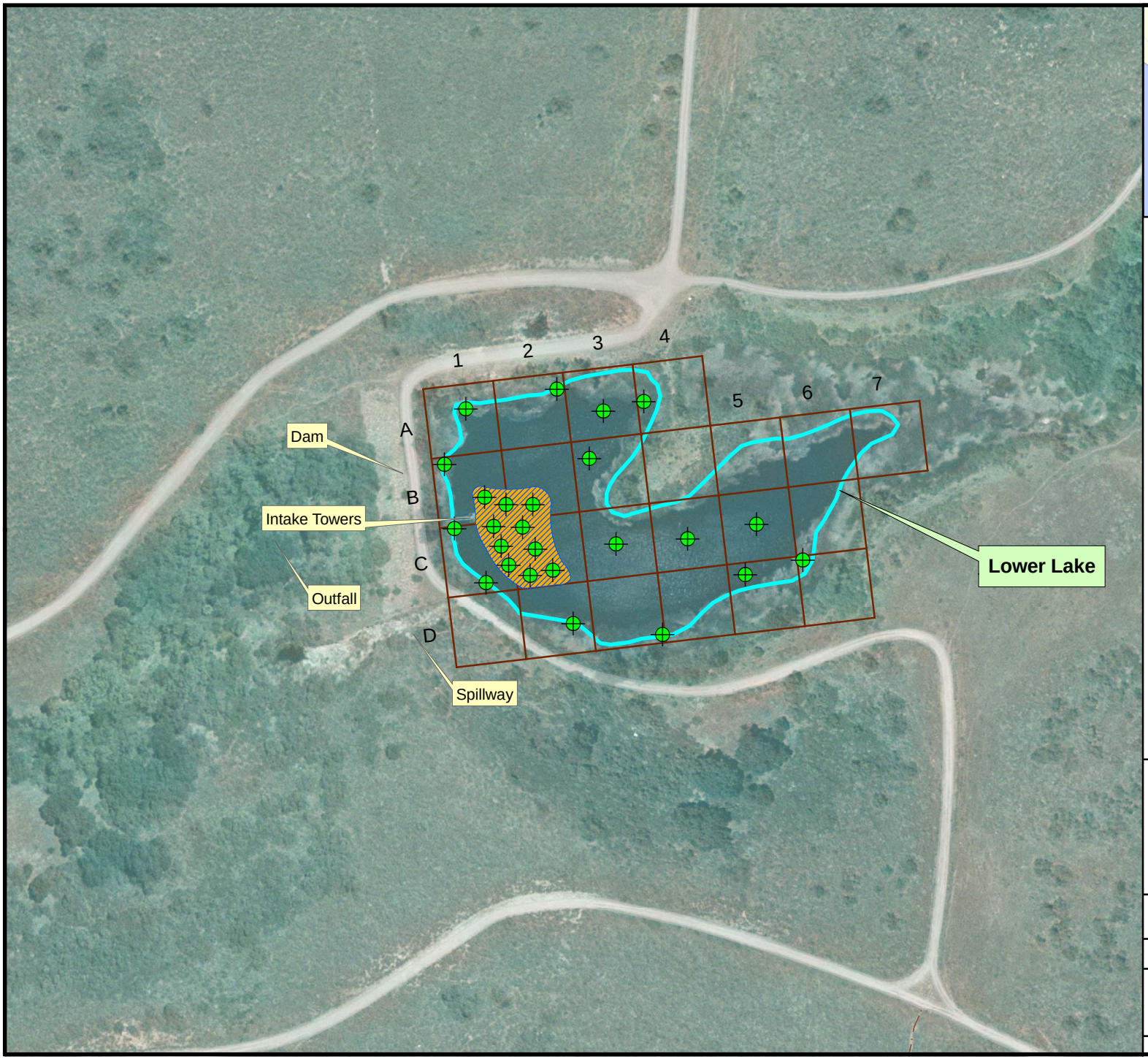

Legend

- Recreation Trail
- Roads
- IR or MRP Sites
- Approximate Extent of Lake (Observed 10/17/07)
- Proposed Surface Sample (~)
- Soil Sampling Grid

0 200 Feet

1 in = 200 feet

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NAVWPNSTA Seal Beach Det Fallbrook, California

Figure 11

MRP Site UXO7
Lower Lake

Map Produced by TTEM, Inc

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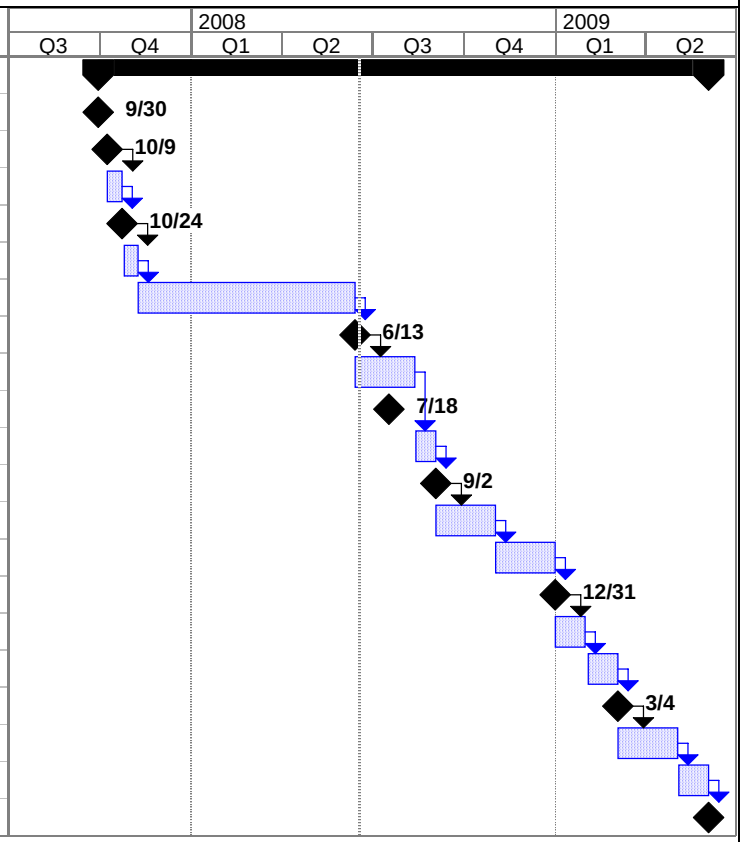
PROJECT SCHEDULE
N62473-07-D-3213, DELIVERY ORDER 0002, MOD 01, REV 01 SITE INSPECTION FOR IRP SITES 32, 34B, 34D AND 34E, AND MRP SITES UX01, UX02, UX03, UX04, UX06, AND UX07
NAVAL WEAPONS SEAL BEACH DETACHMENT FALLBROOK, FALLBROOK, CALIFORNIA

ID		Task Name	Duration	Start	Finish
1		**CTO 0002, Modification 01 Schedule**	**438 days**	**Sun 9/30/07**	**Wed 6/3/09**
2		Award	0 days	Sun 9/30/07	Sun 9/30/07
3		Kick-off Meeting	0 days	Tue 10/9/07	Tue 10/9/07
4		Prepare Pre-Draft Work Plan Addendum	15 edays	Tue 10/9/07	Wed 10/24/07
5		Submit Pre-Draft Work Plan to Government	0 days	Wed 10/24/07	Wed 10/24/07
6		Government Review of Pre-Draft Work Plan	14 edays	Thu 10/25/07	Thu 11/8/07
7		Revise Pre-Draft Work Plan	156 days	Fri 11/9/07	Fri 6/13/08
8		Submit Draft Work Plan (Updated Version)	0 days	Fri 6/13/08	Fri 6/13/08
9		Regulatory Review of Draft Work Plan	60 edays	Fri 6/13/08	Tue 8/12/08
10		External Agency Meeting	0 days	Fri 7/18/08	Fri 7/18/08
11		Prepare Final Work Plan	20 edays	Wed 8/13/08	Tue 9/2/08
12		Submit Final Work Plan	0 days	Tue 9/2/08	Tue 9/2/08
13		Field Investigation	60 edays	Tue 9/2/08	Sat 11/1/08
14		Prepare Pre-Draft Site Inspection Report	60 edays	Sat 11/1/08	Wed 12/31/08
15		Submit Pre-Draft Site Inspection Report	0 days	Wed 12/31/08	Wed 12/31/08
16		Government Review of Pre-Draft SI Report	30 edays	Wed 12/31/08	Fri 1/30/09
17		Revise Pre-Draft Site Inspection Report	30 edays	Mon 2/2/09	Wed 3/4/09
18		Submit Draft Site Inspection Report	0 days	Wed 3/4/09	Wed 3/4/09
19		Regulatory Review of Draft SI Report	60 edays	Wed 3/4/09	Sun 5/3/09
20		Prepare Final Site Inspection Report	30 edays	Mon 5/4/09	Wed 6/3/09
21		Submit Final Site Inspection Report	0 days	Wed 6/3/09	Wed 6/3/09



Task		Milestone		External Tasks	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

Figure 12

ChaduxTt JV
Consulting Engineers and Scientists

A Joint Venture of St. George Chadux and Tetra Tech EM Inc.

TABLES

TABLE 1: SAMPLE SUMMARY TABLE – IRP SITES
Draft Work Plan
Naval Weapons Station Seal Beach Det Fallbrook, California

Site	Subarea	Grid/ Biased	No. Borings	Depths (feet bgs)	No. Samples	Analyses
32 (Paint Shop – Bldg 351))	Former Tank	Biased	3	0-2, 4-6, 8-10	9	VOCs, SVOCs, metals
	Below Embankment – Surface	Grid	NA	0-2	10	VOCs, SVOCs, metals
34B (DDS 2)	NA	Biased	9	0-2, 4-6	18	VOCs, SVOCs, metals
		Grid	NA	0-2	12	VOCs, SVOCs, metals
34D (DDS 4)	Former Building 338	Biased	4	0-2, 4-6	8	VOCs, SVOCs, metals
	Drainage Channel	Biased	2	0-2, 4-6	4	VOCs, SVOCs, metals
	Central Grid - Surface	Grid	NA	0-2	4	VOCs, SVOCs, metals
34E (DDS 5)	Inlet	Biased	1	0-2, 4-6	2	VOCs, SVOCs, metals
	Outfall	Biased	1	0-2, 4-6	2	VOCs, SVOCs, metals
	Toe of Slope	Biased	3	0-2, 4-6	6	VOCs, SVOCs, metals
	Embankment - Surface	Grid	NA	0-2	6	VOCs, SVOCs, metals

Notes:

IRP Installation Restoration Program
bgs Below ground surface
No. Number
VOC Volatile organic compounds
SVOCs Semivolatile organic compounds
NA Not applicable

TABLE 2: SAMPLE SUMMARY TABLE – MRP SITES
Draft Work Plan
Naval Weapons Station Seal Beach Det Fallbrook, California

Site	Subarea	Grid/ Biased	No. Borings	Depths (feet bgs)	No. Samples	Analyses
UXO1 (QE Test Area)	Burn/Slit Trenches	Biased	9	0-2, 4-6[1]	18	Explosives, metals, VOCs, SVOCs, perchlorate, ammonium picrate, strontium, dioxin (1/trench)
	Buried Trenches	Biased	6	0-2, 4-6	12	
	Burn Barrels	Biased	2	0-2, 4-6	4	Explosives, metals, perchlorate, dioxin (1)
	Between Drop Test Tower - Burn Barrels	Grid	NA	0-0.5[2]	5	Explosives, metals
	Drop Test Tower	Biased	NA	0-0.5[2]	3	Explosives, metals
	Target Area	Biased	NA	0-0.5[2]	5	Explosives, metals, depleted uranium, perchlorate
	Firing Point	Biased	NA	0-0.5[2]	5	Explosives, metals, perchlorate
	Between Target and Firing Point	Grid	NA	0-0.5[2]	12	Explosives, metals, perchlorate
	Building Debris	Biased	NA	0-2	3	Metals
UXO2 (Small Arms and Skeet/Trap Ranges	SAR – Firing Line	Biased	NA	0-2	4	Explosives, Lead (3 XRF, 1 lab)
	SAR – Between Firing Line and Target	Grid	NA	0-2	5	Lead (5 XRF, 1 lab)
	SAR - Target	Biased	NA	0-0.5	16	Lead (24 XRF, 5 lab)
			NA	0.5-2	8	
	Skeet/Trap Range – Firing Line	Biased	NA	0-2	4	Explosives, Lead (5 XRF, 1 lab)
	Skeet/Trap Range – Range Area	Grid	NA	0-2	30	Lead (30 XRF, 6 lab), PAHs (5)

TABLE 2: SAMPLE SUMMARY TABLE – MRP SITES
Draft Work Plan
Naval Weapons Station Seal Beach Det Fallbrook, California

Site	Subarea	Grid/ Biased	No. Borings	Depths (feet bgs)	No. Samples	Analyses
UXO3 (DDS 1)	Area where munitions observed	Biased	3	0-2, 4-6	10	Explosives, metals, perchlorate, strontium
	Area where metal banding & drums observed	Biased	6	0-2, 4-6	8	Explosives, metals
	Drainage in southern portion of site	Grid	NA	0-2	4	Explosives, metals
	Drainage in northern portion of site	Grid	NA	0-2	2	Explosives, metals
UXO4 (DDS 3)	Vicinity of rifle grenades/other munitions	Biased	5	0-2, 4-6	12	Explosives, metals, strontium, perchlorate
	Drainage –surface	Biased	NA	0-2	2	Explosives, metals, strontium, perchlorate
	Remainder of site	Grid	NA	0-2	4	Explosives, metals, perchlorate
UXO6 (Depot Lake)	Lake bottom sediments	Biased	NA	0-2	10	Explosives, metals, perchlorate
	Between high water mark and shoreline	Biased	NA	0-2	15	Explosives, metals, perchlorate
	Lake Water	Grid	NA	NA	10	Explosives, metals, perchlorate
	Lake Pore Water	Biased	NA	NA	5	Explosives, metals, perchlorate
	Sediments (from pore water sample)	Biased	N/A	0-2	5	Explosives, metals, perchlorate
UXO7 (Lower Lake)	Lake bottom sediments	Biased	NA	0-2	10	Explosives, metals, perchlorate
	Between high water mark and shoreline	Biased	NA	0-2	15	Explosives, metals, perchlorate
	Lake Water	Grid	NA	NA	10	Explosives, metals, perchlorate

TABLE 2: SAMPLE SUMMARY TABLE – MRP SITES
Draft Work Plan
Naval Weapons Station Seal Beach Det Fallbrook, California

Site	Subarea	Grid/ Biased	No. Borings	Depths (feet bgs)	No. Samples	Analyses
	Lake Pore Water	Biased	NA	NA	5	Explosives, metals, perchlorate
	Sediments (from pore water sample)	Biased	N/A	0-2	5	Explosives, metals, perchlorate

Notes:

[1]Beginning at the exposed bottom of the trench for the covered burn/slit trenches.
[2]Shallow surface (0-0.5 ft bgs) soil samples will be collected as a composite of a minimum of three sampling points.

NA Not Applicable
MRP Munitions Response Program
No. Number
VOC Volatile organic compounds
SVOCs Semivolatile organic compounds
SAR Small Arms Range
XRF X-Ray Fluorescence
Lab Laboratory
PAH Polynuclear aromatic hydrocarbons

Draft

Site Inspection of Installation Restoration Program Sites 32, 34b, 34d, and 34e and Munitions Response Program Sites UXO1, UXO2, UXO3, UXO4, UXO6, and UXO7

Naval Weapons Station Seal Beach Detachment Fallbrook Fallbrook, California

June 9, 2008

Prepared for
Department of the Navy
NAVFAC Southwest
San Diego, California 92132

Prepared by
ChaduxTt, A Joint Venture of St. George Chadux Corp. and Tetra Tech EM Inc.
1230 Columbia Street, Suite 1000
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Prepared under:
Naval Facilities Engineering Command
Contract Number N62473-07-D-3213
Contract Task Order 002

CHAD.3213.0002.0002

APPENDIX A
BIOLOGICAL AVOIDANCE AND MINIMIZATION PLAN

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ATTACHMENT

Attachment 1: Letter from U.S. Fish and Wildlife
Attachment 2: Endangered Species Assessment Initial Site Visit for IRP Sites 32, 34b, 34d, 34e; MRP Sites UXO1, UXO2, UXO3, AND UXO4, Naval Weapons Station, Seal Beach Detachment Fallbrook

A1.0 INTRODUCTION

Suitable habitat for the coastal California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, and Stephens' kangaroo rat (SKR) occurs within the footprint of the various sites at Naval Weapons Station (NAVWPNSTA) Seal Beach Detachment Fallbrook. This biological avoidance and minimization plan has been prepared as a result. A qualified biologist familiar with the natural history of these species and with the appropriate permits has developed the biological avoidance and minimization measures. These measures will be applied for site access, fencing installation and other field activities related to conducting Site Investigations (SIs) at four Installation Restoration Program (IRP) sites and six Munitions Response Program (MRP) sites described in the following sections. It should be noted that the installation of cattle exclusion fencing around IRP/MRP sites was consulted on previously with the USFWS (FWS-SD-4030.2, dated 10 October 2006); however, fence installation has yet to be implemented. This Work Plan diverges from the previously proposed action with the addition of proposed fencing around UXO7 (Lower Lake) and a slightly wider estimated width (from 4-feet to 6-feet) of temporary impacts from the fence installation. For this reason, acreage estimates for the temporary impacts from fence installation are generally larger than those described in FWS-SD-4030.2. The locations of the sites described in this appendix are provided in the attached Figure A-1.

Before any field activities begin, all on-site personnel will be briefed on the need for minimizing impacts on sensitive biological resources. These field activities may include, but are not limited to, road or access clearance, geophysical surveys, visual surveys, soil sampling (hand auger or limited access track mounted drill), and fence installation. Methods for avoiding and minimizing potential impacts on the species and communities of concern will be reviewed during the on-site training. The qualified biologist will ensure that the avoidance and minimization measures are implemented during field activities.

In addition to these biological control procedures, and to minimize the potential for fire hazards, at least one fire extinguisher will remain accessible on site and during vehicle site access off paved roads. Vehicles may travel off paved roads for brush clearance using a brush hog and other mechanical activities such as grading for access roads. A cell phone will also be accessible for fire and non-fire emergencies. The emergency telephone number from the cell phone is 760-725-3333, which goes directly to the Marine Corps Base Camp Pendleton Fire Department equivalent to "911."

A2.0 PLANNED AVOIDANCE AND MINIMIZATION MEASURES

Depending on habitat types, the following avoidance and minimization measures will be implemented for each species listed below, depending on the occurrence of the species at each site.

The biologist will endeavor to route access to and from sample sites in a manner that minimizes the need for brush clearing. Access routes will be delineated in the field with pin flags or perimeter tape (or a combination) and approved by the qualified biologist before they are used.

The sites are planned to be accessed by foot only, and all vehicles will remain on the proposed vehicle access routes during ingress and egress for the field investigation. At a majority of the sites, vehicles will be parked only on the unimproved access roads as well as the staging areas once the areas are cleared by the Detachment Safety Officer, the qualified biologist and for MRP sites the UXO technician. Staging areas for each of the sites will be a maximum of approximately 1,600 square feet in area and be delineated with flagging and cones.

The maximum lateral area for brush clearance for planned field activities is 6 feet for all fencing alignments and geophysical transects and 12 feet for road clearing by rubber-tired equipment. The width of the brush hog clearance is for fencing is based on the planned maximum equipment dimensions of 5.5 feet with allowable lateral tolerance of 0.5 foot for irregularities in the ground surface. The USFWS letter (FWS-SD-4030.2, dated 10-10-06) that provides an assessment of potential effects from the cattle exclusion fencing from all sites is presented in Attachment 1.

If a limited access drill is required for use in vegetated areas, the rig will be capable of traveling over small shrubs without having to clear a path. The biologist will have authority to approve measures that will minimize impacts during route planning for the limited-access drill rig and other foraging activities. Personnel traveling on foot will avoid dense vegetation and will select routes for minimal impact.

A summary of the estimated maximum area of bio-disturbance for the various work activities is provided at the end of this appendix in Table A-1. The areas are calculated based upon habitat designations on the resource survey map that was compiled in 2000 as well as recent reconnaissance. Potential occurrences of federally listed threatened and endangered species in Table A-1 were compiled from the best available data of recent Station-wide surveys (in 2000 for CAGN, in 2000/01 and 2007 [not depicted; draft data] for SKR, and in 2007/2008 [not depicted; draft data] for LBV and SWF). Site specific surveys for CAGN in 2006 by SJM Biological were also used for UXO1 and historical point count data provided in the Integrated Natural Resources Management Plan for LBV and SWF were considered for all sites. The findings from a general assessment (habitat based, passive survey) of each site conducted in 2007 by Arthur Davenport (Appendix A of the Work Plan) were also taken into consideration in estimating potential bio-disturbances. Sites with the coastal sage scrub habitat designations are provided as Figures A-2 through A-11 of this appendix.

Coastal California Gnatcatcher (CAGN)

- Vehicles will be restricted to designated access (ingress and egress) routes and staging areas that avoid or minimize habitat impacts. To the maximum extent practicable, project-related activities will be conducted outside the breeding season. Thus, if possible, project-related activities would not occur within coastal sage scrub and baccharis scrub between February 15 and August 15.

- If activities need to occur within the habitat and during the nesting season of February 15 to August 15, a qualified biologist will survey the site for the species and identify the locations of active nests before activities will begin in that area. A buffer of 20 meters

will be maintained around any active gnatcatcher nests. All field activities will be prohibited within the buffer zone until the chicks have fledged or the nest is abandoned. The biologist will continue to be vigilant for gnatcatcher activity within the action area (project footprint and adjacent 20-meter buffered area) and ensure that any active nests that occurred after the initial survey are avoided in the same manner.

Least Bell's Vireo (LBV)

- Vehicles will be restricted to designated access routes and staging areas that avoid or minimize impact to the habitat.

- To the maximum extent practicable, project-related activities will be conducted outside the breeding season. Thus, if possible, project-related activities would not occur within riparian plant communities between March 15 and August 31.

- If activities need to occur during the nesting season of March 15 to August 31, a qualified biologist will survey the site for the species and identify the locations of active nests. A buffer of 20 meters will be maintained around any active nests for the least Bell's vireo. All field activities will be prohibited within the buffer zone until the chicks have fledged or the nest is abandoned. The biologist will continue to be vigilant for vireo activity within the action area (project footprint and adjacent 20-meter buffered area) and ensure that any active nests that were built after the initial survey are avoided in the same manner.

Southwestern Willow Flycatcher (SWF)

- Vehicles will be restricted to designated access routes and staging areas.

- To the maximum extent practicable, project-related activities will be conducted outside the breeding season. Thus, if possible, project-related activities would not occur within riparian plant communities between March 15 and September 15.

- If activities need to occur within the habitat and during the nesting season of May 15 to September 15, a qualified biologist will survey the site for the species and identify the locations of active nests. A buffer of 20-meters will be maintained around any active willow flycatcher nests. All field activities will be prohibited within the buffer until the chicks have fledged or the nest is abandoned. The biologist will continue to be vigilant for flycatcher activity within the action area (project footprint and adjacent 20-meter buffered area) and ensure that any active nests that were built after the initial survey are avoided in the same manner.

Stephens' Kangaroo Rat (SKR)

- Vehicles will be restricted to designated access routes and staging areas.

- Vehicle travel will be restricted to the period between sunrise and sunset to avoid vehicle strikes of the SKR.

- Before project-related activities begin at a specific site, potential or suitable habitat of the SKR will be mapped and the location of active SKR burrows will be flagged by a qualified biologist.

- Sampling will not occur within 10 feet of the flagged burrows.

- Fence posts will not be installed within 10 feet of flagged burrows.

A3.0 IRP SITE AVOIDANCE AND MINIMIZATION – ACCESS, INVESTIGATION, AND FENCING

The planned biological avoidance and minimization measures described in the previous section will be implemented for all field activities at NAVWPNSTA Seal Beach Detachment Fallbrook. A detailed description of site access and the investigation for each of the Installation Restoration Program (IRP) sites is provided in the following sections. All field activities at the IRP sites will strictly adhere to the planned biological and minimization measures presented in Section A2.0 . The proposed access routes, staging areas, and areas requiring brush clearance for each of the sites are shown in Figures B-2 through B-11 that are included in this Appendix.

A3.1 SITE ACCESS AND FIELD ACTIVITIES FOR IRP 32

IRP Site 32, Paint Shop – Building 351, will be accessed directly from the north along Ammunition Road over paved asphalt surfaces. Ingress and egress for the site will also be on paved surfaces (Figure A-2). All vehicles will be parked on paved surfaces just east of Building 351, where site access will not be obstructed.

A track-mounted drill rig will be used to advance three subsurface borings to a maximum depth of 10 feet below ground surface (bgs) within the primary area of concern. The track-mounted drill rig will remain on either the paved areas or within the footprint of the IRP site at all times. Existing containers will be removed from the site before the southeastern portion of the site is accessed for surface soil sampling across a grid at 10 locations (see Figure A-2). Vegetation surrounding the site will be unaffected by the site inspection (SI) field work for IRP Site 32 since no brush clearance is required for site access. No fencing is planned for this site.

A3.2 SITE ACCESS AND FIELD ACTIVITIES FOR IRP 34B

IRP Site 34b, Dunnage Disposal Site 2, will be directly accessed from Walleye Road and then on an existing unimproved road along the southeastern site boundary (Figure A-3). The proposed staging area for all field activities for IRP Site 34b will be located just south of the proposed primary vehicle access route. Activities at the site will include access road clearance and grading, soil sampling, and field fencing.

The unimproved road will require minor grading using a rubber-tired tractor (skip loader) and some brush clearance (using a brush hog) to serve as a primary vehicle access route to the site. The estimated maximum possible area of disturbance for brush clearance for the proposed primary vehicle access route along the unimproved road southeast of IRP Site 34b access is 0.30 acre. Vegetation that will be temporarily affected by the disturbance consists of sparse coastal sage scrub.

Field sampling at IRP Site 34b will include visual inspection and hand auguring of nine borings to a maximum depth of 6 feet bgs for subsurface soil sampling; surface soil samples (0 to 2 feet bgs) will be collected within a grid at 12 random locations.

Field fencing, consisting of five-strand barbed wire, is planned to enclose the site. The fencing will be installed on the east side of Walleye Road and the north side of the existing unimproved road that extends east from Walleye Road to Red Eye Road. A portion of the fencing will cross vegetated land, as shown on Figure A-3. The estimated maximum area of coastal sage scrub disturbance related to proposed fencing operations is 0.42 acres.

A3.3 SITE ACCESS AND FIELD ACTIVITIES FOR IRP 34D

Access to IRP Site 34d, Dunnage Disposal Site 4, will be along the northwestern boundary of the site from Maverick Road (Figure A-4). All vehicle parking will be along the shoulder of Maverick Road on paved surfaces. Vegetation surrounding the site will be unaffected by the SI field work for IRP Site 34d, since no brush clearance is required for site access and no fencing is planned for the site.

Sampling to occur at the site is proposed to include hand auguring of seven borings to a maximum depth of 6 feet bgs for subsurface soil sampling, collecting surface soil samples (0 to 2 feet bgs) over a grid at 10 locations, and visual surveys. The proposed staging area for all field activities for IRP Site 34d will be located just south of Maverick Road on a paved area located on the northwestern site boundary.

A3.4 SITE ACCESS AND FIELD ACTIVITIES FOR IRP 34E

IRP Site 34e, Dunnage Disposal Site 5, will be directly accessed along Harm Road from Ammunition Road. Ammunition Road is an asphalt-paved road that lies just east of the IRP site footprint. Harm Road cuts though the center of the IRP site and is gated on its eastern end (Figure A-5). Parking and staging for field activities will be along the shoulder of Harm Road on paved surfaces.

Sampling to take place at IRP Site 34e will consist of hand auguring five borings to a maximum depth of 6 feet bgs for subsurface soil sampling and collecting surface soil samples at six biased locations. Fencing will include installation of field fences along the north and south shoulder and at the base of the road embankments that support Harm Road. Although there is sparse coastal sage scrub within the action area of this site, the area generally does not support intact, contiguous coastal

sage scrub vegetation or other sensitive habitats; see Figure A-5 and photos taken by Arthur Davenport. The area of disturbance for non-sensitive habitat is approximately 0.19 acre.

A4.0 MRP SITE AVOIDANCE AND MINIMIZATION – ACCESS, INVESTIGATION, AND FENCING

The planned biological avoidance and minimization measures described in the Section A2.0 of this appendix will be implemented for all field activities at Munitions Response Program (MRP) Sites within NAVWPNSTA Seal Beach Detachment Fallbrook. Detailed descriptions of site access and the investigation for each of the MRP sites are provided in the following sections. All field activities at the MRP sites will strictly adhere to the planned biological and minimization measures presented in Section A2.0. In addition to the procedures defined in Section A2.0, all field activities will require clearance by the unexploded ordnance (UXO) technician. The UXO technician will work directly with the biologist to provide direction on UXO and biological avoidance procedures to the field team. The proposed access routes, staging areas, and areas that will require brush clearance for each of the sites are shown in Figures B-6 through B-11. The approximate acreage to be disturbed for brush clearance or minor grading for development of site access routes and installation of fencing for the various MRP sites is also provided in Table A-1, which is located at the end of this appendix.

A4.1 SITE ACCESS AND FIELD ACTIVITIES FOR MRP UXO1

MRP Site UXO1, QE Test Area, will be accessed from Ammunition Road, then south along a paved road near the Missile Test Facility, and then along existing unimproved roads that are shown as primary vehicle access routes (see Figure A-6). Staging and parking for field activities in the main portion of the QE test area will be in a graded area south of the Drop Test Tower in the western portion of the site. Field activities will include visual inspections, geophysical surveys, surface and subsurface sampling, and fencing.

Two features or areas of concern have also been identified north of the main QE test area. These features consists of an open burn/slit trench (burn/slit trench 3) and an unconfirmed rocket fuel disposal trench, which will be accessed by vehicles from a road to be created that will extend from the northeastern limit of the main QE Test Area. Access to these areas will require grading with a rubber-tired skip loader. Estimated maximum possible area of disturbance for brush clearance and grading for proposed primary vehicle access routes north of the main QE test area is 0.14 acre. The vegetation that will be temporarily affected by the disturbance consists of coastal sage scrub.

The MRP site footprint is planned to be accessed for geophysical surveys and sampling by foot only; all vehicles will remain on the proposed vehicle access routes during ingress and egress for the field investigation. Field activities to occur at the site will include hand auguring 20 borings to a maximum depth of 6 feet bgs for subsurface soil sampling, collecting surface soil samples at 16 biased locations, collecting of 17 grid surface soil samples, visual surveys, and geophysical surveys. If a limited-access drill rig is required, the permitted biologist, archeologist (to be present for UXO1 and UXO2 sites only), and UXO technician must approve of the specified

route of access within the site footprint. The qualified biologist and archeologist will also not access any of the areas within the MRP site footprint until the areas have been cleared by the UXO technician.

Geophysical surveys at UXO1 will be conducted with an EM61, which is a time-domain metal detector that consists of a man-towed portable cart with two bicycle sized tires on each side. The EM61 surveys will require minimal and temporary vegetation disturbance within the main QE Test Area, as most of the vegetation is sparse scrub. Geophysical surveys will be initiated from an established baseline with transects on 5-foot centers. The transects may vary laterally by a maximum of 2 feet to avoid vegetation disturbance. Any obstructing vegetation of significant lateral extent that compromises the integrity of the geophysical survey will be inspected and approved by the qualified biologist before it is cleared by hand. Should clearing brush not be advised, the area where the deviation occurred will be evaluated using hand-held equipment, as approved by the biologist. Before any geophysical surveying begins at UXO1, the qualified biologist, archeologist (required for UXO1 and UXO2 only), and UXO technician will approve the specified areas to be accessed. It is conservatively estimated that the maximum area that will require clearing for the geophysical survey will be 2.75 acres within the northwestern portion of the 63-acre site. The geophysical survey activities that may require clearing brush are related to the investigation of potential buried open burn/open detonation (OB/OD) trenches located immediately east of the road leading to the drop test tower.

A maximum of five-strand wire fencing will be installed at around the site footprint at MRP Site UXO1 (and includes a separate fence around the northern burn/slit trench 3) to prevent cattle access (Figure A-6). Gates will be installed to provide vehicle access to the fenced areas.

Field fencing is planned for the main QE Test Area and will be installed mostly along the shoulder of the existing unimproved road. The estimated maximum area of disturbance for brush clearance to provide access for fencing installation at UXO1 is 1.12 acres. The vegetation that will be temporarily affected by the disturbance consists of mixed grassland and coastal sage scrub. All proposed fencepost locations, which are still to be selected, will be screened by the UXO technician with a magnetic gradiometer and will require approval by the qualified biologist.

Actual alignment of fencing may vary from the locations depicted in Figure A-6 as conditions in the field (presence of UXO or natural resources) dictate. The biomonitor will endeavor to minimize adverse impacts to sensitive vegetation and will implement avoidance and minimization measures for the coastal California gnatcatcher and Stephens' kangaroo rat, which have both been documented as occurring within the action area of this site.

A4.2 SITE ACCESS AND FIELD ACTIVITIES FOR MRP UXO2

MRP Site UXO2, Small Arms Range and Skeet/Trap Range, will be directly accessed by vehicle along a temporary route that will generally parallel and cross over Fallbrook Creek using an existing culvert (see Figure A-7). This proposed primary vehicle access route will require minor grading and will be approached from the paved road east of the Missile Test Facility off from

Ammunition Road. Parking for field activities will be in the staging area within the footprint of the Trap/Skeet Range. The maximum width of disturbance for this proposed primary vehicle access route will be approximately 12 feet. The estimated maximum area of disturbance for the proposed primary vehicle access route is 1.00 acre, which includes the proposed staging area of approximately 0.04 acre. The vegetation that will be temporarily affected by the disturbance is predominantly grassland with minimal coastal sage scrub and some mulefat based upon visual reconnaissance.

The MRP site footprint will be accessed by foot only, with the exception of the portion of the primary vehicle access road that lies within the boundary of the Skeet/Trap Range. All vehicles will remain on the proposed vehicle access routes during ingress and egress for the field investigation.

Field activities to occur at the site will include visual surveys, biased and grid surface soil sampling (a total of 67 locations), and fencing for the small arms range The field fencing will consist of a maximum of five-strand barbed wire at the approximate location shown on Figure A-7. A gate will be installed to provide access at the northeastern corner of the range. Hand brushing of a few individual shrubs may be required in the slope area at the western end of the range. The remaining alignment is located within an area considered grassland. The repair of pasture fencing and addition of a gate is also planned along the existing road southeast of the site should it be desirable to prohibit cattle from grazing within this entire section of pasture. The estimated maximum area of disturbance for brush clearance to allow installation/repair of fencing is 0.11 acre. Vegetation that will be temporarily affected by the disturbance consists of coastal sage scrub and partial mixed grassland. Although a single transient least Bell's vireo was detected within the adjacent stretch of riparian habitat along Fallbrook Creek in 2007 (not depicted on Figure A-7 as data are still draft), no pairs and no nesting were observed. Moreover, no least Bell's vireos have been observed during the 2008 field season within this stretch of Fallbrook Creek. Contrary to the previous consultation (FWS-SD-4030.2), no Stephens' kangaroo rats are known to occupy the grasslands within the project site, although they were documented as formerly occupying an area adjacent to the fence repair/gate installation location southeast of the site. SKR avoidance/minimization measures will be implemented during fence repair and gate installation at this location as a precautionary.

A4.3 SITE ACCESS AND FIELD ACTIVITIES FOR MRP UXO3

MRP Site UXO3, Dunnage Disposal 1 (formerly consulted on as IRP site 34a), will be reached from two proposed primary vehicle access routes, each requiring minor grading and brush clearance. The primary access will be from Red Eye Road east of the site (Figure A-8). A northern primary vehicle access route will use existing unimproved roads and a south branch of the road to provide access to the north side of the site. Parking will be along the shoulder of Red Eye Road on paved surfaces to ensure clear access along the proposed vehicle access routes. The southern side of the site will be accessed along the fence line of the former napalm storage area, also on Red Eye Road. All proposed primary vehicle access routes will be essentially improving or clearing previous unimproved roads and might require minor grading and clearing brush along the shoulders of the road to allow access. The estimated maximum possible total

area of disturbance for brush clearance and grading for the proposed primary vehicle access routes on the eastern and western site boundaries, as well as the westernmost access route that leads to UXO3 and Walleye Road, is 1.43 acres. The vegetation that will be temporarily affected by the disturbance is considered coastal sage scrub with some riparian habitat.

The MRP site footprint will be accessed by foot only, with the exception of the primary vehicle access routes that will follow site boundaries and will accommodate only a brush hog. All vehicles will remain on the proposed vehicle access routes during ingress and egress for the field investigation.

Field sampling to occur on site will include hand auguring of nine borings to a maximum depth of 6 feet bgs for subsurface soil sampling, collecting surface soil samples (0 to 2 feet bgs) in six locations over a grid, and visual surveys. The qualified biologist will work directly with the UXO technician; however, the biologist may not enter an area unless the access route has been cleared by the UXO technician. The proposed staging area for field work at the site will be located in the southeastern portion of the site, south of the drainage.

A maximum of five-strand field fencing installed around the entire site footprint to prevent cattle access is proposed at MRP Site UXO3 (Figure A-8). Two proposed access gates are to be installed to provide access at the northeastern and southeastern boundaries of the site. The maximum width of disturbance for grading and bush clearing to allow access for installation of fencing along the northeast and southwest boundaries of the site will be approximately 12 feet. The fence alignment along the eastern boundary of the site will require clearing brush to allow installation across an area with no previous improvements. Workers will use only this alignment for ingress and egress to the working area. The estimated maximum area of disturbance for brush clearance to provide access for fencing installation is 0.13 acre. The vegetation that will be temporarily affected by the disturbance is considered coastal sage scrub with some riparian habitat. All proposed fencepost locations, which are to be selected in the field, will be screened by the UXO technician with a magnetic gradiometer and will require approval by the qualified biologist.

A4.4 SITE ACCESS AND FIELD ACTIVITIES FOR MRP UXO4

MRP Site UXO4, Dunnage Disposal Site 3 (formerly consulted on as IRP site 34c), will be directly accessed from Terrier Road (Figure A-9). Vegetation surrounding the site will be unaffected by the SI field work for MRP Site UXO4 since no brush clearance is required for site access. The footprint of the MRP site will be accessed by foot only; all vehicles will remain on the proposed vehicle access routes or the surrounding paved surfaces during ingress and egress for the field investigation.

A geophysical survey will be conducted across the entire footprint of the UXO4 site with an EM61, which was described previously. The EM61 surveys will require minimal temporary vegetation disturbance, as most of the vegetation is sparse scrub. The geophysical survey will be initiated from an established baseline with transects on 5-foot centers. The transects may vary laterally by a maximum of 2 feet to avoid disturbing vegetation. Any obstructing vegetation of

significant lateral extent that compromises the integrity of the geophysical survey will be inspected and approved by the qualified biologist before it is cleared by hand. Should clearing not be advised, the area where the deviation occurred will be evaluated using hand-held equipment. Before any geophysical surveying begins at UXO4, the UXO technician and qualified biologist will approve the specified areas to be accessed.

Field sampling for UXO4 will include hand auguring five borings to a maximum depth of 6 feet bgs for subsurface soil sampling, collecting two biased surface soil samples, collecting surface soil samples over a grid at four locations, visual surveying, and geophysical surveying. The qualified biologist will work with the UXO technician and will not access any of the areas within the site footprint until the areas have been cleared by the UXO technician. The staging area for the site will be located on the south side of Terrier Road and will require traffic control.

A maximum of five-strand wire fencing installed around the entire site footprint to prevent cattle access is proposed at MRP Site UXO4 (Figure A-9). A gate is to be installed to provide access at the northwestern boundary of the site. Only the proposed fencing along the western boundary of UXO4 will likely require some non-coastal sage scrub brush clearance for access (see Figure A-9). The estimated maximum possible area of disturbance for clearance of sparse sage scrub mixed with grassland to provide access for fencing installation is 0.17 acre. The vegetation that will be temporarily affected by the disturbance is considered sparse mixed grassland. Proposed fencepost locations, which are to be selected in the field, will be screened by the UXO technician with a magnetic gradiometer and will require approval by the qualified biologist. Stephens' kangaroo rats were documented within the 100-foot buffer area of Site UXO4 in 2000; however, the species was not documented within the vicinity in the 2007 Station-wide survey (not depicted on Figure A-9 as data are still draft).

A4.5 SITE ACCESS AND FIELD ACTIVITIES FOR MRP UXO6

MRP Site UXO6, Depot Lake, will be accessed directly along two existing trails from Terrier Road (Figure A-10). The staging area for UXO6 will be located on the turn-out alongside Terrier Road, immediately north of the site. Both existing trails will be used to provide access to the shoreline and lakebed. However, the access route to the west will also serve as a boat launch and may require minor clearing of brush. Hand trimming or clearing will likely be required to clear vegetation for the access route to be used to launch an inflatable boat. The maximum width of disturbance for brush clearing and possible minimal grading for the access routes will be 12 feet. The estimated maximum possible area of disturbance for brush clearance for proposed lakebed and shoreline access routes is 0.08 acre. The vegetation that will be temporarily affected by the disturbance is considered predominantly riparian with some coastal sage scrub.

The MRP site footprint will be accessed by foot or boat only; all vehicles will remain on the proposed vehicle access routes during ingress and egress for the field investigation. The focus of the site inspection is the area within the limits of the lake (below the high water mark) where disposal of munitions may have occurred. The field activities to occur at the site will include visual inspection, marine geophysical surveying, as well as both biased and grid surface soil sampling at a total of 40 locations. No fencing is planned for this site. However, because least

Bell's vireos have been observed to nest around Depot Lake as recently as the 2008 field season, every effort will be made to avoid the breeding season for this species. The qualified biologist will work with the UXO technician and will also not access any of the areas within the MRP site footprint until the areas have been cleared by the UXO technician.

A geophysical survey will be conducted over accessible portions of the lake using a boat as the instrument (magnetometer) platform. Therefore, the geophysical survey is anticipated not to cause any significant disturbance of vegetation. The geophysical survey will be initiated from an established baseline with transects on 5-foot centers. However, before any geophysical surveying begins at UXO6, the qualified biologist and UXO technician will approve the specified areas to be accessed.

A4.6 SITE ACCESS AND FIELD ACTIVITIES FOR MRP UXO7

The focus of the site inspection at MRP Site UXO7, Lower Lake, is the area within the limits of the lake's high water mark where disposal of munitions may have occurred. Access to the MRP site will be from the existing unimproved road that connects to Sidewinder Road (Figure A-11). The staging area and parking will be along the shoulder of the existing unimproved road. The lake and lakebed are planned to be accessed by foot or inflatable boat only; all vehicles will remain on the unimproved road and staging area.

Two existing trails will be used for access to the shoreline and lakebed. However, the access route to the north will also be used to launch the inflatable boat and may require that brush be cleared by hand. The maximum width of disturbance for brush clearing or grading for the access routes will be approximately 12 feet. Estimated maximum possible area of disturbance for brush clearance for proposed access to the shoreline and lakebed routes is 0.05 acre. The vegetation that will be temporarily affected by the disturbance is considered predominantly riparian with some mixed grassland and coastal sage scrub. Least Bell's vireos depicted on Figure A-11 are from 2002 and 2004 sightings; no vireos were detected within the general Lower Lake area in 2007 or 2008.

Field activities to occur at the site will include visual inspection, marine geophysical surveying, as well as both biased and grid surface soil sampling at a total of 40 locations within the lake bed. Fencing is also planned for the site, with a maximum disturbance of 0.34 acre of scrub and riparian habitat. The qualified biologist will work with the UXO technician and will also not access any of the areas within the footprint of the MRP site until the areas have been cleared by the UXO technician.

A geophysical survey will be conducted over accessible portions of the lake using a boat as the instrument (magnetometer) platform or by foot in the dry lakebed portion of the site. Therefore, the geophysical survey is anticipated not to cause any significant disturbance of vegetation. The geophysical survey will be initiated from an established baseline with transects on 5-foot centers. However, before any geophysical surveying begins at UXO7, the qualified biologist and UXO technician will approve the specified areas to be accessed.

TABLE A-1

Table A-1. Maximum Acreage Estimates of Temporary Bio-Disturbance - Grading, Brush Clearance, Access Routes, and Fence Installation [a]

		Acreage of Bio-Disturbance for Site Access Routes (Approximate)					Acreage of Bio-Disturbance for Fencing Installation (Approximate)					Acreage of Bio disturbance for geophysical surveys/sampling	Potential T&E Species within the Action Area [b, c]	
Site	**Site Acreage**	**Coastal Sage Scrub (CSS)**	**Grass-land**	**Riparian**	**Ruderal/ Disturbed or Paved [d]**	**Total [e]**	**Coastal Sage Scrub (CSS)**	**Grass-land**	**Riparian**	**Ruderal/ Disturbed or Paved [d]**	**Total [e]**	**Total [e]**	**Within Site**	**Within 100-foot Buffer**
IRP 32	0.2	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A
IRP 34b	9.0	0.30	0.00	0.00	0.00	0.30	0.42	0.00	0.00	0.00	0.42	0.00	CAGN	CAGN
IRP 34d	1.8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	CAGN, LBV	CAGN, LBV
IRP 34e	0.7	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.02	0.00	0.19	0.00	SKR	SKR, CAGN
MRP UXO1 [f]	63.0	0.14	0.00	0.00	0.00	0.14	0.48	0.62	0.02	0.00	1.12	2.75	SKR*, CAGN*	SKR*, CAGN*
MRP UXO2 [g]	31.0	0.06	0.91	0.03	0.00	1.00	0.04	0.07	0.00	0.00	0.11	0.00	CAGN, LBV*	CAGN, LBV*
MRP UXO3	7.8	1.43	0.00	0.00	0.00	1.43	0.13	0.00	0.00	0.00	0.13	0.00	CAGN	CAGN
MRP UXO4	1.8	0.00	0.00	0.00	0.00	0.00	0.10	0.07	0.00	0.00	0.17	0.00	N/A	SKR*, CAGN
MRP UXO6	12.0	0.00	0.00	0.07	0.01	0.08	0.00	0.00	0.00	0.00	0.00	0.00	CAGN, LBV	CAGN, LBV*
MRP UXO7	3.0	0.00	0.00	0.05	0.00	0.05	0.00	0.15	0.19	0.00	0.34	0.00	LBV*	CAGN, LBV*
TOTAL	**130.3**	**1.93**	**0.91**	**0.14**	**0.03**	**3.02**	**1.26**	**1.16**	**0.22**	**0.00**	**2.47**	**2.75**		

[a] With the exception of exclusion fencing (which may be kept in place for many years), all impacts from the Site Inspection actions (geophysical surveying/sampling) are expected to be temporary effects.

[b] T&E = Threatened and endangered (CAGN = Coastal california gnatcatcher; LBV = least Bell's vireo; SKR = Stephens' kangaroo rat; N/A = Not Applicable). Most species are listed for their potential occurrence due to habitat and proximity of known current

[c] Action Area = Area to be affected directly or indirectly (100-foot buffer) by the federal action and not merely the immediate area (within the site) involved in the action. For this Site Investigation, T&E species are considered to be included in the action area if they are known to occur, or have the potential to occur within the project site or within 100 feet (buffer) of the project site. Direct and indirect potential effects to species within the 100-foot buffer area are expected to involve temporary noise, visual changes and possibly dust disturbance.

[d] Ruderal/disturbed acreage for access routes and fencing is the linear footage x 12.0 and x 6.0 feet wide, respectively.

[e] Combined bio-disturbance from access route, fencing, and geophysical surveying/sampling is much less than site acreage total because the majority of the site footprint will not be disturbed during this Site Investigation.

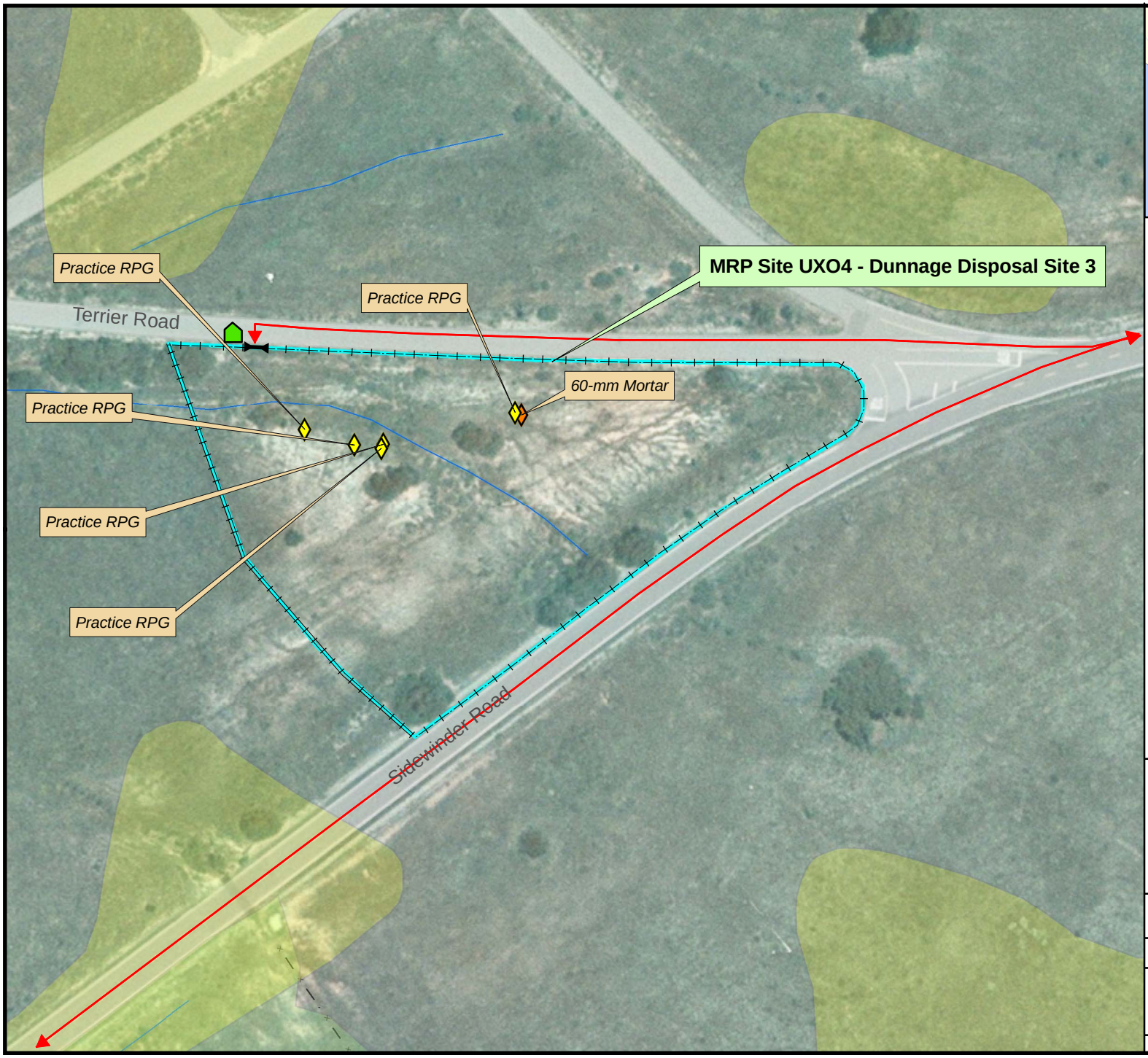
[f] UXO1 Includes a total of 1.0 acres of occupied SKR habitat

[g] Acreage estimates for impacts to CSS is based on field reconnaisance, not the vegetation layer; grassland acreage includes staging area clearance (0.04 acres) in the distrubance summary; the CSS bio-disturbance summary also includes a proposed fence extension / gate to be located along the installation boundary SE of the Trap/Skeet range.

FIGURES

Figures A-1, A-2, A-3, A-6, A-7, A-10 and A-11
have been removed.

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



Legend

- Roads
- Streams
- IR or MRP Sites
- Evidence of Munitions Use
- Munitions Fragments/Scraps
- Existing Fences
- Proposed Fencing
- Proposed Fencing with Brush Clearance
- Proposed Primary Vehicle Access Routes
- Proposed Staging Area with Traffic Control
- Proposed Gate
- CSS (2000 Survey)
- Occupied SKR Habitat (2000 Survey)

RPG - Rifle Propelled Grenade

** MEC (Munitions and Explosives of Concern) locations are based on the Preliminary Assessment (Malcolm Pirnie 2006).*

0 100 Feet

1 in = 100 feet

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NAVWPNSTA Seal Beach Det Fallbrook, California

Figure A-9

MRP Site UXO4
Dunnage Disposal Site 3

Map Produced by TTEM, Inc

Legend

- Roads
- Railroad
- Streams
- IR or MRP Sites
- Existing Fences
- Proposed Fencing
- Proposed Fencing with Brush Clearance
- Proposed Primary Vehicle Access Routes
- Proposed Staging Area
- Proposed Gate
- CSS (2000 Survey)
- CAGN Detections 2000-03

N

0 160 Feet

1 in = 160 feet

ChaduxTt JV

NAVWPNSTA Seal Beach Det Fallbrook, California

Figure A-5

IRP Site 34e
Dunnage Disposal Site 5

Map Produced by TTEM, Inc

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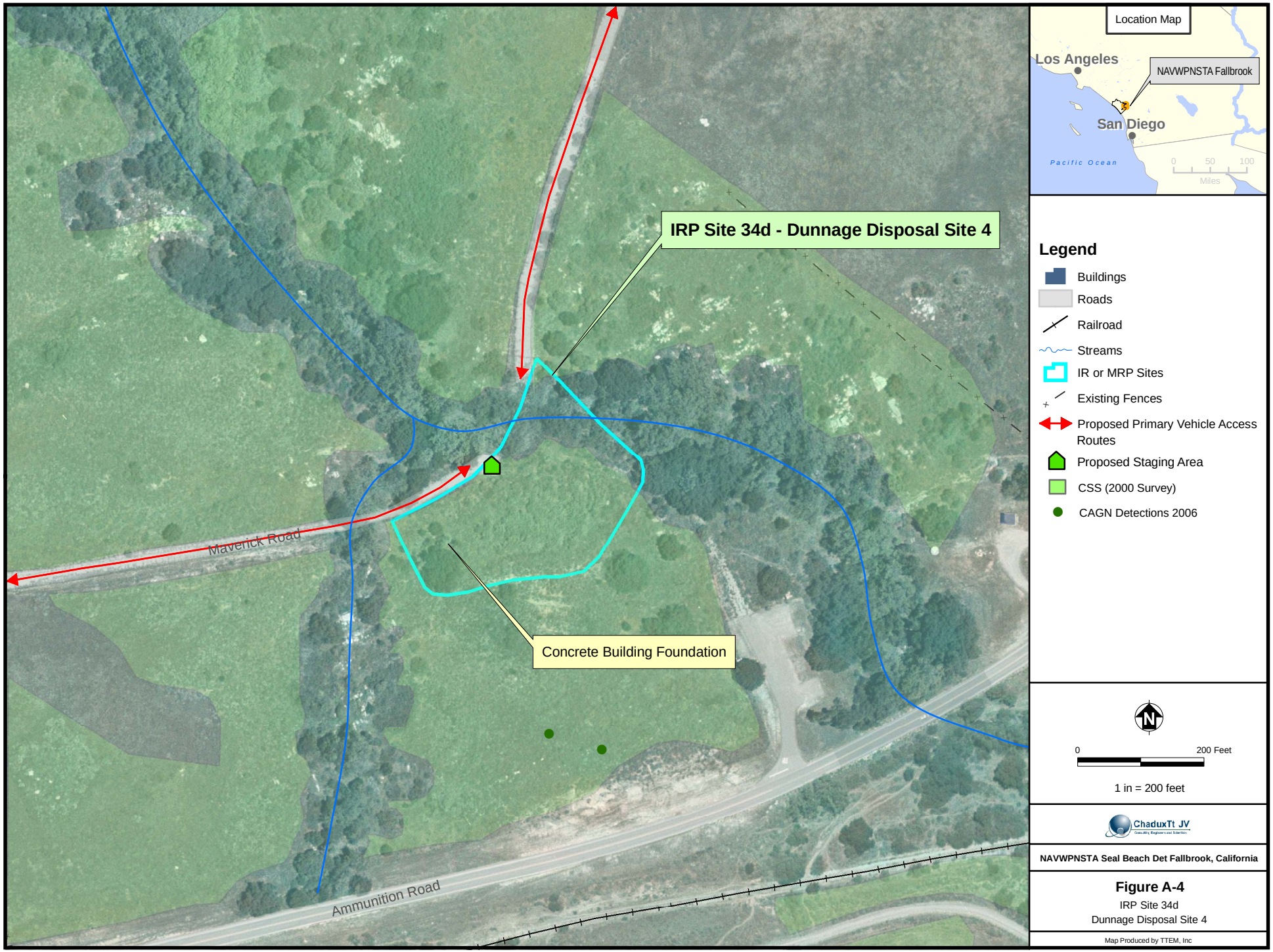

NAVWPNSTA Seal Beach Det Fallbrook, California

Figure A-4

IRP Site 34d

Dunnage Disposal Site 4

Map Produced by TTEM, Inc

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Legend

- Roads
- Recreation Trail
- IR or MRP Sites
- Approximate Extent of Lake (Observed 10/17/07)
- Proposed Fencing
- Proposed Fencing with Brush Clearance
- Proposed Primary Vehicle Routes
- Proposed Primary Access Routes with Brush Clearance
- Proposed Staging Area
- Proposed Gate
- CSS (2000 Survey)
- CAGN Detections 2000-03
- LBV Detections 2002

N

0 200 Feet

1 in = 200 feet

ChaduxTt JV

NAVWPNSTA Seal Beach Det Fallbrook, California

Figure A-11

MRP Site UXO7
Lower Lake

Map Produced by TTEM, Inc

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ATTACHMENT 1
LETTER FROM U.S. FISH AND WILDLIFE

Rcvd. Fri. 10-20-06

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road
Carlsbad, California 92011

In Reply Refer To:
FWS-SD-4030.2

OCT 10 2006

Mr. David Baillie, Environmental Director
Naval Weapons Station Seal Beach, Detachment Fallbrook
700 Ammunition Road
Fallbrook, California 92028-3187

Attn: Bob Schallmann and Christy Wolf, Conservation Program Managers

Subject: Fencing of Installation Restoration Program and Munitions Response Program Sites, Naval Weapons Station Seal Beach, Detachment Fallbrook, San Diego County, California

Dear Mr. Baillie:

We have reviewed your letter (5090 Ser N45W/0206) that we received on September 11, 2006, requesting informal consultation for the proposed fencing of Installation Restoration Program (IRP) and Munitions Response Program (MRP) sites at Naval Weapons Station Seal Beach, Detachment Fallbrook (Fallbrook NWS). The proposed project may affect the federally endangered Stephens' kangaroo rat (*Dipodomys stephensi*, "SKR"), the federally threatened coastal California gnatcatcher (*Polioptila californica californica*, "gnatcatcher"), and the gnatcatcher's designated and proposed critical habitat. You determined that the project will not impact southwestern willow flycatcher (*Empidonax trailllii extimus*), least Bell's vireo (*Vireo bellii pusillus*), arroyo toad (*Bufo californicus*), quino checkerspot butterfly (*Editha quino euphydryas*) and thread-leaved brodiaea (*Brodiaea filifolia*); we concur with that determination.

The proposed project involves repair of existing fencing and erection of additional fencing at nine IR or MRP sites on Fallbrook NWS to allow the existing grazing program, which is part of the fire management program, to continue in a manner that ensures the safety of grazing program personnel. The Fallbrook NWS conservation program staff has worked to avoid and minimize impacts to sensitive biological resources by placing the fencing, to the extent possible, along existing areas that do not support habitat for the gnatcatcher or SKR. The fencing will consist of t-posts and 5-strand barbed wire cattle fence; the project will take approximately 60 days to complete. The nine sites where fencing will be repaired or installed are presented in Table 1. A total of 2.13 acres will be affected by fencing due to removal of vegetation (mainly coastal sage scrub) and disturbance to the ground from post installation. Where necessary, an approximately 4-foot wide area will have the vegetation cut to allow workers to erect the fence. About 0.44 acres of the total are coastal sage scrub that may support the gnatcatcher; the remainder is dominated by annual grassland.

TAKE PRIDE IN AMERICA

Table 1. Impacts associated with fencing of Installation Restoration and Munitions Response Program sites, Fallbrook Naval Weapons Station.

IR/MRP Site	Linear Foot (ft) Impacts	Acreage Impacts (linear ft x 4-ft-wide clearing)	Coastal Sage Scrub Impacts (acres)	SKR Occupied Habitat Impacts (acres)
UXO-2 Skeet and Pistol Ranges	400.00	0.04	0.02	0.02
UXO-1 Quality Evaluation Test Site	6814.88	0.63	0.09	0.49
Site 33 Salvage Yard Landfill	3174.50	0.29	0.10	0
Site 34 – a Dunnage Disposal Area	3904.48	0.36	0.07	0
Site 34 – b Dunnage Disposal Area	3313.61	0.30	0.08	0
Site 34 – c Dunnage Disposal Area	1108.91	0.10	0	0
Site 34 – d Dunnage Disposal Area	0	0	0	0
Site 34 – e Dunnage Disposal Area	1165.67	0.11	0	0
Site 27 Landfill	3285.07	0.30	0.08	0.17
TOTAL	**23167.12**	**2.13**	**0.44**	**0.68**

The following conservation measures will be implemented to minimize impacts to SKR, gnatcatcher, and designated and proposed gnatcatcher critical habitat.

1. A biological monitor will be present during construction to ensure conservation measures are implemented.
2. Work will occur between September 1 and February 14 to avoid the gnatcatcher breeding season.
3. Impacts will be limited to a 4-foot width.
4. In areas occupied by SKR, a qualified biologist will conduct surveys one month prior to construction.
5. Potential SKR burrows within the project footprint will be identified by the qualified biologist and marked with pin flags. Ground disturbing activities will not occur within 10 feet of flagged burrows.
6. Vehicles will be used only on existing access roads and parked overnight only in appropriate locations.
7. Work will be conducted during daylight hours only.

Each individual site where clearing of coastal sage scrub habitat suitable for gnatcatcher breeding or work in SKR occupied areas is small (impact area ranges from 0 – 0.49 acres) and will be

narrow and linear. While SKR could be crushed in their burrows by fence post installation, given the small individual impact footprint at each site, the conservation measures to avoid burrows, and the SKR occupancy at a trace level in only some areas, the likelihood of death or injury of SKR from project implementation is discountable.

A total of 0.44 acres of coastal sage scrub suitable for gnatcatchers will be removed; however, no individual fencing site's impact is greater than 0.10 acres. Since habitat removal will be done outside of the gnatcatcher breeding season, no impacts to eggs or young will occur. Adult gnatcatchers will be mobile enough to move away from workers removing the vegetation so no adult gnatcatchers will be killed or injured by the project. Loss of the coastal sage scrub will not preclude gnatcatchers from persisting in the area given the linear nature of the impact and since the loss represents only a minor amount of habitat relative to typical gnatcatcher territories of approximately 10-11 acres (Bontrager 1991; Preston *et al.* 1998). Therefore, the effects to gnatcatchers from the project will be insignificant. Cattle may keep the scrub in a disturbed condition in areas open to grazing, but some habitat may re-grow where cattle are excluded and thus be available to gnatcatchers.

The loss of a total of 2.13 total acres of scrub, grassland and other habitats represents a very small proportion of the total proposed or designated critical habitat (495,795 acres and 513,650 acres, respectively) for the gnatcatcher. Because of the individual small areas affected and the narrow, linear nature of the impacts, and since the function of the critical habitats will remain for breeding, feeding and dispersal, the loss of a total of 2.13 acres of proposed and designated gnatcatcher critical habitat is insignificant.

Based on the project description and the conservation measures, we concur that the proposed project is not likely to adversely affect SKR, gnatcatchers, or proposed or designated gnatcatcher critical habitat. Should additional information on listed or proposed species or critical habitat become available, this determination may be reconsidered.

We suggest that our agencies work together to clarify aspects of the grazing program which serves the overall fire management program on Fallbrook NWS. In particular, we suggest that maintenance of livestock fencing be more explicitly addressed, as discussed in a telephone conversation between Fallbrook NWS and Service staff on October 3, 2006.

We thank you for your continued coordination and communication with us on Fallbrook NWS projects that may affect federally listed species. If you have any questions regarding this letter, please contact Jill Terp at (760) 431-9440 extension 221.

Sincerely,

Jill Terp
for

Karen A. Goebel
Assistant Field Supervisor

Literature Cited

Bontrager, D. R. 1991. Habitat requirements, home range and breeding biology of the California gnatcatcher (*Polioptila californica*) in South Orange County, California. Prepared for Santa Margarita Company, Rancho Santa Margarita, California. April 1991. 19pp.

Preston, K., P. Mock, M. Grishaver, E. Bailey, and D. King. 1998. California gnatcatcher territorial behavior. Western Birds 29:242-257.

ATTACHMENT 2
Endangered Species Assessment Initial Site Visit for IRP Sites 32, 34b, 34d, 34e; MRP Sites UXO1, UXO2, UXO3, AND UXO4, Naval Weapons Station, Seal Beach Detachment Fallbrook

Endangered Species Assessment
Initial Site Visit for
IRP Sites 32 (Paint Shop Bldg 351), 34b (DDS 2), 34d (DDS 4), 34e (DDS 5); MRP Sites UXO1 (QE Test Area), UXO2 (Skeet/Trap and Small Arms Range), UXO3 (DDS 1), UXO4 (DDS 3), UXO6 (Depot Lake) and UXO7 (Lower lake)
Naval Weapons Station, Seal Beach Detachment Fallbrook
Fallbrook, CA

Prepared for:

ChaduxTt JV
1230 Columbia Street, Suite 1000
San Diego, CA 92101

By

Arthur Davenport
Davenport Biological Services
P.O. Box 1692
Barstow, CA 92312
619-729-4242

December 28, 2007

INTRODUCTION

Davenport Biological Services (DBS) was hired to review a variety of sites located at Naval Weapons Station, Seal Beach Detachment Fallbrook, in regard to the potential for the presence of Federally protected species. The Naval Weapons Station, Seal Beach Detachment Fallbrook, is located in Fallbrook, California, within San Diego County (Figure 1). For the purposes of this assessment, Federally protected species are those listed as threatened or endangered under the Endangered Species Act of 1973, as amended.

The native plant communities of Seal Beach Detachment Fallbrook are varied and include perennial grassland, coastal sage scrub, chamise chaparral, coast live oak riparian woodland, willow riparian woodland, as well as others. Non-native annual grassland also occurs in this area.

Three of the plant communities, perennial grassland, coastal sage scrub, and riparian woodland, are representative of plant communities that were once more widespread in California. It is estimated that 85% of the coastal sage scrub has been lost (Westman 1981). Regarding riparian plant communities in southern California, it is estimated that there has been a reduction of 95% to 97% (Faber et al., 1989). The Federally protected animal species that occur on Seal Beach Detachment Fallbrook are strongly associated with one or more of these declining plant communities.

The Stephens' kangaroo rat (*Dipodomys stephensi*) was listed as an endangered species on 30 September 1988 (USFWS 1988). This species is associated with areas of low perennial cover, where bare ground is common, and where their burrows can be established. Thus, this species is found in disturbed areas of coastal sage scrub, chaparral, and grassland (native perennial and annual). At Seal Beach Detachment Fallbrook, the spatial distribution of the population of Stephens' kangaroo rat has declined. However, the species remains in suitable patches across this area.

The California least tern (*Sterna antillarum browni*) was listed as an endangered species on 2 June 1970 (USFWS 1970). California least terns typically nest near the ocean on the upper reaches of sandy beaches and salt-pans. California least terns forage on fish over ocean, brackish, and fresh water. In regard to from fresh water bodies, California least terns have been observed foraging at fresh water lakes such as Lake Oneal, Windmill, and Guojomi. In addition, they have been observed at Depot Lake (Christy Magdalena Wolf, Naval Weapons Station Seal Beach, Detachment Fallbrook, pers. comm., 2007).

The least Bell's vireo (*Vireo bellii pusillus*) was listed as an endangered species on 2 May 1986 (USFWS 1986). The least Bell's vireo establishes nests in riparian vegetation (e.g., willows (*Salix* sp.), mule fat (*Baccharis glutinosa*), cottonwood (*Populus* sp.), etc.) as well as coastal sage vegetation where Mexican elderberry (*Sambucus mexicanus*) forms adequate patches of vegetation. The least Bell's vireo generally begins to arrive in southern California to nest in mid March and generally departs for Mexico in late August or September. For 2007, the distribution of least Bell's vireo at Seal Beach Detachment Fallbrook is unknown.

The southwestern willow flycatcher (*Empidonax traillii extimus*) was listed as an endangered species on 27 February 1995 (USFWS 1995). The southwestern willow flycatcher nests in

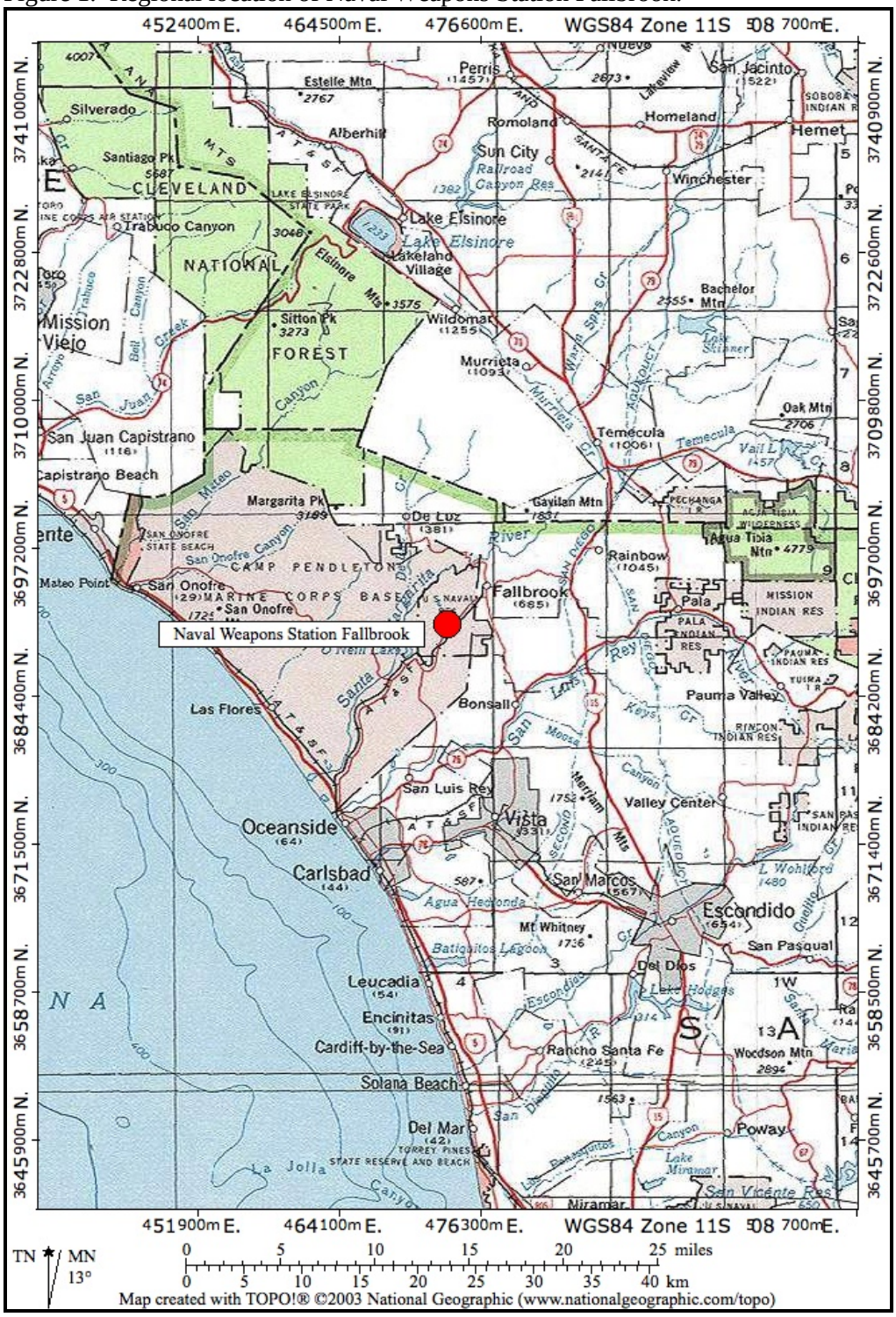
riparian vegetation. The flycatcher generally arrives in southern California in mid May and departs for South America in September or October. For 2007, the distribution of flycatchers at Seal Beach Detachment Fallbrook is unknown.

The coastal California gnatcatcher (*Polioptila californica californica*) was listed as a threatened species on 30 March 1993 (USFWS 1993). In addition, critical habitat was designated for the coastal California gnatcatcher on 24 October 2000 (USFWS 2000). The critical habitat designation included 8,690 acres (98%) of Detachment Fallbrook. The designation was subsequently remanded; however, until final regulations become effective, areas previously designated as critical habitat are to remain in place. The coastal California gnatcatcher nests in coastal sage scrub, baccharis scrub, as well as in chaparral, when located adjacent to coastal sage scrub. In addition, the species will forage in riparian vegetation during and following nesting. The gnatcatcher is non-migratory and occurs throughout the coastal sage scrub plant community of Seal Beach Detachment Fallbrook.

The arroyo toad (*Bufo californicus*) was listed as an endangered species on 16 December 1994 (USFWS 1994). The arroyo toad uses wetland and upland plant communities (e.g., coastal sage scrub) for different aspects of its life cycle. Depending on rainfall and local conditions, the arroyo toad may lay eggs as early as February. Although adult arroyo toads may be found in upland and wetland vegetation, the young-of-the-year apparently remains within or immediately adjacent to wetland/riparian vegetation. Arroyo toads are known to occur along the Margarita River and may occur in other suitable areas at Seal Beach Detachment Fallbrook.

The California red-legged frog (*Rana aurora draytonii*) was listed as a threatened species on 23 May 1996 (USFWS 1996). The California red-legged frog is highly aquatic and inhabits fresh water marshes associated with lakes, rivers, streams, arroyos, and springs. Red-legged frogs are known to have persisted on the Santa Rosa Plateau until at least the late 1990's. At the Santa Rosa Plateau, the frogs inhabited deep pools associated with arroyos. The Santa Rosa Plateau is located approximately 11 miles to the north of Seal Beach Detachment Fallbrook.

Figure 1. Regional location of Naval Weapons Station Fallbrook.



METHODS

Each IRP and UXO site was reviewed as to its potential for listed species. The basis for determining potential presence was habitat based. That is, if suitable habitat for a particular listed species occurred within or immediately adjacent to a site, the site was determined to have potential for that species. In addition, an initial passive survey of the sites for listed species was also conducted during the initial visit. All sightings of protected species were documented. In addition, each site was photographed.

RESULTS

IRP 32 (Paint Shop Building 351)

As shown in Figure 2, only suitable habitat for the Stephens' kangaroo rat, and therefore the potential for this protected species, exists at this site. However, no sign of kangaroo rats was present and habitat occupied by this species does not occur adjacent to the site. Therefore, the Stephens' kangaroo rat is not anticipated at this site.

Figure 2. IRP 32 (Paint Shop Building 351) Photo shows suitable habitat for the Stephens' kangaroo rat (i.e., open area with little aerial cover).

IRP 34b (Dunnage Disposal Site 2)

As shown in Figure 3a, suitable habitat for the coastal California gnatcatcher occurs on and immediately adjacent to the site. Additionally, in open areas such as along the edges of paved roads and along dirt roads, suitable habitat exists for the Stephens' kangaroo rat. Kangaroo rat burrows were observed along the edges of the paved road and along the dirt road bordering the site (Figure 3b). Thus, both the coastal California gnatcatcher and Stephens' kangaroo rat have the potential to occur at this site.

Figure 3a. IRP 34b (Dunnage Disposal Site 2) Photos shows suitable habitat for the coastal California gnatcatcher.

Figure 3b. IRP 34b (Dunnage Disposal Site 2) Photos shows suitable habitat for the Stephens' kangaroo rat (e,g., distributed along dirt road).

IRP 34d (Dunnage Disposal Site 4)

As shown in Figure 4a, 4b, & 4c, suitable habitat for the coastal California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher occurs on and immediately adjacent to the site. Additionally, in open areas such as along the edges of paved roads, suitable habitat exists for the Stephens' kangaroo rat. Thus, the coastal California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, and Stephens' kangaroo rat have the potential to occur at this site.

Figure 4a. IRP 34d (Dunnage Disposal Site 4) Photo shows suitable habitat for the coastal California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher.

Figure 4b. IRP 34d (Dunnage Disposal Site 4) Photo shows suitable habitat for the coastal California gnatcatcher.

Figure 4c. IRP 34d (Dunnage Disposal Site 4) Photo shows suitable habitat for the least Bell's vireo and southwestern willow flycatcher. Coastal California gnatcatchers also use this habitat; especially post nesting.

IRP 34e (Dunnage Disposal Site 5)

As shown in Figures 5a and 5b, suitable habitat for the coastal California gnatcatcher and Stephens' kangaroo rat occurs on and immediately adjacent to the site. In regards to the Stephens' kangaroo rat, it is anticipated to occur in open areas such as along the edges of paved roads. A kangaroo rat burrow was observed on site. Thus, both the coastal California gnatcatcher and Stephens' kangaroo rat have the potential to occur at this site.

Figure 5a. IRP 34e (Dunnage Disposal Site 5) Photo shows coastal sage scrub as well as Mexican elderberry on west facing slope within and adjacent to site.

Figure 5b. IRP 34e (Dunnage Disposal Site 5). Photo shows coastal sage scrub as well as Mexican elderberry on east facing slope within and adjacent to site.

UXO 01 (IRP Site 26, QE Test Area)

As shown in Figure 6a, 6b, 6c & 6d, suitable habitat for the coastal California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher occurs on and immediately adjacent to the site. Additionally, in open areas of the coastal sage scrub, along dirt roads, along the edges of paved roads, suitable habitat exists for the Stephens' kangaroo rat. Thus, the coastal California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, and Stephens' kangaroo rat have the potential to occur at this site. During the initial site visit, a pair of coastal California gnatcatchers was observed on site.

Figure 6a. UXO 01 (IRP Site 26; QE Test Area). Photo shows coastal sage scrub.

Figure 6b. UXO 01 (IRP Site 26; QE Test Area). Photo shows coastal sage scrub. A pair of coastal California gnatcatchers was observed in this area.

Figure 6c. UXO 01 (IRP Site 26; QE Test Area). Photo shows riparian plant community.

Figure 6d. UXO 01 (IRP Site 26; QE Test Area). Photo shows active kangaroo rat burrow within project area.

UXO 02 (Small Arms Range and Skeet/Trap Range)

As shown in Figure 7a and 7b, suitable habitat for the coastal California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher occurs on and immediately adjacent to the site. Thus, the coastal California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher have the potential to occur at this site. In contrast, the introduced annual grassland of the site is thick and has formed a thatch. Therefore, no suitable habitat for the Stephens' kangaroo rat occurs on site at this time. However, suitable habitat for the Stephens' kangaroo rat occurs along the access route to this site. It is also important to note that a wildfire would open this area up and improve its suitability, and therefore potential, for the Stephens' kangaroo rat.

Figure 7a. UXO 02 (Small Arms Range and Skeet/Trap Range) Photo shows introduced annual grassland and coastal sage scrub plant communities of the site.

Figure 7b. UXO 02 (Small Arms Range and Skeet/Trap Range) Photo shows both the riparian and coastal sage scrub plant communities located at this site.

UXO 03 (Dunnage Disposal Site 1)

As shown in Figures 8a and 8b, both suitable habitat for the Stephens' kangaroo rat and coastal California gnatcatcher occur on and immediately adjacent to the site. Given the presence of suitable habitat, the potential for both of these protected species exists at this site. Kangaroo rat burrows were also observed on site (Figure 5b).

Figure 8a. UXO 03 (Dunnage Disposal Site 1) Photo shows coastal sage scrub plant community of this site.

Figure 8b. UXO 03 (Dunnage Disposal Site 1) Photo shows coastal sage scrub plant community as well as one of the dirt roads of this site.

UXO 04 (Dunnage Disposal Site 3)

As shown in Figure 9a, both suitable habitat for the Stephens' kangaroo rat and coastal California gnatcatcher occurs on and immediately adjacent to the site. Given the presence of suitable habitat, the potential for both of these protected species exists at this site. Kangaroo rat burrows were also observed on site (Figure 9b).

Figure 9a. UXO 04 (Dunnage Disposal Site 3) Photo shows presence of coastal sage scrub and areas with low aerial cover.

Figure 9b. UXO 04 (Dunnage Disposal Site 3) Photo shows active kangaroo rat burrow on site.

UXO 06 (Depot Lake)

As shown in Figures 10a and 10b, suitable habitat for the coastal California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher occurs on and/or immediately adjacent to the site. Thus, the coastal California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher have the potential to occur at this site. Suitable habitat for the Stephens' kangaroo rat is very limited due to the thick nature of the surrounding vegetation (coastal sage scrub and introduced annual grassland). The only potential site for the Stephens' kangaroo rat was along the road shoulder and the access point to the lake. The freshwater marsh is suitable for the California red-legged. In addition, the open water is suitable for foraging California least terns.

Figure 10a. UXO 06 (Depot Lake) Photo shows fresh water marsh, willows, and coastal sage scrub. .

Figure 10b UXO 06 (Depot Lake) Shows coastal sage scrub along edge of site.

UXO 07 (Lower Lake)

As shown in Figures 11a and 11b, suitable habitat for the coastal California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher occurs on and/or immediately adjacent to the site. Thus, the coastal California gnatcatcher, least Bell's vireo, and southwestern willow flycatcher have the potential to occur at this site. Suitable habitat for the Stephens' kangaroo rat is very limited due to the thick nature of the surrounding vegetation (i.e., coastal sage scrub). The only potential site for the Stephens' kangaroo rat occurs along the shoulder of the road. The freshwater marsh is suitable for the California red-legged. The freshwater marsh is suitable for the California red-legged. In addition, the open water is suitable for foraging California least terns.

Figure 11a. UXO 07 (Lower Lake) Photo shows coastal sage scrub and riparian plant communities at and adjacent to site.

Figure 11b. UXO 07 (Lower Lake) Photo shows fresh water marsh and riparian plant communities at the site.

CONCLUSION

Suitable habitat of at least one protected species was found at all sites. Therefore, except for IRP 32; Paint Shop Building 135, the potential for conflicts between protected species and project related activities exist. The incorporation of avoidance and minimization measures into project activities should reduce potential future conflicts.

LITERATURE CITED

Faber, P.A., E. Keller, A. Sands, and B.M. Massey. 1989. The Ecology of Riparian Habitats of the Southern California Coastal Region: A Community Profile. U.S. fish and Wild. Serv. Biol. Rep. 85(7.27). 152 pp.

U.S. Fish and Wildlife Service. 1970. Endangered and threatened wildlife and plants; determination of endangered status for the California least tern. Federal Register 35: 8495.

U.S. Fish and Wildlife Service. 1986. Endangered and threatened wildlife and plants; determination of endangered status for the least Bell's vireo. Federal Register 51: 16482.

U.S. Fish and Wildlife Service. 1988. Endangered and threatened wildlife and plants; determination of endangered status for the Stephens' kangaroo rat. Federal Register 53: 38469.

U.S. Fish and Wildlife Service. 1993. Endangered and threatened wildlife and plants; determination of threatened status for the coastal California gnatcatcher. Federal Register 58: 16757.

U.S. Fish and Wildlife Service. 1994. Endangered and threatened wildlife and plants; determination of endangered status for the arroyo southwestern toad. Federal Register 59: 64859-4866.

U.S. Fish and Wildlife Service. 1995. Endangered and threatened wildlife and plants; determination of endangered status for the Southwestern willow flycatcher. Federal Register 60: 10715.

U.S. Fish and Wildlife Service. 1996. Endangered and threatened wildlife and plants; determination of endangered status for the California red-legged frog. Federal Register 61: 25832.

U.S. Fish and Wildlife Service. 2000. Endangered and threatened wildlife and plants; Final determination of critical habitat for the coastal California gnatcatcher. Federal Register 65: 63679-63743.

Westman, W.E. 1981. Diversity relations and succession in California coastal sage scrub. Ecology 62:170-184.

CERTIFICATION

I hereby certify that the statements furnished above present the data and information required for this biological evaluation, and that the facts, statements, and information presented are true and correct to the best of my knowledge. Fieldwork conducted for this assessment was performed by me or under my supervision. I certify that I have not signed a nondisclosure or consultant confidentiality agreement with the project applicant or applicant's representative and that I have no financial interest in the project.

Date: November 1, 2007 Signed Chitta E. Dawson

APPENDIX B

ESS WAIVER AND ACCEPTANCE MEMO

REQUEST FOR A NOSSA EXPLOSIVES SAFETY SUBMISSION DETERMINATION

MRS identifier: Activity, City and State	Naval Weapons Station Seal Beach, Detachment Fallbrook Fallbrook, California	Date submitted:	November 1, 2007
Responsible project manager: Name, activity, and contact information	Richard Quesada IRP, RAB, MRP, and EHW Naval Weapons Station Seal Beach, Bldg 110 (562) 626-7897 (DSN 873)	EOD/UXO technical support: Contact information	Ralph Brooks Tetra Tech, Inc. (770) 413-0965 Ext 231
Site history: Briefly describe past site use; discuss why MEC are known or suspected to be present	Detachment Fallbrook has been used since 1942 for the shipment, storage, and handling of ammunition to support Pacific naval operations. MRP Sites UX01, UX02, UX03, UX04, Depot Lake, and Lower Lake located at Naval Weapons Station (NAVWPNSTA) Seal Beach Detachment (Det) have been identified during a recent PA by site visits and historical data as known or suspected MEC areas. The MRP sites, excluding the two lake sites, are: [UXO1] Quality Evaluation (QE) Test Area, and [UXO2] a Small Arms/Trap and Skeet Range, [UXO3] Dunnage Disposal Site 1 and [UXO4} Dunnage Disposal Site 3.		
MEC encountered or believed to be present: Quantity, type/nomenclature, and condition	20-mm cartridges, HE, type/nomenclature unknown, condition unknown. Other evidence of possible MEC include the following: Unknown quantities of various small arms ammunition and debris, condition unknown; Unknown quantities of debris from 60-mm, 81-mm, and 4.2-in mortars (Illum), evidence of live fire; Unknown quantities of rocket motors and related debris from M72 LAW Rockets, evidence of live fire; Unknown quantities of cartridges and related debris from 40-mm grenades (Illum and TP observed), evidence of live fire; Unknown quantities of 20-mm, 40-mm, and 60-mm cartridges and 7.2-in projector cartridges referred to in an addendum regarding the lake sites; no evidence of live fire; Except for the 20mm projectiles, no other intact or live rounds were observed.		
Proposed operation: Describe on-call construction support, anomaly avoidance activities, or other proposed actions; identify if operation is encumbered by existing ESQD arc	Proposed operation: Anomaly avoidance in support of soil sample collection in MRP sites UXO1, UXO2, UXO3, UXO4, Depot Lake, and Lower Lake. Shallow soil samples will be collected by hand up to 18 inches below ground surface (bgs). Subsurface soil samples will be collected from the interval of 6 to 6.5 feet bgs. Anomaly avoidance as sample locations are surveyed and marked with wooden stakes. Detector-aided visual sweep with anomaly avoidance prior to minor brush clearing. UXO Escort with anomaly avoidance during a marine magnetometer survey at the Depot Lake and Lower Lake sites to aid in the identification of munitions. Anomaly avoidance during fencing installation proposed for MRP site UXO3. Suspect MEC items will be marked and surveyed in. The detector employed will be a Schonstedt Magnetic Locator GA-52Cx (magnetic gradiometer) or equivalent. All anomaly avoidance and visual sweeps will be conducted by a UXO-qualified technician, as defined in DDESB TP 18. None of the soil samples or anomaly avoidance activities will take place within an existing ESQD arc.		

Risk Assessment Code from page 2:[1]	5 Negligible-Low

[1] Note: NOSSA will only consider determining that an ESS is not required when the Risk Assessment Codes are 4 (minor) or 5 (negligible).

DEPARTMENT OF THE NAVY
NAVAL ORDNANCE SAFETY & SECURITY ACTIVITY
FARRAGUT HALL BLDG D-323
23 STRAUSS AVENUE
INDIAN HEAD MD 20640-5555

8020
Ser N539/1911
9 Nov 07

From: Commanding Officer, Naval Ordnance Safety and Security Activity
To: Commanding Officer, Naval Weapons Station Seal Beach, California

Subj: EXPLOSIVES SAFETY SUBMISSION DETERMINATION FOR COLLECTING SOIL, SEDIMENT, AND WATER SAMPLES FROM MRP SITES UXO1, UXO2, UXO3, UXO4, DEPOT LAKE, AND LOWER LAKE, NAVAL WEAPONS STATION SEAL BEACH DETACHMENT FALLBROOK, FALLBROOK, CALIFORNIA

Ref: (a) E-mail NAVWPNSTA Seal Beach Ms. P. Tamashiro/NOSSA (N539) Mr. D. Murray of 5 Nov 07 (w/encl)
(b) NOSSAINST 8020.15A, Explosives Safety Review, Oversight, and Verification of Munitions Responses, of 2 Feb 07
(c) NAVSEA OP 5, Revision 7

1. As requested by reference (a) the Naval Ordnance Safety and Security Activity (NOSSA) reviewed the subject Explosives Safety Submission (ESS) Determination Request in accordance with references (b) and (c). Based on the information presented in reference (a) NOSSA has determined that an ESS is not required for collecting soil, sediment, and water samples at Munitions Response Program Sites UXO1, UXO2, UXO3, UXO4, Depot Lake, and Lower Lake at Naval Weapons Station Seal Beach Detachment Fallbrook, Fallbrook, California.

2. NOSSA understands that the following conditions apply:

a. UXO1 is a former Quality Evaluation test area where high explosive projectiles were fired against a fixed target; UXO2 is a former small arms and trap/skeet range; UXO3 and UXO4 are former disposal sites where ammunition dunnage was burned; and both Depot and Lower Lake were subjected to unauthorized dumping of Munitions and Explosives of Concern (MEC);

b. A recent site inspection has revealed numerous surface MEC present at all of the terrestrial sites from which the soil samples will be taken and below-average water levels in both Depot and Lower Lakes;

Subj: EXPLOSIVES SAFETY SUBMISSION DETERMINATION FOR COLLECTING SOIL, SEDIMENT, AND WATER SAMPLES FROM MRP SITES UXO1, UXO2, UXO3, UXO4, DEPOT LAKE, AND LOWER LAKE, NAVAL WEAPONS STATION SEAL BEACH DETACHMENT FALLBROOK, FALLBROOK, CALIFORNIA

c. The proposed operation includes having a qualified Unexploded Ordnance (UXO) technician employ avoidance techniques as defined in reference (b) prior to minor brush clearing, the installation of fencing, and at each location where samples are to be taken;

d. The operation does not involve ammunition and explosives operations at less than K18 intraline distance from a potential explosive source, it is not encumbered by an existing Explosives Safety Quantity Distance arc, and authorization is not needed to conduct the operation per paragraph 8-1.2.1a(7) of reference (c).

e. The reference (a) risk assessment concluded that the risk posed by this operation is negligible (low).

3. Prior to beginning any soil sampling operations, the contractor UXO technician shall provide a MEC recognition briefing to the sample collection team.

4. The NOSSA point of contact for this ESS Determination is Mr. Douglas Murray, who can be contacted at DSN 354-4450 or commercial at 301-744-4450.

Pamela G. Clements

PAMELA G. CLEMENTS
By direction

Copy to:
CNO (N411; N453)
NAVFAC HQ (ENV)
NOSSA ESSOPAC (N5P)
NAVWPNSTA SEAL BEACH (ESO)
NAVWPNSTA SEAL BEACH (N45WCW)

Draft

Sampling and Analysis Plan

(Field Sampling Plan/Quality Assurance Project Plan)

Site Inspection for Installation Restoration Program Sites 32, 34b, 34d, and 34e and Munitions Response Program Sites UXO1, UXO2, UXO3, UXO4, UXO6, and UXO7

Naval Weapons Station Seal Beach Detachment Fallbrook, Fallbrook, California

June 9, 2008

Prepared for:
Department of the Navy
NAVFAC Southwest
San Diego, California 92132

Prepared by:
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Prepared under:
Naval Facilities Engineering Command
Contract Number N62473-07-D-3213
Contract Task Order 002

CHAD.3213.0002.0002

Draft

Sampling and Analysis Plan
(Field Sampling Plan/Quality Assurance Project Plan)
Site Inspection for Installation Restoration Program Sites 32, 34b, 34d, and 34e and Munitions Response Sites UXO1, UXO2, UXO3, UXO4, UXO6, and UXO7
Naval Weapons Station Seal Beach Detachment Fallbrook
Fallbrook, California

June, 2008

Contract Number N62473-07-D-3213
Contract Task Order D002
CHAD.3213.0002.0002
ChaduxTt

PREPARED FOR:

DEPARTMENT OF THE NAVY

REVIEW AND APPROVAL

Reviewed by: Kevin Hoch for Date: 06-09-2008
Greg Swanson
ChaduxTt Program
QA Manager

Reviewed by: _____ Date: _____
Narciso A. Ancog
Navy QA Officer

TABLE 1: ELEMENTS OF UFP-QAPP AND EPA QA/R-5 IN RELATION TO THIS SAP
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan)
Site Inspection for Installation Restoration Sites 32, 34b, 34d, 34e and Munitions Response Sites UXO1, UXO2, UXO3, UXO4, UXO6, UXO7
Naval Weapons Station Seal Beach Det Fallbrook, Fallbrook, California

UFP-QAPP WORKSHEET		EPA QA/R-5 SAP ELEMENT[a]		This SAP		VARIANCE FROM UFP-QAPP
1	Title and Approval Page	A1	Title and Approval Sheet		Title and Approval Sheet	
2	QAPP Identifying Information			1.0	Project Description and Management	
				2.0	Data Generation and Acquisition	
				3.0	Assessment/Oversight	
				4.0	Data Validation and Usability	
		A2	Table of Contents		Table of Contents	
3	Distribution List	A3	Distribution List		Distribution List	
4	Project Personnel Sign-Off Sheet			1.5	Special Training and Certification	
					Page viii	
5	Project Organization Chart	A4	Project/Task Organization	1.4	Project Organization	
					Figure 2	
6	Communication Pathways			1.4	Project Organization	
					Figure 2	
					Table 5	
7	Personnel Responsibilities and Qualifications Table			1.4	Project Organization	
					Table 5	
8	Special Personnel Training Requirements Table	A8	Special Training/Certification	1.5	Special Training and Certification	
9	Project Scoping Sessions Participants Sheet					All project scoping documents are retained in the project file
10	Problem Definition	A5	Problem Definition/Background	1.1	Problem Definition and Background	

TABLE 1: ELEMENTS OF UFP-QAPP AND EPA QA/R-5 IN RELATION TO THIS SAP (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan)
Site Inspection for Installation Restoration Sites 32, 34b, 34d, 34e and Munitions Response Sites UXO1, UXO2, UXO3, UXO4, UXO6, UXO7
Naval Weapons Station Seal Beach Det Fallbrook, Fallbrook, California

UFP-QAPP WORKSHEET		EPA QA/R-5 SAP ELEMENT[a]		This SAP		VARIANCE FROM UFP-QAPP
11	Project Quality Objectives/Systematic Planning Process Statements	A7	Quality Objectives and Criteria	1.3	Quality Objectives and Criteria Table 3	
12	Measurement Performance Criteria Table	B5	Quality Control	2.5 2.5.1	Quality Control Field Quality Control Samples Table 8	
13	Secondary Data Criteria and Limitations Table					No secondary data will be used during this investigation.
14	Summary of Project Tasks	A6	Project/Task Description	1.2	Project Description Table 7	
15	Reference Limits and Evaluation Table				Appendix C	
16	Project Schedule/Timeline Table				Table 2	
		A9	Documents and Records	1.6	Documents and Records	
17	Sampling Design and Rationale	B1	Sampling Process Design	2.1	Sampling Process Design	
18	Sampling Locations and Methods	B1	Sampling Process Design	2.1	Sampling Process Design Table 7	
19	Analytical SOP Requirement Table	B2	Sampling Methods	2.4	Analytical Methods Table 9	
20	Field Quality Control Sample Summary Table	B5	Quality Control	2.5	Quality Control Table 4	

TABLE 1: ELEMENTS OF UFP-QAPP AND EPA QA/R-5 IN RELATION TO THIS SAP (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan)
Site Inspection for Installation Restoration Sites 32, 34b, 34d, 34e and Munitions Response Sites UXO1, UXO2, UXO3, UXO4, UXO6, UXO7
Naval Weapons Station Seal Beach Det Fallbrook, Fallbrook, California

UFP-QAPP WORKSHEET		EPA QA/R-5 SAP ELEMENT[a]		This SAP		VARIANCE FROM UFP-QAPP
21	Project Sampling Reference Table			2.2.2 2.2.3	Surface Soil Sampling Subsurface Soil Sampling	
22	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	B6 and	Instrument/Equipment Testing, Inspection, Maintenance	2.6 Appendix B	Equipment Testing, Inspection, and Maintenance	
23	Analytical SOP Reference Table	B4	Analytical Methods	2.4.1	Selection of Analytical Laboratories	SOPs will be available at the subcontract laboratory upon selection (see Section 2.4.1)
24	Analytical Instrument Calibration Table	B7	Instrument/Equipment Calibration and Frequency	2.7.2	Calibration of Laboratory Equipment	Details for calibration of laboratory instruments are included in laboratory SOPs and can be located at the subcontract laboratory upon selection (see Section 2.4.1).
25	Analytical Instrument and Equipment, Maintenance, Testing, and Inspection Table			2.6	Equipment Testing, Inspection, and Maintenance	
26	Sample Handling System			2.3.4 2.3.5	Chain of Custody Sample Shipment	
27	Sample Custody Requirements	B3	Sample Handling and Custody	2.3	Sample Handling and Custody	
28	QC Samples Table			2.5 Table 8	Quality Control	
29	Project Document and Records Table			Table 11		

TABLE 1: ELEMENTS OF UFP-QAPP AND EPA QA/R-5 IN RELATION TO THIS SAP (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan)
Site Inspection for Installation Restoration Sites 32, 34b, 34d, 34e and Munitions Response Sites UXO1, UXO2, UXO3, UXO4, UXO6, UXO7
Naval Weapons Station Seal Beach Det Fallbrook, Fallbrook, California

UFP-QAPP WORKSHEET		EPA QA/R-5 SAP ELEMENT[a]		This SAP		VARIANCE FROM UFP-QAPP
30	Analytical Services Table			1.6.2	Summary Data Package Table 6	Laboratories will be chosen from a list of pre-qualified laboratories (see Section 2.4.1)
31	Planned Project Assessment Table			3.1	Assessment and Response Actions	
		B8	Inspection/Acceptance of Supplies and Consumables	2.8	Inspection and Acceptance of Supplies and Consumables	
		B9	Nondirect Measurements	2.9	Nondirect Measurements	
		B10	Data Management	2.10	Data Management	
32	Assessment Findings and Response Actions	C1	Assessment and Response Actions	3.1	Assessment and Response Actions	
33	QA Management Reports Table	C2	Reports to Management	3.2	Reports to Management	
34	Sampling and Analysis Verification (Step 1) Process Table	D1	Data Review, Verification, and Validation		Table 10	
35	Sampling and Analysis Validation (Steps 2a and 2b) Process Table	D2	Validation and Verification Methods		Table 12	
36	Sampling and Analysis Validation (Steps 2a and 2b) Summary Table				Table 12	
37	Data Usability Assessment	D3	Reconciliation with User Requirements	4.2	Reconciliation with User Requirements	

TABLE 1: ELEMENTS OF UFP-QAPP AND EPA QA/R-5 IN RELATION TO THIS SAP (CONTINUED)

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan)
Site Inspection for Installation Restoration Sites 32, 34b, 34d, 34e and Munitions Response Sites UXO1, UXO2, UXO3, UXO4, UXO6, UXO7
Naval Weapons Station Seal Beach Det Fallbrook, Fallbrook, California

Notes:

[a] EPA. 2001. "EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5." Office of Environmental Information. Washington, DC. EPA/240/B-01/003. March.

EPA	U.S. Environmental Protection Agency		
QA	Quality assurance	SOP	Standard operating procedure
QAPP	Quality Assurance Project Plan	NAVFAC	Naval Facilities Engineering Command
QC	Quality control	UFP	Uniform Federal Policy

I certify that this SAP is in compliance with the latest version of the UFP-QAPP and the EPA QA/R-5

ChaduxTt
Project QA Officer: Kevin Hoch Date: 06-09-2008

Kevin Hoch

DISTRIBUTION LIST

QAPP Worksheet #3-NAVFAC SW SAP

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TBD[1]	Third-party data validation manager	TBD[1]	TBD[1]	TBD[1]

Notes:

1 Prior to finalization of this SAP and initialization of field work, all required information will be added.

NAVFAC Naval Facilities Engineering Command
SAP Sampling and analysis plan
SW Southwest
TBD To be determined

QAPP Worksheet #4 - NAVFAC SW SAP

(UFP-QAPP Manual Section 2.3.2)

Project Personnel Sign-Off Sheet

Project Personnel	Organization	Title	Signature	SAP Section Reviewed	Date QAPP Read
Steven Bradley	ChaduxTt	Project Manager		All	
Sara Woolley	ChaduxTt	Analytical Coordinator		All	
Darren Knight	ChaduxTt	Sampling Field Team Lead		All	
Jeff Eddo	ChaduxTt	Geophysical Team Lead		All	
David Alltucker	Test America	Laboratory Project Manager		Worksheets 12, 13, 15, 19, 22, 23, 24, 25, 26, 27, 30, 32	
TBD[1]	TBD[1]	Data Validation Manager		Worksheets 12, 13, 15, 19, 22, 23, 24, 25, 26, 27, 30, 32	

Note:
[1] Prior to finalization of this SAP and initialization of field work, all required information will be added.

TBD To be determined

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Appendix

A Method Precision and Accuracy Goals

B Field Forms

C Project-Required Reporting Limits

D Approved Laboratories

Attachment

1A Sample Location Maps

FIGURES

1 IRP and MRP Site Location Map

2 Project Team Organization Chart

TABLES

1 Elements of UFP-QAPP and EPA QA/R-5 in Relation to this SAP

2 Implementation Schedule for Sampling, Analysis, and Reporting

3A Data Quality Objectives for Site 32

3B Data Quality Objectives for Site 34b

3C Data Quality Objectives for Site 34d

3D Data Quality Objectives for Site 34e

3E Data Quality Objectives for Site UXO1

3F Data Quality Objectives for Site UXO2

3G Data Quality Objectives for Site UXO3

3H Data Quality Objectives for Site UXO4

3I Data Quality Objectives for Site UXO6

3J Data Quality Objectives for Site UXO7

4 Field Quality Assurance/Quality Control Samples

5 Key Personnel

6 Requirements for Summary and Full Data Packages

7 Proposed Soil and Groundwater Samples, Rationale, and Analyses

8 Measurement Performance Criteria Table - Field QC Samples

9 Sample Container, Holding Time, and Preservative Requirements

10 Verification Process

11 Project Documents and Records

12 Validation (Steps IIa and IIb) Process Table

13 Validation (Steps IIa and IIb) Summary Table

°C	degree Celsius
%R	percent recovery
AHA	Activity Hazard Analysis
bgs	below ground surface
ChaduxTt	joint venture of St. George Chadux and Tetra Tech EM Inc.
CLP	contract laboratory program
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
CSM	conceptual site model
CTO	contract task order
DQA	data quality assessment
Det	Detachment
DQO	data quality objective
DTSC	Department of Toxic Substances Control
EDD	electronic data deliverable
EPA	U.S. Environmental Protection Agency
ESSL	ecological soil screening level
FS	feasibility study
GC/MS	gas chromatography/mass spectrometry
GPS	global positioning system
HSA	hollow-stem auger
IAS	initial assessment study
ID	identification
IDL	instrument detection limit
IRP	Installation Restoration Program
Jacobs	Jacobs Engineering Group, Inc.
LCS	laboratory control sample
MC	munitions constituents
MCB	Marine Corps Base
MDL	method detection limit
MEC	munitions and explosives of concern

MQO	measurement quality objective
MRP	Munitions Response Program
MS	matrix spike
MSD	matrix spike duplicate
MSR	monthly status report
NAD	Naval Ammunition Depot
NAVFAC	Naval Facilities Engineering Command
NEDD	Navy Environmental Data Deliverable
NESSA	Naval Energy and Environmental Support Activity
NFA	no further action
NFESC	Naval Facilities Engineering Service Center
NIRIS	Naval Installation Restoration Information System
NAVWPNSTA Seal Beach	Naval Weapons Station Seal Beach
PA	preliminary assessment
PAH	polynuclear aromatic hydrocarbon
PARCC	precision, accuracy, representativeness, completeness, and comparability
PID	photoionization detector
PRG	preliminary remediation goal
PRRL	project-required reporting limit
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
QE	quality evaluation
RI	remedial investigation
RPD	relative percent difference
RPM	remedial project manager
RWQCB	Regional Water Quality Control Board
SAP	sampling and analysis plan
SDG	sample delivery group
SI	site inspection
SOP	standard operating procedure
SOW	statement of work
SQL	sample quantitation limit
SVOC	semivolatile organic compounds
Tetra Tech	Tetra Tech EM Inc.

TSA	technical systems audit
VOC	volatile organic compound
XRF	X-ray fluorescence

1.0 PROJECT DESCRIPTION AND MANAGEMENT

ChaduxTt is preparing the sampling plans for a site inspection (SI) at four Installation Restoration Program (IRP) sites and six Munitions Response Program (MRP) sites located at Naval Weapons Station (NAVWPNSTA) Seal Beach Detachment (Det) Fallbrook in Fallbrook, California. The sites under investigation are as follows:

- Site 32, Paint Shop – Building 351 (Disposal Area)
- Site 34b, Dunnage Disposal Site 2
- Site 34d, Dunnage Disposal Site 4
- Site 34e, Dunnage Disposal Site 5
- Site UXO1, QE Test Area
- Site UXO2, Small Arms Range
- Site UXO3, Dunnage Disposal Site 1
- Site UXO4, Dunnage Disposal Site 3
- Site UXO6, Depot Lake
- Site UXO7, Lower Lake

ChaduxTt prepared this sampling and analysis plan (SAP), which consists of a field sampling plan and a quality assurance project plan (QAPP) in an integrated format, to guide the field, laboratory, and data reporting efforts associated with this project.

Table 1 follows the approval page at the beginning of this SAP. The table demonstrates how this SAP addresses all the elements of a QAPP currently required by the U.S. Environmental Protection Agency (EPA) QA/R-5 guidance document (EPA 2001) as well as the Uniform Federal Policy for Quality Assurance Project Plans (EPA 2005). Additionally, a cross-reference to specific worksheets required in the Uniform Federal Policy for QAPPs (EPA 2005) is presented on all relevant tables and figures.

Appendix A contains method precision and accuracy goals, Appendix B contains all field forms that will be used for the investigation, Appendix C lists project-required reporting limits (PRRL), and Appendix D lists laboratories that ChaduxTt has contracted to analyze samples collected under Navy contracts. Attachment A presents figures that show each site along with approximate sample locations and sample grids.

1.1 PROBLEM DEFINITION AND BACKGROUND

This section describes the following:

- Purpose of the Investigation (see Section 1.1.1)
- Problem to be Solved (see Section 1.1.2)
- Site Background (see Section 1.1.3)
- Site Descriptions and Previous Investigations (see Section 1.1.4)
- Site Description and Physical Setting (see Section 1.1.5)
- Principal Decision-Makers (see Section 1.1.6)
- Technical or Regulatory Standards (see Section 1.1.7)

1.1.1 Purpose of the Investigation

The objective of the SI for all the sites is to characterize soil and water to evaluate whether chemicals of potential concern (COPC) to human health, chemicals of potential ecological concern (COPEC), or both, have been released. An additional objective for the MRP sites is to document surface evidence of munitions and explosives of concern (MEC). Based on the findings of the field investigation, the SI report will recommend whether further action, such as additional characterization or a remedial response, or no further action is warranted.

1.1.2 Problem to be Solved

Only an initial assessment study (IAS) by Naval Energy and Environmental Support Activity (NEESA) (1985) and a preliminary assessment (PA) by Malcolm Pirnie (2006) have been conducted at NAVWPNSTA Seal Beach Det Fallbrook; no analytical samples have been collected at the 10 sites under investigation. Data for soil samples are necessary to evaluate whether contamination exists from past operations and, if present, its nature and extent.

1.1.3 Site Background

NAVWPNSTA Seal Beach Det Fallbrook is located 53 miles north of San Diego, California, in northern San Diego County. It is 9 miles inland from the Pacific Ocean and is immediately adjacent to the eastern border of Marine Corps Base (MCB) Camp Pendleton. Elevation at the installation varies from 200 to 840 feet above mean sea level, and the topography is characterized by low hills and drainages which contain relatively thin accumulations of alluvium. The installation occupies 8,852 acres and the perimeter is secured by a chain-link fence (Malcolm Pirnie 2006).

Naval Ammunition Depot (NAD) Fallbrook was commissioned in February 1942. The depot's mission was to receive, store, and guard large quantities of explosives and ammunition and to distribute and deliver them as needed to other installations. NAD Fallbrook was put on caretaker status in 1947 but was reactivated in 1950 with the onset of the Korean War. In 1958, NAD Fallbrook was designated an annex of the Naval Ammunition and Net Depot, Seal Beach. In the 1960s, Det Fallbrook's primary duty was to support the Pacific Marine Forces. It also stored, tested, and maintained several types of missiles. As of October 1, 1997, the installation's name changed to Det Fallbrook and the installation reported to the present NAVWPNSTA Seal Beach. It currently inspects, maintains, and recertifies air-launched missiles such as the Phoenix, Sidewinder, Maverick, and high-speed anti-radiation missile. The installation has 190 magazines that store pyrotechnics, high explosives, fuzes, and detonators, and small arms (Malcolm Pirnie 2006). There are no active ranges within the installation.

1.1.4 Site Descriptions and Previous Investigations

Site descriptions are provided in Section 1.6 of the work plan. An IAS for NAVWPNSTA Seal Beach, including the Fallbrook Annex and Corona Annex, was completed by NEESA in February 1985 (NEESA 1985). In 1989, NAVWPNSTA Seal Beach requested that NEESA update the IAS, which was revised and issued in August 1990 (NEESA 1990). Sites addressed in the IAS include IRP Site 26 Ordnance Burn Pits and Burial Pits by the Drop Test Tower, and Building 348, which is now MRP Site UXO1 Quality Evaluation (QE) Test Area. Other sites in the IAS that are part of this SI include Site 32 Paint Shop Disposal Area, and Site 34 Dunnage Disposal Areas. Site UXO2 Small Arms Range was not addressed in the IAS. The IAS recommended an SI be conducted at the QE Test Area and Paint Shop Disposal Area, but not at the Dunnage Disposal Areas.

A PA for the munitions response program was completed in 2006 (Malcolm Pirnie 2006). The report addressed all sites included in this SI, except for Site 32. The PA recommended an SI for MEC and munitions constituents (MC) at Sites UXO1, UXO3, UXO4, UXO6, and UXO7. An SI for MC but no further action (NFA) for MEC was proposed for Site UXO2. NFA for MEC and MC was recommended for Sites 34b, 34d, and 34e.

1.1.5 Physical Setting

NAVWPNSTA Seal Beach Det Fallbrook is located in the Peninsular Ranges geomorphic province, which is dominated by the igneous and metamorphic rocks of the Peninsular Range batholith. Metasediments now preserved in the Peninsular Range region include marbles, slates, schists, quartzites, and gneiss.

The conditions within NAVWPNSTA Seal Beach Det Fallbrook are highly variable due to the hydrogeologic properties of underlying bedrock. Although a majority of the sites are underlain by weathered granitic materials of the southern California batholith or metasedimentary rock, weathering and fracturing has provided physical modification of these units, which in-turn, locally affects groundwater conditions at each of the sites. The groundwater in the bedrock

generally occurs at depths of 50 to 100 feet and is typically found in fractures. Flow in the bedrock is laminar to turbulent and dependant upon the fracture pattern and, as such, may move at any angle to the groundwater gradient.

In topographically low areas such as drainages, groundwater occurs within the alluvium, colluvium or thin weathered bedrock layers. This perched water occurs seasonally primarily after storm events or periods or prolonged precipitation and may be present at relatively shallow depths of less than 10 feet. Specific groundwater data within the Detachment are minimal. Although groundwater within the detachment is considered beneficial use by the Regional Water Quality Control Board, NAVWPNSTA Seal Beach Det Fallbrook receives all of its potable water from the San Diego County Water Authority.

During installation of three monitoring wells at IRP Site 27, groundwater was measured at approximately 17 to 29 feet below ground surface (bgs) after equilibration (Marrs 2007). IRP Site 27 is located approximately 1000 feet north of UXO1 and at approximately the same elevation. The depth to water in three other monitoring wells installed at Buildings 230 and 232 on Ammunition Road was measured at depths between 50 and 60 feet bgs in 2003 (Malcolm Pirnie 2006). The investigation was conducted at IR Site 30, located approximately 1400 feet southwest of the Paint Shop Building IR site 32, which is part of this investigation. The wells were installed during an underground storage tank investigation. Based on the data from these wells, direction of groundwater flow was toward the southwest.

Two man-made reservoirs, Depot Lake (UXO6) and Lower Lake (UXO7), are located within NAVWPNSTA Seal Beach Det Fallbrook. Both Depot Lake and Lower Lake are located in the Santa Margarita-Upper Ysidora watershed. They are currently used for fire suppression and have also been used in the past for livestock water. MCB Camp Pendleton and the City of Oceanside are located downgradient from NAVWPNSTA Seal Beach Det Fallbrook. Both extract and use groundwater as a part of their potable water supply.

The area around NAVWPNSTA Seal Beach Det Fallbrook and MCB Camp Pendleton provides the largest remaining wildlife habitat area in coastal southern California. The native plant communities at NAVWPNSTA Seal Beach Det Fallbrook are varied and include perennial grassland, coastal sage scrub, chamise chaparral, coast live oak riparian woodland, and willow riparian woodland. Several threatened and endangered species are associated with the critical habitats of the sites. Threatened and endangered species that have been documented at NAVWPNSTA Seal Beach Det Fallbrook include the coastal California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, and Stephens' kangaroo rat. Suitable habitat of one or more protected species was found at all sites during a field visit conducted June 11 through 13, 2007. A report prepared by Davenport Biological Services provides an endangered species assessment for the sites and is included as Appendix A of the work plan.

1.1.6 Principal Decision-Makers

The principal decision makers for the investigation of these active sites are the Navy, California Regional Water Quality Control Board (RWQCB) – San Diego Region, U.S. Fish and Wildlife

Service, U.S. Department of the Interior, and California Department of Toxic Substances Control (DTSC).

1.1.7 Technical or Regulatory Standards

The Navy will compare analytical results for soil at concentrations above background levels (where applicable) with residential soil preliminary remediation goals (PRG) (EPA 2004b) for this SI and to support further decision making. The data will also be compared with ecological soil screening levels (ESSL) (EPA 2007). The lowest available ecological screening levels from Oak Ridge National Laboratory (Efroymson and others 1997) or Talmage and others (1999) will also be considered in the evaluation.

1.2 PROJECT DESCRIPTION

The following sections discuss the objectives and measurements of the additional sampling at active sites. Table 2 presents a schedule of sampling, analysis, and reporting for this project.

1.2.1 Project Objectives

The primary objective of the SI is stated in Section 1.1.1. The following activities are planned at each site to meet that objective:

Site 32 – Paint Shop – Building 351 (Disposal Area)

- Aerial photo review
- Utility survey
- Laboratory analysis of 19 soil samples for volatile organic compounds (VOC), semivolatile organic compounds (SVOC), and metals
- Surveys of site boundaries, cultural features, and sample locations

Site 34b – Dunnage Disposal Site 2

- Aerial photo review
- Utility survey
- Laboratory analysis of 30 soil samples for VOCs, SVOCs, and metals
- Surveys of site boundaries, cultural features, and sample locations

Site 34d – Dunnage Disposal Site 4

- Aerial photo review
- Utility survey
- Laboratory analysis of 24 soil samples for VOCs, SVOCs, and metals

- Surveys of site boundaries, cultural features, and sample locations

Site 34e – Dunnage Disposal Site 5

- Aerial photo review
- Utility survey
- Laboratory analysis of 16 soil samples for VOCs, SVOCs, and metals
- Surveys of site boundaries, cultural features, and sample locations

Site UXO1 – QE Test Area

- Aerial photo review
- Geophysical survey to identify the location and extent of anomalies that may represent shallow buried munitions
- Surveys of anomaly locations, site boundaries, cultural features, and sample locations
- Target Area: laboratory analysis of five soil samples for explosives, perchlorate, depleted uranium, and metals
- Firing Point: laboratory analysis of five soil samples for explosives, perchlorate, depleted uranium, and metals
- Area between Target and Firing point: laboratory analysis of 12 soil samples for explosives, perchlorate, depleted uranium, and metals
- Trenches: laboratory analysis of 36 soil samples for explosives (including picric acid), metals (including strontium), VOCs, SVOCs, and perchlorate and five soil samples for dioxins
- Drop Test Tower: laboratory analysis of three soil samples for explosives, perchlorate, depleted uranium, and metals
- Area between Drop Test Tower and Burn Barrels: laboratory analysis of five soil samples for explosives, perchlorate, depleted uranium, and metals
- Burn Barrels: laboratory analysis of four soil samples for explosives, perchlorate, depleted uranium, and metals and one soil sample for dioxins
- Building Debris: laboratory analysis of three soil samples for metals

Site UXO2 – Small Arms Firing Range, Skeet/Trap Range

- Aerial photo review
- Surveys of site boundaries, cultural features, and sample locations
- Firing Lines: X-ray fluorescence (XRF) analysis of four soil samples (lead), laboratory analysis of one soil sample for lead and 4 soil samples for explosives at each range
- Area between Firing Line and Target (Small Arms Range): XRF analysis of five soil samples for lead, laboratory analysis of one soil sample for lead
- Small Arms Range Target: XRF analysis of 24 soil samples for lead, laboratory analysis of five soil samples for lead

- Skeet/Trap Range: XRF analysis of 30 soil samples for lead, laboratory analysis of six soil samples for lead and five soil samples for polynuclear aromatic hydrocarbons (PAH).

Site UXO3 – Dunnage Disposal Site 1

- Aerial photo review
- Surveys of MEC locations, site boundaries, cultural features, and sample locations
- High-density munitions area: laboratory analysis of 10 soil samples for explosives, metals including strontium, and perchlorate
- Remainder of site: laboratory analysis of 14 soil samples for explosives, perchlorate, and metals

Site UXO4 – Dunnage Disposal Site 3

- Aerial photo review
- Geophysical survey to identify the location and extent of anomalies that may represent shallow buried munitions
- Surveys of anomaly locations, site boundaries, cultural features, and sample locations
- Laboratory analysis of 16 soil samples for explosives, perchlorate, and metals

Site UXO6 – Depot Lake

- Aerial photo review
- Geophysical survey to identify the location and extent of anomalies that may represent shallow buried munitions
- Surveys of anomaly locations, site boundaries, cultural features, and sample locations
- Laboratory analysis of five pore water and 10 lake water samples for explosives and metals
- Laboratory analysis of 20 soil samples for explosives, metals, and perchlorate

Site UXO7 – Lower Lake

- Aerial photo review
- Geophysical survey to identify the location and extent of anomalies that may represent shallow buried munitions
- Surveys of anomaly locations, site boundaries, cultural features, and sample locations
- Laboratory analysis of five pore water and 10 lake water samples for explosives and metals
- Laboratory analysis of 20 soil samples for explosives, metals, and perchlorate

1.2.2 Project Measurements

The project measurements for this investigation are based on site history and field observations. Soil samples from the IRP sites will be analyzed for VOCs, SVOCs, and metals. Soil samples from the MRP sites (except UXO2) will be analyzed for explosives and metals. Select samples from UXO1 will also be analyzed for VOCs, SVOCs, perchlorate, picric acid, strontium, depleted uranium, and dioxins, while select samples from UXO3 will also be analyzed for perchlorate and strontium. Samples from UXO2 will be analyzed for lead, except that samples from the firing line area will also be analyzed for explosives; five samples from the skeet and trap range portion of UXO2 will also be analyzed for PAHs. Samples from UXO6 and UXO7 will be analyzed for perchlorate.

1.3 QUALITY OBJECTIVES AND CRITERIA

The following sections present the data quality objectives (DQO) and measurement quality objectives (MQO) identified for this project.

1.3.1 Data Quality Objectives

DQOs are qualitative and quantitative statements developed through the seven-step DQO process (EPA 2000b, 2000d). The DQOs clarify the study objective, define the most appropriate data to collect and the conditions under which to collect them, and specify tolerable limits on decision errors that will be used as the basis for establishing the quantity and quality of data needed to support decision-making. The DQOs are used to develop a scientific and resource-effective design for data collection. The seven steps of the DQO process for this project are presented in Tables 3A to 3H.

1.3.2 Measurement Quality Objectives

All analytical results will be evaluated in accordance with precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters to document the quality of the data and to ensure that the data are of sufficient quality to meet the project objectives. Of these PARCC parameters, precision and accuracy will be evaluated quantitatively by collecting the quality control (QC) samples listed in Table 4. Specific precision and accuracy goals for these QC samples are listed in Appendix A.

The following subsections describe each of the PARCC parameters and how they will be assessed within this project.

1.3.2.1 Precision

Precision is the degree of mutual agreement between individual measurements of the same property under similar conditions. Usually, combined field and laboratory precision are

evaluated by collecting and analyzing field duplicates and then calculating the variance between the samples, typically as a relative percent difference (RPD):

$$RPD = \frac{|A-B|}{(A+B)/2} \quad x \quad 100\%$$

where:

A	=	First duplicate concentration
B	=	Second duplicate concentration

Field sampling precision is evaluated by analyzing field duplicate samples.

Laboratory analytical precision is evaluated by comparing analytical results of field samples with those of field duplicates or by analyzing matrix spikes (MS) of field samples with matrix spikes of field duplicates (matrix spike duplicates [MSD]). For this project, MS/MSD samples will be generated for all organic analytes. The results of the analysis of each MS/MSD pair will be used to calculate an RPD for evaluating precision. Appendix A presents the precision goals for this project.

1.3.2.2 Accuracy

Field accuracy will be assessed by collecting and analyzing equipment rinsate and source water blank QC samples. These QC samples will be used to evaluate the potential for target analytes to enter samples as a result of sampling processes.

A program of sample spiking will be conducted to evaluate laboratory accuracy. This program includes analysis of the MS and MSD samples, laboratory control samples (LCS) or blank spikes, surrogate standards, and method blanks. MS samples will be prepared and analyzed at a frequency of 5 percent for samples that will require analysis for inorganic chemicals. LCS or blank spikes are also analyzed at a frequency of 5 percent or per extraction batch, whichever is most frequent. Surrogate standards, where available, are added to every sample analyzed for organic constituents. The results of the spiked samples are used to calculate the percent recovery (%R) for evaluating accuracy.

$$Percent \quad Recovery = \frac{S-C}{T} \quad x \quad 100$$

where:

S	=	Measured spike sample concentration
C	=	Sample concentration
T	=	True or actual concentration of the spike

Appendix A presents accuracy goals for this investigation based on the percent recovery of matrix and surrogate spikes. Results that fall outside the accuracy goals will be evaluated further on the basis of the results of other QC samples.

1.3.2.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent the characteristics of a population, variations in a parameter at a sampling point, or an environmental condition that they are intended to represent. For this project, representative data will be obtained through careful selection of sampling locations and analytical parameters. Representative data will also be obtained through proper collection and handling of samples to avoid interference and minimize contamination.

Representativeness of data will also be ensured through consistent application of established field and laboratory procedures. Laboratory blank samples will be evaluated for the presence of contaminants to aid in evaluating the representativeness of sample results. Data determined to be nonrepresentative, by comparison with existing data, will be used only if accompanied by appropriate qualifiers and limits of uncertainty.

1.3.2.4 Completeness

Completeness is a measure of the percentage of project-specific data that are valid. Valid data are obtained when samples are collected and analyzed in accordance with QC procedures outlined in this SAP, and when none of the QC criteria that affect data usability are exceeded. When all data validation is completed, the percent completeness value will be calculated by dividing the number of useable sample results by the total number of sample results planned for this investigation.

As discussed further in Section 4.2, completeness will also be evaluated as part of the data quality assessment process (EPA 2000c). This evaluation will help determine whether any limitations are associated with the decisions to be made based on the data collected.

1.3.2.5 Comparability

Comparability expresses the confidence with which one data set can be compared with another. Comparability of data will be achieved by consistently following standard field and laboratory procedures and by using standard measurement units in reporting analytical data. Field procedures will be standardized to ensure comparability. The comparability of laboratory data will be assured by use of established and approved analytical methods, consistency in the basis of analysis (wet weight, volume, or similar units), and consistency in reporting units (parts per million, parts per billion, and so forth).

1.3.2.6 Detection and Quantitation Limits

The method detection limit (MDL) and instrument detection limit (IDL) are the minimum concentration of an analyte that can be reliably distinguished from background noise for a specific analytical method. The quantitation limit represents the lowest concentration of an analyte that can be accurately and reproducibly quantified in a specific sample matrix. PRRLs are contractually specified maximum quantitation limits for specific analytical methods and sample matrices, such as soil or water, and are typically several times higher than the MDL to allow for matrix effects. PRRLs, which are established by ChaduxTt in the scope of work for subcontract laboratories, are set to establish minimum criteria for laboratory performance; actual laboratory quantitation limits may be substantially lower.

Analytical methods have been selected for this project so that the PRRL for each target analyte is below the applicable comparison criteria wherever practical. Appendix C compares the PRRLs for the selected analytical methods with comparison criteria, including background concentrations for metals. This comparison shows that the analytical methods selected and the associated PRRLs are capable of quantifying the contaminants of concern at concentrations below the residential PRG and ecological screening levels (assuming the concentrations are above background levels, if applicable). The PRRL listed reflects the maximum sensitivity of current, routinely used analytical methods. The listed PRRLs will be used as the project screening criteria unless reasonable grounds are established for pursuing non-routine methods. All analytes will be reported as estimated values if concentrations are less than PRRLs but greater than MDLs or IDLs, as appropriate. This procedure is being adopted to help ensure that analytical results can effectively be compared with comparison criteria for certain compounds where the screening criteria are near or below the PRRL. This procedure also will help to ensure that subsequent statistical evaluations of the data will not be biased by high-value nondetect results.

1.4 PROJECT ORGANIZATION

Figure 2 presents the organization of the project team. Table 5 presents the responsibilities and contact information for key personnel who will be involved in sampling at NAVWPNSTA Seal Beach Det Fallbrook.

1.5 SPECIAL TRAINING AND CERTIFICATION

This section outlines the training and certification required to complete the activities described in this SAP. Personnel working on this investigation have been trained in the field activities necessary to complete the investigation. In addition to the requirements in the following sections, personnel involved in field tasks are required to read the SAP and sign their name and requested information on the sign-off sheet as provided in the front of this document. The following sections describe the requirements for ChaduxTt and subcontractor personnel working on site.

1.5.1 Health and Safety Training

ChaduxTt personnel who work at hazardous waste project sites are required to meet the Occupational Safety and Health Administration training requirements defined in Title 29 *Code of Federal Regulations* Part 1910.120(e). These requirements include (1) 40 hours of formal off-site instruction; (2) a minimum of 3 days of actual on-site field experience under the supervision of a trained and experienced field supervisor; and (3) 8 hours of annual refresher training. Field personnel who directly supervise employees engaged in hazardous waste operations also receive at least 8 additional hours of specialized supervisor training. The supervisor training covers the contract's requirements for the health and safety program, training, and personal protective equipment, the spill containment program, and health-hazard monitoring procedures and techniques. At least one member of every ChaduxTt field team will maintain current certification in the American Red Cross "Multimedia First Aid" and "Cardiopulmonary Resuscitation Modular," or equivalent.

Copies of ChaduxTt's health and safety training records are maintained in project files, including course completion certifications for the initial and refresher health and safety training, specialized supervisor training, and first aid and cardiopulmonary resuscitation training.

In addition, all Navy projects are required to develop an Activity Hazard Analysis (AHA) that complies with U.S. Army Corps of Engineers EM385-1-1.

Before work begins at a specific hazardous waste project site, ChaduxTt personnel are required to undergo site-specific training that thoroughly covers the following areas:

- Names of personnel and alternates responsible for health and safety at a hazardous waste project site
- Health and safety hazards present on site
- Selection of the appropriate personal protection levels
- Correct use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment on site
- Medical surveillance requirements, including recognition of symptoms and signs that might indicate overexposure to hazardous substances
- Contents of the project health and safety plan

1.5.2 Subcontractor Training

Subcontractors who work on site will certify that their employees have been trained for work on hazardous waste project sites. Training will meet Occupational Safety and Health Administration requirements defined in Title 29 of the *Code of Federal Regulations* Section 1910.120(e). Before work begins at the project site, subcontractors will submit copies of the training certification for each employee to ChaduxTt.

All employees of associate and professional services firms and technical services subcontractors will attend a safety briefing and complete the "Safety Meeting Sign-Off Sheet" before they conduct on-site work. This briefing covers the topics described in Section 1.5.1 and is delivered by the ChaduxTt on-site health and safety officer or other qualified person.

Subcontractors are responsible for conducting their own safety briefings. ChaduxTt personnel may audit these briefings.

In addition to the health and safety requirements detailed above, ChaduxTt includes the following language in all subcontractor agreements to ensure that qualified subcontractors are used: "Subcontractor shall render the services to be provided and shall perform the work hereunder in a manner consistent with the generally accepted standards of care, quality, and skill applicable in Subcontractor's field or profession, and further agrees to furnish or assign only fully qualified and competent personnel to perform such services and work. In the event that ChaduxTt is not reasonably satisfied for any reason with the services or personnel provided or the work performed by Subcontractor, Subcontractor shall at its own cost and expense, in addition to its other duties and responsibilities hereunder and without limiting in any way ChaduxTt's rights and remedies hereunder, promptly re-perform and correct the unsatisfactory services or work." In addition, a ChaduxTt employee experienced in the type of work being conducted will be provide on-scene oversight of the work to ensure that work being done by a subcontractor is completed in accordance with this SAP.

1.5.3 Specialized Training and Certification Requirements

In addition to the general training described above, the samplers must receive general awareness training for MEC before any field activities begin. One UXO technician will be on site throughout each shift on sites UXO1, UXO3, UXO4, UXO6, and UXO7. The technician will have prior military UXO experience or a minimum of 3 years experience in munitions response actions or range clearance.

1.6 DOCUMENTS AND RECORDS

Documentation is critical for evaluating the success of any environmental data collection activity. The following sections discuss the requirements for documenting field activities and for preparing laboratory data packages. This section also describes reports that will be generated as a result of this project.

Additionally, soil samples will be collected by personnel experienced with sampling procedures. In some cases, junior personnel will work alongside experienced personnel to assist in sample collection and for training.

1.6.1 Field Documentation

Complete and accurate documentation is essential to demonstrate that field measurement and sampling procedures are carried out as described in the SAP. Field personnel will use permanently bound field logbooks with sequentially numbered pages to record and document field activities. The logbook will list the contract name and number, the CTO number, the site name, and the names of subcontractors, the service client, and the project manager. At a minimum, the following information will be recorded in the field logbook:

- Name and affiliation of all on-site personnel or visitors
- Weather conditions during the field activity
- Summary of daily activities and significant events
- Notes of conversations with coordinating officials
- References to other field logbooks or forms that contain specific information
- Discussions of problems encountered and their resolution
- Discussions of deviations from the SAP or other governing documents
- Description of all photographs taken

The field team will also use the various field forms included in Appendix B to record field activities.

1.6.2 Summary Data Package

The summary data package will consist of a case narrative, copies of all associated chain-of-custody forms, sample results, and quality assurance and QC (QA/QC) summaries. The case narrative will include the following information:

- Subcontractor name, project name, CTO number, project order number, sample delivery group (SDG) number, and a table that cross-references client and laboratory sample identification (ID) numbers
- Detailed documentation of all sample shipping and receiving, preparation, analytical, and quality deficiencies

- A list of each instance of manual integration of data interpretation in the case narrative and a statement that each instance of manual integration was approved by a supervisor.

- Copies of all associated nonconformance and corrective action forms that will describe the nature of the deficiency and the corrective action taken

- Copies of all associated sample receipt notices

Additional requirements for the summary data package are outlined in Table 6. The subcontracting laboratory will provide ChaduxTt with two copies of the summary data package within 28 days after it receives the last sample in the SDG.

1.6.3 Full Data Package

When a full data package is required, the laboratory will prepare data packages in accordance with the instructions provided in the EPA Contract Laboratory Program (CLP) statements of work (SOW) (EPA 1999a, 2000a). Full data packages will contain all of the information from the summary data package and all associated raw data. Full data package requirements are outlined in Table 6. Full data packages are due to ChaduxTt within 35 days after the last sample in the SDG is received. Unless otherwise requested, the subcontractor will deliver one copy of the full data package.

1.6.4 Electronic Data Package Format

The subcontracted laboratory will provide electronic data deliverables (EDD) for all analytical results. An automated laboratory information management system must be used to produce the EDDs. Manual creation of the deliverable (data entry by hand) is unacceptable. The laboratory will verify EDDs internally before they are issued. The EDDs will correspond exactly to the hard-copy data. No duplicate data will be submitted. EDDs will be delivered in a format compatible with the Navy Environmental Data Delivery (NEDD) format for import into the Naval Installation Restoration Information System (NIRIS). Results that should be included in all EDDs are as follows:

- Target analyte results for each sample and associated analytical methods requested on the chain-of-custody form

- Method and instrument blanks and preparation and calibration blank results reported for the SDG

- Percent recoveries for the spike compounds in the MS, MSDs, blank spikes, or LCSs

- Matrix duplicate results reported for the SDG

- All re-analysis, re-extractions, or dilutions reported for the SDG, including any associated with samples and the specified laboratory QC samples

Electronic and hard-copy data must be retained for a minimum of 3 and 10 years, respectively, after final data have been submitted. The subcontractor will use an electronic storage device capable of recording data for long-term, off-line storage. Raw data will be retained on an electronic data archival system. The NAVFAC Southwest Administrative Record will also retain a hard copy of the data.

1.6.5 Reports Generated

An SI report will be prepared to present the results from this investigation at the active sites. The report will include a summary of the results of previous related activities, field and sampling procedures for this investigation, target analyte concentration and associated QC data, updated site maps, comparisons to human health and ecological screening levels, conclusions and recommendations for each site.

2.0 DATA GENERATION AND ACQUISITION

This section describes the requirements for the following:

- Sampling Process Design (see Section 2.1)
- Sampling Methods (see Section 2.2)
- Sample Handling and Custody (see Section 2.3)
- Analytical Methods (see Section 2.4)
- Quality Control (see Section 2.5)
- Equipment Testing, Inspection, and Maintenance (see Section 2.6)
- Instrument Calibration and Frequency (see Section 2.7)
- Inspection and Acceptance of Supplies and Consumables (see Section 2.8)
- Nondirect Measurements (see Section 2.9)
- Data Management (see Section 2.10)

2.1 SAMPLING PROCESS DESIGN

This section presents the proposed sampling locations and planned analytical suite for soil samples. No groundwater samples will be collected for the SI.

2.1.1 Investigation of Soil

The design for the soil sampling program is site specific. Section 3.2 of the work plan describes the proposed field investigation activities in detail. Tables 1 and 2 of the work plan provide sample summary tables for IRP and MRP sites. In general, the investigation at the IRP sites is designed to characterize surface and subsurface soil and evaluate if releases of COPCs or COPECs are present as a result of historical waste disposal operations. The purpose of the SI at the MRP sites is similar, except that surface evidence of MEC will be identified by visual observation, and the presence of MC from past operations at the sites will be investigated by including analysis for explosives and other MC as appropriate.

2.1.2 Rationale for Selecting Analytical Parameters

The analytical parameters for this investigation were selected based on site history and findings of the IAS (NEESA 1990) and the PA (Malcolm Pirnie 2006).

2.2 SAMPLING METHODS

This section describes the procedures for sampling, including utility identification, surface and subsurface soil sampling, surveying, decontamination procedures, and management of investigation-derived waste. A list of planned soil samples is provided on Table 7. Associated quality control samples are presented in Table 8.

2.2.1 Underground Utilities

Subsurface utilities will be clearly identified and marked at all sites where intrusive activities will be performed. All clearances needed for drilling and hand augering will be obtained in accordance with the Navy's established procedures and requirements. The drilling site will be marked in the field with a wooden stake, and the location will be marked on a map. The map will be submitted to a utility location subcontractor and to the NAVWPNSTA Seal Beach Det Fallbrook resident officer in charge of construction at least 2 weeks before intrusive field activities begin. ChaduxTt will work with the Navy and the location subcontractor to obtain permits required before intrusive activities begin.

2.2.2 Geophysical Surveys

2.2.2.1 Geophysical Surveys for Sites UXO1 and UXO4

Geophysical surveys will be conducted at accessible portions of MRP Sites UXO1 and UXO4 to aid in the detection of possible subsurface munitions and in selection of soil sampling locations. Non-accessible portions of these sites include areas where there are biological avoidance issues, safety hazards, or obstructive dense vegetation that is not feasible to clear. The surveys will be conducted using an EM61 detector or equivalent. The EM61 is a time-domain device used for detecting buried electrically conductive objects. The instrument measures induced secondary magnetic fields in electrically conductive materials. Due to the instruments unique coil arrangement, the response curve is a single well-defined positive peak directly over a buried electrically conductive object. This facilitates quick and accurate location of targets, making it suitable for metallic munitions detection at Sites UXO1 and UXO4. In general, the EM61 can detect conductive objects to an approximate depth of 11 feet.

The EM61 surveys will be initiated from an established baseline with transects on 5-foot centers. The transects may vary laterally by a maximum of 2 feet to avoid vegetation disturbance or safety hazards. A field demonstration will be conducted as a quality control check prior to commencement of the surveys to ensure that any applied instrumentation will be capable of detecting MC. The demonstration will consist of an identification survey using the EM61 and/or other detectors to sweep over a “clean” area and an area with blind placement of test items.

Other instrumentation, such as a TW-6 M-Scope (metal locator), magnetic gradiometer, and differential global positioning system (DGPS), may also be used to aid in mapping or further investigating resulting EM anomalies. Any obstructive vegetation of significant lateral extent that compromises the integrity of the EM61 surveys will be inspected and approved by the permitted biologist before it is brushed by hand. Should brushing not be advised, the area where the deviation occurred will be evaluated using any of the hand-held equipment listed above.

2.2.2.2 Geophysical Surveys for Sites UXO6 and UXO7

For the Depot Lake and Lower Lake sites, magnetometer surveys will be conducted to aid in the identification of possible munitions buried in lake sediments and in selection of sampling locations. The proposed instrument for these surveys is either a Geometrics 882 marine magnetometer or a Geometrics 858 magnetometer. The choice of instrumentation will be made based on the logistics of the deployment, which is largely dependent on the water level of the lakes at the time the surveys are to be conducted. However, if the lakes are dry, an EM61 or equivalent survey may be used to facilitate the identification of munitions. For the areas between the shoreline and the high water mark, a Schonstedt magnetic gradiometer with a DGPS will be used to aid in the selection of sampling locations.

The Geometrics 882 marine magnetometer is better suited to deeper water, while the 858 is better suited to shallow water (less than 1-2 meters). Both of these instruments use optically pumped cesium vapor sensors and have a measurement sensitivity of less than 0.1 nano-teslas. A

real-time differential global positioning system (DGPS) will be used to track the position of the boat and aid in navigation during the surveys.

The surveys will be conducted using roughly parallel transects separated by about five feet over all accessible areas of both lakes. The magnetometer data collection rate and boat speed will be such that at least one data point per three feet is collected along each transect. An additional magnetometer will be used to make measurements at a designated base station location (where no magnetic anomalies are observed) during the course of the surveys to assess diurnal variations of the earth's magnetic field. Solar geomagnetic activity will also be checked at the NOAA (National Oceanic and Atmospheric Administration) webpage (http://www.sec.noaa.gov/ftpdir/forecasts) to provide additional assessment of diurnal variations of the earth's magnetic field.

Magnetic anomalies are produced by the presence of ferrous metal objects. These anomalies can be detected by measuring the strength of the magnetic field at various points over and around metal objects using a magnetometer. The anomalies will vary depending on the size, shape, depth, and orientation of the objects.

2.2.3 Surface Soil Sampling

Surface soil samples will be collected from the 0- to 2-foot bgs interval using a stainless-steel hand auger or disposable trowel for the IRP sites and disposal areas on the MRP sites. However, samples collected at former range areas on the MRP sites will generally be collected from 0 to 0.5 feet bgs. The shallower depth at range-type areas is planned because most energetic material and munitions residue is deposited at the ground surface as particles (Jenkins and others 2001). Therefore, for the MRP sites, surface soil samples will be collected from a depth of either 0 to 0.5 feet bgs (former range areas) or 0 to 2 feet bgs (disposal areas). Further, at the former range areas on the MRP sites, each surface sample will be a composite of four subsamples. The subsamples will be composited in the field. This variation of multi-increment sampling will be employed to reduce error associated with contaminant particles being scattered unevenly. At disposal areas, only discrete samples will be collected in the subsurface. Except for samples for analysis of VOCs, surface samples will be collected using an individually packaged disposable scoop or trowel. If the soil is too compacted to use a trowel, a percussion-type hand-held drive sampler equipped with a brass sleeve insert will be used. A brass sleeve will be used to collect all samples for analysis of VOCs, as described below.

An EnCore sampling device will be used to collect an undisturbed sample for analysis of VOCs from the end of the brass sleeve immediately after it is removed. The EnCore sampler is a dedicated, single-use system designed to collect, store, and deliver approximately 5 grams of soil. The system consists of a plunger, a cap, and a T-handle to aid in sample collection. The cap is placed into the T-handle and inserted into the soil. The soil cap is then immediately sealed and sent to the laboratory for analysis.

A portable X-ray fluorescence (XRF) unit will be used to analyze a portion of the samples collected at UXO2 for lead. The unit will allow real-time analysis in the field. Gravel,

vegetation and other debris in the sample will be discarded and any bullets will be removed and weighed to assess their percentage of the sample by weight. A mortar and pestle will be used to grind the sample and the sample will be sieved to attain a relatively uniform grain size. Once the sample is adequately ground and sieved, it will be homogenized by hand or by using a plastic bag. An aliquot of soil will then be placed into an XRF sample cup and analyzed.

2.2.4 Subsurface Soil Sampling

Subsurface soil samples will be collected at Site 32 by hollow-stem auger (HSA) drilling rig or direct-push methods. Headspace readings will be collected using a photo-ionization detector (PID). A limited amount of soil from each sample interval will be placed into a jar and allowed to sit until the boring has been completed to collect headspace readings. A PID will then be used to monitor any organic vapors within the jar. If no visual or PID evidence of organic contamination exists, then soil samples will be collected at depths of 0-2, 4-6, and 8-10 feet bgs.

A stainless steel hand auger will be used to advance borings and collect soil samples at the other sites. The maximum planned depth for hand augering is 6 feet. First, a percussion-type hand-held drive sampler equipped with a brass sleeve will be advanced either 0.5 or 2 feet, depending on the location. Soil for samples for analysis of VOCs will be collected from the sleeve as described in Section 2.2.3. The remaining soil will be collected from the sleeve and placed in a glass jar for analysis of SVOCs and metals. The hand auger will then be used to advance the boring to 6 feet, where required, to collect a deeper sample at 4-6 feet bgs. If after repeated attempts the hand auger cannot be advanced to a depth of 6 feet, then an HSA or direct-push method will be used as described for Site 32.

At the MRP sites, the type of sample (discrete or composite) and sampling interval for surface soil samples will depend on the historical practices that potentially resulted in contamination. At former range areas, surface soil samples will be collected from a depth of 0 to 0.5 feet bgs and will be composited from four subsampling points in the immediate vicinity of the identified sampling location. This will assure that the likelihood of detecting any MC is maximized in a range-type setting, where explosive residue is typically deposited only at the surface of the soil. At disposal areas, surface soil samples will be collected from a depth of 0 to 2 feet bgs and will be collected as a single sample from the identified depth interval

Soil borings will be properly plugged after all samples have been collected. Destruction of the boring will include completely sealing the borehole with a bentonite and cement grout for Site 32 and any other locations drilled using HSA or direct-push methods. The soil cuttings for borings hand augered to 6 feet will be returned to the hole unless visual observation or PID readings indicate potential contamination. If contamination is suspected, then the cuttings will be containerized and the boring backfilled with concrete. All borings will be staked for location surveying.

2.2.5 Water Sampling

Lake water samples (surface and subsurface) will be collected at both the Depot Lake (UXO6) and Lower Lake (UXO7) sites. Surface water samples will be collected using a grab sampler and subsurface (pore water) samples will be collected using a Trident and/or temporary piezometer samplers. The Trident probe is a flexible, multi-sensor water sampling probe for screening and mapping groundwater contamination at the surface water interface. The probe detects contrast in salinity and/or clay content in unconsolidated sediments. It also measures temperature to detect groundwater by thermal contrast with surface water. The Trident porewater sampler allows for contaminant characterization. Results from the Trident/piezometer survey will be used to determine if identified and verified source anomalies are currently associated with a MC release to the lakes or the groundwater beneath the lakes.

Fine-grained sediments can make collection of subsurface water samples difficult. This can be mitigated by use of sand-pack filters or use of an alternative sampling device such as a diffusion sampler. Potential refusal during insertion of the sampling probe can result in an inability to collect a sample at same depth as the source target. Refusal during insertion of the sample probe can be overcome by attempting multiple push locations and/or collecting a sample as close to the target as possible at the depth where refusal is encountered.

An estimated 10 surface water samples and 5 pore water samples will be collected at each lake site and will be sent to a lab for metals and explosives analysis. The selected locations of these samples will be based on the magnetometer or magnetic gradiometer survey results. Water quality measurements of pore water and surface water samples will also include pH, conductivity, TDS, ORP, DO, and temperature.

2.2.6 Sample Location Surveying

Sample locations will be surveyed using a differential global positioning system (DGPS), with an average horizontal accuracy of about 5 feet or less. Vertical measurements will not be obtained.

2.2.7 Decontamination

All non-dedicated sampling tools will be decontaminated by scrubbing in a solution of potable water and nonphosphate detergent (Liquinox or Alconox) before sampling begins and between sample locations. The tools will then be double-rinsed with distilled water. Sampling tools that are not used immediately after decontamination will be allowed to air dry and wrapped in plastic.

2.2.8 Management of Investigation-Derived Waste

All soils from the ground surface to the total depth at Site 32 will be contained in 55-gallon drums. The drums will be labeled and will remain on site pending analysis of a composite characterization sample. The results of the sample will determine the exact disposal requirements. The drums will then be shipped off site to the appropriate facility. The soil

cuttings at the remaining IRP sites will be returned to the hole unless visual observation or PID readings indicate potential contamination. If contamination is suspected, then the cuttings will be containerized and a characterization sample obtained. The containers will remain on each site until analytical results are received. Soil that is not contaminated will be spread on site in a manner that conforms to current grade.

Water investigation-derived waste will be generated from decontamination activities. The water from each site will be combined into a 55-gallon drum and a sample will be collected. Once it has been characterized, the water will be disposed of in accordance with applicable federal, state, and local laws and regulations.

Personal protective equipment and miscellaneous waste from sampling (paper towels, aluminum foil, and plastic sheeting) will be placed in large garbage bags, sealed, and disposed of in facility trash receptacles.

2.2.9 Sample Containers and Holding Times

The type of sample containers to be used for each analysis, the sample volumes required, the preservation requirements, and the maximum holding times for samples before extraction and analysis are presented in Table 9.

2.3 SAMPLE HANDLING AND CUSTODY

The sections below describe sample handling procedures, including sample ID and labeling, documentation, chain of custody, and shipping.

2.3.1 Sample Identification

Specific sampling location identifiers (known as point names) have been assigned to all samples collected for this project. Point names are presented on Table 7. In addition to the point name, each individual sample will be identified by a sample ID. Sample IDs will be listed on the chain-of-custody forms submitted to the laboratory and will be cross-referenced to the point name in permanently bound field logbooks and sample data sheets. Each sample ID consists of a letter and four numbers; the numbers will be a sequential series that will be assigned by the NAVWPNSTA Seal Beach Det Fallbrook database manager before the field work begins.

QC samples for this investigation will also be assigned specific sample IDs. The following system will be used for each QC sample.

Source water blank (SWB)	=	SWB01 though SWBXX
Equipment rinsate	=	ER01 through ERXX

2.3.2 Sample Labels

A sample label will be affixed to all sample containers. The label will be completed with the following information written in indelible ink:

- Project name and location
- Sample ID number
- Date and time of sample collection
- Preservative used
- Sample collector's initials
- Analysis required

After it is labeled, each sample will be refrigerated or placed in a cooler that contains ice to maintain the sample temperature at 4 ± 2 degrees Celsius (°C).

2.3.3 Sample Documentation

Documentation during sampling is essential to ensure proper sample identification. ChaduxTt personnel will adhere to the following general guidelines for maintaining field documentation:

- Documentation will be completed in permanent black ink.
- All entries will be legible.
- Errors will be corrected by crossing out with a single line and then dating and initialing the lineout.
- Any serialized documents will be maintained at ChaduxTt and referenced in the site logbook.
- Unused portions of pages will be crossed out, and each page will be signed and dated.

Section 1.6.1 includes additional information on how ChaduxTt will document field activities in logbooks. The ChaduxTt field team leader is responsible for ensuring that sampling activities are properly documented.

2.3.4 Chain of Custody

ChaduxTt will use standard sample custody procedures to maintain and document sample integrity during collection, transportation, storage, and analysis. A sample will be considered to be in custody if one of the following statements applies:

- It is in a person's physical possession or view.
- It is in a secure area with restricted access.
- It is placed in a container and secured with an official seal such that the sample cannot be reached without breaking the seal.

Chain-of-custody procedures provide an accurate written record that traces the possession of individual samples from the time they are collected in the field to the time they are accepted at the laboratory. The chain-of-custody record (see Appendix B) also will be used to document all samples collected and the analysis requested. Information that field personnel will record on the chain-of-custody record includes the following:

- Project name and number
- Sampling location
- Name and signature of sampler
- Destination of samples (laboratory name)
- Sample ID number
- Date and time of collection
- Number and type of containers filled
- Analysis requested
- Preservatives used (if applicable)
- Sample designation (grab or composite)
- Signatures of individuals involved in custody transfer, including the date and time of transfer
- Airbill number (if applicable)
- Project contact and phone number

Unused lines on the chain-of-custody record will be crossed out. Field personnel will sign chain-of-custody records that are initiated in the field, and the airbill number will be recorded. The record will be placed in a waterproof plastic bag and taped to the inside of the shipping container used to transport the samples. Signed airbills will serve as evidence of custody transfer between field personnel and the courier, and between the courier and the laboratory. Copies of the chain-of-custody record and the airbill will be retained and filed by field personnel before the containers are shipped.

Laboratory chain of custody begins when samples are received and continues until samples are discarded. Laboratories analyzing samples under the ChaduxTt contract must follow custody procedures at least as stringent as are required by the EPA CLP SOWs (EPA 1999a, 2000a). The laboratory should designate a specific individual as the sample custodian. The custodian will receive all incoming samples, sign the accompanying custody forms, and retain copies of the forms as permanent records. The laboratory sample custodian will record all pertinent information on the samples, including the persons who delivered the samples, the date and time received, sample condition at the time of receipt (sealed, unsealed, or broken container; temperature; or other relevant remarks), the sample ID numbers, and any unique laboratory ID numbers for the samples. This information should be entered into a computerized laboratory information management system. When the sample transfer process is complete, the custodian is responsible for maintaining internal logbooks, tracking reports, and other records necessary to maintain custody throughout sample preparation and analysis.

The laboratory will provide a secure storage area for all samples. Access to this area will be restricted to authorized personnel. The custodian will ensure that samples that require special handling, including samples that are heat- or light-sensitive, radioactive, or have other unusual physical characteristics, will be properly stored and maintained prior to analysis.

2.3.5 Sample Shipment

The following procedures will be implemented when samples collected during this project are shipped:

- The cooler will be filled with bubble wrap, sample bottles, and packing material. Sufficient packing material will be used to prevent sample containers from breaking during shipment. Enough ice will be added to maintain the sample temperature of below 4 +/- 2 °C.

- The chain-of-custody records will be placed inside a plastic bag. The bag will be sealed and taped to the inside of the cooler lid. The air bill, if required, will be filled out before the samples are handed over to the carrier. The laboratory will be notified if the sampler suspects that the sample contains any substance that would require laboratory personnel to take safety precautions.

- The cooler will be closed and taped shut with strapping tape around both ends. If the cooler has a drain, it will be taped shut both inside and outside of the cooler.

- Signed and dated custody seals will be affixed on the front and side of each cooler. Wide clear tape will be placed over the seals to prevent accidental breakage.

- The chain-of-custody record will be transported within the taped sealed cooler. When the cooler is received at the analytical laboratory, laboratory personnel will open the cooler and sign the chain-of-custody record to document transfer of samples.

Multiple coolers may be sent in one shipment to the laboratory. The outside of the coolers will be marked to indicate the number of coolers in the shipment.

2.4 ANALYTICAL METHODS

This section contains an overview of the analytical methods and procedures to be used for this project. Table 9 presents the analytical methods that will be used to analyze samples collected during this project, and Appendix A presents the MQOs and control limits for sample analysis. Appendix C presents the individual target analytes for this investigation and the associated PRRLs. The analytical laboratories will attempt to achieve the PRRLs for all the investigative samples collected. If problems occur in achieving the PRRLs, the laboratories will contact the ChaduxTt analytical coordinator immediately and other alternatives will be pursued (such as analyzing an undiluted aliquot and allowing nontarget compound peaks to go off scale) to achieve acceptable reporting limits. In addition, results below the reporting limit but above the MDL will be reported with appropriate flags to indicate the greater uncertainty associated with these values.

The analytical methods required for this investigation are all standard EPA SW-846 (EPA 1996). Protocols for laboratory selection and for ensuring laboratory compliance with project analytical and QA/QC requirements are presented in the following sections.

2.4.1 Selection of Analytical Laboratories

Laboratories for this investigation will be selected from a list of prequalified laboratories developed by ChaduxTt to support Navy contracts. Prequalification streamlines laboratory selection by reducing the need to compile and review detailed bid and qualification packages for each individual investigation. Prequalification also improves flexibility in the program by allowing analysis to be directed to a number of different capable laboratories with available capacity when samples are collected.

ChaduxTt's laboratory prequalification and selection process relies on (1) a standard procedure to evaluate and prequalify laboratories for work under the contract, and (2) the "Tetra Tech EM Inc. Laboratory Analytical Statement of Work" for Navy contracts (Tetra Tech 2002), a contractual document that specifies standard requirements for analyses that are routinely conducted. ChaduxTt establishes a basic ordering agreement that incorporates and enforces the laboratory SOW with each prequalified laboratory. Individual purchase orders can then be written for specific investigations. These aspects of laboratory selection are further described in

the following sections, along with ChaduxTt's procedures for selecting laboratories when the laboratory SOW does not specifically address project-specific analytical methods or QC requirements.

2.4.1.1 Laboratory Evaluation and Prequalification

Laboratories that support the Navy directly or through subcontracts are evaluated and approved for Navy use by the Naval Facilities Engineering Service Center (NFESC). Laboratories that support ChaduxTt under Navy contracts have been selected from the list of laboratories approved by NFESC and evaluated by ChaduxTt to assure that the laboratory can meet the technical requirements of the laboratory SOW and produce data of acceptable quality. The laboratories are evaluated in accordance with the NFESC *Installation Restoration Chemical Data Quality Manual* (NFESC 1999). The laboratory evaluation includes the following elements:

- **Certification and approval.** Laboratories must be currently approved by NFESC. The NFESC approval must be obtained before the laboratory begins work.

- **Performance evaluation samples.** Each laboratory must initially and yearly demonstrate its ability to satisfactorily analyze single-blind performance evaluation samples for all analytical services it will provide under Navy contracts. At its discretion, ChaduxTt may submit one or more double-blind performance evaluation samples at ChaduxTt's cost. When the results for the performance evaluation sample are deficient, the laboratory must correct any problems and analyze (at its own cost) a subsequent round of performance evaluation samples for the deficient analysis.

- **Audits.** Laboratories must initially and yearly demonstrate their qualifications by submitting to one or more audits by ChaduxTt. The audits may consist of (1) an on-site review of laboratory facilities, personnel, documentation, and procedures, or (2) an off-site review of hard copy and electronic deliverables or magnetic tapes. When deficiencies are identified, the laboratory must correct the problem and provide ChaduxTt with a written summary of the corrective action that was taken.

Appendix D provides a current list of subcontractor laboratories that have passed this evaluation program. Each laboratory was evaluated before it was added to the list, and each is reevaluated annually. If a laboratory fails to meet any of the evaluation criteria, it is removed from the list of approved laboratories.

2.4.1.2 Laboratory Statement of Work

The laboratory SOW establishes standard requirements for the analytical methods that are most commonly used under Navy contracts. The laboratory SOW specifies standard method-specific target analyte lists and PRRLs for each method; QC samples and associated control limits; calibration requirements; and miscellaneous method performance requirements. The laboratory SOW also specifies standard data package requirements, EDD formats, data qualifiers, and delivery schedules. In addition, the laboratory SOW outlines support services (such as providing

sample containers, trip blanks, temperature blanks, sample coolers, and custody forms and seals) that are expected of laboratories. The laboratory SOW incorporates Navy QA policy, as well as applicable EPA and state QA guidelines, as appropriate.

ChaduxTt's laboratory SOW is based on EPA CLP methods for VOCs, SVOCs, pesticides, polychlorinated biphenyls, metals, and cyanide. The laboratory SOW also addresses frequently used non-CLP methods for a variety of organic, inorganic, and physical parameters. Non-CLP methods include the methods published by EPA in SW-846 (1996). Laboratories on ChaduxTt's approved laboratory list can elect to provide all or a portion of the analytical services specified in the laboratory SOW.

As noted above, the laboratory SOW is incorporated into all laboratory subcontracts established for analytical services supporting Navy projects. Thus, the prequalified laboratories commit to meeting the requirements in the laboratory SOW during the contracting process before they receive samples. ChaduxTt reviews and revises the laboratory SOW regularly to incorporate new methods and requirements, modifications or updates to existing methods, changes in Navy QA policy or regulatory requirements, and any other necessary corrections or revisions.

2.4.1.3 Laboratory Selection and Oversight

After project-specific analytical and QA/QC requirements have been identified and documented in the SAP, the ChaduxTt analytical coordinator works closely with a ChaduxTt procurement specialist to select a laboratory that can meet these requirements. When project-specific analytical and QC requirements are consistent with ChaduxTt's laboratory SOW, the analytical coordinator identifies one or more prequalified subcontractor laboratories that are capable of carrying out the work. As part of this process, the analytical coordinator typically contacts the laboratories to discuss the analytical requirements and project schedule. The analytical coordinator then forwards the name of the recommended laboratory (or laboratories) to the ChaduxTt procurement specialist, who issues a purchase order for the work. When analytical requirements are consistent with ChaduxTt's laboratory SOW and multiple prequalified laboratories are capable of performing the work, a specific laboratory is typically selected based on laboratory workload and project schedule considerations.

ChaduxTt follows a similar procedure when project-specific analytical and QC requirements are nonstandard and differ from those specified in ChaduxTt's laboratory SOW. The analytical coordinator contacts analytical laboratories, beginning with those on ChaduxTt's prequalified list, to discuss the analytical and QA/QC requirements in the SAP and to assess the laboratories' ability to meet the requirements. In many cases, ChaduxTt works cooperatively with analytical laboratories to develop and refine QC requirements for nonstandard analyses or matrices.

Additional laboratories are contacted if the analytical coordinator is unable to identify one or more prequalified laboratories that can accept the work. The additional laboratories must be evaluated as described in Section 2.4.1.1 before they will be allowed to analyze any samples, although some steps in the evaluation may be waived for certain investigations and circumstances (for example, unusual analytes, urgent project needs, experimental methods,

mobile laboratories, or on-site screening analysis). After additional laboratories have been identified, the analytical coordinator forwards their names to the procurement specialist. The procurement specialist prepares a solicitation package, including the project-specific analytical and QC requirements, and submits the package to the laboratories. The procurement specialist, in cooperation with the analytical coordinator and project manager, then evaluates the proposals that are received and selects a laboratory that meets the requirements and provides the best value to the Navy and ChaduxTt. Finally, the procurement specialist issues a purchase order to the selected laboratory that incorporates the project-specific analytical and QA/QC requirements.

After a laboratory has been selected, the analytical coordinator holds a kickoff meeting with the laboratory project manager. The kickoff meeting is held regardless of whether project-specific analytical and QA/QC requirements are consistent with ChaduxTt's laboratory SOW or are outside the SOW. The ChaduxTt project manager, procurement specialist, and other key project and laboratory staff may also be involved in this meeting. The kickoff meeting includes a review of analytical and QC requirements in the SAP, the project schedule, and any other logistical support that the laboratory will be expected to provide.

2.4.2 Project Analytical Requirements

The goal for this investigation is to gather decision-quality data. One or more prequalified subcontractor laboratories will analyze samples of soil and water off site. The laboratories will be selected before the field program begins based on their ability to meet the project analytical and QC requirements, as well as their ability to meet the project schedule. All of the analytical methods selected for the site investigations are standard EPA methods that are described in ChaduxTt's laboratory SOW. These methods are listed in Table 9 and are from EPA's SW-846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846), Update III" (EPA 1996).

This SAP documents project-specific QC requirements for the selected analytical methods. Sample volume, preservation, and holding time requirements are specified in Table 9. Requirements for laboratory QC samples are described in Table 4 and in Section 2.5. Appendix A includes project-specific precision and accuracy goals for the methods. PRRLs for each method are documented in Appendix C.

2.5 QUALITY CONTROL

ChaduxTt will assess the quality of field data through regular collection and analysis of field QC samples. Laboratory QC samples will also be analyzed in accordance with referenced analytical method protocols to ensure that laboratory procedures are conducted properly and that the quality of the data is known.

2.5.1 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.

2.5.1.1 Field Duplicates

Soil duplicate samples will not be collected for this project for two reasons. First, these samples cannot be used directly to assess sampling precision since adjacent soil samples incorporate some spatial variability. Furthermore, it is not practical to set QC limits for the RPD of these samples, which precludes their use for QC. Second, although the information on spatial variability 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 information on spatial variability will be obtained during subsequent investigations at this site, if required.

2.5.1.2 Equipment Rinsate Samples

Equipment rinsate samples are generally collected during sampling at a frequency of once per day of sampling, per team, per type of tool used. For this project, it is estimated that one equipment rinsate sample will be generated daily during the investigation. 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. Deionized or distilled water will be used for inorganic parameters. The equipment rinsate will allow for verification that the decontamination procedures were appropriately performed.

During data validation, the results for the equipment rinsate samples will be used to qualify data or to evaluate the levels of analytes in the field samples collected during the sampling event.

2.5.1.3 Source Water Blank Samples

One source water blank will be collected for each source of water (distilled or deionized) used to decontaminate the sampling equipment. The source-water blank sample will verify that the water used for decontamination was analyte-free. It is anticipated that one source water blank will be necessary during this investigation.

2.5.1.4 Temperature Blanks

A temperature blank demonstrates the temperature of water samples within a cooler. The temperature blank originates at the laboratory and is then shipped within each cooler. The temperature blank is opened at the laboratory when the sample is received and a thermometer is

used to record the water temperature in the 40-milliliter vial. This temperature is then recorded as the sample temperature for the cooler by the receiving laboratory.

2.5.2 Laboratory Quality Control Samples

The types of laboratory QC samples that will be used for this project are discussed in the following sections. Table 4 presents the required frequencies for laboratory QC samples, and Appendix A presents project-specific precision and accuracy goals for these samples.

2.5.2.1 Method Blanks

Method blanks will be prepared at the frequency prescribed in the individual analytical method or at a rate of 5 percent of the total samples if a frequency is not prescribed in the method.

2.5.2.2 Matrix Spike and Matrix Spike Duplicates

MS/MSD samples require collection of an additional volume of material for laboratory spiking and analysis. The percent recoveries will be calculated for each of the spiked analytes and used to evaluate analytical accuracy. The RPD between spiked samples will be calculated to evaluate precision. Project-specific precision and accuracy goals are presented in Appendix A.

2.5.2.3 Laboratory Control Samples

LCSs, or blank spikes, will be analyzed at the frequency prescribed in the analytical method or at a rate of 5 percent of the total samples if a frequency is not prescribed in the method. Laboratory-specific protocols will be followed to gauge the usability of the data if %R results for the LCS or blank spike are outside of the established goals.

2.5.2.4 Surrogate Standards

Surrogate standards consist of known concentrations of nontarget organic analytes that are added to each sample, method blank, and MS/MSD before samples are prepared and analyzed. The surrogate standard measures the efficiency the analytical method in recovering the target analytes from an environmental sample matrix. Percent recoveries for surrogate compounds are evaluated using laboratory control limits. Surrogate standards indicate laboratory accuracy and matrix effects for every field and QC sample that is analyzed by gas chromatography for volatile and extractable organic constituents. Surrogate compounds are used in the analysis of VOCs to monitor purge efficiency and analytical performance, whereas surrogates are used in the analysis of extractable organic compounds to monitor the extraction process and analytical performance.

2.5.2.5 Internal Standards

Internal standards are compounds that are added to every standard for analysis of VOCs and SVOCs, method blank, MS/MSD, and sample or sample extract at a known concentration prior to analysis. Internal standards are used as the basis for quantification of gas chromatography/mass spectrometry (GC/MS) target compounds and ensure that the GC/MS sensitivity and response are stable during the analytical run. An internal standard is used to evaluate the efficiency of the sample introduction process and monitors the efficiency of the analytical procedure for each sample matrix encountered. Internal standards may also be used in the analysis of organic compounds by GC to monitor retention-time shifts. Validation of internal standards data will be based on EPA protocols presented in guidelines for evaluating organic analysis (EPA 1999b).

2.5.3 Additional Laboratory Quality Control Procedures

In addition to the analysis of laboratory QC samples, subcontractor laboratories will conduct the QC procedures discussed in the following sections.

2.5.3.1 Method Detection Limit Studies

The MDL is the minimum concentration of a compound that can be measured and reported. The MDL is a specified limit at which there is 99 percent confidence that the concentration of the analyte is greater than zero. The MDL takes into account sample matrix and preparation. The subcontractor laboratory will demonstrate the MDLs for all analyses, except inorganic analysis and physical properties test methods.

MDL studies will be conducted annually for soil matrices, or more frequently if any method or instrumentation changes. Each MDL study will consist of seven replicates spiked with all target analytes of interest at concentrations no greater than required quantitation limits. The replicates will be extracted and analyzed in the same manner as routine samples. If multiple instruments are used, each will be included in the MDL study. The MDLs reported will be representative of the least sensitive instrument.

2.5.3.2 Sample Quantitation Limits

Sample quantitation limits (SQL), also referred to as practical quantitation limits, are PRRLs adjusted for the characteristics of individual samples. The PRRLs presented in Appendix C are chemical-specific levels that a laboratory should be able to routinely detect and quantitate in a sample matrix. The PRRL is usually defined in the analytical method or in laboratory method documentation. The SQL takes into account changes in the preparation and analytical methodology that may alter the ability to detect an analyte, including changes such as use of a smaller sample aliquot or dilution of the sample extract. Physical characteristics such as sample matrix and percent moisture that may alter the ability to detect the analyte are also considered. The laboratory will calculate and report SQLs for all environmental samples.

2.5.3.3 Control Charts

Control charts document data quality in graphic form for specific method parameters such as surrogate standards and blank spike recoveries. A collection of data points for each parameter is used to statistically calculate means and control limits for a given analytical method. This information is useful in determining whether analytical measurement systems are in control. In addition, control charts provide information about trends over time in specific analytical and preparation methodologies. Although they are not required, ChaduxTt recommends that subcontractor laboratories maintain control charts for organic and inorganic analyses. At a minimum, method-blank surrogate recoveries and blank spike recoveries should be charted for all organic methods. Blank spike recoveries should be charted for inorganic methods. Control charts should be updated monthly.

2.6 EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

This section outlines the testing, inspection, and maintenance procedures that will be used to keep both field and laboratory equipment in good working condition.

2.6.1 Maintenance of Field Equipment

Preventive maintenance for most field equipment is carried out in accordance with procedures and schedules recommended in (1) the equipment manufacturer's literature or operating manual, or (2) SOPs that describe equipment operation associated with specific applications of the instrument. However, more stringent testing, inspection, and maintenance procedures and schedules may be required when field equipment is used to make critical measurements.

A field instrument that is out of order will be segregated, clearly marked, and not used until it is repaired. The field team leader will be notified of equipment malfunctions so that service can be completed quickly or substitute equipment can be obtained. Unscheduled testing, inspection, and maintenance should be conducted when the condition of equipment is suspect. Any significant problems with field equipment will be reported in the daily field QC report.

2.6.2 Maintenance of Laboratory Equipment

Subcontractor laboratories will prepare and follow a maintenance schedule for each instrument used to analyze samples collected for this project. All instruments will be serviced at scheduled intervals necessary to optimize factory specifications. Routine preventive maintenance and major repairs will be documented in a maintenance logbook.

An inventory of items to be kept ready for use in case of instrument failure will be maintained and restocked as needed. The list will include equipment parts subject to frequent failure, parts that have a limited lifetime of optimum performance, and parts that cannot be obtained in a timely manner.

The laboratory's QA plan and written SOPs will describe specific preventive maintenance procedures for equipment maintained by the laboratory. These documents identify the personnel responsible for major, preventive, and daily maintenance procedures, the frequency and type of maintenance performed, and the procedures for documenting maintenance.

Laboratory equipment malfunctions will require immediate corrective action. Actions should be documented in laboratory logbooks. No other formal documentation is required unless data quality is adversely affected or further corrective action is necessary. On-the-spot corrective actions will be taken as necessary in accordance with the procedures described in the laboratory QA plan and SOPs.

2.7 INSTRUMENT CALIBRATION AND FREQUENCY

The following sections discuss calibration procedures that will be followed to ensure the accuracy of measurements made using field and laboratory equipment.

2.7.1 Calibration of Field Equipment

Field equipment will be calibrated at the beginning of the field effort and at prescribed intervals. The frequency of calibration depends on the type and stability of equipment, the intended use of the equipment, and the recommendation of the manufacturer. Detailed calibration procedures for field equipment are available from the specific manufacturers' instruction manuals. All calibration information will be recorded in a field logbook or on field forms. A label that specifies the scheduled date of the next calibration will be attached to the field equipment. If this type of identification is not feasible, equipment calibration records will be readily available for reference.

ChaduxTt will calibrate field equipment every day in accordance with manufacturers' directions.

2.7.2 Calibration of Laboratory Equipment

Procedures and frequencies for calibration of laboratory equipment will follow the requirements in the methods referenced in Section 2.4.2 of this SAP. Qualified analysts will calibrate laboratory equipment and document the procedures and results in a logbook.

The laboratory will obtain calibration standards from commercial vendors for both inorganic and organic compounds and analytes. Stock solutions for surrogate standards and other inorganic mixes will be made from reagent-grade chemicals or as specified in the analytical method. Stock standards will also be used to make intermediate standards that will be used to prepare calibration standards. Special attention will be paid to expiration dating, proper labeling, proper refrigeration, and freedom from contamination. Documentation on receipt, mixing, and use of standards will be recorded in the appropriate laboratory logbook. Logbooks must be permanently bound. Additional specific handling and documentation requirements for the use of standards may be provided in subcontractor laboratory QA plans.

2.8 INSPECTION AND ACCEPTANCE OF SUPPLIES AND CONSUMABLES

ChaduxTt project managers have primary responsibility for identifying the types and quantities of supplies and consumables needed to complete Navy projects and are responsible for determining acceptance criteria for these items.

Supplies and consumables can be received either at a ChaduxTt office or at a work site. When supplies are received at an office, the project manager or field team leader will sort them according to vendor, check packing slips against purchase orders, and inspect the condition of all supplies before they are accepted for use on a project. If an item does not meet the acceptance criteria, deficiencies will be noted on the packing slip and purchase order and the item will then be returned to the vendor for replacement or repair.

Procedures for receiving supplies and consumables in the field are similar. When supplies are received, the ChaduxTt project manager or field team leader will inspect all items against the acceptance criteria. Any deficiencies or problems will be noted in the field logbook, and deficient items will be returned for immediate replacement.

Analytical laboratories are required to provide certified clean containers for all analyses. These containers must meet EPA standards described in "Specifications and Guidance for Obtaining Contaminant-Free Sampling Containers" (EPA 1992).

2.9 NONDIRECT MEASUREMENTS

No data for project implementation or decision-making will be obtained from nondirect measurement sources.

2.10 DATA MANAGEMENT

Field and analytical data collected from this project and other environmental investigations at NAVWPNSTA Seal Beach Det Fallbrook are critical to site characterization efforts, development of the comprehensive CSM, risk assessments, and selection of remedial actions to protect human health and the environment. An information management system is necessary to ensure efficient access so that decisions based on the data can be made in a timely manner.

After the field and laboratory data reports are reviewed and validated, the data will be entered into ChaduxTt's database for NAVWPNSTA Seal Beach Det Fallbrook. The database contains data for (1) summarizing observations on contamination and geologic conditions, (2) preparing reports and graphics, (3) using with geographic information systems, and (4) transmitting in an electronic format compatible with NEDD and NIRIS. ChaduxTt's data tracking procedures, data pathways, and overall data management strategy for NAVWPNSTA Seal Beach Det Fallbrook are described in the following paragraphs.

2.10.1 Data Tracking Procedures

All data that are generated in support of the Navy program at NAVWPNSTA Seal Beach Det Fallbrook are tracked through a database created by ChaduxTt. Information related to receipt and delivery of samples, project order fulfillment, and invoicing for laboratory and validation tasks is stored in the ChaduxTt program, SAMTRAK. All data are filed according to the document control number.

2.10.2 Data Pathways

Data are generated from three primary pathways at NAVWPNSTA Seal Beach Det Fallbrook: data derived from field activities, laboratory analytical data, and validated data. Data from all three pathways must be entered into the NAVWPNSTA Seal Beach Det Fallbrook database. Data pathways must be established and well documented to evaluate whether the data have been accurately loaded into the database in a timely manner.

Data generated during field activities are recorded using field forms (Appendix B). The analytical coordinator or field team leader reviews these forms for completeness and accuracy. Data from the field forms, including the chain-of-custody form, are entered into SAMTRAK according to the document control number.

Data generated during laboratory analysis are recorded in hard copy and in EDDs after the samples have been analyzed. The laboratory will send the hard copy and EDD records to the analytical coordinator. The analytical coordinator reviews the data deliverable for completeness, accuracy, and format. After the format has been approved, the electronic data are manipulated and downloaded into the NAVWPNSTA Seal Beach Det Fallbrook database. ChaduxTt data entry personnel will then update SAMTRAK with the total number of samples received and number of days required to receive the data. An EDD of the laboratory data will be provided to the Navy in NEDD format for upload to NIRIS.

After validation, the analytical coordinator reviews the data for accuracy. ChaduxTt will then update the NAVWPNSTA Seal Beach Det Fallbrook database with the appropriate data qualifiers. SAMTRAK is also updated to record associated laboratory and data validation costs.

2.10.3 Data Management Strategy

Following the updated Navy Environmental Work Instruction #6, data will be transmitted to NIRIS within 30 days after the final validation report has been received.

The data will be loaded into the database at ChaduxTt for storage, further manipulation, and retrieval after laboratory and field reports are reviewed and validated to satisfy long-term data management goals. The database will be used to provide data for chemical and geologic analysis and for preparing reports and graphic representations of the data. Additional data acquired from field activities are recorded on field forms (Appendix B) that the analytical coordinator or field

team leader reviews for completeness and accuracy (Table 10). Hard copies of forms, data, and chain-of-custody forms are filed in a secure storage area according to project and document control numbers. Laboratory data packages and reports will be archived at ChaduxTt or Navy offices. Laboratories that generated the data will archive hard-copy data for a minimum of 10 years (Table 11). Hard copy analytical data will also be stored at the NAVFAC Southwest Administrative Record.

3.0 ASSESSMENT AND OVERSIGHT

This section describes the field and laboratory assessments that may be conducted during this project, the individuals responsible for conducting the assessments, the corrective actions that may be implemented in response to assessment results, and how quality-related issues will be reported to ChaduxTt and Navy management.

3.1 ASSESSMENT AND RESPONSE ACTIONS

ChaduxTt and the Navy will oversee collection of environmental data using the assessment and audit activities described below. Any problems encountered during an assessment of field investigation or laboratory activities will require corrective action to ensure that the problems are resolved. This section describes the types of assessments that may be completed, ChaduxTt and Navy responsibilities for conducting the assessments, and corrective action procedures to address problems identified during an assessment.

3.1.1 Field Assessments

ChaduxTt conducts field technical systems audits (TSA) on selected Navy projects to support data quality and encourage continuous improvement in the field systems that involve environmental data collection. The ChaduxTt QA program manager selects projects for field TSAs quarterly based on available resources and the significance of the field sampling effort. The assessor will use personnel interviews, direct observations, and reviews of project-specific documentation during the field TSA to evaluate and document whether procedures specified in the approved SAP (or addendum) are being implemented. The following are specific items that may be observed during the TSA:

- Availability of approved project plans such as the SAP and health and safety plan
- Documentation of personnel qualifications and training
- Sample collection, identification, preservation, handling, and shipping procedures
- Sampling equipment decontamination

- Equipment calibration and maintenance
- Completeness of logbooks and other field records (including nonconformance documentation)

During the TSA, the ChaduxTt assessor will verbally communicate any significant deficiencies to the field team leader for immediate correction. These and all other observations and comments will also be documented in a TSA report. The TSA report will be issued to the ChaduxTt project manager, field team leader, program QA manager, and project QA officer in electronic (e-mail) format within 7 days after the TSA is completed.

The ChaduxTt program QA manager determines the timing and duration of TSAs. Generally, TSAs are conducted early in the project so that any quality issues can be resolved before large amounts of data are collected.

The Navy QA officer may also independently conduct a field assessment of any ChaduxTt project. Items reviewed by the Navy QA officer during a field assessment may be similar to those described above.

3.1.2 Laboratory Assessments

As described in Section 2.4.1, NFESC assesses all laboratories before they are allowed to analyze samples under Navy contracts. In addition to Navy approval, the selected laboratory must also be certified by the State of California. ChaduxTt also conducts a pre-award assessment of each laboratory before they are placed on the approved list for performing work under Navy contracts (Appendix D). These assessments include (1) reviews of laboratory certifications, (2) initial and annual demonstrations of the laboratory's ability to satisfactorily analyze single-blind performance evaluation samples, and (3) laboratory audits. Laboratory audits may consist of an on-site review of laboratory facilities, personnel, documentation, and procedures, or an off-site evaluation of the ability of the laboratory's data management system to meet contract requirements. ChaduxTt also conducts an assessment when an approved laboratory has been selected for nonroutine analyses or when a laboratory that is not on the approved list must be used. ChaduxTt will not conduct a laboratory assessment for this project because the analytical suite for this project is routine.

The Navy may audit any laboratory that will analyze samples on this project. The Navy QA officer will determine the need for these audits and typically will conduct the audits before samples are submitted to the laboratory for analysis.

3.1.3 Assessment Responsibilities

ChaduxTt personnel who conduct assessments will be independent of the activity evaluated. The ChaduxTt program QA manager will select the appropriate personnel to conduct each assessment and will assign them responsibilities and deadlines for completing the assessment. These

personnel may include the program QA manager, project QA officer, or senior technical staff with relevant expertise and experience in assessment.

When an assessment is planned, the ChaduxTt program QA manager selects a lead assessor who is responsible for the following tasks:

- Selecting and preparing the assessment team
- Preparing an assessment plan
- Coordinating and scheduling the assessment with the project team, subcontractor, or other organization being evaluated
- Participating in the assessment
- Coordinating preparation and issuance of assessment reports and corrective action request forms
- Evaluating responses and resulting corrective actions

After a TSA is completed, the lead assessor will submit an audit report to the ChaduxTt program QA manager, project manager, and project QA officer; other personnel may be included in the distribution as appropriate.

The Navy QA officer is responsible for coordinating all audits that may be conducted by Navy personnel under this project. Audit preparation, completion, and reporting responsibilities for Navy auditors would be similar to those described above.

3.1.4 Field Corrective Action Procedures

Field corrective action procedures will depend on the type and severity of the finding. ChaduxTt classifies assessment findings as either deficiencies or observations. Deficiencies are findings that may have a significant impact on data quality and that will require corrective action. Observations are findings that do not directly affect data quality, but are suggestions for consideration and review.

As described in Section 3.1.1, project teams are required to respond to deficiencies identified in TSA reports. The project manager, field team leader, and project QA officer will discuss the deficiencies and the appropriate steps to resolve each deficiency through the following steps:

- Determining when and how the problem developed
- Assigning responsibility for problem investigation and documentation

- Selecting the corrective action to eliminate the problem
- Developing a schedule for completing the corrective action
- Assigning responsibility for implementing the corrective action
- Documenting and verifying that the corrective action has eliminated the problem
- Notifying the Navy of the problem and the corrective action taken

In responding to the TSA report, the project team will include a brief description of each deficiency, the proposed corrective action, the individual responsible for identifying and implementing the corrective action, and the completion dates for each corrective action. The project QA officer will use a status report to monitor all corrective actions.

The ChaduxTt program QA manager is responsible for reviewing proposed corrective actions and verifying that they have been effectively implemented. The program QA manager can require data acquisition to be limited or discontinued until the corrective action is complete and a deficiency is eliminated. The program QA manager can also request the reanalysis of any or all samples and a review of all data acquired since the system was last in control.

3.1.5 Laboratory Corrective Action Procedures

The ChaduxTt analytical coordinator will review the data. Any questions that arise will be communicated to the Navy and, as directed, will be addressed in consultation with the laboratory. Internal laboratory procedures for corrective action and descriptions of out-of-control situations that require corrective action are contained in laboratory QA plans. At a minimum, corrective action will be implemented when any of the following three conditions occurs: control limits are exceeded, method QC requirements are not met, or sample holding times are exceeded. The laboratory will report out-of-control situations to the ChaduxTt analytical coordinator within 2 working days after they are identified. In addition, the laboratory project manager will prepare and submit a corrective action report to the ChaduxTt analytical coordinator. This report will identify the out-of-control situation and the steps that the laboratory has taken to rectify it.

3.2 REPORTS TO MANAGEMENT

Effective management of environmental data collection requires (1) timely assessment and review of all activities, and (2) open communication, interaction, and feedback among all project participants. ChaduxTt will use the reports described below to address any project-specific quality issues and to facilitate timely communication of these issues.

3.2.1 Daily Progress Reports

ChaduxTt will prepare a daily progress report to summarize activities throughout the field investigation. This report will describe sampling and field measurements, the equipment used, ChaduxTt and subcontractor personnel on site, QA/QC and health and safety, problems encountered, corrective actions taken, deviations from the SAP, and explanations for the deviations. The daily progress report is prepared by the field team leader and submitted to the project manager and to the Navy Remedial Project Manager (RPM), if requested. The content of the daily reports will be summarized and included in the final report submitted for the field investigation.

3.2.2 Project Monthly Status Report

The ChaduxTt project manager will prepare a monthly status report (MSR) to be submitted to the ChaduxTt program manager and the Navy RPM. MSRs address project-specific quality issues and facilitate their timely communication. The MSR will include the following quality-related information:

- Project status
- Instrument, equipment, or procedural problems that affect quality and recommended solutions
- Objectives from the previous report that were achieved
- Objectives from the previous report that were not achieved
- Work planned for the next month

If appropriate, ChaduxTt will obtain similar information from subcontractors who are participating in the project and will incorporate the information into the MSR.

4.0 DATA VALIDATION AND USABILITY

This section describes the procedures that are planned to review, verify, and validate field and laboratory data. This section also discusses procedures for verifying that the data are sufficient to meet DQOs and MQOs for the project.

4.1 DATA REVIEW, VERIFICATION, AND VALIDATION

Validation and verification of the data generated during field and laboratory activities are essential to obtaining defensible data of acceptable quality. Verification and validation methods for field and laboratory activities are presented below.

4.1.1 Field Data Verification

Project personnel will verify field data through reviews of data sets to identify inconsistencies or anomalous values. Any inconsistencies discovered will be resolved as soon as possible by seeking clarification from field personnel responsible for data collection. All field personnel will be responsible for following the sampling and documentation procedures described in this SAP so that defensible and justifiable data are obtained.

Data values that are significantly different from the population are called "outliers." A systematic effort will be made to identify any outliers or errors before field personnel report the data. Outliers can result from improper sampling or measurement methodology, data transcription errors, calculation errors, or natural causes. Outliers that result from errors found during data verification will be identified and corrected; outliers that cannot be attributed to errors in sampling, measurement, transcription, or calculation will be clearly identified in project reports.

4.1.2 Laboratory Data Verification

Laboratory personnel will verify analytical data at the time of analysis and reporting and through subsequent reviews of the raw data for any nonconformances to the requirements of the analytical method. Laboratory personnel will make a systematic effort to identify any outliers or errors before they report the data. Outliers that result from errors found during data verification will be identified and corrected; outliers that cannot be attributed to errors in analysis, transcription, or calculation will be clearly identified in the case narrative section of the analytical data package.

4.1.3 Laboratory Data Validation

An independent third-party contractor will validate all laboratory data in accordance with current EPA national functional guidelines (EPA 2004a, 1999b). The data validation strategy will be consistent with Navy guidelines. Ninety percent of the data for contaminants of concern will undergo cursory validation and 10 percent of the data for contaminants of concern will undergo full validation for this project. Requirements for cursory and full validation are listed below.

4.1.3.1 Cursory Data Validation

Cursory validation (Level 3) will be completed on 90 percent of the summary data packages for analysis of contaminants of concern. (The remaining 10 percent of the packages will be subjected to full validation.) The data reviewer is required to notify ChaduxTt and request any missing information needed from the laboratory. Elimination of the data from the review process is not allowed. All data will be qualified as necessary in accordance with established criteria. Data summary packages will consist of sample results and QC summaries, including calibration and internal standard data.

4.1.3.2 Full Data Validation

Full validation (Level 4) will be completed on 10 percent of the full data packages for analysis of contaminants of concern. The data reviewer is required to notify ChaduxTt and request any missing information needed from the laboratory. Elimination of data from the review process is not allowed. All data will continue through the validation process and will be qualified in accordance with established criteria. Data summary packages will consist of sample results, QC summaries, and all raw data associated with the sample results and QC summaries.

4.1.3.3 Data Validation Criteria

Tables 12 and 13 list the QC processes and criteria that will be reviewed for both cursory and full data validation. The data validation criteria selected from these tables will be consistent with the project-specific analytical methods referenced in Section 2.4 of the SAP.

4.2 RECONCILIATION WITH USER REQUIREMENTS

After environmental data have been reviewed, verified, and validated in accordance with the procedures described in Section 4.1, the data must be further evaluated to determine whether DQOs have been met.

To the extent possible, ChaduxTt will follow EPA's data quality assessment (DQA) process to verify that the type, quality, and quantity of data collected are appropriate for their intended use. DQA methods and procedures are outlined in EPA's "Guidance for Data Quality Assessment, Practical Methods for Data Analysis" (EPA 2000c). The DQA process includes five steps: (1) review the DQOs and sampling design; (2) conduct a preliminary data review; (3) select a statistical test; (4) verify the assumptions of the statistical test; and (5) draw conclusions from the data.

ChaduxTt will systematically assess data quality and data usability when the five-step DQA process is not completely followed because the DQOs are qualitative. This assessment will include the following:

- A review of the sampling design and sampling methods to verify that these were implemented as planned and are adequate to support project objectives
- A review of project-specific data quality indicators for PARCC and quantitation limits (defined in Section 1.3.2) to evaluate whether acceptance criteria have been met
- A review of project-specific DQOs to determine whether they have been achieved by the data collected

- An evaluation of any limitations associated with the decisions to be made based on the data collected. For example, if data completeness is only 90 percent compared with a project-specific completeness objective of 95 percent, the data may still be usable to support a decision, but at a lower level of confidence.

The final report for the project will discuss any potential impacts of these reviews on data usability and will clearly define any limitations associated with the data.

5.0 REFERENCES

Efroymson, R.A., M.E, Will, and G.W. Suter II. 1997. "Toxicological Benchmarks for Contaminants of Potential Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Processes: 1997 Revision." Oak Ridge National Laboratory, Oak Ridge, Tennessee. ES/ER/TM-126/R2

Jacobs Engineering Group, Inc. 1997. Draft Final Remedial Investigation/Feasibility Study, Remedial Investigation for Group D Sites, Marine Corps Base, Camp Pendleton, California. CLE-I01-01F301-B7-0043, CTO 0301, Revision 0. July 16.

Jenkins, T.F., J.C. Pennington, T.A. Ranney, T.E. Berry Jr., P.H. Miyares, M.E. Walsh, A.D. Hewitt, N.M. Perron, L.V. Parker, C.A. Hayes, and E.G. Wahlgren. 2001. Characterization of Explosives Contamination at Military Firing Ranges. U.S. Army Corps of Engineers, Engineer Research and Development Center. ERDC TR-01-5. July.

Naval Energy and Environmental Support Activity (NEESA). 1985. Initial Assessment Study of Naval Weapons Station Seal Beach, California. NEESA 13-062. February.

NEESA. 1990. Addendum to the Preliminary Assessment (Initial Assessment Study) of Naval Weapons Station Seal Beach, California. NEESA 13-062A. August.

Naval Facilities Engineering Service Center (NFESC). 1999. *Installation Restoration Chemical Data Quality Manual*.

Malcolm Pirnie, Inc. 2006. Preliminary Assessment for the Munitions Response Program, Naval Weapons Station Seal Beach Detachment Fallbrook, California. June.

Marrs Services, Inc. 2007. Draft Site Inspection Report, Installation Restoration Program Site 27, Seal Beach Naval Weapons Station Detachment Fallbrook, Fallbrook, California. November.

Talmage, S.S., D.M. Opresko, C.J. Maxwell, J.E. Welsh, M. Cretella, P.H. Reno, and F.B. Daniel. 1999. Nitroaromatic munition compounds: Environmental effects and screening values. Reviews in Environmental Contamination and Toxicology. 161: 1-156

Tetra Tech EM Inc. (Tetra Tech). 2002. "Tetra Tech EM Inc. Laboratory Analytical Statement of Work." January.

U.S. Environmental Protection Agency (EPA). 1992. "Specifications and Guidance for Obtaining Contaminant-Free Sampling Containers." Office of Solid Waste and Emergency Response (OSWER) Directive No. 9240.0-05A. April.

EPA. 1996. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846), Update III." OSWER. Washington, DC. December.

EPA. 1999a. "U.S. EPA Contract Laboratory Program Statement of Work for Organics Analysis, Multi-Media, Multi-Concentration." Document Number OLM04.2. May.

EPA. 1999b. "National Functional Guidelines for Organic Data Review." Office of Emergency and Remedial Response. Washington, DC. EPA-540/R-99-008. October.

EPA. 1999c. Data Quality Objectives Process for Hazardous Waste Site Investigations. EPA QA/G-47 HW. Peer Review Draft.

EPA. 2000a. "U.S. EPA Contract Laboratory Program Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration." Document Number ILM04.1. January.

EPA. 2000b. "Data Quality Objectives Process for Hazardous Waste Site Investigations (EPA QA/ G-4HW)." Office of Environmental Information. Washington, D.C. EPA/600/R-00/007. January.

EPA. 2000c. "Guidance for Data Quality Assessment, Practical Methods for Data Analysis, EPA QA/ G-9, QA00 Update." Office of Environmental Information. Washington, D.C. EPA/600/ R-96-084. July.

EPA. 2000d. "Guidance for the Data Quality Objectives Process, EPA QA/G-4." Office of Environmental Information. Washington, DC. EPA/600/R-96/055. August.

EPA. 2001. "EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5." Office of Environmental Information. Washington, DC. EPA/240/B-01/003. March.

EPA. 2004a. "National Functional Guidelines for Inorganic Data Review." OSWER 9240.1-45. EPA-540-R-04-004. October.

EPA. 2004b "Region 9 Preliminary Remediation Goals." November 1. On-line address: http://www.epa.gov/region09/waste/sfund/prg/index.html

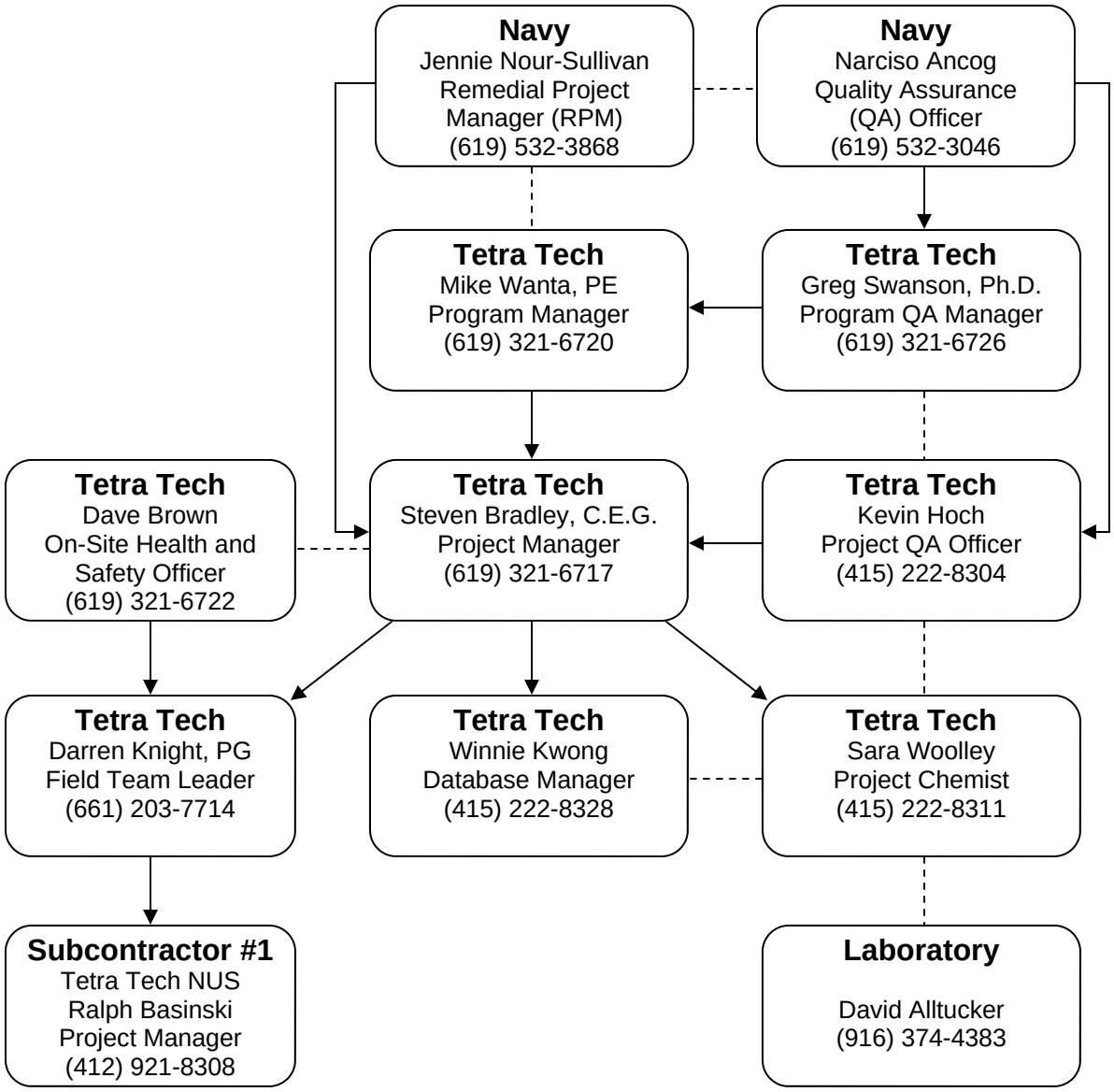
EPA. 2005. "Uniform Federal Policy for Implementing Environmental Quality Systems. Evaluating, Assessing, and Documenting Environmental Data Collection/Use and Technology Programs." Intergovernmental Data Quality Task Force. EPA-505-F-03-001. March.

EPA. 2007. Interim Ecological Screening Levels. April. Available on-line at: http://www.epa.gov/ecotox/ecossl/

FIGURES

Figure 1

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



ChaduxTt JV
Consulting Engineers and Scientists

Lines of Authority →

Lines of Communication - - - - - - - - - -

Naval Weapons Seal Beach Detachment Fallbook

FIGURE 2

PROJECT TEAM ORGANIZATION CHART

Sampling and Analysis Plan

TABLES

TABLE 2: IMPLEMENTATION SCHEDULE FOR SAMPLING, ANALYSIS, AND REPORTING
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #16 – NAVFAC SW SAP

Milestone	Scheduled Delivery	Anticipated Date
Internal Draft SAP to Navy	105 calendar days after project kick-off meeting	April 30, 2008
Draft SAP to Agencies	30 calendar days after Navy comments are received	June 13, 2008
Final SAP and Response to Comments to Reg. Agencies	82 calendar days after state comments are received	September 2, 2008
Field investigation	Immediately following finalization of SAP	September 9, 2008
Internal Draft SI Report to Navy	100 calendar days after beginning of field investigation	December 31, 2008
Draft SI Report to Agencies	60 calendar days after Navy comments are received	March 4, 2009
Final SI Report and Response to Comments to Reg. Agencies	90 calendar days after submittal of draft report	June 2, 2009

Note:

SAP Sampling and Analysis Plan
SI Site Investigation

TABLE 3-A: DATA QUALITY OBJECTIVES FOR SITE 32

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #11 – NAVFAC SW SAP

STEP 1: State the Problem

- No analytical samples have been collected at the site to evaluate the potential impact of the caustic soda disposal
- Soil characterization data are required to determine whether contaminated soil is present at Site 32
- Potentially complete pathways between human and ecological receptors exist under both current and potential future land uses

STEP 2: Identify the Goals of the Study

(1) Are VOCs and SVOCs associated with the disposal practices at Site 32 present at concentrations that require further response actions or proceeding to an remedial investigation/feasibility study (RI/FS)?

(2) Are metals associated with the disposal practices at Site 32 present at concentrations which require further response actions or proceeding to an RI/FS?

STEP 3: Identify Information Inputs

- Information from historical documents
- Surface and subsurface soil analytical data for VOCs, SVOCs, and metals
- Project-required reporting limits that meet screening criteria
- Background concentrations for metals in soil (Jacobs Engineering Group, Inc. [Jacobs] 1997)
- EPA Region IX PRGs for soil
- Ecological comparison criteria for soil

STEP 4: Define the Boundaries of the Study

The horizontal boundary is the area that encompasses the vicinity of the former tank, drain pipe, seepage drum, and the probable drainage area down the hill.

The vertical boundary includes subsurface soils to a depth of 10 feet. Vertical expansion of the study area to deeper subsurface soils may be necessary if contamination is present in the deepest subsurface soils.

The temporal boundary is defined by the period of performance for this investigation.

STEP 5: Develop Analytic Approach

(1a) If concentrations of VOCs and SVOCs are below Region IX PRGs and ESSLs (Appendix C), then no further action is required for these chemicals.

(1b) If concentrations of VOCs or SVOCs are detected above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS.

(2a) If concentrations of metals are below Region IX PRGs and ESSLs (Appendix C), or background concentrations (Table C-5), then no further action is required for metals.

(2b) If concentrations of metals are above background and above Region IX PRGs and ESSLs (Appendix C) , then the SI report will recommend further response actions or proceeding to an RI/FS.

STEP 6: Specify Performance or Acceptance Criteria

- Both biased samples and random grid samples will be collected to provide complete coverage of the site and minimize decision errors. For the biased sampling, three soil borings will be drilled to a depth of 10 feet in the vicinity of the pipe outlet of the former caustic soda tank. Samples will be collected in each boring at 0-2, 4-6, and 8-10 feet bgs. The boring locations will be based on historical and visual information. For the random grid sampling, ten surface samples will be collected within selected cells from a grid, which will be positioned southeast of the former pipe outfall. The square grid will measure approximately 50 feet on each side.
- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits

STEP 7: Develop the Plan for Obtaining Data

- The position of the surface sampling grid and the three boring locations will be based on site observations and historical information
- Samples from the soil borings will be collected at 0-2, 4-6, and 8-10 feet bgs unless visual observations or PID readings indicate contamination at a different depth
- The analytical suite for soil is optimized based on historical information for the site

Notes:

bgs	Below ground surface
EPA	U.S. Environmental Protection Agency
ESSL	Ecological soil screening level
PID	Photoionization detector
PRG	Preliminary remediation goal
QA	Quality assurance
SI	Site Inspection
SVOC	Semivolatile organic compound
VOC	Volatile organic compounds

TABLE 3-B: DATA QUALITY OBJECTIVES FOR SITE 34B

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #11 – NAVFAC SW SAP

STEP 1: State the Problem

- The potential impact of the dunnage disposal requires evaluation
- No analytical samples have been collected at the site
- Potentially complete pathways between human and ecological receptors exist under both current and potential future land uses

STEP 2: Identify the Goals of the Study

(1) Are VOCs and SVOCs associated with the disposal practices at Site 34b present at concentrations that require further response actions or proceeding to an RI/FS?

(2) Are metals associated with the disposal practices at Site 34b present at concentrations that require further response actions or proceeding to an RI/FS?

STEP 3: Identify Information Inputs

- Information from historical documents
- Surface and subsurface soil analytical data for VOCs, SVOCs, and metals
- Project-required reporting limits that meet screening criteria
- Background concentrations for metals in soil (Jacobs 1997)
- EPA Region IX PRGs for soil
- Ecological comparison criteria for soil

STEP 4: Define the Boundaries of the Study

The horizontal boundary is the area that encompasses the ravines used for dunnage disposal. This area is in the north-central portion of the installation, east of Walleye Road and north of an unnamed unimproved road that forms the southern boundary for most of the site.

The vertical boundary includes soils to a depth of 6 feet. Vertical expansion of the study area to deeper subsurface soils may be necessary if contamination is present at 6 feet bgs.

The temporal boundary is defined by the period of performance for this investigation.

STEP 5: Develop the Analytic Approach

(1a) If concentrations of VOCs and SVOCs are below Region IX PRGs and ESSLs (Appendix C), then no further action is required for these chemicals

(1b) If concentrations of VOCs and SVOCs are detected above Region IX PRGs or ESSLs (Appendix C) , then the SI report will recommend further response actions or proceeding to an RI/FS

(2a) If concentrations of metals are below Region IX PRGs and ESSLs, or background concentrations, (Appendix C) then no further action is required for metals

(2b) If concentrations of metals are above background and above Region IX PRGs or ESSLs (Appendix C) , then the SI report will recommend further response actions or proceeding to an RI/FS

TABLE 3-B: DATA QUALITY OBJECTIVES FOR SITE 34b

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #11 – NAVFAC SW SAP

STEP 6: Specify Performance or Acceptance Criteria

- Both biased samples and random grid samples will be collected to provide complete coverage of the site and minimize decision errors. For the random grid sampling, a sampling grid will be established across the 9-acre site. For the biased samples, soil borings will be drilled at nine locations (about one per acre), with samples collected at 0-2 feet bgs and 4- 6 feet bgs for each. All soil borings will be located based on field observations, such as the presence of debris, disturbed or discolored soil, or stressed vegetation. The remaining surface sampling locations will be collected from 0-2 feet bgs and will be randomly selected from the grid.
- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits.

STEP 7: Develop the Plan for Obtaining Data

- The nine judgmental boring locations will be based on site observations
- The proposed subsurface sampling depth interval will be adjusted if visual observations or PID readings indicate contamination at a different depth
- The soil analytical suite is optimized based on historical information for the site

Notes:

bgs	Below ground surface
EPA	U.S. Environmental Protection Agency
ESSL	Ecological soil screening levels
FS	Feasibility Study
PID	Photoionization detector
PRG	Preliminary remediation goal
QA	Quality assurance
RI	Remedial Investigation
SI	Site Inspection
SVOC	Semivolatile organic compounds
VOC	Volatile organic compounds

TABLE 3-C: DATA QUALITY OBJECTIVES FOR SITE 34d

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #11 – NAVFAC SW SAP

STEP 1: State the Problem

- The potential impact of the dunnage disposal requires evaluation
- No analytical samples have been collected at the site
- Potentially complete pathways between human and ecological receptors exist under both current and potential future land uses

STEP 2: Identify the Goals of the Study

(1) Are VOCs and SVOCs associated with the disposal practices at Site 34d present at concentrations that require further response actions or proceeding to an RI/FS?

(2) Are metals associated with the disposal practices at Site 34d present at concentrations that require further response actions or proceeding to an RI/FS?

STEP 3: Identify Information Inputs

- Information from historical documents
- Surface and subsurface soil analytical data for VOCs, SVOCs, and metals
- Project-required reporting limits that meet screening criteria
- Background concentrations for metals in soil (Jacobs 1997)
- EPA Region IX PRGs for soil
- Ecological comparison criteria for soil

STEP 4: Define the Boundaries of the Study

The horizontal boundary is the area that potentially received dunnage, defined on the northern boundary of the site by Maverick Road, which is no longer used for vehicle traffic. Fallbrook Creek cuts through the northern portion of the site. A small abandoned building (Building 338) is present in the southwestern corner of the site. South of the site is Ammunition Road; coastal sage scrub extends west of the site and Fallbrook Creek, and coastal sage scrub extends east of the site.

The vertical boundary includes soils to a depth of 6 feet. Vertical expansion of the study area to deeper subsurface soils may be necessary if contamination is present at 6 feet bgs.

The temporal boundary is defined by the period of performance for this investigation.

STEP 5: Develop the Analytic Approach

(1a) If concentrations of VOCs and SVOCs are below Region IX PRGs and ESSLs (Appendix C) , then no further action is required for these chemicals

(1b) If concentrations of VOCs or SVOCs are detected above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS

(2a) If concentrations of metals are below Region IX PRGs and ESSLs, or background concentrations (Appendix C), then no further action is required for metals

(2b) If concentrations of metals are above background and above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS

TABLE 3-C: DATA QUALITY OBJECTIVES FOR SITE 34d

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #11 – NAVFAC SW SAP

STEP 6: Specify Performance or Acceptance Criteria

- Both biased samples and random grid samples will be collected to provide complete coverage of the site and minimize decision errors. For the random grid sampling, a sampling grid will be established across the 1.8-acre site. Ten samples will collected within randomly selected grid cells across the site. The grid will provide a sample density of approximately five samples per acre. For the biased sampling, seven soil borings will be drilled with samples collected at 0-2 feet bgs and 4-6 feet bgs. Two of the borings will be located adjacent to the creek that cuts across the northern portion of the site. Four borings will be located around the foundation of former Building 338, and the final boring will be located based on visual observation.
- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits.

STEP 7: Develop the Plan for Obtaining Data

- The judgmental boring locations will be based on site observations
- The proposed sample depth of 6 feet bgs will be adjusted if visual observations or PID readings indicate contamination at a different depth
- The soil analytical suite is optimized based on historical information for the site

Notes:

bgs	Below ground surface
EPA	U.S. Environmental Protection Agency
ESSL	Ecological soil screening levels
FS	Feasibility Study
PID	Photoionization detector
PRG	Preliminary remediation goal
QA	Quality assurance
RI	Remedial Investigation
SI	Site Inspection
SVOC	Semivolatile organic compounds
VOC	Volatile organic compounds

TABLE 3-D: DATA QUALITY OBJECTIVES FOR SITE 34e

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #11 – NAVFAC SW SAP

STEP 1: State the Problem

- The potential impact of the dunnage disposal requires evaluation
- No analytical samples have been collected at the site
- Potentially complete pathways between human and ecological receptors exist under both current and potential future land uses

STEP 2: Identify the Goals of the Study

(1) Are VOCs and SVOCs associated with the disposal practices at Site 34e present at concentrations that require further response actions or proceeding to an RI/FS?

(2) Are metals associated with the disposal practices at Site 34e present at concentrations that require further response actions or proceeding to an RI/FS?

STEP 3: Identify Information Inputs

- Information from historical documents
- Surface and subsurface soil analytical data for VOCs, SVOCs, and metals
- Project-required reporting limits that meet screening criteria
- Background concentrations for metals in soil (Jacobs 1997)
- EPA Region IX PRGs for soil
- Ecological comparison criteria for soil

STEP 4: Define the Boundaries of the Study

The horizontal boundaries include Harm Road, the road fill materials (embankment) that extends a maximum of approximately 70 feet on either side of the road, and the areas approximately 20 feet beyond the toe of the embankment.

The vertical boundary includes soils to a depth of 6 feet. Vertical expansion of the study area to deeper subsurface soils may be necessary if contamination is present at 6 feet bgs.

The temporal boundary is defined by the period of performance for this investigation.

STEP 5: Develop the Analytic Approach

(1a) If concentrations of VOCs and SVOCs are below Region IX PRGs and ESSLs (Appendix C), then no further action is required for these chemicals

(1b) If concentrations of VOCs or SVOCs are detected above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS

(2a) If concentrations of metals are below Region IX PRGs and ESSLs, or background concentrations (Appendix C), then no further action is required for metals

(2b) If concentrations of metals are above background and above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS

STEP 6: Specify Performance or Acceptance Criteria

- Three soil borings will be drilled at the toe of the embankment with samples collected at 0-2 feet bgs and 4-6 feet bgs. The borings will be located based on field observations, such as the presence of

debris, disturbed or discolored soil, or stressed vegetation. Two borings will be located at the corrugated metal pipe culvert inlet and outfall located on the upgradient and downgradient sides of the road. The culvert extends below Harm Road approximately 150 feet west of its intersection with Ammunition Road. Six additional surface samples will be collected on the slope of the embankment and chosen based on visual observation of debris.

- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits

STEP 7: Develop the Plan for Obtaining Data

- All the boring locations will be based on site observations
- The proposed sample depth of 6 feet bgs will be adjusted if visual observations or PID readings indicate contamination at a different depth
- The soil analytical suite is optimized based on historical information for the site

Notes:

bgs	Below ground surface
EPA	U.S. Environmental Protection Agency
ESSL	Ecological soil screening levels
FS	Feasibility Study
PID	Photoionization detector
PRG	Preliminary remediation goal
QA	Quality assurance
RI	Remedial Investigation
SI	Site Inspection
SVOC	Semivolatile organic compounds
VOC	Volatile organic compounds

TABLE 3-E: DATA QUALITY OBJECTIVES FOR SITE UXO1

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #11 – NAVFAC SW SAP

STEP 1: State the Problem

- Site observations indicate the presence of MEC; however, the extent and density of the MEC are not known. The MEC may present an explosive hazard.
- No analytical samples have been collected at the site to evaluate the presence of MC and other potential contaminants
- Potentially complete pathways between human and ecological receptors exist under both current and potential future land uses

STEP 2: Identify the Goals of the Study

(1) Are VOCs, SVOCs, explosives, perchlorate, strontium, or dioxins associated with past operations at Site UXO1 present at concentrations that require further response actions or proceeding to an RI/FS?

(2) Are metals associated with past operations, including depleted uranium, at Site UXO1 present at concentrations that require further response actions or proceeding to an RI/FS?

(3) Are MEC present at the site in quantities that require an immediate response?

STEP 3: Identify Information Inputs

- Information from historical documents
- Results from visual reconnaissance of the site
- Results from geophysical survey
- Project-required reporting limits that meet screening criteria
- Background concentrations for metals in soil (Jacobs 1997)
- EPA Region IX PRGs for soil
- Ecological comparison criteria for soil
- Soil analytical data for the subareas of the site as follows:
    - Trenches – explosives (including picric acid), metals, VOCs, SVOCs, perchlorate, strontium, dioxins
    - Burn Barrels – explosives, metals, depleted uranium, dioxin
    - Firing Point, Target Area, Area between Firing Point and Target Area, Drop Test Tower, Area between Drop Tower and Burn Barrels – explosives, depleted uranium, and metals
    - Building Debris – metals

STEP 4: Define the Boundaries of the Study

The horizontal boundary of the site is defined by unimproved roads to the north, east and southeast. The southwestern and western limits extend through areas of native vegetation. In this area, the boundary will be identified by aerial photo review and visual observation. Lateral expansion of portions of the study area may be necessary if MEC is present at the lateral extent of the initial sampling area.

The vertical boundary includes soils from ground surface to a depth of approximately 6 feet bgs.

The temporal boundary is defined by the period of performance for this investigation.

STEP 5: Develop the Analytic Approach

(1a) If concentrations of VOCs, SVOCs, explosives (Table C-3), perchlorate (Table C-6), strontium (Table C-5), depleted uranium (Table C-5), and dioxin (Table C-4) are below Region IX PRGs and ESSLs, then no further action is required for these chemicals

(1b) If concentrations of VOCs, SVOCs, explosives, perchlorate, strontium, depleted uranium, or dioxin are detected above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS

(2a) If concentrations of metals are below Region IX PRGs and ESSLs or background concentrations (Appendix C), then no further action is required for metals

(2b) If concentrations of metals are above background and above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS

(3a) If a visual survey of the site by a UXO technician indicates MEC does not pose an unacceptable risk (Section 3.1.1 of Work Plan), then proceed with caution

(3b) If a visual survey of the site by a UXO technician indicates MEC poses an unacceptable risk (Section 3.1.1 of Work Plan), then stop work and contact the site safety coordinator

STEP 6: Specify Performance or Acceptance Criteria

- Both biased samples and random grid samples will be collected to provide complete coverage of the site and minimize decision errors. Grid samples will be collected between the firing line and target area and between the drop test tower and the burn barrels. Judgmental samples will be collected at the other subareas based on anomalies identified by geophysical screening or visual observations, such as the presence of ordnance fragments, miscellaneous debris, disturbed or discolored soil, or stressed vegetation.
- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits.

STEP 7: Develop the Plan for Obtaining Data

- Sampling of the various subareas will be conducted using a combination of random grid and judgmental sampling techniques. Judgmental sample locations will be based on site observations.
- The surface samples at each grid location will be a composite of four subsamples
- The soil analytical suite is optimized based on historical information for the site

Notes:

bgs	Below ground surface
EPA	U.S. Environmental Protection Agency
ESSL	Ecological soil screening levels
FS	Feasibility Study
MC	Munitions constituents
MEC	Munitions ane explosives of concern
PRG	Preliminary remediation goal
QA	Quality assurance
RI	Remedial Investigation
SI	Site Inspection
SVOC	Semivolatile organic compounds
VOC	Volatile organic compounds
UXO	Unexploded ordnance

TABLE 3-F: DATA QUALITY OBJECTIVES FOR SITE UXO2

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #11 – NAVFAC SW SAP

STEP 1: State the Problem

- Site observations indicate the presence of small arms caliber bullets and possible presence of lead shot and PAH's from skeet range activities; however, the extent and density of the ammunition are not known
- No analytical samples have been collected at the site
- Potentially complete pathways between human and ecological receptors exist under both current and future land uses

STEP 2: Identify the Goals of the Study

- Have past activities at the Small Arms Range and the Skeet/Trap Range resulted in lead or explosives concentrations in soil that require further response actions or proceeding to an RI/FS?
- Are PAHs in soil in the vicinity of the Skeet/Trap Range pigeon landing zone at concentrations that would require the Navy to conduct additional investigation or remedial action?

STEP 3: Identify Information Inputs

- Information from historical documents
- Results from visual reconnaissance of the site
- Project-required reporting limits that meet screening criteria
- Background concentrations for lead in soil (Jacobs 1997)
- EPA Region IX PRGs for soil
- Ecological comparison criteria for soil
- XRF sample data for lead
- Laboratory analysis of a subset of the XRF samples to establish a correlation between XRF and laboratory results
- Analytical data for PAHs

STEP 4: Define the Boundaries of the Study

The horizontal boundaries are the SDZ's of the Small Arms Range sub area and the Skeet/Trap Range subarea.

The vertical boundary includes soils from ground or berm surface to a depth of approximately 2 feet bgs.

The temporal boundary is defined by the period of performance for this investigation.

STEP 5: Develop the Analytic Approach

(1a) If concentrations of lead are below Region IX PRGs and ESSLs or background concentrations (Appendix C), then no further action is required for lead

(1b) If concentrations of lead are detected above background and above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS

(2a) If concentrations of PAHs are below Region IX PRGs and ESSLs (Appendix C), then no further action is required for these compounds

(2b) If concentrations of PAHs are above Region IX PRGs or ESSLs (Appendix C), then the SI report

will recommend further response actions or proceeding to an RI/FS

STEP 6: Specify Performance or Acceptance Criteria

- Both biased samples and random grid samples will be collected to provide complete coverage of the site and minimize decision errors. For the random grid sampling, a sampling grid will be established between the small arms firing line and the target berm. This area measures about 50 by 100 feet. Four biased samples will be collected at the small arms range firing line, and 24 biased samples will be collected in the vicinity of the small arms target berm. A separate sampling grid will be established at the skeet/trap range that encompasses approximately 30 acres. Four biased samples will be collected at the skeet/trap firing line and 29 grid samples will be collected from the range fan. Five of the samples from the range fan, that are located a distance of 75 to 125 feet from the firing line in the clay pigeon landing zone, will be also analyzed for PAH's.
- Twenty percent of the XRF samples will be sent to an analytical laboratory to establish a correlation between XRF and laboratory results. The samples selected for laboratory analysis will be representative of the range of XRF values and not just the highest concentrations. The samples selected for laboratory analysis will be representative of the range of XRF values and not just the highest concentrations.
- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits.

STEP 7: Develop the Plan for Obtaining Data

- Judgmental sample locations will be based on site observations.
- The soil analytical suite is optimized based on historical information for the site

Notes:

bgs	Below ground surface
EPA	U.S. Environmental Protection Agency
ESSL	Ecological soil screening levels
FS	Feasibility Study
PAH	Polynuclear aromatic hydrocarbons
PRG	Preliminary remediation goal
QA	Quality assurance
RI	Remedial Investigation
SI	Site Inspection
SVOC	Semivolatile organic compounds
VOC	Volatile organic compounds
XRF	X-ray fluorescence

TABLE 3-G: DATA QUALITY OBJECTIVES FOR SITE UXO3

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #11 – NAVFAC SW SAP

STEP 1: State the Problem

- Site observations indicate the presence of MEC; however, the extent and density of the MEC are not known
- No analytical samples have been collected at the site to evaluate the presence of MC and metals at concentrations above background levels
- Potentially complete pathways between human and ecological receptors exist under both current and future land uses

STEP 2: Identify the Goals of the Study

(1) Are explosives, perchlorate, and strontium associated with the disposal of ordnance and dunnage at Site UXO3 present at concentrations that require further response actions or proceeding to an RI/FS?

(2) Are metals associated with the disposal of ordnance and dunnage at Site UXO3 present at concentrations that require further response actions or proceeding to an RI/FS?

(3) Are MEC present at the site in quantities that require an immediate response?

STEP 3: Identify Information Inputs

- Information from historical documents
- Results from visual reconnaissance of the site
- Project-required reporting limits that meet screening criteria
- Background concentrations for metals in soil (Jacobs 1997)
- EPA Region IX PRGs for soil
- Ecological comparison criteria for soil
- Soil analytical data for explosives, metals, perchlorate, and strontium in the area where munitions were previously observed; analytical data for explosives and metals in surface soil in the remaining portion of the site

STEP 4: Define the Boundaries of the Study

The horizontal boundary is the region that encompasses the intermittent steam beds and extending about 10 meters on each side. Lateral expansion of the study area may be necessary if MC is present at the lateral extent of the initial sampling pattern.

The vertical boundary includes soils from ground surface to a depth of approximately 6 feet.

The temporal boundary is defined by the period of performance for this investigation.

STEP 5: Develop the Analytic Approach

(1a) If concentrations of explosives, perchlorate, and strontium are below Region IX PRGs and ESSLs (Appendix C), then no further action is required for these chemicals

(1b) If concentrations of explosives, perchlorate, or strontium are detected above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS

(2a) If concentrations of metals are below Region IX PRGs and ESSLs or background concentrations (Appendix C), then no further action is required for metals

(2b) If concentrations of metals are above background and above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS

(3a) If a visual and magnetic gradiometer survey of the site by a UXO technician indicates MEC does not pose an unacceptable risk (Section 3.1.1 of Work Plan), then proceed with caution

(3b) If a visual and magnetic gradiometer survey of the site by a UXO technician indicates MEC poses an unacceptable risk (Section 3.1.1 of Work Plan), then stop work and contact the site safety coordinator

STEP 6: Specify Performance or Acceptance Criteria

- Both biased samples and random grid samples will be collected to provide complete coverage of the site and minimize decision errors. For the random grid sampling, a sampling grid will be established across the site. Four grid samples will be collected in the southern (downstream) portion of the site and two grid samples will be collected at the northern portion. These six samples will be collected from near the bottom of the drainage.
- Eighteen biased samples will be collected based on the observation anomalies identified by geophysical screening or visual observations, such as the presence of ordnance fragments, miscellaneous debris, disturbed or discolored soil, or stressed vegetation.
- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits.

STEP 7: Develop the Plan for Obtaining Data

- The 18 judgmental sample locations will be based on site observations.
- The soil analytical suite is optimized based on historical information for the site.

Notes:

bgs	Below ground surface
EPA	U.S. Environmental Protection Agency
ESSL	Ecological soil screening levels
FS	Feasibility Study
MC	Munitions constituents
MEC	Munitions ane explosives of concern
PRG	Preliminary remediation goal
QA	Quality assurance
RI	Remedial Investigation
SI	Site Inspection
SVOC	Semivolatile organic compounds
VOC	Volatile organic compounds
UXO	Unexploded ordnance

TABLE 3-H: DATA QUALITY OBJECTIVES FOR SITE UXO4

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #11 – NAVFAC SW SAP

STEP 1: State the Problem

- Site observations indicate the presence of MEC; however, the extent and density of the MEC are not known
- No analytical samples have been collected at the site to evaluate the presence of MC and metals at concentrations above background levels
- Potentially complete pathways between human and ecological receptors exist under both current and future land uses

STEP 2: Identify the Goals of the Study

(1) Are explosives associated with the disposal of ordnance and dunnage at Site UXO4 present at concentrations that require further response actions or proceeding to an RI/FS?

(2) Are metals associated with the disposal of ordnance and dunnage at Site UXO4 present at concentrations that require further response actions or proceeding to an RI/FS?

(3) Are MEC present at the site in quantities that require an immediate response?

STEP 3: Identify Information Inputs

- Information from historical documents
- Results from visual reconnaissance of the site
- Results from geophysical survey
- Project-required reporting limits that meet screening criteria
- Background concentrations for metals in soil (Jacobs 1997)
- EPA Region IX PRGs for soil
- Ecological comparison criteria for soil
- Surface soil analytical data for explosives and metals

STEP 4: Define the Boundaries of the Study

The horizontal boundary is the wedge-shaped region that extends approximately 100 meters southwest from the intersection of Terrier and Sidewinder Roads.

The vertical boundary includes soils from ground surface to a depth of approximately 6 feet bgs.

The temporal boundary is defined by the period of performance for this investigation.

STEP 5: Develop the Analytic Approach

(1a) If concentrations of explosives are below Region IX PRGs and ESSLs (Appendix C), then no further action is required for these chemicals

(1b) If concentrations of explosives are detected above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS

(2a) If concentrations of metals are below Region IX PRGs and ESSLs or background concentrations (Appendix C), then no further action is required for metals

(2b) If concentrations of metals are above background and above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS

TABLE 3-H: DATA QUALITY OBJECTIVES FOR SITE UXO4

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #11 – NAVFAC SW SAP

(3a) If a visual survey of the site by a UXO technician indicates MEC does not pose an unacceptable risk (Section 3.1.1 of Work Plan), then proceed with caution

(3b) If a visual survey of the site by a UXO technician indicates MEC poses an unacceptable risk (Section 3.1.1 of Work Plan), then stop work and contact the site safety coordinator

STEP 6: Specify Performance or Acceptance Criteria

- Both biased samples and random grid samples will be collected to provide complete coverage of the site and minimize decision errors. For the random grid sampling, four samples will be collected from a grid established on the site. Twelve judgmental samples will be collected at the site. The sample locations will be based on anomalies identified by geophysical screening or visual observations, such as the presence of ordnance fragments, miscellaneous debris, disturbed or discolored soil, or stressed vegetation.
- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits.

STEP 7: Develop the Plan for Obtaining Data

- The twelve judgmental sample locations will be based on site observations.
- The analytical suite for soil is optimized based on historical information for the site

Notes:

bgs	Below ground surface
EPA	U.S. Environmental Protection Agency
ESSL	Ecological soil screening levels
FS	Feasibility Study
MC	Munitions constituents
MEC	Munitions ane explosives of concern
PRG	Preliminary remediation goal
QA	Quality assurance
RI	Remedial Investigation
SI	Site Inspection
SVOC	Semivolatile organic compounds
VOC	Volatile organic compounds
UXO	Unexploded ordnance

TABLE 3-I: DATA QUALITY OBJECTIVES FOR SITE UXO6

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #11 – NAVFAC SW SAP

STEP 1: State the Problem

- Historical records indicate that munitions were dumped into the lake. However, the extent and density of the discarded munitions are not known.
- No analytical samples have been collected at the site to evaluate the presence of MC and perchlorate or metals at concentrations above background levels
- Potentially complete pathways between human and ecological receptors exist under both current and future land uses

STEP 2: Identify the Goals of the Study

(1) Are explosives and/or perchlorate associated with the disposal of munitions at Site UXO6 present at concentrations that require further response actions or proceeding to an RI/FS?

(2) Are metals associated with the disposal of munitions at Site UXO6 present at concentrations that require further response actions or proceeding to an RI/FS?

(3) Are MEC present at the site in quantities that require an immediate response?

STEP 3: Identify Information Inputs

- Information from historical documents
- Results from visual reconnaissance of the site
- Results from geophysical survey
- Project-required reporting limits that meet screening criteria
- Background concentrations for metals in soil (Jacobs 1997)
- EPA Region IX PRGs for soil and water
- Ecological comparison criteria for soil and water
- Surface soil analytical data for explosives, perchlorate, and metals
- Lake water and pore water analytical data for explosives and metals

STEP 4: Define the Boundaries of the Study

The horizontal boundaries are within the historical or maximum high water level of the lake as shown on Figure 10 of Attachment A.

The vertical boundary includes soils from ground or sediment surface to a depth of approximately 18 inches bgs and the lake water surface.

The temporal boundary is defined by the period of performance for this investigation.

STEP 5: Develop the Analytic Approach

(1a) If concentrations of explosives and perchlorate are below Region IX PRGs and ESSLs in soil and water (Appendix C), then no further action is required for these chemicals

(1b) If concentrations of explosives or perchlorate are detected above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS

(2a) If concentrations of metals are below Region IX PRGs and ESSLs or background concentrations

(Appendix C), then no further action is required for metals

(2b) If concentrations of metals are above background and above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS

(3a) If a visual survey of the site by a UXO technician indicates MEC does not pose an unacceptable risk (Section 3.1.1 of Work Plan), then proceed with caution

(3b) If a visual survey of the site by a UXO technician indicates MEC poses an unacceptable risk (Section 3.1.1 of Work Plan), then stop work and contact the site safety coordinator

STEP 6: Specify Performance or Acceptance Criteria

- Both biased samples and random grid samples will be collected to provide complete coverage of the site and minimize decision errors. Ten biased samples will be collected from the lake bottom sediments and fifteen will be collected along the current shoreline adjacent to the access road. The sample locations will be based on anomalies identified by visual observations, such as the presence of ordnance fragments, miscellaneous debris, disturbed or discolored soil, or stressed vegetation.
- Fifteen samples will be collected from a grid established on the site between the existing shoreline and the high water levels.
- Five pore water samples will be collected from lake bottom sediments and 10 lake water samples will be collected.
- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits.

STEP 7: Develop the Plan for Obtaining Data

- The 25 judgmental soil sample locations will be based on site observations.
- The analytical suite for soil is optimized based on historical information for the site

Notes:

bgs	Below ground surface
EPA	U.S. Environmental Protection Agency
ESSL	Ecological soil screening levels
FS	Feasibility Study
MC	Munitions constituents
MEC	Munitions and explosives of concern
PRG	Preliminary remediation goal
QA	Quality assurance
RI	Remedial Investigation
SI	Site Inspection
SVOC	Semivolatile organic compounds
VOC	Volatile organic compounds

TABLE 3-J: DATA QUALITY OBJECTIVES FOR SITE UXO7

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #11 – NAVFAC SW SAP

STEP 1: State the Problem

- Historical records indicate that munitions were dumped into the lake. However, the extent and density of the discarded munitions are not known.
- No analytical samples have been collected at the site to evaluate the presence of MC and perchlorate or metals at concentrations above background levels
- Potentially complete pathways between human and ecological receptors exist under both current and future land uses

STEP 2: Identify the Goals of the Study

(1) Are explosives and/or perchlorate associated with the disposal of munitions at Site UXO7 present at concentrations that require further response actions or proceeding to an RI/FS?

(2) Are metals associated with the disposal of munitions at Site UXO7 present at concentrations that require further response actions or proceeding to an RI/FS?

(3) Are MEC present at the site in quantities that require an immediate response?

STEP 3: Identify Information Inputs

- Information from historical documents
- Results from visual reconnaissance of the site
- Results from geophysical survey
- Project-required reporting limits that meet screening criteria
- Background concentrations for metals in soil (Jacobs 1997)
- EPA Region IX PRGs for soil and water
- Ecological comparison criteria for soil and water
- Surface soil analytical data for explosives, perchlorate, and metals
- Lake water and pore water analytical data for explosives and metals

STEP 4: Define the Boundaries of the Study

The horizontal boundaries are the area between high and low water levels of the lake as shown on Figure 11 of Attachment A.

The vertical boundary includes soils and sediments from the surface to a depth of approximately 18 inches bgs or from the lake water surface to the sediment water interface.

The temporal boundary is defined by the period of performance for this investigation.

STEP 5: Develop the Analytic Approach

(1a) If concentrations of explosives and perchlorate are below Region IX PRGs and ESSLs in soil and water (Appendix C), then no further action is required for these chemicals

(1b) If concentrations of explosives or perchlorate are detected above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an

RI/FS

(2a) If concentrations of metals are below Region IX PRGs and ESSLs or background concentrations (Appendix C), then no further action is required for metals

(2b) If concentrations of metals are above background and above Region IX PRGs or ESSLs (Appendix C), then the SI report will recommend further response actions or proceeding to an RI/FS

(3a) If a visual survey of the site by a UXO technician indicates MEC does not pose an unacceptable risk (Section 3.1.1 of Work Plan), then proceed with caution

(3b) If a visual survey of the site by a UXO technician indicates MEC poses an unacceptable risk (Section 3.1.1 of Work Plan), then stop work and contact the site safety coordinator

STEP 6: Specify Performance or Acceptance Criteria

- Both biased samples and random grid samples will be collected to provide complete coverage of the site and minimize decision errors. Ten biased samples will be collected from the lake bottom sediments and fifteen will be collected between the access road and the current shoreline. The sample locations will be based on anomalies identified by visual observations, such as the presence of ordnance fragments, miscellaneous debris, disturbed or discolored soil, or stressed vegetation.
- Fifteen samples will be collected from a grid established on the site between the existing shoreline and the high water level.
- Five pore water samples will be collected from lake bottom sediments and 10 lake water samples will be collected.
- Performance criteria for analytical data are normal laboratory QA limits and pre-established detection limits.

STEP 7: Develop the Plan for Obtaining Data

- The 25 judgmental soil sample locations will be based on site observations.
- The analytical suite for soil is optimized based on historical information for the site

Notes:

bgs	Below ground surface
EPA	U.S. Environmental Protection Agency
ESSL	Ecological soil screening levels
FS	Feasibility Study
MC	Munitions constituents
MEC	Munitions and explosives of concern
PRG	Preliminary remediation goal
QA	Quality assurance
RI	Remedial Investigation
SI	Site Inspection
SVOC	Semivolatile organic compounds
VOC	Volatile organic compounds

TABLE 4: FIELD QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #20 – NAVFAC SW SAP

Matrix	Parameter	Analytical Method	# of Primary Samples	# of Field Duplicates	# of /MSDs (at 5%)	# of Equipment Rinsates[a]	Approx # of Source Water Blanks	Total # of Samples to Lab
Soil	Explosives	EPA 8330	198	0	8	0	0	198
Lake Water	Explosives	EPA 8330	20	0	1	0	0	20
Pore Water	Explosives	EPA 8330	10	0	1	0	0	10
Soil	Explosives plus picric acid	EPA 8330	36	0	1	0	0	36
Soil	Metals	EPA 6020/7471A	282	0	13	7	1	290
Lake Water	Metals	EPA 8330	20	0	1	0	0	20
Pore Water	Metals	EPA 8330	10	0	1	0	0	10
Soil	Metals plus strontium	EPA 6020	46	0	2	0	0	46
Soil	Lead only	EPA 6020	67	0	1	0	0	67
Soil	VOCs	EPA 8260B	125	0	6	5	1	131
Soil	SVOCs	EPA 8270C	125	0	6	5	1	131
Soil	PAHs	EPA 8270C - SIM	5	0	1	0	0	5
Soil	Perchlorate	EPA 6850	190	0	3	0	0	190
Soil	Dioxins	EPA 8290	7	0	1	0	0	7
Soil	Depleted uranium	EPA 6020	34	0	2	0	0	34

TABLE 3-J: DATA QUALITY OBJECTIVES FOR SITE UXO7

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #11 – NAVFAC SW SAP

Notes:

a Assumes all surface sampling is conducted with disposable equipment. Actual number of equipment rinsate samples will be equal to the number of sampling days when decontamination of sampling equipment is conducted.

EPA	U.S Environmental Protection Agency
MS/MSD	Matrix spike and matrix spike duplicate
NA	Not applicable
SAP	Sampling and Analysis Plan
SIM	Selected ion monitoring

TABLE 5: KEY PERSONNEL

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, Naval Weapons Station Seal Beach Det Fallbrook, California

QAPP Worksheet #7 – NAVFAC SW SAP

Name	Organization	Role	Responsibilities	Contact Information
Jennifer Nour-Sullivan	Navy	Remedial Project Manager	▪ Responsible for overall project execution and for coordination with base representatives, regulatory agencies, and Navy management ▪ Actively participates in DQO process ▪ Provides management and technical oversight during data collection	Naval Facilities Engineering Command Southwest San Diego, CA Jennifer.a.sullivan1@navy.mil (619) 532-6878
Pei-Fen Tamashiro	Navy	Activity Point of Contact	▪ Responsible for coordinating field activities ▪ Ensuring that operations conducted on the site are in compliance with Det Fallbrook specific rules and regulations ▪ Interacting with the regulatory agencies and community members	Naval Weapons Station Seal Beach, CA Building 120 Attn. code N45WW 800 Seal Beach Blvd pei-fen.tamashiro@navy.mil (562) 626-7897
Narciso A. Ancog	Navy	QA Officer	▪ Responsible for QA issues for all Naval Facilities Engineering Command Southwest environmental work ▪ Provides government oversight of ChaduxTt's QA program ▪ Reviews and approves SAP and any significant modifications ▪ Has authority to suspend project activities if Navy quality requirements are not met	Naval Facilities Engineering Command Southwest San Diego, CA narciso.ancog@navy.mil (619) 532-3046

TABLE 5: KEY PERSONNEL (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #7 – NAVFAC SW SAP

Name	Organization	Role	Responsibilities	Contact Information
Steve Bradley	ChaduxTt	Project Manager	▪ Responsible for implementing all activities called out in CTO ▪ Prepares or supervises preparation of SAP ▪ Monitors and directs field activities to ensure compliance with SAP requirements ▪ Monitors CTO staffing, schedules and budget	ChaduxTt San Diego steve.bradley@ttemi.com (619) 321-6717
Greg Swanson	ChaduxTt	Program QA Manager	▪ Responsible for regular discussion and resolution of QA issues with Navy QA officer ▪ Provides program-level QA guidance to installation coordinator, project manager, and project teams ▪ Reviews and approves SAPs ▪ Identifies nonconformances through audits and other QA review activities and recommends corrective action	ChaduxTT, San Diego, CA greg.swanson@ttemi.com (619) 321-6726
Kevin Hoch	ChaduxTt	Project QA Officer	▪ Responsible for providing guidance to project teams that are preparing SAPs ▪ Verifies that data collection methods specified in SAP comply with Navy and ChaduxTt requirements ▪ May conduct laboratory evaluations and audits	ChaduxTt, San Francisco, CA kevin.hoch@ttemi.com (415) 222-8304
Darren Knight	ChaduxTt	Field Team Leader	▪ Responsible for directing day-to-day field activities conducted by ChaduxTt and subcontractor personnel ▪ Verifies that field sampling and measurement procedures follow SAP ▪ Provides project manager with regular reports on status of field activities	ChaduxTt, San Diego, CA dknight@stgcx.com (619) 237-1865

TABLE 5: KEY PERSONNEL (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #7 – NAVFAC SW SAP

Name	Organization	Role	Responsibilities	Contact Information
David Brown	ChaduxTt	On-Site Safety Officer	▪ Responsible for implementing health and safety plan and for selecting appropriate site control measures and personal protection levels ▪ Conducts safety briefings for ChaduxTt and subcontractor personnel and site visitors ▪ Can suspend operations that threaten health and safety	
Sara Woolley	ChaduxTt	Analytical Coordinator	▪ Responsible for working with project team to define analytical requirements ▪ Assists in selecting a pre-qualified laboratory to complete required analyses (see Section 2.4 of SAP) ▪ Coordinates with laboratory project manager on analytical requirements, delivery schedules, and logistics ▪ Reviews laboratory data before they are released to project team	ChaduxTt, San Francisco, CA sara.woolley@ttemi.com (415) 222-8311
Wing Tse	ChaduxTt	Database Manager	▪ Responsible for developing, monitoring, and maintaining project database under guidance of project manager ▪ Works with analytical coordinator during preparation of SAP to resolve sample identification issues	ChaduxTt, San Francisco, CA wing.tse@ttemi.com (415) 222-8326

TABLE 5: KEY PERSONNEL (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #7 – NAVFAC SW SAP

Name	Organization	Role	Responsibilities	Contact Information
David Brown	ChaduxTt	On-Site Safety Officer	▪ Responsible for implementing health and safety plan and for selecting appropriate site control measures and personal protection levels ▪ Conducts safety briefings for ChaduxTt and subcontractor personnel and site visitors ▪ Can suspend operations that threaten health and safety	
Dave Alltucker	Test America Laboratories	Project Manager	▪ Responsible for delivering analytical services that meet requirements of SAP ▪ Reviews SAP to understand analytical requirements ▪ Works with ChaduxTt analytical coordinator to confirm sample delivery schedules ▪ Reviews laboratory data package before it is delivered to ChaduxTt	Test America Labs, Inc Dave.alltucker@testamericainc.com (916) 374-4383
Ralph Basinski	Tetra Tech NUS, Inc.	Project Manager MEC Avoidance	▪ Responsible for ensuring that subcontractor activities are conducted in accordance with requirements of SAP ▪ Coordinates subcontractor activities with ChaduxTt project manager or field team leader	Tetra Tech NUS, Inc., Pittsburgh, PA ralph.basinski@ttnus.com

Notes:

CTO	Contract task order	SAP	Sampling Analysis Plan
DQO	Data quality objective	TBD	To be determined (Will be updated prior to finalization of the SAP and initiation of field work)
QA	Quality assurance		

TABLE 6: REQUIREMENTS FOR SUMMARY AND FULL DATA PACKAGES

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, Naval Weapons Station Seal Beach Det Fallbrook, California

QAPP Worksheet #30 – NAVFAC SW SAP

Requirements for Summary Data Packages – Organic Analysis	Requirements for Summary Data Packages – Inorganic Analysis
Section I **Case Narrative**	**Section I** **Case Narrative**
1. Case narrative	1. Case narrative
2. Copies of nonconformance and corrective action forms	2. Copies of nonconformance and corrective action forms
3. Chain-of-custody forms	3. Chain-of-custody forms
4. Copies of sample receipt notices	4. Copies of sample receipt notices
5. Internal tracking documents, as applicable	5. Internal tracking documents, as applicable
Section II **Sample Results – Form I for the following:**	**Section II** **Sample Results – Form I for the following:**
1. Environmental samples, including dilutions and re-analysis	1. Environmental sample including dilutions and re-analysis
2. Tentatively identified compounds (TIC) (volatile organic compounds [VOC] and semivolatile organic compounds only)	
Section III **Quality Assurance/Quality Control (QA/QC) Summaries – Forms II through XI for the following:**	**Section III** **QA/QC Summaries – Forms II through XIV for the following:**
1. System monitoring compound and surrogate recoveries (Form II)	1. Initial and continuing calibration verifications (Form II)
2. Matrix spike (MS) and matrix spike duplicate (MSD) recoveries and relative percent differences (RPD) (Forms I and III)	2. Project-required reporting limit (PRRL) standard (Form II)
3. Blank spike or laboratory control sample (LCS) recoveries (Forms I and III-Z)	3. Detection limit standard (Form II-Z)
4. Method blanks (Forms I and IV)	4. Method blanks, continuing calibration blanks, and preparation blanks (Form III)
5. Performance check (Form V)	5. Inductively coupled plasma (ICP) interference-check samples (Form IV)
6. Initial calibrations with retention time information (Form VI)	6. MS and post-digestion spikes (Forms V and V-Z)
7. Continuing calibrations with retention time information (Form VII)	7. Sample duplicates (Form VI)
8. Quantitation limit standard (Form VII-Z)	8. LCSs (Form VII)
9. Internal standard areas and retention times (Form VIII)	9. Method of standard additions (Form VIII)
10. Analytical sequence (Forms VIII-D and VIII-Z)	10. ICP serial dilution (Form IX)
11. Gel permeation chromatography (GPC) calibration (Form IX)	11. Instrument detection limit (IDL) (Form X)
12. Single component analyte identification (Form X)	12. ICP interelement correction factors (Form XI)

TABLE 6: REQUIREMENTS FOR SUMMARY AND FULL DATA PACKAGES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, Naval Weapons Station Seal Beach Det Fallbrook, California

QAPP Worksheet #30 – NAVFAC SW SAP

Requirements for Summary Data Packages – Organic Analysis	Requirements for Summary Data Packages – Inorganic Analysis
13. Multicomponent analyte identification (Form X-Z)	13. ICP linear working range (Form XII)
14. Matrix-specific method detection limit (MDL) (Form XI-Z)	
Sections I, II, and III Summary Package	**Sections I, II, III Summary Package**
Section IV Sample Raw Data – indicated form, plus all raw data	**Section IV Instrument Raw Data - Sequential measurement readout records for ICP, graphite furnace atomic absorption (GFAA), flame atomic absorption (AA), cold vapor mercury, cyanide, and other inorganic analyses, which will contain the following information:**
1. Analytical results, including dilutions and re-analysis (Forms I and X)	1. Environmental samples, including dilutions and re-analysis
2. TICs (Form I — volatile organic analysis [VOA])	2. Initial calibration
	3. Initial and continuing calibration verifications
Section V QC Raw Data – indicated form, plus all raw data	4. Detection limit standards
1. Method blanks (Form I)	5. Method blanks, continuing calibration blanks, and preparation blanks
2. MS and MSD samples (Form I)	6. ICP interference check samples
3. Blank spikes or LCSs (Form I)	7. MS and post-digestion spikes
	8. Sample duplicates
Section VI Standard Raw Data – indicated form, plus all raw data	9. LCSs
1. Performance check (Form V)	10. Method of standard additions
2. Initial calibrations, with retention-time information (Form VI)	11. ICP serial dilution
3. Continuing calibrations, with retention-time information (Form VII)	**Section V Other Raw Data**
4. Quantitation-limit standard (Form VII-Z)	1. Percent moisture for soil samples
5. GPC calibration (Form IX)	2. Sample digestion, distillation, and preparation logs, as necessary

TABLE 6: REQUIREMENTS FOR SUMMARY AND FULL DATA PACKAGES (CONTINUED)

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, Naval Weapons Station Seal Beach Det Fallbrook, California

QAPP Worksheet #30 – NAVFAC SW SAP

Requirements for Summary Data Packages – Organic Analysis	Requirements for Summary Data Packages – Inorganic Analysis
Section VII **Other Raw Data**	3. Instrument analysis log for each instrument used
1. Percent moisture for soil samples	4. Standard preparation logs, including initial and final concentrations for each standard used
2. Sample extraction and cleanup logs	5. Formula and a sample calculation for the initial calibration
3. Instrument analysis log for each instrument used (Form VIII-Z)	6. Formula and a sample calculation for soil sample results
4. Standard preparation logs, including initial and final concentrations for each standard used	
5. Formula and a sample calculation for the initial calibration	
6. Formula and a sample calculation for soil sample results	

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #18 – NAVFAC SW SAP

Soil Samples

Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
IRP32-SB01(0-2)	Former tank	1	Evaluate impacts to soils in vicinity of former tank	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 2
IRP32-SB01(4-6)	Former tank	1	Evaluate impacts to soils in vicinity of former tank	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 2
IRP32-SB01(8-10)	Former tank	1	Evaluate impacts to soils in vicinity of former tank	Soil	8-10	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 2
IRP32-SB02(0-2)	Former tank	1	Evaluate impacts to soils in vicinity of former tank	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 2
IRP32-SB02(4-6)	Former tank	1	Evaluate impacts to soils in vicinity of former tank	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 2
IRP32-SB02(8-10)*	Former tank	1	Evaluate impacts to soils in vicinity of former tank	Soil	8-10	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 2
IRP32-SB03(0-2)	Former tank	1	Evaluate impacts to soils in vicinity of former tank	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 2
IRP32-SB03(4-6)	Former tank	1	Evaluate impacts to soils in vicinity of former tank	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 2
IRP32-SB03(8-10)	Former tank	1	Evaluate impacts to soils in vicinity of former tank	Soil	8-10	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 2
IRP32-SS01	Below embankment	1	Evaluate releases to surface soils from draining of tank	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 2
IRP32-SS02	Below embankment	1	Evaluate releases to surface soils from draining of tank	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 2

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #18 – NAVFAC SW SAP

Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
IRP32-SS03	Below embankment	1	Evaluate releases to surface soils from draining of tank	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 2
IRP32-SS04	Below embankment	1	Evaluate releases to surface soils from draining of tank	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 2
IRP32-SS05	Below embankment	1	Evaluate releases to surface soils from draining of tank	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 2
IRP32-SS06	Below embankment	1	Evaluate releases to surface soils from draining of tank	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 2
IRP32-SS07	Below embankment	1	Evaluate releases to surface soils from draining of tank	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 2
IRP32-SS08*	Below embankment	1	Evaluate releases to surface soils from draining of tank	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 2
IRP32-SS09	Below embankment	1	Evaluate releases to surface soils from draining of tank	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 2
IRP32-SS10	Below embankment	1	Evaluate releases to surface soils from draining of tank	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 2
IRP34B-SB01(0-2)	NA	1	Evaluate releases to surface soils from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #18 – NAVFAC SW SAP

Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
IRP34B-SB01(4-6)	NA	1	Evaluate releases to 6 feet bgs from dunnage disposal	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 3
IRP34B-SB02(0-2)	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SB02(4-6)	NA	1	Evaluate releases to 6 feet bgs from dunnage disposal	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 3
IRP34B-SB03(0-2)	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SB03(4-6)	NA	1	Evaluate releases to 6 feet bgs from dunnage disposal	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 3
IRP34B-SB04(0-2)	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SB04(4-6)	NA	1	Evaluate releases to 6 feet bgs from dunnage disposal	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 3
IRP34B-SB05(0-2)*	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SB05(4-6)	NA	1	Evaluate releases to 6 feet bgs from dunnage disposal	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 3
IRP34B-SB06(0-2)	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SB06(4-6)	NA	1	Evaluate releases to 6 feet bgs from dunnage disposal	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 3

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
IRP34B-SB07(0-2)	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SB07(4-6)*	NA	1	Evaluate releases to 6 feet bgs from dunnage disposal	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 3
IRP34B-SB08(0-2)	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SB08(4-6)	NA	1	Evaluate releases to 6 feet bgs from dunnage disposal	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 3
IRP34B-SB09(0-2)	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SB09(4-6)	NA	1	Evaluate releases to 6 feet bgs from dunnage disposal	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 3
IRP34B-SS01	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SS02	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SS03	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SS04	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
IRP34B-SS05	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SS06	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SS07	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SS08	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SS09	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SS10*	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SS11	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34B-SS12	NA	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 3
IRP34D-SB01(0-2)	Former Building 338	1	Evaluate impact from activities at Bldg 338	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
IRP34D-SB01(4-6)	Former Building 338	1	Evaluate impact from activities at Bldg 338	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 4
IRP34D-SB02(0-2)	Former Building 338	1	Evaluate impact from activities at Bldg 338	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4
IRP34D-SB02(4-6)	Former Building 338	1	Evaluate impact from activities at Bldg 338	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 4
IRP34D-SB03(0-2)	Former Building 338	1	Evaluate impact from activities at Bldg 338	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4
IRP34D-SB03(4-6)*	Former Building 338	1	Evaluate impact from activities at Bldg 338	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 4
IRP34D-SB04(0-2)	Former Building 338	1	Evaluate impact from activities at Bldg 338	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4
IRP34D-SB04(4-6)	Former Building 338	1	Evaluate impact from activities at Bldg 338	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 4
IRP34D-SB05(0-2)	Drainage channel	1	Evaluate impact from activities in vicinity of creek	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4
IRP34D-SB05(4-6)	Drainage channel	1	Evaluate impact from activities in vicinity of creek	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 4
IRP34D-SB06(0-2)	Drainage channel	1	Evaluate impact from activities in vicinity of creek	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4
IRP34D-SB06(4-6)	Drainage channel	1	Evaluate impact from activities in vicinity of creek	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 4
IRP34D-SB07(0-2)	Concrete bldg	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
IRP34D-SB07(4-6)	Concrete bldg	1	Evaluate releases to 6 feet bgs from dunnage disposal	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 4
IRP34D-SS01 (0-2)	Concrete bldg	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4
IRP34D-SS02 (4-6)	Concrete bldg	1	Evaluate releases to surface soil from dunnage disposal	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4
IRP34D-SS03 (0-2)	Concrete bldg	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4
IRP34D-SS04 (4-6)	Concrete bldg	1	Evaluate releases to surface soil from dunnage disposal	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4
IRP34D-SS05 (0-2)	Concrete bldg	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4
IRP34D-SS06 (4-6)	Concrete bldg	1	Evaluate releases to surface soil from dunnage disposal	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4
IRP34D-SS07	Central grid	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4
IRP34D-SS08*	Central grid	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
IRP34D-SS09	Central grid	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4
IRP34D-SS10	Central grid	1	Evaluate releases to surface soil from dunnage disposal	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 4
IRP34E-SB01(0-2)	Inlet	1	Evaluate releases from dunnage disposal at inlet	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 5
IRP34E-SB01(4-6)	Inlet	1	Evaluate releases from dunnage disposal at Inlet	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 5
IRP34E-SB02(0-2)	Outfall	1	Evaluate releases from dunnage disposal at outfall	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 5
IRP34E-SB02(4-6)	Outfall	1	Evaluate releases from dunnage disposal at outfall	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 5
IRP34E-SB03(0-2)	Toe of slope	1	Evaluate releases from dunnage disposal at toe of slope	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 5
IRP34E-SB03(4-6)	Toe of slope	1	Evaluate releases from dunnage disposal at toe of slope	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 5
IRP34E-SB04(0-2)	Toe of slope	1	Evaluate releases from dunnage disposal at toe of slope	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 5
IRP34E-SB04(4-6)	Toe of slope	1	Evaluate releases from dunnage disposal at toe of slope	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 5

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
IRP34E-SB05(0-2)	Toe of slope	1	Evaluate releases from dunnage disposal at toe of slope	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 5
IRP34E-SB05(4-6)	Toe of slope	1	Evaluate releases from dunnage disposal at toe of slope	Soil	4-6	VOCs, SVOCs, Metals[1]	SAP Section 2.2.4 and Figure 5
IRP34E-SS01	Embankment	1	Evaluate releases from dunnage on slope	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 5
IRP34E-SS02*	Embankment	1	Evaluate releases from dunnage on slope	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 5
IRP34E-SS03	Embankment	1	Evaluate releases from dunnage on slope	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 5
IRP34E-SS04	Embankment	1	Evaluate releases from dunnage on slope	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 5
IRP34E-SS05	Embankment	1	Evaluate releases from dunnage on slope	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 5
IRP34E-SS06	Embankment	1	Evaluate releases from dunnage on slope	Soil	0-2	VOCs, SVOCs, Metals[1]	SAP Section 2.2.3 and Figure 5
UXO1-SS01	Target area	1	Evaluate releases from munitions impact	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS02	Target area	1	Evaluate releases from munitions impact	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS03	Target area	1	Evaluate releases from munitions impact	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS04	Target area	1	Evaluate releases from munitions impact	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6

Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO1-SS05	Target area	1	Evaluate releases from munitions impact	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS06	Firing point	1	Evaluate releases from firing of weapons	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS07	Firing point	1	Evaluate releases from firing of weapons	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS08	Firing point	1	Evaluate releases from firing of weapons	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS09*	Firing point	1	Evaluate releases from firing of weapons	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS10	Firing point	1	Evaluate releases from firing of weapons	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS11	Between target and firing point	1	Evaluate releases from activities between target and firing point	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS12	Between target and firing point	1	Evaluate releases from activities between target and firing point	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS13	Between target and firing point	1	Evaluate releases from activities between target and firing point	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS14	Between target and firing point	1	Evaluate releases from activities between target and firing point	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS15	Between target and firing point	1	Evaluate releases from activities between target and firing point	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO1-SS16	Between target and firing point	1	Evaluate releases from activities between target and firing point	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS17	Between target and firing point	1	Evaluate releases from activities between target and firing point	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS18	Between target and firing point	1	Evaluate releases from activities between target and firing point	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS19	Between target and firing point	1	Evaluate releases from activities between target and firing point	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS20	Between target and firing point	1	Evaluate releases from activities between target and firing point	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS21	Between target and firing point	1	Evaluate releases from activities between target and firing point	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS22	Between target and firing point	1	Evaluate releases from activities between target and firing point	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1- SS23	Drop Test Tower	1	Evaluate releases from operations at drop test tower	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1- SS24	Drop Test Tower	1	Evaluate releases from operations at drop test tower	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6

Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO1- SS25*	Drop Test Tower	1	Evaluate releases from operations at drop test tower	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS26	Between Drop Test Tower and burn barrels	1	Evaluate releases from activities between drop test tower and burn barrels	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS27	Between Drop Test Tower and burn barrels	1	Evaluate releases from activities between drop test tower and burn barrels	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS28	Between Drop Test Tower and burn barrels	1	Evaluate releases from activities between drop test tower and burn barrels	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS29	Between Drop Test Tower and burn barrels	1	Evaluate releases from activities between drop test tower and burn barrels	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SS30	Between Drop Test Tower and burn barrels	1	Evaluate releases from activities between drop test tower and burn barrels	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SB01(0-0.5)	Burn barrels	1	Evaluate releases from burning munitions	Soil	0-0.5	Explosives, Metals[1],Perchlorate	SAP Section 2.2.3 and Figure 6
UXO1-SB01(4-6)	Burn barrels	1	Evaluate releases from burning munitions	Soil	4-6	Explosives, Metals[1],Perchlorate	SAP Section 2.2.4 and Figure 6
UXO1-SB02(0-0.5)*	Burn barrels	1	Evaluate releases from burning munitions	Soil	0-0.5	Explosives, Metals[1],Perchlorate, Dioxins	SAP Section 2.2.3 and Figure 6

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO1-SB02(4-6)	Burn barrels	1	Evaluate releases from burning munitions	Soil	4-6	Explosives, Metals[1],Perchlorate, Dioxins	SAP Section 2.2.4 and Figure 6
UXO1-SB03(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.3 and Figure 6
UXO1-SB03(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB04(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.3 and Figure 6
UXO1-SB04(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB05(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.3 and Figure 6
UXO1-SB05(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB06(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.3 and Figure 6
UXO1-SB06(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO1-SB07(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.3 and Figure 6
UXO1-SB07(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB08(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.3 and Figure 6
UXO1-SB08(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB09(0-2)*	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.3 and Figure 6
UXO1-SB09(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB10(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.3 and Figure 6
UXO1-SB10(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB11(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.3 and Figure 6

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO1-SB11(4-6)*	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB12(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.3 and Figure 6
UXO1-SB12(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB13(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.3 and Figure 6
UXO1-SB13(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB14(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs, Dioxins	SAP Section 2.2.3 and Figure 6
UXO1-SB14(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB15(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs, Dioxins	SAP Section 2.2.3 and Figure 6

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO1-SB15(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB16(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs, Dioxins	SAP Section 2.2.3 and Figure 6
UXO1-SB16(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB17(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs, Dioxins	SAP Section 2.2.3 and Figure 6
UXO1-SB17(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB18(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs, Dioxins	SAP Section 2.2.3 and Figure 6
UXO1-SB18(4-6)*	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB19(0-2)	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs, Dioxins	SAP Section 2.2.3 and Figure 6

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO1-SB19(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SB20(0-2)*	Trenches	1	Evaluate releases from disposing/burning	Soil	0-2	Explosives, Metals[1],Perchlorate, VOCs, SVOCs, Dioxins	SAP Section 2.2.3 and Figure 6
UXO1-SB20(4-6)	Trenches	1	Evaluate releases from disposing/burning	Soil	4-6	Explosives, Metals[1],Perchlorate, VOCs, SVOCs	SAP Section 2.2.4 and Figure 6
UXO1-SS31	Building debris	1	Evaluate impact from activities at former buildings	Soil	0-2	Metals[1]	SAP Section 2.2.3 and Figure 6
UXO1-SS32	Building debris	1	Evaluate impact from activities at former buildings	Soil	0-2	Metals[1]	SAP Section 2.2.3 and Figure 6
UXO1-SS33	Building debris	1	Evaluate impact from activities at former buildings	Soil	0-2	Metals[1]	SAP Section 2.2.3 and Figure 6
UXO2-XRF-SS01	SAR – Firing line	1	Evaluate impacts from firing of weapons at SAR	Soil	0-2	Explosives, Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS02	SAR – Firing line	1	Evaluate impacts from firing of weapons at SAR	Soil	0-2	Explosives, Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS03**	SAR – Firing line	1	Evaluate impacts from firing of weapons at SAR	Soil	0-2	Explosives, Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS04	SAR – Firing line	1	Evaluate impacts from firing of weapons at SAR	Soil	0-2	Explosives, Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS05	SAR – Between firing line and target	1	Evaluate impacts from firing of weapons at SAR	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO2-XRF-SS06**	SAR – Between firing line and target	1	Evaluate impacts from errant shooting	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS07	SAR – Between firing line and target	1	Evaluate impacts from errant shooting	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS08	SAR – Between firing line and target	1	Evaluate impacts from errant shooting	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS09	SAR – Between firing line and target	1	Evaluate impacts from errant shooting	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS10	SAR-Target	1	Evaluate impacts from errant shooting	Soil	0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS11	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS12**	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS13	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS14	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS15	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS16	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO2-XRF-SS17	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS18(0-0.5)	SAR-Target	1	Evaluate density of lead in target region	Soil	0-0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS18(0.5-2)**	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS19(0-0.5)	SAR-Target	1	Evaluate density of lead in target region	Soil	0-0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS19(0.5-2)	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS20(0-0.5)**	SAR-Target	1	Evaluate density of lead in target region	Soil	0-0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS20(0.5-2)	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS21(0-0.5)	SAR-Target	1	Evaluate density of lead in target region	Soil	0-0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS21(0.5-2)	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS22(0-0.5)	SAR-Target	1	Evaluate density of lead in target region	Soil	0-0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS22(0.5-2)	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS23(0-0.5)	SAR-Target	1	Evaluate density of lead in target region	Soil	0-0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS23(0.5-2)	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO2-XRF-SS24(0-0.5)**	SAR-Target	1	Evaluate density of lead in target region	Soil	0-0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS24(0.5-2)	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS25(0-0.5)	SAR-Target	1	Evaluate density of lead in target region	Soil	0-0.5	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS25(0.5-2)	SAR-Target	1	Evaluate density of lead in target region	Soil	0.5-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS26	Skeet/Trap Range – Firing Line	1	Evaluate impacts from firing of weapons at Skeet Range	Soil	0-2	8330, XRF (LEAD)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS27	Skeet/Trap Range– Firing Line	1	Evaluate impacts from firing of weapons at Skeet Range	Soil	0-2	8330, XRF (LEAD)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS28**	Skeet/Trap Range– Firing Line	1	Evaluate impacts from firing of weapons at Skeet Range	Soil	0-2	Explosives, Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS29	Skeet/Trap Range– Firing Line	1	Evaluate impacts from firing of weapons at Skeet Range	Soil	0-2	Explosives, Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS30	Skeet/Trap Range	1	Evaluate density of lead in target region	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS31	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS32	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO2-XRF-SS33	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS34	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS35**	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS36	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS37	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS38**	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS39	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS40	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS41	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS42	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS43	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS44**	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS45	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO2-XRF-SS46	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS47	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS48	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS49	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS50	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS51	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS52	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS53**	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS54	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS55	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS56	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS57	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-XRF-SS58**	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO2-XRF-SS59	Skeet/Trap Range	1	Evaluate density of lead in skeet/trap range area	Soil	0-2	Lead (XRF)	SAP Section 2.2.3 and Figure 7
UXO2-SS01	SAR – Firing line	1	Establish correlation between field and laboratory results for lead	Soil	0-2	Lead	SAP Section 2.2.3 and Figure 7
UXO2-SS02	SAR – Between firing line and target	1	Establish correlation between field and laboratory results for lead	Soil	0-2	Lead	SAP Section 2.2.3 and Figure 7
UXO2-SS03	SAR – Target	1	Establish correlation between field and laboratory results for lead	Soil	0-0.5	Lead	SAP Section 2.2.3 and Figure 7
UXO2-SS04*	SAR – Target	1	Establish correlation between field and laboratory results for lead	Soil	0-0.5	Lead	SAP Section 2.2.3 and Figure 7
UXO2-SS05	SAR – Target	1	Establish correlation between field and laboratory results for lead	Soil	0-0.5	Lead	SAP Section 2.2.3 and Figure 7
UXO2-SS06	SAR – Target	1	Establish correlation between field and laboratory results for lead	Soil	0-0.5	Lead	SAP Section 2.2.3 and Figure 7
UXO2-SS07	SAR – Target	1	Establish correlation between field and laboratory results for lead	Soil	0-0.5	Lead	SAP Section 2.2.3 and Figure 7
UXO2-SS08	Skeet/Trap Range	1	Establish correlation between field and laboratory results for lead	Soil	0-2	Lead	SAP Section 2.2.3 and Figure 7

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO2-SS09	Skeet/Trap Range	1	Establish correlation between field and laboratory results for lead	Soil	0-2	Lead	SAP Section 2.2.3 and Figure 7
UXO2-SS10*	Skeet/Trap Range	1	Establish correlation between field and laboratory results for lead; evaluate impact of clay pigeon debris	Soil	0-2	Metals[2], PAH-SIM	SAP Section 2.2.3 and Figure 7
UXO2-SS11	Skeet/Trap Range	1	Establish correlation between field and laboratory results for lead; evaluate impact of clay pigeon debris	Soil	0-2	Metals[2], PAH-SIM	SAP Section 2.2.3 and Figure 7
UXO2-SS12	Skeet/Trap Range	1	Establish correlation between field and laboratory results for lead; evaluate impact of clay pigeon debris	Soil	0-2	6020, 8270-SIMI	SAP Section 2.2.3 and Figure 7
UXO2-SS13	Skeet/Trap Range	1	Establish correlation between field and laboratory results for lead; evaluate impact of clay pigeon debris	Soil	0-2	Metals[2], PAH	SAP Section 2.2.3 and Figure 7
UXO2-SS14	Skeet/Trap Range	1	Establish correlation between field and laboratory results for lead; evaluate impact of clay pigeon debris	Soil	0-2	Metals[2], PAH	SAP Section 2.2.3 and Figure 7

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO3-SB01(0-2)	Area where metal banding observed	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8
UXO3-SB01(4-6)	Area where metal banding observed	1	Evaluate impact of dunnage and possible munitions disposal	Soil	4-6	Explosives, Metals[1], Perchlorate	SAP Section 2.2.4 and Figure 8
UXO3-SB02(0-2)*	Area where metal banding observed	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8
UXO3-SB02(4-6)	Area where metal banding observed	1	Evaluate impact of dunnage and possible munitions disposal	Soil	4-6	Explosives, Metals[1], Perchlorate	SAP Section 2.2.4 and Figure 8
UXO3-SB03(0-2)	Area where metal banding observed	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8
UXO3-SB03(4-6)	Area where metal banding observed	1	Evaluate impact of dunnage and possible munitions disposal	Soil	4-6	Explosives, Metals[1], Perchlorate	SAP Section 2.2.4 and Figure 8
UXO3-SB04(0-2)	Area where metal banding observed	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8
UXO3-SB04(4-6)	Area where metal banding observed	1	Evaluate impact of dunnage and possible munitions disposal	Soil	4-6	Explosives, Metals[1], Perchlorate	SAP Section 2.2.4 and Figure 8
UXO3-SS01	Southern portion of site	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #18 – NAVFAC SW SAP

Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO3-SS02	Southern portion of site	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8
UXO3-SS03	Southern portion of site	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8
UXO3-SS04	Southern portion of site	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8
UXO3-SS05	Northern portion of site	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8
UXO3-SS06	Northern portion of site	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8
UXO3-SB05(0-2)	Area where munitions observed	1	Evaluate impact of dunnage and munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8
UXO3-SB05(4-6)	Area where munitions observed	1	Evaluate impact of dunnage and munitions disposal	Soil	4-6	Explosives, Metals[1], Perchlorate	SAP Section 2.2.4 and Figure 8
UXO3-SB06(0-2)	Area where munitions observed	1	Evaluate impact of dunnage and munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8
UXO3-SB06(4-6)	Area where munitions observed	1	Evaluate impact of dunnage and munitions disposal	Soil	4-6	Explosives, Metals[1], Perchlorate	SAP Section 2.2.4 and Figure 8

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO3-SB07(0-2)	Area where munitions observed	1	Evaluate impact of dunnage and munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8
UXO3-SB07(4-6)	Area where munitions observed	1	Evaluate impact of dunnage and munitions disposal	Soil	4-6	Explosives, Metals[1], Perchlorate	SAP Section 2.2.4 and Figure 8
UXO3-SB08(0-2)	Area where munitions observed	1	Evaluate impact of dunnage and munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8
UXO3-SB08(4-6)	Area where munitions observed	1	Evaluate impact of dunnage and munitions disposal	Soil	4-6	Explosives, Metals[1], Perchlorate	SAP Section 2.2.4 and Figure 8
UXO3-SB09(0-2)	Area where munitions observed	1	Evaluate impact of dunnage and munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 8
UXO3-SB09(4-6)	Area where munitions observed	1	Evaluate impact of dunnage and munitions disposal	Soil	4-6	Explosives, Metals[1], Perchlorate	SAP Section 2.2.4 and Figure 8
UXO4-SB01(0-2)	Vicinity of rifle grenades	1	Evaluate impact of dunnage and munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 9
UXO4-SB01(4-6)	Vicinity of rifle grenades	1	Evaluate impact of dunnage and munitions disposal	Soil	4-6	Explosives, Metals[1], Perchlorate	SAP Section 2.2.4 and Figure 9
UXO4-SB02(0-2)	Vicinity of rifle grenades	1	Evaluate impact of dunnage and munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 9

Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO4-SB02(4-6)	Vicinity of rifle grenades	1	Evaluate impact of dunnage and munitions disposal	Soil	4-6	Explosives, Metals[1], Perchlorate	SAP Section 2.2.4 and Figure 9
UXO4-SB03(0-2)	Vicinity of rifle grenades	1	Evaluate impact of dunnage and munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 9
UXO4-SB03(4-6)	Vicinity of rifle grenades	1	Evaluate impact of dunnage and munitions disposal	Soil	4-6	Explosives, Metals[1], Perchlorate	SAP Section 2.2.4 and Figure 9
UXO4-SB04(0-2)	Vicinity of rifle grenades	1	Evaluate impact of dunnage and munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 9
UXO4-SB04(4-6)	Vicinity of rifle grenades	1	Evaluate impact of dunnage and munitions disposal	Soil	4-6	Explosives, Metals[1], Perchlorate	SAP Section 2.2.4 and Figure 9
UXO4-SB05(0-2)	Vicinity of rifle grenades	1	Evaluate impact of dunnage and munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 9
UXO4-SB05(4-6)	Vicinity of rifle grenades	1	Evaluate impact of dunnage and munitions disposal	Soil	4-6	Explosives, Metals[1], Perchlorate	SAP Section 2.2.4 and Figure 9
UXO4-SS01	Drainage	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 9
UXO4-SS02	Drainage	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 9

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO4-SS03	Remainder of site	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 9
UXO4-SS04	Remainder of site	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 9
UXO4-SS05	Remainder of site	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 9
UXO4-SS06	Remainder of site	1	Evaluate impact of dunnage and possible munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 9
UXO6-SS01	Lake bottom sediments	1	Evaluate impact of Munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS02	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS03	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS04	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS05	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO6-SS06	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS07	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS08	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS09	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS10	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS11	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS12	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS13	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS14	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO6-SS15	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS16	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS17	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS18	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS19	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS20	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS21	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS22	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS23	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO6-SS24	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-SS25	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 10
UXO6-WS01	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10
UXO6-WS02	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10
UXO6-WS03	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10
UXO6-WS04	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10
UXO6-WS05	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10
UXO6-WS06	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10
UXO6-WS07	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10
UXO6-WS08	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10
UXO6-WS09	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10
UXO6-WS10	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10
UXO6-PWS01	Lake bottom sediments	1	Evaluate impact of munitions disposal	Pore Water	0-2	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #18 – NAVFAC SW SAP

Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO6-PWS02	Lake bottom sediments	1	Evaluate impact of munitions disposal	Pore Water	0-2	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10
UXO6-PWS03	Lake bottom sediments	1	Evaluate impact of munitions disposal	Pore Water	0-2	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10
UXO6-PWS04	Lake bottom sediments	1	Evaluate impact of munitions disposal	Pore Water	0-2	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10
UXO6-PWS05	Lake bottom sediments	1	Evaluate impact of munitions disposal	Pore Water	0-2	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 10
UXO7-SS01	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS02	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS03	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS04	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS05	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS06	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #18 – NAVFAC SW SAP

Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO7-SS07	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS08	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS09	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS10	Lake bottom sediments	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS11	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS12	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS13	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS14	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS15	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO7-SS16	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS17	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS18	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS19	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS20	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS21	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS22	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS23	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-SS24	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO7-SS25	Between high water mark and shoreline	1	Evaluate impact of munitions disposal	Soil	0-2	Explosives, Metals[1], Perchlorate	SAP Section 2.2.3 and Figure 11
UXO7-WS01	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11
UXO7-WS02	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11
UXO7-WS03	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11
UXO7-WS04	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11
UXO7-WS05	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11
UXO7-WS06	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11
UXO7-WS07	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11
UXO7-WS08	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11
UXO7-WS09	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11
UXO7-WS10	Lake	1	Evaluate impact of munitions disposal	Lake Water	NA	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11
UXO7-PWS01	Lake bottom sediments	1	Evaluate impact of munitions disposal	Pore Water	0-2	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11

TABLE 7: PROPOSED SOIL AND GROUNDWATER SAMPLES, RATIONALE, AND ANALYSES (CONTINUED)
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #18 – NAVFAC SW SAP

Sampling Location/ID Number	Subarea	Number of Samples	Rationale	Matrix	Depth (feet bgs)	Analytical Group	Sampling Reference
UXO7-PWS02	Lake bottom sediments	1	Evaluate impact of munitions disposal	Pore Water	0-2	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11
UXO7-PWS03	Lake bottom sediments	1	Evaluate impact of munitions disposal	Pore Water	0-2	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11
UXO7-PWS04	Lake bottom sediments	1	Evaluate impact of munitions disposal	Pore Water	0-2	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11
UXO7-PWS05	Lake bottom sediments	1	Evaluate impact of munitions disposal	Pore Water	0-2	Explosives, Metals[3]	SAP Section 2.2.5 and Figure 11

Notes:

1 Metals by EPA Methods 6020/7471A. See Appendix C for analyte list.
2 Metals by EPA Methods 6020. See Appendix C for analyte list.
3 Metals by EPA Methods 6010B. See Appendix C for analyte list.

Each surface soil sample at Sites UXO1, UXO3, UXO4, UXO6, and UXO7 will be a composite of four subsamples

bgs Below ground surface
XRF X-Ray Fluorescence

* Laboratory duplicate sample
** Duplicate field sample for confirmation of XRF results via fixed laboratory analysis

TABLE 8: MEASUREMENT PERFORMANCE CRITERIA TABLE – FIELD QC SAMPLES

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #12-NAVFAC SW SAP

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Soil					
Equipment Blank	8260B, 8270C, 6020/7471A, 8330, 6850, 8270-SIM, 8290	1 per day	Accuracy/ Contamination	No target compounds > PRRL	S & A
Source Blank	8260B, 8270C, 6020/7471A, 8330, 6850, 8270-SIM, 8290	1 per event	Accuracy/ Contamination	No target compounds > PRRL	S & A
Surrogate Spike	8260B, 8270C, 8330, 8270C, 8290	Each Sample	Accuracy	See Appendix A	A
Laboratory Control Sample	Each Sample	5%	Accuracy	See Appendix A	A
Matrix Spike	Each Sample	5%	Precision/Accuracy	See Appendix A	S & A
Water					
Equipment Blank	6010B, 8330	NA	Accuracy/ Contamination	No target compounds > PRRL	S & A
Source Blank	6010B,8330	NA	Accuracy/ Contamination	No target compounds > PRRL	S & A
Surrogate Spike	6010B, 8330	Each Sample	Accuracy	See Appendix A	A
Laboratory Control Sample	Each Sample	5%	Accuracy	See Appendix A	A
Matrix Spike	Each Sample	5%	Precision/Accuracy	See Appendix A	S & A

Notes:

PRRL Project Required Reporting Limit

TABLE 9: SAMPLE CONTAINER, HOLDING TIME, AND PRESERVATIVE REQUIREMENTS

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #19 – NAVFAC SW SAP

Parameter	Method Number	Sample Volume and Container	Preservative	Holding Time[a]
Soil				
Explosives	EPA 8330	8-ounce glass jar	Cool, 4 +/- 2 °C	14 days/40 days
Perchlorate	EPA 6850	8-ounce glass jar	Cool, 4 +/- 2 °C	28 days
Metals (incl. depleted uranium)	EPA 6020	8-ounce glass jar	Cool, 4 +/- 2 °C	6 months
Mercury	EPA 7471A	8-ounce glass jar	Cool, 4 +/- 2 °C	28 days
SVOCs	EPA 8270C	8-ounce glass jar	Cool, 4 +/- 2 °C	14 days/40 days
Dioxin	EPA 8290	8-ounce glass jar	Cool, 4 +/- 2 °C	28 days/40 days
VOCs	EPA 8260B	3 EnCore Samplers	Cool, 4 +/- 2 °C	48 hours/14 days
PAHs	EPA 8270-SIM	8-ounce glass jar	Cool, 4 +/- 2 °C	14 days/40 days
Water				
Explosives	EPA 8330	2 1-L amber glass bottles with Teflon lids	Cool, 4 ± 2 °C	7 days/40 days
Metals	EPA 6010B	250 mL polyethylene bottle	HNO3, Cool, 4 ± 2 °C	6 months

Notes:

a "x" days/"y" days refers to the maximum number of days from sampling to extraction (or preservation of VOCs)/the maximum number of days from extraction (or preservation for VOCs) to analysis.

°C Degree Celsius
EPA U.S. Environmental Protection Agency
VOC Volatile organic compounds
SVOC Semivolatile organic compounds
PAH Polynuclear aromatic hydrocarbons

TABLE 10: VERIFICATION PROCESS

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #34-NAVFAC SW SAP

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Chain-of-custody forms	Chain-of-custody forms will be reviewed internally upon their completion and verified against the packed sample coolers they represent. The shipper's signature on the chain-of-custody should be initialed by the reviewer, a copy of the chain-of-custody will be retained in the project file, and the original and remaining copies taped inside the cooler for shipment.	I	Field team leader (TBD, ChaduxTt)
Audit reports	Upon report completion, a copy of all audit reports will be placed in the project file. If corrective actions are required, a copy of the documented corrective action taken will be attached to the appropriate audit report in the project file. At the beginning of each week, and at the completion of the site work, project file audit reports will be reviewed internally to ensure that all appropriate corrective actions have been taken and that corrective action reports are attached. If corrective actions have not been taken, the project manager will be notified to ensure action is taken.	I	Project Manager (Steve Bradley, ChaduxTt)
Field notes/logbook	Field notes will be reviewed internally and placed in the project file. A copy of the field notes will be attached to the final report.	I	Field team leader (TBD, ChaduxTt)
Laboratory data	All laboratory data packages will be verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal. All received data packages will be verified externally according to the data validation procedures specified in Section 2.10 of the SAP.	I, E	Laboratory and data validators (TBD)

Note:

TBD To be determined (Will be updated prior to finalization of the SAP and initiation of field work)

TABLE 11: PROJECT DOCUMENTS AND RECORDS

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #34-NAVFAC SW SAP

Document	Where Maintained
Field notes/logbook	Project file
Chain of custody forms	Project file
Laboratory raw data package (Hard copy)	Project file, NAVFAC SW Administrative Record
Audit/assessment checklists/reports	Project file and laboratory
Corrective action forms/reports	Project file and laboratory
Laboratory equipment calibration logs	Laboratory
Sample preparation logs	Laboratory
Run logs	Laboratory
Sample disposal records	Laboratory
Validated data	Project file, NAVFAC SW Administrative Record

Notes:

NAVFAC Naval Facilities Engineering Command
SW Southwest

TABLE 12: VALIDATION (STEPS IIA AND IIB) PROCESS TABLE

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheet #35 – NAVFAC SW SAP

Step IIa / IIb[1]	Validation Input	Description	Responsible for Validation (Name, organization)
IIa	Sample collection, handling, and analysis procedures	Field forms will be reviewed by field team leader or analytical coordinator. Field forms will be initialed by reviewer.	Sara Woolley, Tetra Tech
IIa, IIb	Analytical data package verification for completeness	Analytical data packages will be reviewed by the analytical coordinator and independent third-party validator. All analytical data associated with this investigation will be validated.	Sara Woolley, Tetra Tech Validator to be determined
IIb	Comparison of analytical data with measurement performance criteria	Analytical data will be evaluated against measurement quality objectives by an independent third-party validator	Validator to be determined

TABLE 13: VALIDATION (STEPS IIA AND IIB) SUMMARY TABLE
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheets #36 – NAVFAC SW SAP

Step IIa / IIb	Matrix	Analytical Group	Validation Criteria	Data Validator (Title and organizational affiliation)
Cursory Data Validation Criteria (90% of samples)	Soil/Water	Non-CLP Organic Analyses	Method compliance Holding times Calibration Blanks Surrogate recovery Matrix spike and matrix spike duplicate recovery Laboratory control sample or blank spike Internal standard performance Field duplicate sample analysis Other laboratory QC specified by the method Overall assessment of data for an SDG	TBD
Cursory Data Validation Criteria (90% of samples)	Soil/Water	Non-CLP Inorganic Analyses	Method compliance Holding times Calibration Blanks Matrix spike and matrix spike duplicate recovery Laboratory control sample or blank spike Field duplicate sample analysis Other laboratory QC specified by the method Overall assessment of data for an SDG	TBD
Full Data Validation Criteria (10% of samples)	Soil/Water	Non-CLP Organic Analyses	Method compliance Holding times Calibration Blanks Surrogate recovery Matrix spike and matrix spike duplicate recovery Laboratory control sample or blank spike Other laboratory QC specified by the method	TBD

TABLE 13: VALIDATION (STEPS IIA AND IIB) SUMMARY TABLE

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

QAPP Worksheets #36 – NAVFAC SW SAP

Step IIa / IIb	Matrix	Analytical Group	Validation Criteria	Data Validator (Title and organizational affiliation)
Full Data Validation Criteria (10% of samples)	Soil/Water	Non-CLP Inorganic Analyses	Compound identification Detection limits Compound quantitation Sample results verification Other laboratory QC specified by the method Overall assessment of data for an SDG Method compliance Holding times Calibration Blanks Matrix spike and matrix spike duplicate recovery Laboratory control sample Field duplicate sample analysis Other laboratory QC specified by the method Detection limits Analyte identification Analyte quantitation Sample results verification Overall assessment of data for an SDG	Stella Cuenco, Laboratory Data Consultants

Notes:

CLP Contract Laboratory Program
QC Quality control
SDG Sample delivery group
TBD To be determined (Will be updated prior to finalization of the SAP and initiation of field work)

APPENDIX A
METHOD PRECISION AND ACCURACY GOALS

TABLE A-1: VOLATILE ORGANIC COMPOUNDS EPA METHOD 8260B
METHOD PRECISION AND ACCURACY GOALS
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Laboratory Control Sample and Matrix Spike Limits

	Soil		
Matrix Spike Compound	**LCS % Recovery**	**Matrix Spike % Recovery**	**RPD**
1,1-Dichloroethene	59 to 172	59 to 172	30
Trichloroethene	62 to 137	62 to 137	30
Benzene	66 to 142	66 to 142	30
Toluene	59 to 139	59 to 139	30
Chlorobenzene	59 to 139	60 to 133	30

Surrogate Control Limits

Surrogate Spike Compound	Soil % Recovery
Toluene-d8	84 to 138
Bromofluorobenzene	59 to 113
1,2-dichloroethane-d4	70 to 121

Notes:

% Percent
LCS Laboratory control sample
RPD Relative percent difference

TABLE A-2: SEMIVOLATILE ORGANIC COMPOUNDS EPA METHOD 8270C METHOD PRECISION AND ACCURACY GOALS

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Laboratory Control Sample and Matrix Spike Limits

	Soil		
Matrix Spike Compound	**LCS % Recovery**	**Matrix Spike % Recovery**	**RPD**
Phenol	30 to 130	20 to 130	50
2-Chlorophenol	30 to 130	20 to 130	50
1,4-Dichlorobenzene	30 to 130	10 to 130	50
N-nitroso-di-n-propylamine	30 to 130	20 to 130	50
1,2,4-Trichlorobenzene	30 to 130	10 to 130	50
4-Chloro-3-methylphenol	30 to 130	30 to 130	50
Acenaphthene	30 to 130	20 to 130	50
4-Nitrophenol	20 to 130	20 to 130	50
2,4-Dinitrotoluene	30 to 130	20 to 130	50
Pentachlorophenol	20 to 130	20 to 130	50
Pyrene	30 to 130	10 to 160	50

Surrogate Control Limits

Surrogate Spike Compound	Soil % Recovery
Nitrobenzene-d5	20 to 130
2,4,6--Tribromophenol	20 to 140
Terphenyl-d14	40 to 130
Phenol-d5	20 to 130
2-fluorophenol	20 to 130
2-fluorobiphenyl	30 to 130

Notes:

%	Percent
LCS	Laboratory control sample
RPD	Relative percent difference

TABLE A-3: EXPLOSIVES EPA METHOD 8330
METHOD PRECISION AND ACCURACY GOALS
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Laboratory Control Sample and Matrix Spike Limits

	Soil and Water		
Matrix Spike Compound	**LCS % Recovery**	**Matrix Spike % Recovery**	**RPD**
1,3,5-Trinitrobenzene	60 to 140	50 to 150	50
1,3-Dinitrobenzene	60 to 140	50 to 150	50
2,4,6-Trinitrotoluene	60 to 140	50 to 150	50
2,4-Dintrotoluene	60 to 140	50 to 150	50
2,6-Dinitrotoluene	60 to 140	50 to 150	50
2-Amino-4,6-dinitrotoluene	60 to 140	50 to 150	50
2-Nitrotoluene	60 to 140	50 to 150	50
3-Nitrotoluene	60 to 140	50 to 150	50
4-Amino-2,6-dinitrotoluene	60 to 140	50 to 150	50
4-Nitrotoluene	60 to 140	50 to 150	50
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	60 to 140	50 to 150	50
Nitrobenzene	60 to 140	50 to 150	50
Picric Acid	60 to 140	50 to 150	50
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	60 to 140	50 to 150	50
Tetryl	60 to 140	50 to 150	50

Surrogate Control Limits

Surrogate Spike Compound	Soil % Recovery
3,4-Dinitrotoluene [a]	75 to 125

Notes:

a Or other suitable surrogate compound

% Percent
LCS Laboratory control sample
RPD Relative percent difference

TABLE A-4: DIOXINS EPA METHOD 8290
METHOD PRECISION AND ACCURACY GOALS
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Laboratory Control Sample and Matrix Spike Limits

	Soil		
Matrix Spike Compound	**LCS % Recovery**	**Matrix Spike % Recovery**	**RPD**
2,3,7,8 – TCDD	67 to 158	67 to 158	50
2,3,7,8 – TCDF	75 to 158	75 to 158	50
1,2,3,7,8 – PeCDF	80 to 134	80 to 134	50
1,2,3,7,8 – PeCDD	70 to 142	70 to 142	50
2,3,4,7,8 – PeCDF	68 to 160	68 to 160	50
1,2,3,4,7,8 – HxCDF	72 to 134	72 to 134	50
1,2,3,6,7,8 – HxCDF	84 to 130	84 to 130	50
1,2,3,4,7,8 – HxCDD	70 to 164	70 to 164	50
1,2,3,6,7,8 – HxCDD	76 to 134	76 to 134	50
1,2,3,7,8,9 – HxCDD	64 to 162	64 to 162	50
2,3,4,6,7,8 – HxCDF	70 to 156	70 to 156	50
1,2,3,7,8,9 - HxCDF	78 to 130	78 to 130	50
1,2,3,4,6,7,8 – HpCDF	82 to 132	82 to 132	50
1,2,3,4,,6,7,8 – HpCDD	70 to 140	70 to 140	50
1,2,3,4,7,8,9 – HpCDF	78 to 138	78 to 138	50
OCDD	78 to 144	78 to 144	50
OCDF	63 to 170	63 to 170	50

Surrogate Control Limits

Surrogate Spike Compound	Water % Recovery
13C -1,2,3,4-TCDD[a]	75 to 125
13 C -1,2,3,7,8,9-HxCDD [a]	75 to 125

Notes:

a	Or other suitable surrogate compound		
%	Percent	TCDD	Trichlorodibenzodioxin
LCS	Laboratory control sample	RPD	Relative percent difference
HpCDD	Heptachlorodibenzo-p-dioxin		
HpCDF	Heptachlorodibenzofuran		
HxCDD	Hexachlorodibenzo-p-dioxin		
HxCDF	Hexachlorodibenzofuran		
OCDD	Octachlorodibenzo-p-dioxin		
OCDF	Octachlorodibenzofuran		
PeCDD	Pentachlorodibenzo-p-dioxin		
PeCDF	Pentachlorodibenzofuran		

TABLE A-5: METALS (PLUS STRONTIUM AND DEPLETED URANIUM) ANALYSES EPA METHODS 6010B, 6020 AND 7471A METHOD PRECISION AND ACCURACY GOALS

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Laboratory Control Sample and Matrix Spike Limits

	Soil and Water	
Matrix Spike Compound	**LCS % Recovery**	**Matrix Spike % Recovery**
Aluminum	80 to 120	75 to 125
Anitmony	80 to 120	75 to 125
Arsenic	80 to 120	75 to 125
Barium	80 to 120	75 to 125
Boron	80 to 120	75 to 125
Beryllium	80 to 120	75 to 125
Cadmium	80 to 120	75 to 125
Calcium	80 to 120	75 to 125
Chromium	80 to 120	75 to 125
Cobalt	80 to 120	75 to 125
Copper	80 to 120	75 to 125
Depleted Uranium	80 to 120	75 to 125
Iron	80 to 120	75 to 125
Lead	80 to 120	75 to 125
Magnesium	80 to 120	75 to 125
Manganese	80 to 120	75 to 125
Nickel	80 to 120	75 to 125
Phosphorus	80 to 120	75 to 125
Potassium	80 to 120	75 to 125
Selenium	80 to 120	75 to 125
Silver	80 to 120	75 to 125
Sodium	80 to 120	75 to 125
Thallium	80 to 120	75 to 125
Tin	80 to 120	75 to 125
Vanadium	80 to 120	75 to 125
Zinc	80 to 120	75 to 125
Mercury	80 to 120	75 to 125
Strontium	80 to 120	75 to 125
Lithium	80 to 120	75 to 125

Notes:

% Percent

LCS	Laboratory control sample
EPA	U.S. Environmental Protection Agency
RPD	Relative percent difference

TABLE A-6: PERCHLORATE EPA METHOD 6850 METHOD PRECISION AND ACCURACY GOALS
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Laboratory Control Sample and Matrix Spike Limits

	Soil		
Matrix Spike Compound	**LCS % Recovery**	**Matrix Spike % Recovery**	**RPD**
Perchlorate	80 to 120	75 to 120	20

Notes:

%	Percent
LCS	Laboratory control sample
EPA	U.S. Environmental Protection Agency
RPD	Relative percent difference

TABLE A-7: POLYNUCLEAR AROMATIC HYDROCARBONS EPA METHOD 8270 - SIM METHOD PRECISION AND ACCURACY GOALS

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

	Soil		
Matrix Spike Compound	**LCS % Recovery**	**Matrix Spike % Recovery**	**RPD**
Acenaphthene	10 – 130	10-130	50
Pyrene	20 – 150	10-160	50

Surrogate Control Limits

Surrogate Compound	Soil % Recovery
Terphenyl-d14	40-130

Notes:

EPA U.S. Environmental Protection Agency
RPD Relative percent difference
SIM Selective ion monitoring

APPENDIX B
FIELD FORMS

- Chain-of-Custody Record
- Daily Quality Control Report
- Borelog

ChaduxTt JV
Consulting Engineers and Scientists

SOIL BORING AND WELL INSTALLATION AND VISUAL CLASSIFICATION LOG

CTO: _____

Bldg./Site: _____

Project Name: _____

Boring Number:	Date Started:
Drilling Method: (*Circle one*) HSA Continuous Core/Direct-Push/Hand Auger/ Air Rotary/Mud Rotary/Dual Tube Percussion/Sonic/Vacuum	Date Completed:
	Logged By:
Outer Diameter of Boring:	Drilling Subcontractor:
Inner Diameter of Well Casing:	Driller:
Depth to Water (feet bgs):	Location Sketch:

Time	Depth (feet bgs)	Drive Interval	Recovered Interval	Sample ID	Blow Count (per 6 inches) / V.B. Utility Type Diameter	Description	USCS Soil Symbol	Well Construction	OVM (ppm)

ChaduxTt JV
Consulting Engineers and Scientists

SOIL BORING AND WELL INSTALLATION AND VISUAL CLASSIFICATION LOG

CTO: _____

Bldg./Site: _____

Project Name: _____

Time	Depth (feet bgs)	Drive Interval	Recovered Interval	Sample ID	Blow Count (per 6 inches) / V.B. utility type dia	Description	USCS Soil Symbol	Well Construction	OVM (ppm)

ChaduxTt JV
Consulting Engineers and Scientists

CHAIN-OF-CUSTODY #: _____

Date: _____ Page ____ of ____

Destination: _____

Project Name:	Project Charge No.:
Sampler(s): Printed name and signature	Technical contact:

Sample ID	Date of Collection	Time of Collection	Sample Medium	No./Container Types										Preservatives															

Analyses Required

	SIGNATURE	NAME (print)	COMPANY	DATE	TIME
Relinqueshed by:					
Received by:					
Relinqueshed by:					
Received by:					
Relinqueshed by:					
Received by:					

REMARKS: (Note: Identify samples for which extra volume was collected for MS/MSD and record air bill number and any other pertinent information.)

TURNAROUND TIME

AIRBILL #:

PO #:

Instructions: Under "Analyses Required," and "Field Sample Preparation," enter only one of the following two codes for each analysis requested and each sample listed:

U=UNPRESERVED SAMPLE; P=PRESERVED; F= FILTERED; B= FILTERED AND PRESERVED

APPENDIX C
PROJECT- REQUIRED REPORTING LIMITS

TABLE C-1: VOLATILE ORGANIC COMPOUNDS IN SOIL COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Volatile Compound	CAS Number	Analytical Method	MDL[e]	Soil PRRL (mg/kg)	Residential Soil PRG (mg/kg)	Ecological Screening Level[c] (mg/kg)	Soil PRRL Below Criteria[d]?
Chloromethane	74-87-3	EPA 8260B	TBD	0.005	1.2	NA	Yes
Bromomethane	74-83-9	EPA 8260B	TBD	0.005	3.9	NA	Yes
Vinyl chloride	75-01-4	EPA 8260B	TBD	0.005	0.079	NA	Yes
Chloroethane	75-00-3	EPA 8260B	TBD	0.005	3	NA	Yes
Methylene chloride	75-09-2	EPA 8260B	TBD	0.005	9.1	NA	Yes
Acetone	67-64-1	EPA 8260B	TBD	0.02	14,000	NA	Yes
Carbon disulfide	75-15-0	EPA 8260B	TBD	0.005	360	NA	Yes
1,1-Dichloroethene	75-35-4	EPA 8260B	TBD	0.005	120	NA	Yes
1,1-Dichloroethane	75-34-3	EPA 8260B	TBD	0.005	510	NA	Yes
cis-1,2-Dichloroethene	156-59-2	EPA 8260B	TBD	0.005	43	NA	Yes
trans-1,2-Dichloroethene	156-60-5	EPA 8260B	TBD	0.005	69	NA	Yes
Chloroform	67-66-3	EPA 8260B	TBD	0.005	0.94	NA	Yes
1,2-Dichloroethane	107-06-2	EPA 8260B	TBD	0.005	0.28	NA	Yes
2-Butanone	78-93-3	EPA 8260B	TBD	0.01	22,000	NA	Yes
1,1,1-Trichloroethane	71-55-6	EPA 8260B	TBD	0.005	1,200	NA	Yes
Carbon tetrachloride	56-23-5	EPA 8260B	TBD	0.005	0.25	1,000	Yes
Bromodichloromethane	75-27-4	EPA 8260B	TBD	0.005	0.82	NA	Yes
1,2-Dichloropropane	78-87-5	EPA 8260B	TBD	0.005	0.34	700	Yes
cis-1,3-Dichloropropene	10061-01-5	EPA 8260B	TBD	0.005	0.78	NA	Yes
Trichloroethene	79-01-6	EPA 8260B	TBD	0.005	2.9	NA	Yes
Dibromochloromethane	124-48-1	EPA 8260B	TBD	0.005	1.1	NA	Yes
1,1,2-Trichloroethane	79-00-5	EPA 8260B	TBD	0.005	0.73	NA	Yes
Benzene	71-43-2	EPA 8260B	TBD	0.005	0.64	0.5	Yes
trans-1,3-Dichloropropene	10061-02-6	EPA 8260B	TBD	0.005	0.78	NA	Yes
Bromoform	75-25-2	EPA 8260B	TBD	0.005	62	NA	Yes
4-Methyl-2-pentanone	108-10-1	EPA 8260B	TBD	0.02	5,300	NA	Yes
2-Hexanone	591-78-6	EPA 8260B	TBD	0.02	NA[a]	NA	NA
Tetrachloroethene	127-18-4	EPA 8260B	TBD	0.005	0.48	NA	Yes
Toluene	108-88-3	EPA 8260B	TBD	0.005	520	200	Yes
1,1,2,2-Tetrachloroethane	79-34-5	EPA 8260B	TBD	0.005	0.41	NA	Yes
1,2,4-Trimethylbenzene	95-63-6	EPA 8260B	TBD	0.005	52	NA	Yes
1,3,5-Trimethylbenzene	108-67-8	EPA 8260B	TBD	0.005	21	NA	Yes
n-butylbenzene	104-51-8	EPA 8260B	TBD	0.005	240	NA	Yes
sec-butylbenzene	135-98-8	EPA 8260B	TBD	0.005	220	NA	Yes
tert-butylbenzene	98-06-6	EPA 8260B	TBD	0.005	390	NA	Yes
isopropylbenzene	98-82-8	EPA 8260B	TBD	0.005	570	NA	Yes

TABLE C-1: VOLATILE ORGANIC COMPOUNDS IN SOIL COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS (CONTINUED)

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Volatile Compound	CAS Number	Analytical Method	MDL[e]	Soil PRRL (mg/kg)	Residential Soil PRG (mg/kg)	Ecological Screening Level[c] (mg/kg)	Soil PRRL Below Criteria[d]?
p-isopropyltoluene	99-87-6	EPA 8260B	TBD	0.005	NA[a]	NA	NA
n-propylbenzene		EPA 8260B	TBD	0.005	240	NA	Yes
Chlorobenzene	108-90-7	EPA 8260B	TBD	0.005	150	40	Yes
Ethylbenzene	100-41-4	EPA 8260B	TBD	0.005	400	NA	Yes
Styrene	100-42-5	EPA 8260B	TBD	0.005	1,700	300	Yes
m,p- xylene	136777-61-2	EPA 8260B	TBD	0.010	270[b]	NA	Yes
o-xylene	95-47-6	EPA 8260B	TBD	0.005	270[b]	NA	Yes

Notes:

[a] No PRG is available for this compound; the most updated toxicity criteria will be used in the evaluation.

[b] PRG listed is for total xylenes.

[c] Ecological screening levels are based on EPA Eco-SSLs (EPA 2007) or the lowest available screening level from ORNL (Efroymson and others 1997a,b) or Talmage and others (1999).

[d] The lowest of the screening criteria will be used

[e] The MDL will be determined once a laboratory has been selected for the investigation. The final Sampling and Analysis Plan will include the MDL for each chemical.

mg/kg Milligram per kilogram
EPA U.S. Environmental Protection Agency
MDL Method detection limit
NA Not available or not applicable
PRG Preliminary remediation goal
PRRL Project-required reporting limit
TBD To be determined (Will be updated prior to finalization of the SAP and initiation of field work)

TABLE C-2: SEMIVOLATILE ORGANIC COMPOUNDS IN SOIL COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Semivolatile Organic Compound	CAS Number	Analytical Method	MDL[e]	Soil PRRL (mg/kg)	Residential PRG (mg/kg)	Ecological Screening Level[b] (mg/kg)	PRRL Below Criteria[d]?
1,2,4,5-Tetrachlorobenzene	95-94-3	EPA 8270C	TBD	0.33	18	10	Yes
1,2,4-Trichlorobenzene	120-82-1	EPA 8270C	TBD	0.33	62	20	Yes
1,2-Dichlorobenzene	95-50-1	EPA 8270C	TBD	0.33	600	NA	Yes
1,3-Dichlorobenzene	541-73-1	EPA 8270C	TBD	0.33	530	NA	Yes
1,4-Dichlorobenzene	106-46-7	EPA 8270C	TBD	0.33	3.4	20	Yes
2,4,5-Trichlorophenol	95-95-4	EPA 8270C	TBD	0.33	6100	9	Yes
2,4,6-Trichlorophenol	88-06-2	EPA 8270C	TBD	0.33	6.9	10	Yes
2,4-Dichlorophenol	120-83-2	EPA 8270C	TBD	0.33	180	20	Yes
2,4-Dimethylphenol	105-67-9	EPA 8270C	TBD	0.33	1200	NA	Yes
2,4-Dinitrophenol	51-28-5	EPA 8270C	TBD	0.66	120	20	Yes
2,6-Dichlorophenol	87-65-0	EPA 8270C	TBD	0.33	NA	20	Yes
2-Chloronaphthalene	91-58-7	EPA 8270C	TBD	0.33	4900	NA	Yes
2-Chlorophenol	95-57-8	EPA 8270C	TBD	0.33	63	7	Yes
2-Methylphenol	95-48-7	EPA 8270C	TBD	0.33	3100	NA	Yes
2-Nitroaniline	88-74-4	EPA 8270C	TBD	0.33	180	NA	Yes
2-Nitrophenol	88-75-5	EPA 8270C	TBD	0.33	NA[c]	7	Yes
3,3'-Dichlorobenzidine	91-94-1	EPA 8270C	TBD	0.33	1.1	NA	Yes
3,3'-Dimethylbenzidine	119-93-7	EPA 8270C	TBD	0.33	0.21	NA	No[a]
3,4-Methylphenol	108-39-4	EPA 8270C	TBD	0.33	310	NA	Yes
3-Nitroaniline	99-09-2	EPA 8270C	TBD	0.33	18	NA	Yes
4,6-Dinitro-2-methylphenol	534-52-1	EPA 8270C	TBD	0.66	6.1	NA	Yes
4-Bromophenyl phenyl ether	101-55-3	EPA 8270C	TBD	0.33	NA[c]	NA	NA
4-Chloro-3-methylphenol	59-50-7	EPA 8270C	TBD	0.33	NA[c]	NA	NA
4-Chloroaniline	106-47-8	EPA 8270C	TBD	0.33	240	20	Yes
4-Chlorophenyl phenyl ether	7005-72-3	EPA 8270C	TBD	0.33	NA[c]	NA	NA
4-Nitroaniline	100-01-6	EPA 8270C	TBD	0.33	23	NA	Yes
4-Nitrophenol	100-02-7	EPA 8270C	TBD	0.66	NA[c]	7	Yes
5-Nitro-o-toluidine	99-55-8	EPA 8270C	TBD	0.33	15	NA	Yes

TABLE C-2: SEMIVOLATILE ORGANIC COMPOUNDS IN SOIL COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS (CONTINUED)

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Acenaphthene	83-32-9	EPA 8270C	TBD	0.33	3700	20	Yes
Acetophenone	98-86-2	EPA 8270C	TBD	0.33	7800	NA	Yes
Aniline	62-53-3	EPA 8270C	TBD	0.33	85	NA	Yes
Aramite	140-57-8	EPA 8270C	TBD	0.33	19	NA	Yes
Benzo(a)anthracene	56-55-3	EPA 8270C	TBD	0.33	6.2	NA	Yes
Benzo(a)pyrene	50-32-8	EPA 8270C	TBD	0.33	0.062	NA	No[a]
Benzo(b)fluoranthene	205-99-2	EPA 8270C	TBD	0.33	0.62	NA	Yes
Benzo(g,h,i)perylene	191-24-2	EPA 8270C	TBD	0.33	2300	NA	Yes
Benzo(k)fluoranthene	207-08-9	EPA 8270C	TBD	0.33	0.38	NA	Yes
Benzyl alcohol	100-51-6	EPA 8270C	TBD	0.33	18000	NA	Yes
bis(2-Chloroethoxy)methane	111-91-1	EPA 8270C	TBD	0.33	NA[c]	NA	Yes
bis(2-Chloroethyl)ether	111-44-4	EPA 8270C	TBD	0.33	0.22	NA	No[a]
bis(2-Chloroisopropyl)ether	108-60-1	EPA 8270C	TBD	0.33	2.9	NA	Yes
bis(2-Ethylhexyl) phthalate	117-81-7	EPA 8270C	TBD	0.33	35	NA	Yes
Butyl benzyl phthalate	85-68-7	EPA 8270C	TBD	0.33	12000	NA	Yes
Chlorobenzilate	510-15-6	EPA 8270C	TBD	0.33	1.8	NA	Yes
Chrysene	218-01-9	EPA 8270C	TBD	0.33	62	NA	Yes
Diallate		EPA 8270C	TBD	0.33	8	NA	Yes
Di-n-butyl phthalate	84-74-2	EPA 8270C	TBD	0.33	6100	200	Yes
Di-n-octyl phthalate	117-84-0	EPA 8270C	TBD	0.33	2400	NA	Yes
Dibenzo(a,h)anthracene	53-70-3	EPA 8270C	TBD	0.33	0.062	NA	No[a]
Dibenzofuran	132-64-9	EPA 8270C	TBD	0.33	290	NA	Yes
Diethyl phthalate	84-66-2	EPA 8270C	TBD	0.33	49000	100	Yes
a,a-Dimethylphenethylamine	122-09-8	EPA 8270C	TBD	0.33	61	NA	Yes
Dimethyl phthalate	131-11-3	EPA 8270C	TBD	0.33	100000	200	Yes
Diphenylamine	122-39-4	EPA 8270C	TBD	0.33	1500	NA	Yes
Fluoranthene	206-44-0	EPA 8270C	TBD	0.33	2300	NA	Yes
Fluorene	86-73-7	EPA 8270C	TBD	0.33	2700	20	Yes
Hexachlorobenzene	118-74-1	EPA 8270C	TBD	0.33	0.3	NA	No
Hexachlorobutadiene	87-68-3	EPA 8270C	TBD	0.33	6.2	NA	Yes

TABLE C-2: SEMIVOLATILE ORGANIC COMPOUNDS IN SOIL COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS (CONTINUED)

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Hexachlorocyclopentadiene	77-47-4	EPA 8270C	TBD	0.33	370	10	Yes
Hexachloroethane	67-72-1	EPA 8270C	TBD	0.33	35	NA	Yes
Indeno(1,2,3-cd)pyrene	193-39-5	EPA 8270C	TBD	0.33	0.62	NA	Yes
Isophorone	78-59-1	EPA 8270C	TBD	0.33	510	NA	Yes
Kepone	143-50-0	EPA 8270C	TBD	0.33	0.061	NA	No[a]
Naphthalene	91-20-3	EPA 8270C	TBD	0.33	1.7	20	Yes
n-Nitrosodi-n-butylamine	924-16-3	EPA 8270C	TBD	0.33	0.024	NA	No[a]
n-Nitrosodimethylamine	62-75-9	EPA 8270C	TBD	0.33	0.0095	NA	No[a]
n-Nitrosodi-n-propylamine	621-64-7	EPA 8270C	TBD	0.33	0.069	NA	No[a]
n-Nitrosomethylethylamine	621-64-7	EPA 8270C	TBD	0.33	0.0095	NA	No[a]
n-Nitrosopyrrolidine	10595-95-6	EPA 8270C	TBD	0.33	0.23	NA	No[a]
Pentachlorobenzene	930-55-2	EPA 8270C	TBD	0.33	49	20	Yes
Pentachloroethane	608-93-5	EPA 8270C	TBD	0.33	NA[c]	NA	Yes
Pentachloronitrobenzene	76-01-7	EPA 8270C	TBD	0.33	1.9	NA	Yes
Phenanthrene	85-01-8	EPA8270C	TBD	0.33	2300	20	Yes
Phenol	108-95-2	EPA 8270C	TBD	0.33	18000	30	Yes
Pronamide	23950-58-5	EPA 8270C	TBD	0.33	4600	NA	Yes
Pyrene	129-00-0	EPA 8270C	TBD	0.33	2300	NA	Yes
Pyridine	100-86-1	EPA 8270C	TBD	0.33	61	NA	Yes
o-Toluidine	95-53-4	EPA 8270C	TBD	0.33	2	NA	Yes

Notes:

[a] Concentrations above the method detection limit but below the PRRL will be provided but flagged as an estimated value. The listed PRRL will be used as the project screening criteria unless reasonable grounds are established for pursuing nonroutine methods.

[b] Ecological screening levels are based on EPA Eco-SSLs (EPA 2007) or the lowest available screening level from ORNL (Efroymson and others 1997a,b) or Talmage and others (1999).

[c] No PRG is available for this compound; the most updated toxicity criteria will be used in the evaluation.

[d] The lowest of the screening criteria will be used

[e] The MDL will be determined once a laboratory has been selected for the investigation. The final Sampling and Analysis Plan will include the MDL for each chemical.

TABLE C-2: SEMIVOLATILE ORGANIC COMPOUNDS IN SOIL COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS (CONTINUED)

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

mg/kg	Milligram per kilogram
EPA	U.S. Environmental Protection Agency
MDL	Method detection limit
TBD	To be determined (Will be updated prior to finalization of the SAP and initiation of field work)
NA	Not available or not applicable
PRG	Preliminary remediation goal
PRRL	Project-required reporting limit

TABLE C-3: EXPLOSIVES IN SOIL COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Explosives	CAS Number	Analytical Method	MDL[d]	Soil PRRL (mg/kg)	Residential PRG (mg/kg)	Ecological Screening Level[a] (mg/kg)	PRRL Below Criteria[b]?
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	EPA 8330	TBD	0.005	3,100	NA	Yes
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	EPA 8330	TBD	0.25	4.4	100	Yes
1,3,5-Trinitrobenzene (1,3,5-TNB)	99-35-4	EPA 8330	TBD	0.25	1,800	40	Yes
1,3-Dinitrobenzene (1,3-DNB)	99-65-0	EPA 8330	TBD	0.25	6.1	40	Yes
Methyl-2,4,6-trinitrophenylnitramine (tetryl)	479-45-8	EPA 8330	TBD	0.25	610	25	Yes
Nitrobenzene (NB)	98-95-3	EPA 8330	TBD	0.25	20	40	Yes
2,4,6-Trinitrotoluene (2,4,6-TNT)	118-96-7	EPA 8330	TBD	0.25	16	30	Yes
4-Amino-2,6-dinitrotoluene	19406-51-0	EPA 8330	TBD	0.25	120	NA	Yes
2-Amino-4,6-dinitrotoluene	35572-78-2	EPA 8330	TBD	0.25	120	80	Yes
2,4-Dinitrotoluene (2,4-DNT)	121-14-2	EPA 8330	TBD	0.25	120	NA	Yes
2,6-Dinitrotoluene (2,6-DNT)	606-20-2	EPA 8330	TBD	0.25	61	NA	Yes
2-Nitrotoluene	88-72-2	EPA 8330	TBD	0.25	370	NA	Yes
3-Nitrotoluene	99-08-1	EPA 8330	TBD	0.25	370	NA	Yes
4-Nitrotoluene	99-99-0	EPA 8330	TBD	0.25	12	NA	Yes
Picric Acid[c]	88-89-1	EPA 8330	TBD	1.0	NA	NA	NA

Notes:

[a] Ecological screening levels are based on EPA Eco-SSLs (EPA 2007) or the lowest available screening level from ORNL (Efroymson and others 1997a,b) or Talmage and others (1999).

[b] The lowest of the screening criteria will be used.

TABLE C-3: EXPLOSIVES IN SOIL COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS (CONTINUED)

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

[c] Only samples from the trench subarea will be analyzed for picric acid

[d] The MDL will be determined once a laboratory has been selected for the investigation. The final Sampling and Analysis Plan will include the MDL for each chemical.

mg/kg Milligram per kilogram
CAS Chemical Abstracts Services
EPA U.S. Environmental Protection Agency
MDL Method detection limit
NA Not available or not applicable
PRG Preliminary remediation goal
PRRL Project-required reporting limit
TBD To be determined, (Will be updated prior to finalization of the SAP and initiation of field work)

TABLE C-4: DIOXINS IN SOIL COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Dioxin	CAS Number	Analytical Method	MDL[d]	Soil PRRL (ng/kg)	Residential PRG (ng/kg)	Ecological Screening Level[a] (ng/kg)	PRRL Below Criteria[c]?
1,2,3,4,6,7,8,9-OCDD	3268-87-9	EPA 8290	TBD	10	13000	NA	Yes
1,2,3,4,6,7,8,9-OCDF	39001-02-0	EPA 8290	TBD	10	13000	NA	Yes
1,2,3,4,6,7,8-HPCDD	67562-39-4	EPA 8290	TBD	5	390	NA	Yes
1,2,3,4,6,7,8-HPCDF	67562-39-4	EPA 8290	TBD	5	390	NA	Yes
1,2,3,4,7,8,9-HPCDF	55673-89-7	EPA 8290	TBD	5	390	NA	Yes
1,2,3,4,7,8-HXCDD	39227-28-6	EPA 8290	TBD	5	39	NA	Yes
1,2,3,4,7,8-HXCDF	70648-26-9	EPA 8290	TBD	5	39	NA	Yes
1,2,3,6,7,8-HXCDD	57563-85-7	EPA 8290	TBD	5	39	NA	Yes
1,2,3,6,7,8-HXCDF	57117-44-9	EPA 8290	TBD	5	39	NA	Yes
1,2,3,7,8,9-HXCDD	19408-74-3	EPA 8290	TBD	5	39	NA	Yes
1,2,3,7,8,9-HXCDF	72918-21-9	EPA 8290	TBD	5	39	NA	Yes
1,2,3,7,8-PECDD	40321-76-4	EPA 8290	TBD	5	3.9	NA	No[b]
1,2,3,7,8-PECDF	57117-41-6	EPA 8290	TBD	5	130	NA	Yes
2,3,4,6,7,8-HXCDF	60851-34-5	EPA 8290	TBD	5	39	NA	Yes
2,3,4,7,8-PECDF	57117-31-4	EPA 8290	TBD	5	13	NA	Yes
2,3,7,8-TCDD	1746-01-6	EPA 8290	TBD	1	3.9	NA	Yes
2,3,7,8-TCDF	51207-31-9	EPA 8290	TBD	1	39	NA	Yes

Notes:

[a] Ecological screening levels are based on EPA Eco-SSLs (EPA 2007) or the lowest available screening level from ORNL (Efroymson and others 1997a,b) or Talmage and others (1999).

[b] Concentrations above the method detection limit but below the PRRL will be provided but flagged as an estimated value. The listed PRRL is 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.

[c] The lowest of the screening criteria will be used

[d] The MDL will be determined once a laboratory has been selected for the investigation. The final Sampling and Analysis Plan will include the MDL for each chemical.

ng/kg Nanogram per kilogram
CAS Chemical Abstracts Services

TABLE C-4: DIOXINS IN SOIL COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS (CONTINUED)

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

EPA	U.S. Environmental Protection Agency
NA	Not available or not applicable
PRG	Preliminary remediation goal
PRRL	Project-required reporting limit
TBD	To be determined (Will be updated prior to finalization of the SAP and initiation of field work)

TABLE C-5: METALS IN SOIL COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Metal	CAS Number	Analytical Method	MDL[g]	Soil PRRL (mg/kg)	Residential PRG (mg/kg)	Ecological Screening Level[a] (mg/kg)	Background (mg/kg)	PRRL Below Criteria[b]?
Aluminum	7429-90-5	EPA 6020	TBD	25	76000	50	NA	Yes
Antimony	7440-36-0	EPA 6020	TBD	1	31	0.27	8.76	Yes[c]
Arsenic	7440-38-2	EPA 6020	TBD	5	0.062	18	4.61	No[d]
Barium	7440-39-3	EPA 6020	TBD	5	5400	330	262	Yes
Beryllium	7440-41-7	EPA 6020	TBD	0.5	150	10	1.52	Yes
Cadmium	7440-43-9	EPA 6020	TBD	0.5	37	0.36	1.58	Yes[c]
Calcium	7440-70-2	EPA 6020	TBD	50	NA	NA	NA	NA
Chromium (total)	7440-47-3	EPA 6020	TBD	2	30	0.4	33	Yes[c]
Cobalt	7440-48-4	EPA 6020	TBD	1	900	13	13.3	Yes
Copper	7440-50-8	EPA 6020	TBD	2	3100	28	27	Yes
Depleted Uranium	7440-61-1	EPA 6020	TBD	10	16	NA	NA	Yes
Iron	7439-89-6	EPA 6020	TBD	25	23000	NA	NA	Yes
Lead	7439-92-1	EPA 6020	TBD	2	150	11	29.1	Yes
Magnesium	7439-95-4	EPA 6020	TBD	50	NA	NA	NA	NA
Manganese	7439-96-5	EPA 6020	TBD	2.5	1800	500	NA	Yes
Nickel	7440-02-0	EPA 6020	TBD	1	1600	38	22.5	Yes
Potassium	7440-09-7	EPA 6020	TBD	50	NA	NA	NA	Yes
Selenium	7782-49-2	EPA 6020	TBD	0.5	390	1	0.78	Yes
Silver	7440-22-4	EPA 6020	TBD	0.5	390	2	1.36	Yes
Sodium	7440-23-5	EPA 6020	TBD	50	NA	NA	1.35	Yes
Strontium[e]	7440-24-6	EPA 6020	TBD	10	47000	NA	NA	Yes
Thallium	7440-28-0	EPA 6020	TBD	0.5	5.2	1.1	1.35	Yes
Vanadium	7440-62-2	EPA 6020	TBD	1	78	2	69.4	Yes
Zinc	7440-66-6	EPA 6020	TBD	10	23000	50	111	Yes
Mercury	7439-97-6	EPA 7471	TBD	0.1	23	0.1	0.08	Yes[f]

Notes:

[a] Ecological screening levels are based on EPA Eco-SSLs (EPA 2007) or the lowest available screening level from ORNL (Efroymson and others 1997a,b) or Talmage and others (1999).

[b] Concentrations above background will be compared to the lowest screening criteria

TABLE C-5: METALS IN SOIL COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS (CONTINUED)

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

[c]	PRRL is above ecological screening level but below background concentration
[d]	Although the background concentration for arsenic is slightly below the PRRL, concentrations above the detection limit but below the PRRL will be provided and flagged as an estimated value. Estimated concentrations will be compared to the background concentration of 4.61 mg/kg as necessary.
[e]	Strontium will be included only for a subset of samples collected from UXO1 and UXO3
[f]	Although PRRL is above background, it is equal to the ecological screening level and below the residential PRG
[g]	The MDL will be determined once a laboratory has been selected for the investigation. The final Sampling and Analysis Plan will include the MDL for each chemical.
mg/kg	Milligram per kilogram
CAS	Chemical Abstracts Services
EPA	U.S. Environmental Protection Agency
MDL	Method detection limit
NA	Not available or not applicable
PRG	Preliminary remediation goal
PRRL	Project-required reporting limit
TBD	To be determined (Will be updated prior to finalization of the SAP and initiation of field work)

TABLE C-6: PERCHLORATE IN SOIL COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Perchlorate	CAS Number	Analytical Method	MDL[a]	Soil PRRL (mg/kg)	Residential PRG (mg/kg)	Ecological Screening Level (mg/kg)	PRRL Below Criteria?
Perchlorate	14797-73-0	EPA 6850	TBD	0.005	7.8	NA	Yes

mg/kg Milligram per kilogram
CAS Chemical Abstracts Services
EPA U.S. Environmental Protection Agency
MDL Method detection limit
NA Not available or not applicable
PRG Preliminary remediation goal
PRRL Project-required reporting limit
TBD To be determined (Will be updated prior to finalization of the SAP and initiation of field work)

[a] The MDL will be determined once a laboratory has been selected for the investigation. The final Sampling and Analysis Plan will include the MDL for each chemical.

TABLE C-7: POLYNUCLEAR AROMATIC HYDROCARBONS IN SOIL COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Polynuclear Aromatic Hydrocarbon	CAS Number	Analytical Method	MDL[d]	Soil PRRL (mg/kg)	Residential PRG (mg/kg)	Ecological Screening Level[a] (mg/kg)	PRRL Below Criteria[b]?
Acenaphthene	83-32-9	EPA 8270 - SIM	TBD	0.02	3700	20	Yes
Acenaphthylene	208-96-8	EPA 8270 - SIM	TBD	0.02	3700	20	Yes
Anthracene	120-12-7	EPA 8270 - SIM	TBD	0.02	22000	20	Yes
Benzo(a)anthracene	56-55-3	EPA 8270 - SIM	TBD	0.02	6.2	NA	Yes
Benzo(a)pyrene	50-32-8	EPA 8270 - SIM	TBD	0.02	0.062	NA	Yes
Benzo(b)fluoranthene	205-99-2	EPA 8270 - SIM	TBD	0.02	0.62	NA	Yes
Benzo(g,h,i)perylene	191-24-2	EPA 8270 - SIM	TBD	0.02	2300	NA	Yes
Benzo(k)fluoranthene	207-08-9	EPA 8270 - SIM	TBD	0.02	0.38	NA	Yes
Chrysene	218-01-9	EPA 8270 - SIM	TBD	0.02	62	NA	Yes
Dibenzo(a,h)anthracene	53-70-3	EPA 8270 - SIM	TBD	0.02	0.062	NA	Yes
Fluoranthene	206-44-0	EPA 8270 - SIM	TBD	0.02	2300	NA	Yes
Fluorene	86-73-7	EPA 8270 - SIM	TBD	0.02	2700	20	Yes
Indeno(1,2,3-cd)pyrene	193-39-5	EPA 8270 - SIM	TBD	0.02	0.62	NA	Yes
Naphthalene	91-20-3	EPA 8270 - SIM	TBD	0.02	1.7	20	Yes
Phenanthrene	85-01-8	EPA 8270 - SIM	TBD	0.02	2300	20	Yes
Pyrene	129-00-0	EPA 8270 - SIM	TBD	0.02	2300	NA	Yes

Notes:

[a] Ecological screening levels are based on EPA Eco-SSLs (EPA 2007) or the lowest available screening level from ORNL (Efroymson and others 1997a,b) or Talmage and others (1999).

[b] The lowest of the screening criteria will be used.

[c] Samples from the Skeet/Trap Range will be analyzed for PAHs using EPA 8270 – SIM because PAHs are a chemical of concern at this site only

[d] The MDL will be determined once a laboratory has been selected for the investigation. The final Sampling and Analysis Plan will include the MDL for each chemical.

TABLE C-8: METALS IN WATER COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Metal	CAS Number	Analytical Method	MDL[g]	Water PRRL (ug/L)	Residential PRG (ug/L)	Ecological Screening Level (ug/L)	PRRL Below Criteria[b]?
Aluminum	7429-90-5	EPA 6010B	TBD	200	36000	NA	Yes
Antimony	7440-36-0	EPA 6010B	TBD	6	15	NA	Yes
Barium	7440-39-3	EPA 6010B	TBD	2000	2600	NA	Yes
Boron	7440-42-8	EPA 6010B	TBD	NA	7300	NA	NA
Cadmium	7440-43-9	EPA 6010B	TBD	5	18	NA	Yes
Calcium	7440-70-2	EPA 6010B	TBD	NA	NA	NA	NA
Chromium (total)	7440-47-3	EPA 6010B	TBD	100	NA	NA	NA
Cobalt	7440-48-4	EPA 6010B	TBD	NA	730	NA	NA
Copper	7440-50-8	EPA 6010B	TBD	1000	1500	NA	Yes
Iron	7439-89-6	EPA 6010B	TBD	300	11000	NA	Yes
Lead	7439-92-1	EPA 6010B	TBD	15	NA	NA	NA
Magnesium	7439-95-4	EPA 6010B	TBD	NA	NA	NA	NA
Manganese	7439-96-5	EPA 6010B	TBD	50	880	NA	Yes
Molybdenum	7439-98-7	EPA 6010B	TBD	NA	180	NA	NA
Nickel	7440-02-0	EPA 6010B	TBD	NA	730	NA	NA
Phosphorus	7723-14-0	EPA 6010B	TBD	NA	0.73	NA	NA
Potassium	7440-09-7	EPA 6010B	TBD	NA	NA	NA	NA
Silver	7440-22-4	EPA 6010B	TBD	NA	180	NA	NA
Sodium	148-18-5	EPA 6010B	TBD	NA	0.25	NA	NA
Strontium	7440-24-6	EPA 6010B	TBD	NA	22000	NA	NA
Thallium	7440-28-0	EPA 6010B	TBD	2	2.4	NA	Yes
Tin	7440-31-5	EPA 6010B	TBD	NA	22000	NA	NA
Titanium	7440-32-6	EPA 6010B	TBD	NA	150000	NA	NA
Vanadium	7440-62-2	EPA 6010B	TBD	NA	36	NA	NA
Zinc	7440-66-6	EPA 6010B	TBD	5000	11000	NA	Yes

Notes:

[b] Concentrations above background will be compared to the lowest screening criteria

TABLE C-9: EXPLOSIVES IN WATER COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

[c]	PRRL is above ecological screening level but below background concentration
[e]	Strontium will be included only for a subset of samples collected from UXO1 and UXO3
[f]	Although PRRL is above background, it is equal to the ecological screening level and below the residential PRG
[g]	The MDL will be determined once a laboratory has been selected for the investigation. The final Sampling and Analysis Plan will include the MDL for each chemical.
ug/L	Microgram per liter
CAS	Chemical Abstracts Services
EPA	U.S. Environmental Protection Agency
MDL	Method detection limit
NA	Not available or not applicable
PRG	Preliminary remediation goal
PRRL	Project-required reporting limit
TBD	To be determined (Will be updated prior to finalization of the SAP and initiation of field work)

TABLE C-9: EXPLOSIVES IN WATER COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

TABLE C-9: EXPLOSIVES IN WATER COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS
Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

Explosives	CAS Number	Analytical Method	MDL[d]	Water PRRL (ug/L)	Residential PRG (ug/L)	Ecological Screening Level[a] (ug/L)	PRRL Below Criteria[b]?
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	EPA 8330	TBD	0.25	3100	330	Yes
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	EPA 8330	TBD	0.25	4.4	190	Yes
1,3,5-Trinitrobenzene (1,3,5-TNB)	99-35-4	EPA 8330	TBD	0.25	1800	11	Yes
1,3-Dinitrobenzene (1,3-DNB)	99-65-0	EPA 8330	TBD	0.25	6.1	20	Yes
Methyl-2,4,6-trinitrophenylnitramine (tetryl)	479-45-8	EPA 8330	TBD	0.25	610	NA	Yes
Nitrobenzene (NB)	98-95-3	EPA 8330	TBD	0.25	20	NA	Yes
2,4,6-Trinitrotoluene (2,4,6-TNT)	118-96-7	EPA 8330	TBD	0.25	16	90	Yes
4-Amino-2,6-dinitrotoluene	1946-51-0	EPA 8330	TBD	0.25	120	NA	Yes
2-Amino-4,6-dinitrotoluene	35572-78-2	EPA 8330	TBD	0.25	120	20	Yes
2,4-Dinitrotoluene (2,4-DNT)	121-14-2	EPA 8330	TBD	0.25	120	120	Yes
2,6-Dinitrotoluene (2,6-DNT)	606-20-2	EPA 8330	TBD	0.25	61	NA	Yes
2-Nitrotoluene	88-72-2	EPA 8330	TBD	0.25	370	NA	Yes
3-Nitrotoluene	99-08-1	EPA 8330	TBD	0.25	370	NA	Yes
4-Nitrotoluene	99-99-0	EPA 8330	TBD	0.25	12	NA	Yes
Picric Acid	88-89-1	EPA 8330	TBD	0.25	NA	NA	Yes

Notes:

a Ecological screening levels are based on EPA Eco-SSLs (EPA 2007)

b Concentrations above background will be compared to the lowest screening criteria

TABLE C-9: EXPLOSIVES IN WATER COMPARISON OF PROJECT-REQUIRED REPORTING LIMITS AND PRELIMINARY REMEDIATION GOALS

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

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[f]	Although PRRL is above background, it is equal to the ecological screening level and below the residential PRG
[g]	The MDL will be determined once a laboratory has been selected for the investigation. The final Sampling and Analysis Plan will include the MDL for each chemical.
ug/L	Microgram per liter
CAS	Chemical Abstracts Services
EPA	U.S. Environmental Protection Agency
MDL	Method detection limit
NA	Not available or not applicable
PRG	Preliminary remediation goal
PRRL	Project-required reporting limit
TBD	To be determined (Will be updated prior to finalization of the SAP and initiation of field work)

APPENDIX D
APPROVED LABORATORIES

TABLE D-1: CHADUXTT-APPROVED LABORATORIES UNDER BASIC ORDERING AGREEMENT TOTAL PETROLEUM HYDROCARBONS

Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Site Inspection, NAVWPNSTA Seal Beach Det Fallbrook, California

GPL Laboratories 07MLM-B008	
Lab Address:	883 W. 2525 S.
	Syracuse, UT 84075
Point of Contact:	Tim Mikesell
Phone:	(801) 525-0456
Fax:	(801) 525-0457
Business Size:	**SB**
E-mail	mikesellts@earthlink.net

Test America 07MLM-B005	
Lab Address:	880 Riverside Parkway
	West Sacramento, CA 95605
Point of Contact:	Dave Alltucker
Phone:	(916) 374-4383
Fax:	(916) 372-7768
Business Size:	**LB**
E-mail	dave.alltucker@testamericainc.com

Paragon Analytics 07MLM-B009	
Lab Address:	225 Commerce Drive
	Fort Collins, CO 80524
Point of Contact:	Amy Wolf
Phone:	(800) 443-1511 / (970) 490-1511
Fax:	(970) 490-1522
Business Size:	**LB**
E-mail	awolf@paragonlabs.com

Laucks Laboratories 07MLM-B007	
Lab Address:	940 S. Harney Street
	Seattle, WA 98108
Point of Contact:	Mike Baxter / Joyell (Joy)
Phone:	(206) 957-2422 / (206) 957-2449
Fax:	(206) 767-5063
Business Size:	**SB/SDVOSB**
E-mail	mikeb@lauckslabs.com

EMAX Laboratories Inc. 07MLM-B006	
Lab Address:	1835 205th Street
	Torrance, CA 90501
Point of Contact:	Kam Pang / Ye Myint
Phone:	(310) 618-8889
Fax:	(310) 618-0818
Business Size:	**SB/WO**
E-mail	kpang@emaxlabs.com ymyint@emaxlabs.com

Severn Trent Laboratories 07MLM-B010	
Lab Address:	880 Riverside Parkway
	West Sacramento, CA 95605
Point of Contact:	Nilo Ligi
Phone:	(916) 373-5600
Fax:	(916) 372-1059
Business Size:	**LB**
E-mail	nligi@stl-inc.com

Notes:

SB	Small Business
LB	Large Business
SDVOSB	Small Disadvantaged Veteran-Owned Small Business
WO	Woman Owned