

**FINAL
PRELIMINARY ASSESSMENT FOR
THE MUNITIONS RESPONSE PROGRAM,
NAVAL WEAPONS STATION SEAL BEACH
DETACHMENT FALLBROOK, CALIFORNIA**

June, 2006

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This is **Part 1, Sections 1 to 5.6**

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June 2006

Prepared for:

Naval Facilities Engineering Command
SOUTHWEST DIVISION
1220 Pacific Highway
San Diego, CA 92132-5190

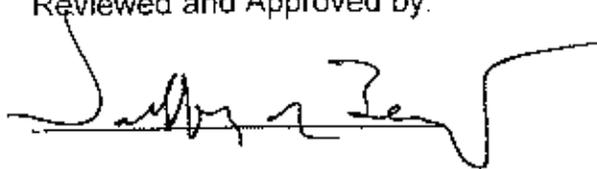
Prepared by:

MALCOLM PIRNIE, INC.
2000 Powell Street, Suite 1180
Emeryville, CA 94608

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THE MUNITIONS RESPONSE PROGRAM,
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DETACHMENT FALLBROOK, CALIFORNIA**

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Reviewed and Approved by:



Jeffrey R. Bennett, P.E., DEE
Program Officer
Malcolm Pirnie, Inc.



Erin K. Caruso, P.E.
Team Leader
Malcolm Pirnie, Inc.



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ACRONYMS

BRAC	Base Realignment and Closure
CD	compact disc
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	conceptual site model
CWM	chemical warfare material
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DU	depleted uranium
EFANE	Engineering Field Activity, Northeast
EOD	explosive ordnance disposal
ESQD	Explosive Safety Quantity Distance
°F	degrees Fahrenheit
ft	foot/feet
FUDS	formerly used defense site
FY	fiscal year
HE	high explosive
HMX	high melting explosive
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
LANTDIV	Atlantic Division
LCDR	Lieutenant Commander
MEC	munitions and explosives of concern
MC	munitions constituents
MCB	Marine Corps Base
MCPD	Marine Corps Program Division
mm	millimeter
MMRP	Military Munitions Response Program
MRP	Munitions Response Program
MSL	mean sea level
NAD	Naval Ammunition Depot

FINAL PRELIMINARY ASSESSMENT

NAND	Naval Ammunition and Net Depot
NAVFAC	Naval Facilities Engineering Command
NAVWPNSTA	Naval Weapons Station
NFA	No Further Action
NCP	National Contingency Plan
OE	Ordnance and Explosives
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbons
PBX	plastic-based explosives
PETN	Pentaerythritol tetranitrate
POC	point of contact
QE	Quality Evaluation
RG	record groups
RDX	royal demolition explosive
RPM	remedial project manager
SARA	Superfund Amendment and Reauthorization Act
SDZ	Surface Danger Zone
SF	Security Forces
SI	Site Inspection
SWRCB	State Water Resources Control Board
TNT	2,4,6-trinitrotoluene
U.S.	United States
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USEPA	U.S Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UXO	Unexploded Ordnance
VERTREP	vertical replenishment
WWII	World War II

GLOSSARY OF TERMS

Base Realignment and Closure (BRAC) – A Department of Defense (DoD) program that focuses on compliance and cleanup efforts at military installations undergoing closure or re-alignment, as authorized by Congress in four rounds of base closures for 1988, 1991, 1993, and 1995. (DERP Management Guidance, September, 2001)

Closed Range – A range that has been taken out of service as a range and that either has been put to new uses that are incompatible with range activities or is not considered by the military to be a potential range area. A closed range is still under the control of a DoD component. (DERP Management Guidance, September, 2001)

Defense Site – All locations that are or were owned by, leased to, or otherwise possessed or used by the DoD. The term does not include any operational range, operating storage or manufacturing facility, or facility that is used or was permitted for the treatment or disposal of military munitions. (10 United States Code (U.S.C.) 2710(e)(1))

Discarded Military Munitions – Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))

Explosive Ordnance Disposal (EOD) – The detection, identification, field evaluation, rendering-safe, recovery, and final disposal of unexploded ordnance (UXO). It may also include the rendering-safe and/or disposal of EO (explosive ordnance) which has become hazardous by damage or deterioration, when disposal of such EO requires techniques, procedures, or equipment which exceed the normal requirements for routine disposal. (OPNAVINST 8027.1G, 14 Feb 92)

Explosives Safety – A condition where operational capability and readiness, personnel, property, and the environment are protected from the unacceptable effects of an ammunition or explosives mishap. (DoD Directive 6055.9 July 1996)

Formerly Used Defense Site (FUDS) – Real property that was formerly owned by, leased by, possessed by, or otherwise under the jurisdiction of the Secretary of Defense or the Components (including governmental entities that are the legal predecessors of DoD or the Components) and those real properties where accountability rested with DoD but where activities at the property were conducted by contractors (i.e., government-owned, contractor-operated (GOCO) properties) that were transferred from DoD control prior to October 17, 1986. The status of a site as a FUDS is irrespective of current ownership or current responsibility within the federal government. (DERP Management Guidance, September, 2001)

Magazine – Any building or structure used exclusively for the storage of ammunition and explosives. (Department of Defense Ammunition and Explosive Safety Standard, October 5, 2004)

Munitions Constituents (MC) – Any materials originating from unexploded ordnance, discarded military munitions or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions. (10 U.S.C. 2710 (e)(3))

Munitions and Explosives of Concern (MEC) – This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means: unexploded ordnance, discarded military munitions or munitions constituents (e.g., TNT, RDX) present in high enough concentrations to pose an explosive hazard. (OUSD(AT&L) 18 December 2003)

Operational Range – A range that is under the jurisdiction, custody, or control of the Secretary of Defense and that is used for range activities, or although not currently being used for range activities, that is still considered by the Secretary to be a range and has not been put to a new use that is incompatible with range activities. (10 U.S.C. 101 (e)(3))

Other than Operational Range – Encompasses closed, transferred and transferring ranges.

Range – A designated land or water area set aside, managed, and used for range activities of the DoD. Ranges include firing lines and positions, maneuver areas, firing lanes, test pads, detonation pads, impact areas, electronic scoring sites, buffer zones with restricted access and exclusionary areas, and airspace areas designated for military use in accordance with regulations

and procedures prescribed by the Administrator of the Federal Aviation Administration. (10 U.S.C. 101 (e)(3))

Transferred Range – A property formerly used as a military range that is no longer under military control and had been leased by the DoD, transferred, or returned from the DoD to another entity, including federal entities. This includes a range that is no longer under military control but was used under the terms of a withdrawal, executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the federal land manager. (DERP Management Guidance, September, 2001)

Transferring Range – A range that is proposed to be transferred or returned from the DoD to another entity, including federal entities. This includes a range that is used under the terms of a withdrawal, executive order, act of Congress, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the federal land manager or property owner. An operational or closed range will not be considered a “transferring range” until the transfer is imminent. (DERP Management Guidance, September, 2001)

Unexploded Ordnance – Military munitions that have been primed, fused, armed, or otherwise prepared for action; have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and remain unexploded either by malfunction, design, or any other cause. (10 U.S.C. 101(e)(5))

EXECUTIVE SUMMARY

The Department of Defense (DoD) has established the Military Munitions Response Program (MMRP) under the Defense Environmental Restoration Program (DERP) to address munitions and explosives of concern (MEC) (including unexploded ordnance and discarded military munitions) and munitions constituents (MC) at other than operational military ranges and other sites. Closed, transferred, and transferring military ranges and sites not located on an operational range are considered other than operational. Although other than operational can include Formerly Used Defense Sites (FUDS) and Base Realignment and Closure (BRAC) ranges and sites, this report addresses other than operational ranges and sites at an active installation. It may include transferred ranges and munitions disposal sites associated with an active installation if they are not included in BRAC or FUDS programs.

This report represents a Preliminary Assessment (PA) for the Naval Weapons Station (NAVWPNSTA) Seal Beach Detachment Fallbrook (Detachment Fallbrook), California. Detachment Fallbrook occupies 8,852 acres about 53 miles north of San Diego in northern San Diego County, CA. It is 5 to 8 miles inland from the Pacific Coast, immediately adjacent to the eastern border of Marine Corps Base (MCB) Camp Pendleton, and south of the Santa Margarita River. Specifically, this PA covers the following 11 munitions response program (MRP) ranges/sites at Detachment Fallbrook: the Security Forces (SF) Small Arms Range, the Quality Evaluation (QE) Test Area, the Salvage Yard Landfill, the Dunnage Disposal Site #1, the Dunnage Disposal Site #2, the Dunnage Disposal Site #3, the Dunnage Disposal Site #4, the Dunnage Disposal Site #5, the Skeet/Trap Range, Depot Lake, and Lower Lake.

The DoD, the United States Navy (Navy), and the United States Environmental Protection Agency (USEPA) guidance for conducting and documenting PAs was followed and tailored, where appropriate, to address the unique aspects of MEC and MC. The PA provides the necessary information for Navy and regulatory decision-makers: 1) to eliminate from further consideration those MEC sites that pose minimal or no threat to public health or the environment; 2) to differentiate MEC sites that may not require further munitions response actions from those that will require further investigation and/or munitions response actions; 3) to determine if an imminent explosives safety hazard from MEC is present that warrants an accelerated response

action; and 4) to determine if an imminent hazard from MC to human health and the environment warranting an accelerated response action exists.

The following recommendations for MEC and MC are made for the 11 ranges/sites located at Detachment Fallbrook. If additional data are discovered, the recommendations should be reviewed and updated appropriately.

SF Small Arms Range

The 0.4-acre SF Small Arms Range is located northeast of Building 366, in the eastern center of Detachment Fallbrook. The SF Small Arms Range was used from 1945 to 1991 by both the Marine Security Forces (from 1945 to 1988) and the civilian Security Forces (from 1987 to 1991) for handgun marksmanship training. The area is not currently in use. Munitions used at the range included .38-caliber, .45-caliber, and 9-millimeter (mm) rounds. Because the range was used for small arms, the range is not suspected to contain MEC and no evidence of MEC was found during the site visit. The potential for MC, specifically lead, exists at the site. Based on the data collected and presented in this PA, no further action (NFA) for MEC is recommended at the SF Small Arms Range. A Site Inspection (SI) is recommended at the SF Small Arms Range with respect to MC.

QE Test Area

The 60-acre QE Test Area (Installation Restoration Program (IRP) Site 26) is located in the southeast corner of Detachment Fallbrook, about one mile from the southern installation border. The QE Test Area was used as a burn and disposal area beginning in 1942, and included a powder disposal area, two small round metal burn barrels, a drop test tower, and at least three burn/slit trenches (not all features are currently present at the site). QE laboratory personnel used the QE Test Area as a munitions testing area from 1977 to 1989. The types of munitions tested included rifle grenades (both live and smoke), 3.5-inch rockets, 75-mm projectiles, and 60- and 81-mm mortars. The majority of the ordnance was picked up or destroyed by explosive ordnance disposal (EOD) personnel after each test. The area is not currently in use. The following munitions were observed during the site visit: 40-mm cartridges fired from grenade launchers, impulse cartridges, and pyrotechnic items such as flares. Blasting caps, igniters, and small arms ammunition were observed in the two small round metal burn barrels. Based on the data collected and presented in this PA, an SI is recommended for both MEC and MC at the QE Test Area.

Salvage Yard Landfill

The Salvage Yard Landfill (IRP Site 33) covers approximately 13 acres in the northeast corner of the installation, approximately 900 feet from the western corner of the installation. The Salvage Yard Landfill was a burial area for munitions and dunnage, according to personnel interviews, historical records, and recent visual surveys. Historical records indicate that expended cartridges, primers, live projectiles, and inert anti-tank projectiles were buried in the area. The area is not currently in use. The following MEC were observed during the visual surveys: a 25-pound bomb, a 3-pound pyrotechnic bomb, a 2.36-inch anti-tank high explosive (HE) rocket, 20-mm rounds, other projectiles, and other munitions scrap. Based on the data collected and presented in this PA, an SI is recommended for both MEC and MC at the Salvage Yard Landfill.

Dunnage Disposal Site #1

The 3.3-acre Dunnage Disposal Site #1 (IRP Site 34a) is located in the north-central portion of the Detachment Fallbrook. The site is L-shaped, extending north and east along two intermittent stream beds. The Dunnage Disposal Site #1 is considered a possible munitions burial site. The site was in use from 1942 to 1978 as a disposal area for dunnage. The area is not currently in use. A limited visual survey of the area revealed various inert rocket motors, practice 2000-pound bombs, a HE 20-mm projectile, several igniters, and other munitions scrap at the site. The site is known to contain MEC and suspected to contain MC. Based on the data collected and presented in this PA, an SI is recommended for both MEC and MC at the Dunnage Disposal Site #1.

Dunnage Disposal Site #2

The Dunnage Disposal Site #2 (IRP Site 34b) covers approximately 9 acres in the north central portion of the installation and is west of Walleye Road. The Dunnage Disposal Site #2 was in use from 1942 to 1978 as a disposal area for dunnage. The area is not currently in use. Investigation of the site and the installation records, and follow-up interviews, indicate that the Dunnage Disposal Site #2 was not used for munitions burial. Based on the data collected and presented in this PA, NFA for MEC and MC is recommended at the Dunnage Disposal Site #2. Any further investigations at the site will be under the IRP.

Dunnage Disposal Site #3

The 1.5-acre Dunnage Disposal Site #3 (IRP Site 34c) is located south of Terriea Road in the central portion of Detachment Fallbrook. The Dunnage Disposal Site #3 is a possible munitions

burial and disposal site. The area was used from 1942 to 1978 as a disposal area for dunnage. The area is not currently in use. According to personnel interviews, the site may have been used as a disposal and burial area for ordnance during this time. Inert rifle grenades and other munitions scrap were observed on the ground surface and in a wash area during the site visits. One H.E. 60-mm mortar was observed on the surface of the site. There is a possibility that other live ordnance was buried there, but this cannot be verified until an EOD technician checks each item buried at the site. Based on the data collected and presented in this PA, an SI is recommended for both MEC and MC at the Dunnage Disposal Site #3.

Dunnage Disposal Site #4

The Dunnage Disposal Site #4 (IRP Site 34d) covers approximately 1.8 acres west of Building 388 in the central portion of Detachment Fallbrook. The Dunnage Disposal Site #4 (IRP Site 34d) was used from 1942 to 1978 as a disposal area for dunnage. The area is not currently in use. Investigation of the site and the installation records, and follow-up interviews, indicate that the Dunnage Disposal Site #4 was not an ordnance burial site. Based on the data collected and presented in this PA, NFA for MEC and MC is recommended at the Dunnage Disposal Site #4. Any further investigations at the site will be under the IRP.

Dunnage Disposal Site #5

The 0.7-acre Dunnage Disposal Site #5 (IRP Site 34e) is in the southwest corner of Detachment Fallbrook. The Dunnage Disposal Site #5 was used from 1942 to 1978 as a disposal area for dunnage. The area is not currently in use. Investigation of the site and the installation records, and follow-up interviews, indicate that the Dunnage Disposal Site #5 was not used for munitions burial. Based on the data collected and presented in this PA, NFA for MEC and MC is recommended at the Dunnage Disposal Site #5. Any further investigations at the site will be under the IRP.

Skeet/Trap Range

The 31-acre Skeet/Trap Range is located in the central plateau of Detachment Fallbrook, near the eastern border. The site is bordered to the east by the SF Small Arms Range. The Skeet/Trap Range was a recreational skeet/trap range that was used by the Marine Security Forces and other station personnel after work hours from 1950 to 1987. The area is not currently in use. Munitions use at the range was limited to 12-gauge shotgun ammunition according to interviewees. Because the range was used for small arms, the range is not suspected to contain

MEC and no evidence of MEC was found during the site visit. The potential for MC exists at the site, specifically lead and polycyclic aromatic hydrocarbons (PAHs). Based on the data collected and presented in this PA, NFA for MEC is recommended at the Skeet/Trap Range. An SI is recommended at the Skeet/Trap Range with respect to MC.

Depot Lake and Lower Lake

The 12-acre Depot Lake is on the western part of the installation, just north of Terriea Road and between buildings 763 and 736. The 3-acre Lower Lake is on the southwestern corner of the installation, approximately 300 feet north of Shaik Road and just west of the Group 13 magazines. Both artificial lakes were identified as disposal sites for munitions in a 1958 memorandum, which states that the lakes were used for disposal of 20-mm, 40-mm, and 60-mm cartridges and 7.2-inch projector charges during World War II (WWII). The memorandum also states that other munitions may have been dumped in the lakes and that munitions had been recovered from the lakes in the past during dry summer seasons. It also requests that EOD technicians perform diving operations at the lakes to salvage MEC. No records were found to indicate whether diving operations took place or whether additional munitions were found in the lakes. Personnel interviewed in September 2004 stated that the Marine Security Forces may have dumped unexpended shells into the lakes instead of returning them to the Navy inventory. Currently, the lakes are used to store water on the installation, for fish and wildlife enhancement, and for wildfire protection. The lakes have also been used in the past for recreational boating and fishing (strict catch and release policy). As of 2004, all recreational activities were discontinued at Depot and Lower Lakes. Based on the data collected and presented in this PA, a site inspection (SI) is recommended for MEC and MC at both Depot Lake and Lower Lake.

More detailed summaries and recommendations for the 11 ranges/sites located at Detachment Fallbrook are given in [Section 5](#)

1. INTRODUCTION

The Department of Defense (DoD) has established the Military Munitions Response Program (MMRP) under the Defense Environmental Restoration Program (DERP) to address munitions and explosives of concern (MEC) [including unexploded ordnance and discarded military munitions] and munitions constituents (MC) at other than operational military ranges and other sites. The term "other than operational ranges" includes closed, transferred and transferring military ranges, as well as any other past-use site known or suspected to contain MEC or MC that is not located on an operational range. Although other than operational can include Formerly Used Defense Sites (FUDS) and Base Realignment and Closure (BRAC) ranges and sites, this report addresses other than operational ranges and sites at an active installation. It may include transferred ranges and munitions disposal sites associated with an active installation if they are not included in the BRAC or FUDS programs.

The DoD and the United States Navy (Navy) are currently establishing policy and guidance for munitions response actions under the Navy Munitions Response Program MRP. However, key program drivers developed to date conclude that munitions response actions will be conducted under the process outlined in the National Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) 300) as authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 United States Code (U.S.C.) 9605, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), Pub. L. 99-499 (hereinafter CERCLA). This report represents a Preliminary Assessment (PA) for 11 MRP ranges/sites at Naval Weapons Station (NAVWPNSTA) Seal Beach Detachment Fallbrook (Detachment Fallbrook), California. DoD, Navy, and United States Environmental Protection Agency (USEPA) guidance for conducting and documenting PAs were followed and tailored, where appropriate, to address the unique aspects of MEC and MC.

This PA Report is organized into the following sections:

- [Section 1 – Introduction](#)
- [Section 2 – Installation Background](#)
- [Section 3 – Physical and Environmental Characteristics](#)
- [Section 4 – Summary of Data Collection Effort](#)
- [Section 5 – Site Characteristics](#)

The following supporting information is appended to this PA:

- [References \(Appendix A\)](#)
- [Project Source Data – General \(Appendix B\)](#)
- [Project Source Data – Site Specific \(Appendix C\)](#)
- [Ordnance Technical Data Sheets \(Appendix D\)](#)
- [Response to Comments \(Appendix E\)](#)

Two interactive compact discs (CDs) are included with the final version of this report. The first CD will include electronic files of the report text, tables, figures, appendices, and project source data. The second CD will include interactive Geographical Information System (GIS) maps of the installation and ranges/sites.

1.1. Purpose

This PA summarizes the history of munitions use at the following former ranges/sites at Detachment Fallbrook: the Security Forces (SF) Small Arms Range, the Quality Evaluation (QE) Test Area, the Salvage Yard Landfill, the Dunnage Disposal Site #1, the Dunnage Disposal Site #2, the Dunnage Disposal Site #3, the Dunnage Disposal Site #4, the Dunnage Disposal Site #5, the Skeet/Trap Range, Depot Lake, and Lower Lake. The PA provides an assessment of the current conditions with respect to MEC and MC. The PA provides the necessary information for Navy and regulatory decision-makers: 1) to eliminate from further consideration those MEC sites that pose minimal or no threat to public health or the environment; 2) to differentiate MEC sites that may not require further munitions response actions from those that will require further investigation and/or munitions response actions; 3) to determine if an imminent explosives safety hazard from MEC is present that warrants an accelerated response action; and 4) to determine if an imminent hazard from MC to human health and the environment warranting an accelerated response action exists.

1.2. Programmatic Framework

The regulatory structure for managing Navy MRP sites is guided by a complex mixture of federal, state, and local laws, as well as DoD and Navy regulations and guidance, and provides the necessary information for Navy decision makers. The key legislation, policy, and guidance directing the program includes, but is not limited to, the following:

DERP Management Guidance (September 2001)

The DERP Management Guidance establishes a MRP element for MEC and MC defense sites. The history of DERP dates back to the SARA of 1986¹. The scope of the DERP is defined in 10 U.S.C. §2701(b), which states that the: “Goals of the program shall include the following: ... (1) The identification, investigation, research and development, and cleanup of contamination from hazardous substances, and pollutants and contaminants. (2) Correction of other environmental damage (such as detection and disposal of unexploded ordnance) which creates an imminent and substantial endangerment to the public health or welfare or to the environment...”

Draft DoD Directive Military Munitions Response Policy on Other Than Operational Ranges

The Draft DoD Directive 4715.MRP (September 2003 version) states that munitions response will be conducted “in accordance with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)”.

National Defense Authorization Act (FY02) (Sections 311-312)

Sections 311-312 of the National Defense Authorization Act of fiscal year (FY) 2002 reinforced the DoD’s 2001 DERP Management Guidance by tasking the DoD to develop and maintain an inventory of defense sites that are known or suspected to contain MEC and MC. Section 311 requires the DoD to develop a protocol for prioritizing defense sites for response activities in consultation with the states and Tribes. Section 312 requires the DoD to create a separate program element to ensure that the DoD can identify and track munitions response funding.

The September 2001 Management Guidance for the DERP and the Defense Authorization Act 2002, described above, established the MRP. The DoD provides program guidance and methods for conducting a baseline inventory of defense sites containing, or potentially containing, MEC and/or MC. The Navy baseline inventory of sites was completed in FY 2002 and was used to establish the sites where PAs are needed to further evaluate the potential for MEC and MC.

¹ SARA was signed into law on October 17, 1986, and amended the CERCLA of 1980, 42 U.S.C. §9601 et seq. Related sections in Title 10 of the U.S.C. (10 U.S.C. §§2702-2710 and §§2810-2811) further define the program.

1.3. Project Management

This PA has been coordinated and managed by the Navy Engineering Field Activity Northeast (EFANE), a component of Naval Facilities Engineering Command (NAVFAC). The EFANE performs engineering functions for Navy installations throughout the northeast U.S. and is the Program Manager for this PA. Malcolm Pirnie, Inc. has been contracted to prepare this PA. The Southwest Division of NAVFAC provides technical guidance and management for environmental projects at Detachment Fallbrook. The Navy Remedial Project Manager (RPM) and the installation point of contact (POC) for Detachment Fallbrook provided valuable information and assistance throughout the PA data collection process.

1.4. Preliminary Assessment Approach

The CERCLA implementing guidance, which was prepared for sites contaminated with hazardous substances, describes the PA as a limited-scope investigation based upon existing and available data. However, the guidance also states that the PA process developed under CERCLA is not equally applicable to all sites and all contaminants and that variation from the guidance may be necessary. Sites containing MEC are prime examples of sites where the generic CERCLA process is incomplete. Unique explosives safety issues associated with MEC cannot be assessed solely with the parameters developed for chemical and hazardous waste contaminants. Therefore, while this PA generally follows CERCLA guidance, certain elements of the report have been tailored to address the unique explosives safety aspects of MEC.

The PA process for each of the sites involved collecting and reviewing existing and available information about the site, including off-site and on-site research and interviews. It also included a visual survey to assess physical evidence that might indicate the presence of MEC (e.g., discarded munitions items, ordnance penetration holes, and scarred trees) and MC (e.g.; ground scarring, stressed vegetation, chemical residue) at the site. The Malcolm Pirnie data collection team conducted two site visits for data collection and visual surveys. The first was from 27 through 30 September 2004 and the second was from 8 through 11 March 2005.

This PA includes and makes use of all available data relating to munitions use at Detachment Fallbrook, including historical records, aerial photographs, field data, anecdotal evidence, interviews with site personnel, and professional knowledge and experience. It is based, in part, on information provided in documents referenced in [Appendix A](#) and is subject to the limitations and qualifications presented in the referenced documents.

2. INSTALLATION BACKGROUND

This section provides Detachment Fallbrook's location, history, and munitions-related training, storage, and usage.

2.1. Location and Setting

Detachment Fallbrook is 53 miles north of San Diego in northern San Diego County, CA. It is approximately 9 miles inland from the Pacific Coast immediately adjacent to the eastern border of Marine Corps Base (MCB) Camp Pendleton, and south of the Santa Margarita River. Other neighboring properties include the Santa Rosa Plateau, the Palomar Mountain Complex, and the San Mateo Wilderness Area of the Cleveland National Forest. The installation varies in elevation from 200 to 840 feet above mean sea level (MSL) and is characterized by mountains and alluvial bottomlands. The installation currently occupies 8,852 acres and is surrounded by a chainlink fence. Only about 274 acres are developed, the rest is mostly open space due to the Explosive Safety Quantity Distance (ESQD) Arcs around the magazines. The one housing complex at the installation is located in the northeast portion of the installation and is classified as all family housing with a total of nine housing units - five single family units and two duplex units. Both children and pets are allowed at the housing complex, and the housing complex is fully occupied as of the date of this report. The location of the installation and the associated MRP ranges/sites are provided on Map 2.1-1.

2.2. Installation History

Naval Ammunition Depot (NAD) Fallbrook was commissioned in February of 1942, after the U.S. Attorney General condemned 9,150 acres in San Diego, CA in order to establish a naval ammunition depot in the area. The acreage was taken from the Santa Margarita Ranch, which was originally a Spanish land-grant. 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. The original facilities included 133 magazines, barracks, and administration and service buildings; 16 miles of railroad; and 115 miles of roads and trails.

**Preliminary Assessment
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**Map 2.1-1
Area Location Map**

Legend

-  Installation Boundary
-  Potential MRP Sites

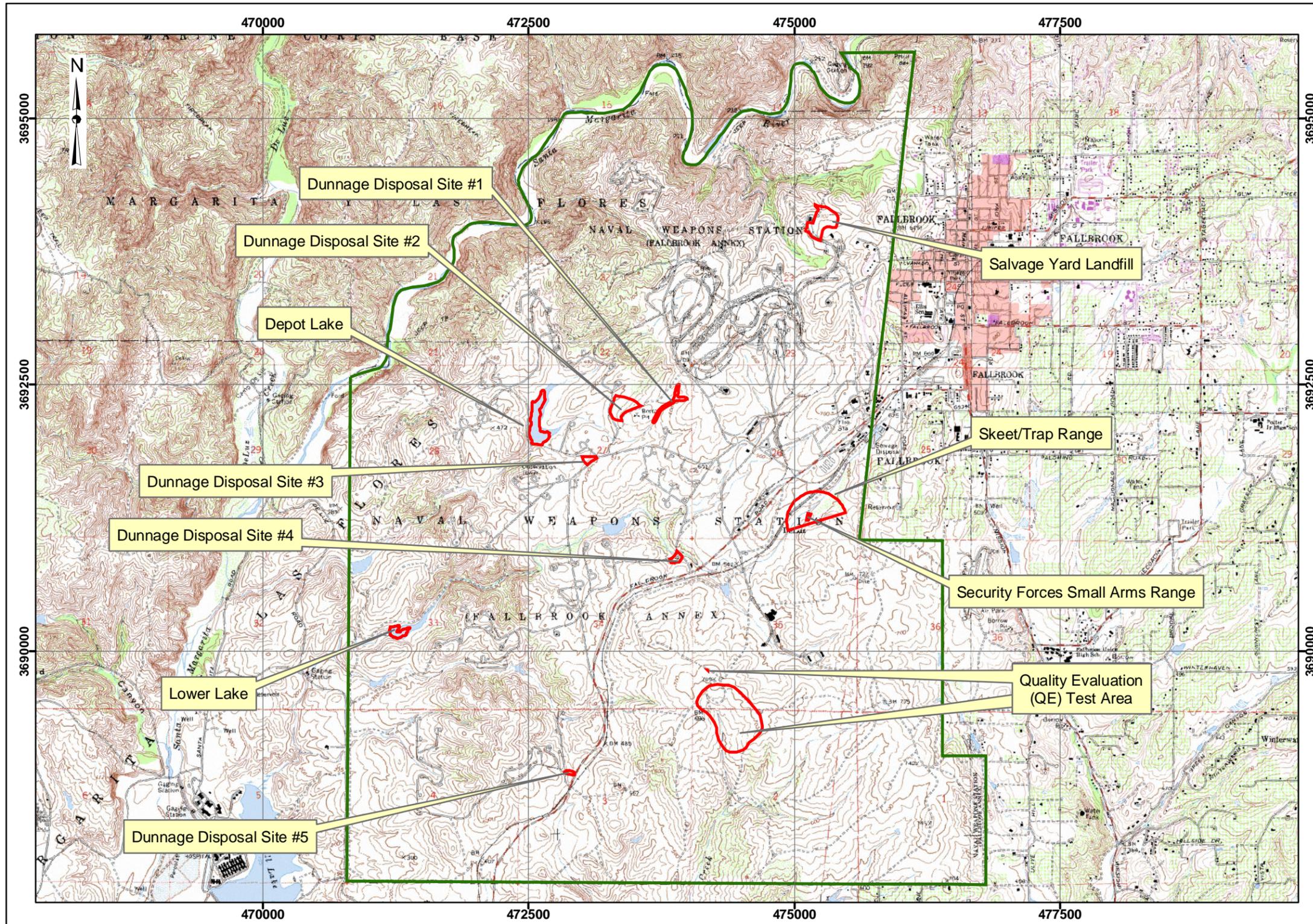
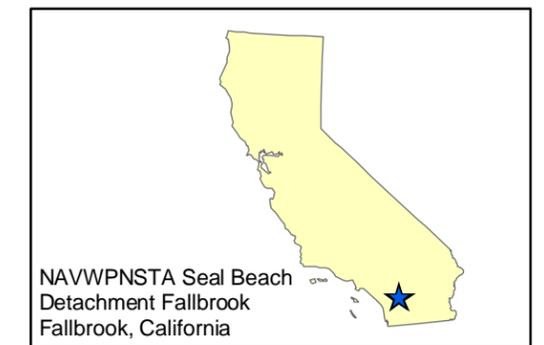
0 600 1,200 Meters



Data Source: NAWPNSTA Seal Beach GIS Data
USGS 7.5 minute topo maps

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

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In 1947, NAD Fallbrook was put on caretaker status and its staff was reduced. The Korean War (1950) brought an end to the caretaker status of the depot. In 1953, the Marine Barracks at the depot became a separate command, which replaced the Marine Guard detachment from MCB Camp Pendleton that had provided station security since 1942.

NAD Fallbrook was annexed to the Naval Ammunition and Net Depot (NAND) Seal Beach in 1958. During the 1960s, Fallbrook's primary duty was to support the Pacific Marine Forces. It also stored, tested, and maintained several types of missiles (e.g., Walleye, Shrike, and Sparrow). The installation's name was changed to NAVWPNSTA Seal Beach, Detachment Fallbrook in 1997, after ordnance handling installations were reorganized. Currently, Detachment Fallbrook is the Navy's primary West Coast ordnance storage, loading, and maintenance installation.

The only West Coast air-launched missile production facility is located at Detachment Fallbrook, where air-launched missiles such as the Phoenix, Sidewinder, Maverick, and high-speed anti-radiation missile are inspected, maintained, and re-certified. The last remnants of the nation's napalm stockpile were stored at Fallbrook, and a state-of-the-art facility was built on base to help eliminate these weapons. The last full napalm canister was destroyed in March, 2001.

Detachment Fallbrook is unique among naval weapons storage areas because it is located inland. Ammunition is transferred to and from ships by a process known as Vertical Replenishment, or VERTREP. In this operation, ammunition is taken by trucks from a magazine on base to a helicopter pad located on the coast inside MCB Camp Pendleton. From there, a helicopter picks up the load and transfers it to the receiving ship waiting several miles off the coast. In this manner, large vessels such as aircraft carriers and amphibious assault ships can be loaded without leaving their primary Southern California operating and training areas.

2.3. Munitions-Related Training / Storage / Usage

Detachment Fallbrook has been in operation since 1942 with a primary mission as a depot for the receipt, storage, and delivery of different types of explosives and munitions. Munitions-related sites are scattered throughout the installation, inside the ESQD Arcs. The installation has 190 magazines, and they store pyrotechnics, high explosives, fuzes and detonators, and small arms, among other weapons. There are no active ranges on the installation.

The MRP identified 11 former ranges/sites at the installation, eight of which were identified as munitions sites through historical documents and interviews. These ranges/sites are: the SF Small Arms Range, the QE Test Area, the Salvage Yard Landfill, the Dunnage Disposal Site #1, the Dunnage Disposal Site #3, the Skeet/Trap Range, Depot Lake, and Lower Lake. Three sites were found to be non-munitions related. These sites are: the Dunnage Disposal Site #2, the Dunnage Disposal Site #4, and Dunnage Disposal Site #5. This PA addresses all 11 former ranges/sites. All are briefly summarized below. Map 2.1-1 depicts the location of all the ranges/sites on the installation.

SF Small Arms Range

The former SF Small Arms Range covers 0.4 acres in the eastern central portion of Detachment Fallbrook, northeast of Building 366. The SF Small Arms Range was oriented for firing to the southwest. The guns were fired at targets positioned in front of a natural soil berm. It was used from 1945 to 1991 by both the Marine Security Forces (from 1945 to 1988) and the civilian Security Forces (from 1987 to 1991) for handgun marksmanship training. It was also used by station civilians and local law enforcement officers. Munitions used at the range include .38-caliber, .45-caliber, and 9-millimeter (mm) rounds.

QE Test Area

The former QE Test Area covers 60 acres in the southeast corner of Detachment Fallbrook, about one mile from the southern installation border. The site was originally used as a burn and disposal area starting in 1942, and included a powder disposal area, two small round metal burn barrels, a drop test tower, and at least three burn/slit trenches. The 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 the QE Test Area for munitions testing from 1977 to 1989. Parts of the QE Test Area were used as burn/disposal pits until 1985. Munitions tested at the QE Test Area include rifle grenades (both live and smoke), 3.5-inch rockets, 75-mm projectiles, and 60- and 81-mm mortars.

Salvage Yard Landfill

The Salvage Yard Landfill, which covers 13 acres, is in the northeast corner of Detachment Fallbrook, about 900 feet from the western corner of the installation's border. The site was used as a storage yard from the 1950s to the late 1960s. The site is believed to be a burial area for munitions and dunnage, according to interviews, historical records, and recent site surveys.

Munitions possibly buried at the Salvage Yard Landfill include expended cartridges, primers, live projectiles, and inert anti-tank projectiles. An explosive ordnance disposal (EOD) report from February 2002 describes an incident in which EOD technicians from MCB Camp Pendleton were called to the site to handle some suspected 20-mm and 40-mm rounds that were found on the ground surface, as well as some blasting caps.

Dunnage Disposal Site #1

The 3.3-acre Dunnage Disposal Site #1 is in the north-central portion of Detachment Fallbrook. It was used from 1942 to 1978 to dispose of dunnage and ordnance.

Dunnage Disposal Site #2

The 9-acre Dunnage Disposal Site #2 is in the north-central portion of the installation and is west of Walleye Road. It was used from 1942 to 1978 to dispose of dunnage.

Dunnage Disposal Site #3

The 1.5-acre Dunnage Disposal Site #3 is just south of Terriea Road in the central portion of Detachment Fallbrook. It was used from 1942 to 1978 to dispose of dunnage, and possibly ordnance. A 1978 memorandum from Tom Curtis, a former Commanding Officer at Detachment Fallbrook, states that numerous cases of inert-rifle-propelled grenades were buried in the area.

Dunnage Disposal Site #4

The 1.8-acre Dunnage Disposal Site #4 is west of Building 388 in the central portion of Detachment Fallbrook. It was used from 1942 to 1978 to dispose of dunnage.

Dunnage Disposal Site #5

The 0.7-acre Dunnage Disposal Site #5 is in the southwest corner of Detachment Fallbrook. It was used from 1942 to 1978 to dispose of dunnage.

Skeet/Trap Range

The former 31-acre Skeet/Trap Range is adjacent to the northeastern border of the SF Small Arms Range. The range was used recreationally for skeet and trap by the Marine Security Forces and other installation personnel after work hours from 1950 to 1987. Munitions used at the range were limited to 12-gauge shotgun ammunition, according to Mr. Kenneth A. Kaptain, a member of the MCB Camp Pendleton Fire Department.

Depot Lake

Depot Lake, which covers 12 acres, is in the western part of the installation, just north of Terriea Road and between buildings 763 and 736. A 1958 memorandum states that two lakes were used as a munitions disposal site for certain munitions (20- mm, 40-mm, and 60-mm cartridges and 7.2-inch projector charges) during World War II (WWII). According to Mr. Robbie Knight, Natural Resource Manager for the installation, Depot Lake is one of the lakes referred to in the memorandum. The memorandum also states that other munitions may have been dumped in the lake and that munitions had been recovered from the lake in the past during dry summer seasons. It also requests that EOD technicians perform diving operations at the lake to salvage MEC.

Lower Lake

Lower Lake, which covers 3 acres, is in the southwestern part of the installation, approximately 300 feet north of Shaike Road and just west of the Group 13 magazines. A 1958 memorandum states that two lakes were used as a munitions disposal site for certain munitions (20-mm, 40-mm, and 60-mm cartridges, and 7.2-inch projector charges) during WWII. According to Mr. Robbie Knight, Natural Resource Manager, Lower Lake is one of the lakes referred to in the memorandum. The memorandum also states that other munitions may have been dumped in the lake and that munitions had been recovered from the lake in the past during dry summer seasons. It also requests that EOD technicians perform diving operations at the lake to salvage MEC.

3. PHYSICAL AND ENVIRONMENTAL CHARACTERISTICS

This section provides general information about Detachment Fallbrook, including its climate, topography, geology, soil and vegetation types, hydrology, hydrogeology, cultural and natural resources, and endangered species.

3.1. Climate

The climate at Detachment 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 in the Detachment Fallbrook vicinity is 63 degrees Fahrenheit (°F). Summer temperatures range from 61 °F at night to 90 °F during the day. Winters tend to be moderate, with temperatures ranging from 33 °F at night to 67 °F during the day. Precipitation ranges from 13.7 to 17.1 inches per year. January is the wettest month and July is the driest, with a mean of 0.02 inches of precipitation. Summers at the installation are punctuated by the Santa Ana (offshore) winds.

3.2. Topography

Detachment Fallbrook is in the foothills of northern San Diego County at an average elevation of 500 feet above MSL, between the Santa Margarita and San Onofre mountain ranges. The topography on the installation varies from the gently rolling slopes of the southern area to the steeply rising hills of the northern area. The elevations at the installation range from 200 feet above MSL in the southwest corner to 840 feet above MSL in the northern central area. Numerous swales and small hills dot the installation. Along the northwest boundary of the installation, the Santa Margarita River has a steep-sided canyon leading down to the riverbed and its alluvial terrace.

3.3. Geology

Detachment Fallbrook is in the Peninsular Ranges geomorphic province, which is characterized by a series of northwest-trending ranges and valleys. This geomorphic province is dominated by the igneous and metamorphic rocks of the Peninsular Range batholith. The Peninsular Ranges region is underlain primarily by plutonic (e.g., granitic) rocks that formed from the cooling of magma deep within the earth's crust. These magmas were generated during subduction of an oceanic crustal plate that was converging on the North American Plate between 140 and 90 million years ago. Extensive masses of plutonic rocks accumulated at depth to form the Southern

California Batholith. Intense heat and pressure associated with these plutonic magmas and plate tectonic movements metamorphosed the ancient sedimentary rocks into which the plutons intruded. These metasediments are now preserved in the Peninsular Range region as marbles, slates, schists, quartzites, and gneisses. Younger marine sedimentary rocks are exposed along the region's western shore.

3.4. Soil Types

There are 33 soil types of eight different major series at Detachment Fallbrook. Of these, some are alluvial, some derived from granite rock, and others are weathered in place from decomposed granodiorite. Soils formed from rock weathered in place are mostly sandy, upland loams, which are soft and easily eroded.

3.5. Vegetation Types

Detachment Fallbrook is composed mainly of open space where plant communities, habitats, and federally threatened or endangered species are able to thrive due to the low-intensity land use requirement of the site. Detachment Fallbrook and its neighbors comprise the largest remaining open space and wildlife in coastal Southern California. Fourteen primary vegetation communities occur on the site and generally correspond to seven wildlife habitat types: coastal sage scrub, mixed chaparral, chamise chaparral, valley foothill riparian, annual grassland, fresh emergent wetlands, and eucalyptus. The following nine vegetation communities are described in the 2005 Draft Final Detachment Fallbrook Integrated Natural Resources Management Plan (INRMP):

Diegan coastal sage scrub covers over 52% of Detachment Fallbrook lands. Generally on south and west facing slopes, coastal sage scrub predominates where the sun has the greatest desiccating effect. Coastal sage scrub on Detachment Fallbrook is a mosaic of five main sub-types, where different shrub species dominate and shrub density can vary greatly. It provides habitat for many sensitive species, including the Least Bell's vireo and the Stephens' kangaroo rat, and is considered critical habitat for the federally threatened coastal California gnatcatcher. Any activity that could potentially impact this habitat on Detachment Fallbrook requires mitigation or consultation with the U.S. Fish and Wildlife Service (USFWS).

Three types of chaparral associations combine to make up approximately 3% of Detachment Fallbrook's lands. Because chaparral and many of its component species are widely distributed

in California, there is no direct threat to it as a vegetation type. This vegetation community is generally fenced inside the installation.

The Santa Margarita River and an associated network of ephemeral streams support abundant riparian vegetation with five plant associations. Although it covers only approximately 6.4% of Detachment Fallbrook, riparian associations support a greater diversity of wildlife than does any other habitat. Sensitive species found in riparian areas on Detachment Fallbrook include the federally endangered arroyo toad, the Southwestern willow flycatcher, and the Least Bell's vireo. This vegetation community is generally fenced inside the installation.

Oak woodlands cover approximately 2.4% of Detachment Fallbrook and are generally on north-facing slopes and in shaded ravines. Although many sensitive species use oak woodlands, no federally listed threatened or endangered species are known to rely on this habitat, and oak woodland communities are decreasing in size throughout California.

Less than one percent of Detachment Fallbrook consists of groves of eucalyptus trees. Native to Australia, the numerous eucalyptus species can grow quickly, are adapted to frequent fires, and prohibit understory growth through allelopathic chemicals in the leaf litter. Once established, eucalyptus will exclude most other native plant species. Eucalyptus trees, however, do provide roosting, nesting, and perching sites for native raptors.

Over 25% of Detachment Fallbrook is grassland, the majority of which is comprised of nonnative annual species. Grasslands provide habitat for several sensitive species, including the federally endangered Stephens' kangaroo rat.

Wetlands, including freshwater marsh and vernal pools, provide many vital ecological functions and support a high diversity of resident and migratory wildlife species at Detachment Fallbrook. Wetlands, however, are among the most impacted habitats and are often subject to regulatory jurisdiction under Section 404 of the Clean Water Act or Sections 9 and 10 of the Rivers and Harbors Act.

While no federally or state listed plants have been confirmed on the base, an estimated 101 of the 378 plant species on Detachment Fallbrook are nonnative. Nonnative, invasive plant species, or noxious weeds, can pose a serious threat to many native habitats by competitively excluding

native species and dramatically altering ecosystem dynamics. In accordance with Executive Order 13112 and Navy policy, Detachment Fallbrook has produced a Noxious Weed Management Plan and targets numerous invasive weeds for control, including the exotic pepper tree and *Arundo donax*.

3.6. Hydrology

There are three major flowing surface water bodies within Detachment Fallbrook: the Santa Margarita River, Fallbrook Creek, and Pilgrim Creek (see Map 3.1-1). The Santa Margarita River is formed by the junction of Murrieta Creek and the Temecula River just west of I-15 in Temecula, and south of SR79. The Santa Margarita River flows into Temecula Gorge and crosses the San Diego County line just northeast of the town of Fallbrook. From there, the river flows through MCB Camp Pendleton and to the Pacific Ocean. The Santa Margarita River provides an important water supply by restoring groundwater aquifers used by local residents and the Marine Corps. Fallbrook Creek would naturally be an intermittent or ephemeral stream within the Santa Margarita watershed, but due to runoff from agricultural and urban irrigation, it is now a perennial stream. MCB Camp Pendleton uses water from the Santa Margarita River and from Fallbrook Creek as water sources for its artificial Lake O'Neill, which is used to supplement its water supply and for recreational purposes. Pilgrim Creek is located on the northeast end of Oceanside and its flow is augmented in the summer months by runoff from an upstream nursery's water supply. There are also two large artificial lakes on the installation: Depot Lake and Lower Lake. Depot 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 Terriea Road to the south. The spillway releases the lake water into an intermittent stream that connects with the Santa Margarita River outside the installation boundaries. Depot Lake is approximately 4 to 10 feet deep in the summer months and 6 to 18 feet deep in the winter months. Lower Lake is fed by streams from the north, east, and west and held by an earthen dam at the western end. The dam releases the lake water into an intermittent stream that feeds Lake O'Neill on MCB Pendleton. Lower Lake is approximately 8 to 16 feet deep during the summer months and 12 to 25 feet during the winter months. More specific bathymetry for the lakes is unknown.

3.7. Hydrogeology, Watersheds, and Water Resources

Detachment Fallbrook land is part of two coastal watersheds (see Map 3.1-1), the Santa Margarita River and the San Luis Rey River. The Santa Margarita River, which forms the northern border of the property, is the longest free flowing river in southern California and has a

750-square-mile watershed. Having largely escaped the development and channelization typical of the region, the Santa Margarita River and estuary support the largest populations of seven federal or state-listed endangered species. The San Luis Rey River watershed, which is represented by the Pilgrim Creek tributary on the Detachment Fallbrook, is 565 square miles and harbors 44 special status species.

Water resources management, including supply, use, conservation, and quality issues, is extremely important in southern California, where periodic drought and increasing urbanization are characteristic of the region. Detachment Fallbrook receives potable water, which is purchased from the San Diego County Water Authority, through Fallbrook Public Utility District water lines. Detachment Fallbrook also has a reclaimed water line running through the installation, which is anticipated for use as part of the irrigation system. MCB Camp Pendleton, located in the Santa Margarita River watershed, and the City of Oceanside, in the San Luis Rey River watershed, are located hydraulically down gradient from Detachment Fallbrook. Both extract and use groundwater as a potable water supply; the groundwater aquifers are recharged by percolation from overlying streams and rivers. Also, MCB Camp Pendleton uses water from the Santa Margarita River and from Fallbrook Creek as water sources for its artificial Lake O'Neill, which is used to supplement its water supply and for recreational purposes. At Lake O'Neill, no swimming is permitted. Fishing is permitted all year round. The fishing program includes a partial catch and release program based on posted signage.

Both surface and groundwater rights along the Santa Margarita River have been affected by a 1961 U.S. District Court decision (as part of the "Fallbrook Case"). Surface water rights are considered by the Court to be riparian rights for stockwater improvements. All stockponds on Detachment Fallbrook, with the exception of Depot Lake, are eligible for a certificate of validity of rights from the State Water Resources Control Board (SWRCB) as they were constructed prior to 1969 and are not more than 10 acre-feet in surface area. Depot Lake surpasses the size limit and, if possible, Detachment Fallbrook will need to obtain a State water right for use of the water through an application-permit-license procedure. Jurisdiction over groundwater was largely retained by the Court.

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**Map 3.1-1
Area Surface Water
Bodies and Watersheds**

Legend

-  Installation Boundary
-  Watershed Boundary
-  Streams
-  Lakes

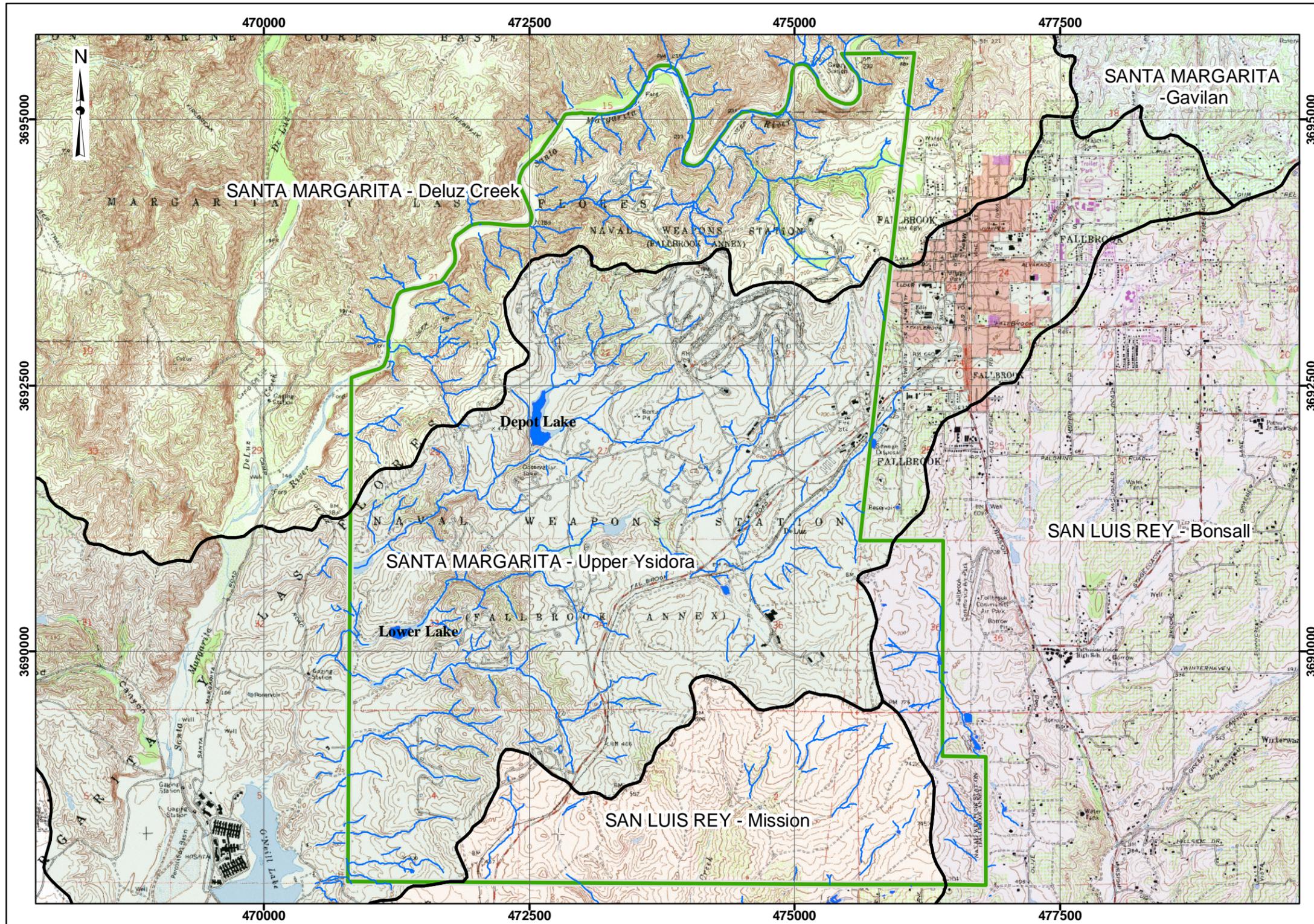
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Data Source: NAWPNSTA Seal Beach GIS Data
USGS 7.5 minute topo maps

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

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The DoD enclave, which includes Detachment Fallbrook and MCB Camp Pendleton, must use historically granted water rights by 2006 or risk losing those rights to the SWRCB. The DoD enclave's rights would be claimed under Permit 15000, which was issued by the State of California in 1965.

The result of another court case regarding riparian water rights is that water districts in the upper Santa Margarita River watershed are required to discharge additional water into the river, and this water will be stored in a new reservoir on Detachment Fallbrook for groundwater recharge of the MCB Camp Pendleton aquifer. The water districts will have the right to purchase back the water from the DoD enclave for their own use. A conjunctive water use project is currently under consideration involving the reservoir that would address a number of ongoing concerns regarding water rights, water supply, and future water use between MCB Camp Pendleton and Fallbrook Public Utilities District.

Water quality at the Detachment Fallbrook falls under the jurisdiction of the San Diego Water Quality Control Board. Water quality monitoring at the site has indicated elevated fecal coliform counts, reduced dissolved oxygen levels, and high levels of sediment. Agricultural operations, septic systems, livestock, domestic animals, use of recycled water, and wastewater treatment facilities are all probable sources of pollution in the Santa Margarita River Watershed.

Groundwater data from wells in MCB Camp Pendleton indicate that the water levels there range from 80 to 100 feet above MSL. Detachment Fallbrook-specific information was obtained from an underground storage tank investigation completed at Buildings 230 and 232 on Ammunition Road. Three monitoring wells were installed at the site (MW-1, MW-2, and MW-3), the water levels ranged from 593 to 599 feet above MSL in 2003, and depth to water from ground surface in these wells was between 50 and 60 feet. The groundwater gradient implied by hydraulic head in the monitoring wells was towards the southwest.

3.8. Cultural and Natural Resources

Detachment Fallbrook has an archaeological heritage ranging from the pre-historic Paleo-Indian period to the Mexican-American War. The Final Cultural Resources Inventory and Survey Report for the Naval Weapons Station Seal Beach Detachment Fallbrook prepared in May 2000 by Mooney & Associates lists the cultural resources present at the installation. Approximately 4,900 acres of the installation have been surveyed for archeological purposes, and over 50

archeological sites were found. To preserve the integrity of the cultural resources, more specific information cannot be released to the public.

3.9. Endangered, Threatened, and Species of Concern

Detachment Fallbrook, MCB Camp Pendleton, and the San Mateo Wilderness Area of the Cleveland National Forest comprise the largest remaining wildlife habitat area in coastal southern California, supporting approximately 500 species of plants and animals. Many species are residents and some are seasonal visitors, such as migratory birds. The California Wildlife and Habitat Analysis Branch website lists protected threatened and endangered species in San Diego County that may inhabit the installation or adjacent areas. These species are listed in Table 3.9-1. Species of concern that are found in San Diego County are listed in Table 3.9-2. Threatened and endangered species and associated critical habitats that are known or have been documented to be within or adjacent to the Detachment Fallbrook are listed and detailed in Table 3.9-3.

Table 3.9-1: Threatened and Endangered Species for San Diego County, California (2005)	
Ecological Receptors	Species
Federal Endangered Species	<ul style="list-style-type: none"> • Least Bell’s vireo (<i>Vireo bellii pusillus</i>) – has been a federal listed endangered species since 1986. It is a small, migratory songbird that eats primarily insects. Least Bell's vireos winter in southern Baja California, Mexico. • Arroyo toad (<i>Bufo californicus</i>) – has been a federal listed endangered species since 1995. It is a relatively small (2-3 inches) toad. The toad’s color ranges from olive green or gray to light brown. Adult arroyo toads are primarily nocturnal, and prefer riparian habitats with sandy streambeds with cottonwood, sycamore, and willow trees. • Stephens’ kangaroo rat (<i>Dipodomys stephensi</i>) – has been a federal listed endangered species since 1988. It has long hind legs, small front legs, and a white belly. It also has dark cinnamon brown fur and black and white tails. The kangaroo rat prefers to live in flat or gently rolling, often degraded, annual grassland. The Stephens’ kangaroo rat eats seeds and is nocturnal. • Southwestern willow flycatcher (<i>Empidonax trillii extimus</i>) - has been a state listed endangered species since 1995. It is about 5.75 inches long and greenish or brownish gray with a white throat that contrasts with a pale olive breast. The belly is pale yellow. It breeds in dense riparian habitats along rivers, streams, or other wetlands. • Mountain yellow-legged frog (<i>Rana muscosa</i>) – has been

listed as a federal endangered species since 1999. It is moderately sized, about 1.5 to 3 inches. The body color is variable, usually a mix of brown and yellow, but often with gray, red, or green-brown. The throat is white or yellow, sometimes with mottling of dark pigment. The belly and undersurface of the high limbs range from pale lemon yellow to an intense sun yellow. It is diurnal, highly aquatic frogs, occupying rocky and shaded streams with cool waters originating from springs and snowmelt. It feeds on small, streamside arthropods. It does not occur in the smallest creeks.

- **Light-footed clapper rail (*Rallus longirostris levipes*)** – has been listed as a federal endangered species since 1970. The light-footed clapper rail is a hen-sized marsh bird that is long-legged, long-toed, and approximately 14 inches long. It has a slightly down-curved beak and a short, upturned tail. Males and females are identical in plumage. Their cinnamon breast contrasts with the streaked plumage of its grayish brown back and gray and white barred flanks. It inhabits coastal salt and freshwater marshes containing cordgrass, cattails or tules, and rushes.
- **California least tern (*Sterna antillarum browni*)** – has been listed as a federal endangered species since 1970. It has long, narrow wings and a broad, forked tail. The black-capped head and black-tipped, pale gray wings of the least tern contrast with its white body. It bears a white blaze across its forehead, dark forewings, black-tipped yellow bill, and yellowish feet. It is less than 9.84 inches when fully grown and has a 30-inch wingspan. Least terns are migratory, arriving in California in the spring of each year. They inhabit bays and lagoons and form breeding colonies in the adjacent open sandy beaches, dunes, or disturbed sites.
- **Southern steelhead (*Oncorhynchus mykiss irideus*)** – has been listed as a federal endangered species since 1997. It is sea-run rainbow trout that has a large mouth with well-developed teeth on both upper and lower jaws, the head and shaft of the vomer, the palatines, and on the tongue. Southern steelheads have been reputed to attain a large size, up to 20 pounds or more.
- **Mohave tui chub (*Gila bicolor mohavensis*)** – has been listed as a federal endangered species since 1970. It is a moderate- to large-sized subspecies of *Gila bicolor*. The male typically ranges from 2 to 4 inches, and rarely measure up to 7 inches. Female Mohave chubs are larger, and can reach up to 8.5 inches. Mohave tui chubs prefer lacustrine habitats, are always associated with deep pools and slough-like areas, and do poorly in fast-flowing streams that are more typical of headwater localities.

- **Desert pupfish (*Cyprinodon macularius*)** – has been listed as a federal endangered species since 1986. It is a small, silvery-colored fish with 6 to 9 dark bands on its sides. This tiny fish grows to a full average length of only 2.5 inches. Its habitat includes warm desert pools, marshes, streams, and springs.
- **Unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*)** – has been listed as a federal endangered species since 1970. It is a small (less than 2.4 inches), scaleless fish that inhabits the slow and quiet waters of streams and rivers.
- **Tidewater goby (*Eucyclogobius newberryi*)** - has been listed as a federal endangered species since 1994. It is a small fish, rarely exceeding 2 inches in length, and is characterized by large pectoral fins and a ventral sucker-like disk formed by the complete fusion of the pelvic fins. The tidewater goby is a fish that occurs in estuaries and lagoons throughout coastal California.
- **Pacific pocket mouse (*Perognathus longimembris pacificus*)** – has been listed as a federal endangered species since 1994. It is a small brownish rodent. Pocket mice are only found within 4 kilometers of the coast on fine-grained sandy substrates in coastal sage scrub, coastal strand, and alluvium.
- **Peninsular bighorn sheep (*Ovis Canadensis nelsoni dps*)** – has been listed as a federal endangered species since 1998. It is compact and muscular; the muzzle, narrow and pointed; the ears, short and pointed; the tail, very short. The fur is deerlike and usually brown with whitish rump patches. Peninsular bighorn sheep live on dry, rocky, low-elevation desert slopes, canyons, and washes from Palm Springs, California south into Baja California, Mexico.
- **San Diego fairy shrimp (*Branchinecta sandiegonensis*)** – has been listed as a federal endangered species since 1997. It is a small aquatic crustacean that is found in shallow vernal pools from January through March, during years with adequate rainfall. Adult fairy shrimp have a delicate elongated body, large stalked compound eyes, and 11 pairs of swimming legs.
- **Riverside fairy shrimp (*Stretocephalus woottoni*)** – has been listed as a federal endangered species since 1993. It is a small aquatic crustacean that is found in deep, long-lasting vernal pools. Adult fairy shrimp have a delicate elongated body.
- **Laguna Mountains skipper (*Pyrgus ruralis lagunae*)** – has been listed as a federal endangered species since 1997. It is a small member of the skipper butterfly family with a wingspan of about 1 inch. The Laguna Mountains skipper

	<p>is one of two subspecies of <i>Pyrgus ruralis</i>, and is only known in higher elevation areas of southern California.</p> <ul style="list-style-type: none"> • Quino checkerspot butterfly (<i>Euphydryas editha quino</i>) – has been listed as a federal endangered species since 1997. It has a wingspread of about 1 inch. The wings are a patchwork of brown, red and yellow spots. It occurs in coastal sage scrub habitat in southern California and northern Baja California.
<p>Federal Threatened Species</p>	<ul style="list-style-type: none"> • Coastal California gnat-catcher (<i>Polioptila californica californica</i>) – has been listed as a federal threatened species since 1993. It is one of the three subspecies of the California gnat-catcher (<i>Polioptila californica</i>). This subspecies has two-tone plumage, dark blue-gray in the upper portion and grayish-white in the lower portion. Its tail is black. It lives in the coastal sage scrub plant community. • Western snowy plover (<i>Charadrium alexandrinus nivosus</i>) – has been listed as a federal threatened species since 1993. The western snowy plover is a small shorebird distinguished from other plovers by its small size, pale brown upper parts, dark patches on either side of the upper breast, and dark gray to blackish legs. They are about 5.9 to 6.6 inches long. They breed primarily on coastal beaches.
<p>State Endangered Species</p>	<ul style="list-style-type: none"> • Belding’s savannah sparrow (<i>Passerculus sandwichensis beldingi</i>) – has been listed as a state endangered species since 1974. The Belding’s savannah sparrow is small and brown with fine streaking on the head and face, a pale beige to white belly, and often a dark central breast spot. Its year-round habitats are salt marshes and coastal estuaries where pickleweed, sea blite, and saltgrass are dominant. • Least Bell’s vireo (<i>Vireo bellii pusillus</i>) – has been listed as a state endangered species since 1980. For a description, see above. • Light-footed clapper rail (<i>Rallus longirostris levipes</i>) - has been listed as a state endangered species since 1971. For a description, see above. • California least tern (<i>Sterna antillarum browni</i>) - has been listed as a state endangered species since 1971. For a description, see above. • Western yellow-billed cuckoo (<i>Coccyzus americanus occidentalis</i>) – has been listed as a state endangered species since 1988. It is 11-13 inches, and known as a cuckoo by the slim sinuous look, brown back, and white underparts. It currently exists in medium and large riparian habitat patches in California, Arizona, New Mexico, and possibly Mexico.

	<ul style="list-style-type: none"> • Southwestern willow flycatcher (<i>Empidonax trillii extimus</i>) - has been a state listed endangered species since 1995. For a description, see above. • Mohave tui chub (<i>Gila bicolor mohavensis</i>) – has been listed as a state endangered species since 1971. For a description, see above. • Desert pupfish (<i>Cyprinodon macularius</i>) – has been listed as a state endangered species since 1986. For a description, see above. • Unarmored threespine stickleback (<i>Gasterosteus aculeatus williamsoni</i>) – has been listed as a state endangered species since 1970. For a description, see above.
<p>State Threatened Species</p>	<ul style="list-style-type: none"> • Stephens’ kangaroo rat (<i>Dipodomys stephensi</i>) – For a description, see above. • Barefoot banded gecko (<i>Coleonyx switaki</i>) – has been a state threatened species since 1980. This lizard has a soft, thin, gray brown skin that is composed of fine, granular scales interspersed with larger, smooth, rounded tubercles. On its head the gecko bears a sprinkling of light-colored flecks. It lives on boulder-strewn hillsides of granitic or volcanic outcrops. These hillsides are found in the deserts of San Diego and Imperial counties elevations of 980 to 2050 feet above msl. • Peninsular bighorn sheep (<i>Ovis Canadensis nelsoni dps</i>) - For a description, see above. • California black rail (<i>Rallus longirostris levipes</i>) – has a length of 4.5 inches and is a very small, chunky, short-tailed, round-winged, ground-dwelling marsh bird with a black head, black breast, and brown nape. • Bank swallow (<i>Riparia riparia</i>) – has a length of 4.75 inches, a tiny bill and is the smallest swallow. It has dark brown upperparts, white underparts, with dark breast band and a rump paler than back. It also has a forked tail and is most often seen flying. It nests in cavities near water.
<p>Other Ecological Receptors</p>	<p>Mammals (mountain lions, bats, opossums, coyotes, foxes, skunks, deer, rats, rabbits, and mice), reptiles (lizards, turtles, and rattlesnakes), insects (beetles and butterflies), amphibians (toads, frogs, and salamanders), fish (catfish, sunfish, and bass), and birds (owls, swallows, wrens, hawks, vultures, herons, and ducks).</p>

Table 3.9-2: Species of Concern Listing for San Diego County, California (2005)

Ecological Receptors	Species
<p>California Department of Fish and Game Species of Concern for San Diego County</p>	<ul style="list-style-type: none"> • Arroyo toad (<i>Bufo californicus</i>) • Western spadefoot (<i>Spea hammondi</i>) • Southwestern pond turtle (<i>Actinemys marmorata pallida</i>) • Belding’s orange-throated whiptail (<i>Cnemidophorus hyperythrus beldingi</i>) • Coronado Island skink (<i>Eumeces sliktionianus interparietalis</i>) • San Diego horned lizard (<i>Phrynosoma coronatum blainvillei</i>) • Silvery legless lizard (<i>Aniella pulchra pulchra</i>) • Coast patchnose snake (<i>Salvadora hexalepis virgultea</i>) • Northern red-diamond rattlesnake (<i>Crotalus ruber ruber</i>) • Two-striped garter snake (<i>Thamnophis hammondi</i>) • San Diego mountain kingsnake (<i>Lampropeltis zonata pulchra</i>) • Double-crested cormorant (<i>Phalacrocorax auritus</i>) • Least bittern (<i>Ixobrychus exilis</i>) • White-faced ibis (<i>Plegadis chihi</i>) • Northern harrier (<i>Circus cyaneus</i>) • Cooper’s hawk (<i>Accipiter cooperii</i>) • Golden eagle (<i>Aquila chrysaetos</i>) • Prairie falcon (<i>Falco mexicanus</i>) • Burrowing owl (<i>Athene cunicularia</i>) • Long-eared owl (<i>Asio otus</i>) • Western snowy plover (<i>Charadrius alexandrinus nivosus</i>) • California horned lark (<i>Eremophila alpestris actia</i>) • Loggerhead shrike (<i>Lanius ludovicianus</i>) • Coastal cactus wren (<i>Campylorhynchus brunneicapillus couesi</i>) • Coastal California gnatcatcher (<i>Polioptila californica californica</i>) • Yellow warbler (<i>Dendroica petechia</i>) • Yellow-breasted chat (<i>Icteria virens</i>) • Southern California rufous-crowned sparrow (<i>Aimophila ruficeps canescens</i>) • Bell’s sage sparrow (<i>Amphispiza belli belli</i>)

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- Tricolored blackbird (*Agelaius tricolor*)
- Southern steelhead (*Oncorhynchus mykiss irideus*)
- Pallid bat (*Antrozous pallidus*)
- Western mastiff bat (*Eumpos perotis californicus*)
- Northwest San Diego pocket mouse (*Chaetodipus fallax fallax*)
- Large-blotched salamander (*Ensatina klauberi*)
- Coast Range newt (*Taricha torosa torosa*)
- Mountain yellow-legged frog (*Rana muscosa*)
- Arroyo chub (*Gila orcutti*)
- Tidewater goby (*Eucyclogobius newberryi*)
- California leaf-nosed bat (*Macrotus californicus*)
- Mexican long-tongued bat (*Choeronycteris mexicana*)
- Townsend's big-eared bat (*Corynorhinus townsendii*)
- Pocketed free-tailed bat (*Nyctinomops femorosaccus*)
- Big free-tailed bat (*Nyctinomops macrotis*)
- American badger (*Taxidea taxus*)
- San Diego desert woodrat (*Neotoma lepida intermedia*)
- Flat-tailed horned lizard (*Phrynosoma mcallii*)
- Colorado desert fringe-toed lizard (*Uma notata*)
- Southern grasshopper mouse (*Onychomys torridus Ramona*)
- Pallid San Diego pocket mouse (*Chaetodipus fallax pallidus*)
- Dulzura pocket mouse (*Chaetodipus californicus femoralis*)
- San Diego black-tailed jackrabbit (*Lepus californicus bennettii*)
- Los Angeles pocket mouse (*Perognathus longimembris brevinasus*)
- Pacific pocket mouse (*Perognathus longimembris pacificus*)
- Jacumba pocket mouse (*Perognathus longimembris international*)

Table 3.9-3: Summary of T&E Species Known or Suspected at the Detachment Fallbrook, California	
Habitat	Species
Coastal Sage Scrub	Least Bell's vireo
	Stephens' kangaroo rat
	Coastal California gnatcatcher
Riparian	Arroyo toad
	Least Bell's vireo
	Southwestern willow flycatcher
Oak Woodlands	None
Eucalyptus Groves	None
Mixed Grassland	Stephens' kangaroo rat
Chaparral	None
Wetlands	San Diego fairy shrimp

4. SUMMARY OF DATA COLLECTION EFFORT

Five primary sources of information were researched as part of the data collection effort for the PA. The sources of data included:

1. Historical Archives (off-site);
2. Personnel interviews;
3. Installation data repositories;
4. Visual surveys; and
5. Off-site data sources.

These five sources of data are discussed below, along with their relative application to this PA.

4.1. Historical Archives (off-site)

The data collection team reviewed archival records located at the National Archives in College Park, Maryland, and in Washington, D.C. The data collection team researched the following records and record groups (RG) for documents relating to munitions usage at Detachment Fallbrook. Records indicated with an asterisk (*) were copied for review.

Textual Records:

RG 71, Bureau of Yards and Docks

Naval Property Case Files, Boxes 42, 56, 61, and 161

RG 72, Bureau of Aeronautics

Entry 1001-G, Unclassified General Correspondence, 1955, Boxes 206, and 230

Entry 1001-H, Unclassified General Correspondence, 1956, Boxes 195, and 219

Entry 1001-I, Unclassified General Correspondence, 1957, Boxes 202, and 222

Entry 1001-J, Unclassified General Correspondence, 1958, Boxes 156, and 172

Entry 1001-K, Unclassified General Correspondence, 1959, Box 159

RG 74, Bureau of Ordnance

Entry 25-E, General Correspondence, Confidential, 1940-1942, Boxes 181, and 195

Entry 25-F, General Correspondence, Restricted, 1940-1942, Boxes 619, and 790

Entry 25-I, General Correspondence, 1942, Confidential, Box 217

Entry 25-J, General Correspondence, 1942, Restricted, Boxes 591, and 592

Entry 25-M, General Correspondence, 1943, Confidential, Boxes 407 through 409

Entry 25-O, General Correspondence, 1943, Restricted, Boxes 452, 461, 462, 463, 464, 465*, and 703

Entry 25-T, General Correspondence (Bulky enclosures), 1940-1943, Boxes 260, and 288

Entry 25-U, General Correspondence, 1944, Confidential, Boxes 594, 595, and 597

Entry 25-V, General Correspondence, 1944, Restricted, Boxes 807, 1235, 1236*, 1237*, 1238*, 1239*, 1240*, and 1280

Entry 1001, General Correspondence, 1907-1949, Boxes 37, 38, 70, 71, 106, and 107

Entry 1003 A-B, General Correspondence, 1948-1959, Boxes 651*, and 652

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Entry 1003-A, General Correspondence, Unclassified and Confidential, 1948, Boxes 223*, 224*, 225*, and 227

Entry 1003-A, General Correspondence, Unclassified and Confidential, 1949, Boxes 659*, 660*, and 662

Entry 1003-A, (UD), Office of Administration, General Subject Files, Boxes 19*, 20*, and 21

Construction and Procurement Subject Files

1945, Boxes 1539-1542, 1543*, 1544*, 1581, 1582, 1583*, 1584*, and 1587

1946, Boxes 354*, 386, 387*, 388*, 405*, 406*, 407*, 408*, 409*, and 411

1947, Boxes 268*, 269*, 293*, 306*, 307*, 308*, and 482*

RG 80, General Records of the Department of the Navy, 1798 through 1947

Entry 32-G, General Correspondence, Executive Office, 1946 through 1947, Box 430*

Entry 11, Secretary's Office, General Correspondence, Index 1945 through 46, Naval Activities, Boxes 283 through 291

Entry 32-F, Name and Subject Index to General Correspondence of Executive Office of the Secretary of the Navy, 1946 through 47, Boxes 336 through 341

Entry 131-F, Assistant Secretary of the Navy for Air, General Correspondence, 1941 through 1945

Entry 256, Index to Reports from Shore Establishments, 1943, Boxes 1 through 3

RG 127, U.S. Marine Corps, Office of the Commandant

United States Marine Corps Real Estate Files, 1918 through 1976, Box 11

Cartographic Records:

RG 57, U.S. Geological Survey

Quadrangle map series

RG 71, Bureau of Yards and Docks

Maps for facilities, Rolls 1230, and 1196*

Series I microfilm, Rolls 1005, and 1082

Series II microfilm, Reel 892*

RG 77, Department of the Army

Army Mapping Service, AMS, Map V795*

RG 385, Naval Facilities Engineering Command, 1917 through 1989

Architectural and Engineering Plans, Boxes 609, 610, 768*, 769*, 770*, 771*, 772*, and 773

Restricted UIC Architectural and Engineering Plans, Box W34 (60701)

Still Photos:

RG 71, Bureau of Yards and Docks

Entry 71-CB, Construction Projects, 1940 through 1943, Boxes 33, and 132

Entry 71-CP, Construction and Aerials, 1941-1953, Boxes 19, 69, 76*, 82, and 83*

RG 80, Department of the Navy

80-G, Boxes 311, 1533, 1601*, 1801, 1872, 2262*, 2378*, 2382*, 2430, 2549, 2575*, 2582, 2760, and 2857*

RG 428, Department of the Navy

Entry 428-GX, Index to Photo Files

Series 428-GXA

Naval Historical Center, Washington, DC

Operational archives: Post World War II command histories*

Aviation branch: Post World War II aviation command histories*

Historical Center Library: "U.S. Naval Administrative Histories of World War II"*

Historical maps, aerial photos, documentation, and correspondence were obtained from the repository search. The historical documents provided general information about the installation and the munitions activities performed there over time. The historical maps provided the location of possible MRP ranges/sites.

4.2. Personnel Interviews

The data collection team visited the following offices located at Detachment Fallbrook, unless otherwise indicated, to interview representatives and to research records related to the training and activities that was conducted at the areas of concern:

- Environmental Department
- Facilities Department
- Marine Corps Program Division (MCPD)
- Security Department
- Ordnance Department
- MCB Camp Pendleton Fire Department
- EOD Detachment at MCB Camp Pendleton

A summary of the personnel interviewed and general information obtained from each office is presented below. These interviews focused on the following ranges/sites: the SF Small Arms Range, the QE Test Area, the Salvage Yard Landfill, Dunnage Disposal Site #1, Dunnage Disposal Site #2, Dunnage Disposal Site #3, Dunnage Disposal Site #4, Dunnage Disposal Site #5, the Skeet/Trap Range, Depot Lake, and Lower Lake.

Environmental Department – The data collection team interviewed Ms. Pei-Fen Tamashiro, who is currently the Installation Restoration Program Manager. Ms. Tamashiro assisted the data collection team in coordinating the interviews and the visual surveys, providing access to documents and maps, and in presenting the in-brief and the exit brief. Mr. Robbie Knight,

the Natural Resources Manager, was also interviewed regarding range and munitions activities at the installation. He provided access to several documents and maps relating to these activities, and was a great source of information on the general installation. Mr. Knight also helped the data collection team coordinate interviews. The data collection team also interviewed Ms. Lisa Bosalet, the Cultural Resources Manager, who was a great source of information on the cultural resources at the installation.

Facilities Department – The data collection team interviewed Mr. Kevin Bouelle, who is currently the Head of Facilities at the installation. Mr. Bouelle provided access to historical maps showing range and munitions activities at the installation. Mr. Richard Spinello, the Maintenance Supervisor, was also interviewed.

MCPD – The data collection team interviewed four personnel from the MCPD: Mr. Wayne Ventuleth (Head of the MCPD), Mr. Daniel Reagle (Supervising Engineer Technician), Mr. John Korchick (Mechanical Engineer), and Mr. Jim Francis (Mechanical Engineer). These MCPD personnel provided the data collection team with information on the QE Test Area, where they had all previously worked. They also provided the team with historical documents and maps relating to the QE Test Area and contact information for other interviews.

Security Department – The data collection team interviewed Mr. Ken Scofield from the Security Department at the installation. He was familiar with the SF Small Arms Range and provided useful information to the data collection team. Ms. Leslie Hawkins, a Physical Security Specialist, provided useful information to the team on the security forces activities carried out at the SF Small Arms Range.

Ordnance Department – The data collection team interviewed Mr. Greg Town, who works in Quality Assurance at the Ordnance Department. Mr. Town provided historical information and locations for possible range and munitions sites at the installation.

MCB Camp Pendleton Fire Department – The data collection team interviewed Mr. Kenneth A. Kaptein of the MCB Camp Pendleton Fire Department. Mr. Kaptein provided the team with useful information on the SF Small Arms Range and on the Skeet Range,

where he had participated in activities as part of the Marine Security Department at the installation.

EOD Detachment at MCB Camp Pendleton - The data collection team interviewed Master Gunnery Sergeant Samuel Larter, who is an EOD Technician at MCB Camp Pendleton. Master Gunnery Sergeant Larter provided the team with records of EOD responses at Detachment Fallbrook.

The data collection team also interviewed several retired personnel from Detachment Fallbrook. They provided the data collection team with very useful information, including locations of potential MRP ranges/sites. The personnel are listed below:

- Lieutenant Commander (LCDR) Tom Curtis (Retired), Assistant Commanding Officer at Detachment Fallbrook from 1974 to 1977 and Commanding Officer from 1977 to 1980.
- Mr. Don McNamara, former Special Weapons Officer from 1974 to 1976.
- Mr. Bill Houlder, former Facilities Officer from 1973 to 1976.
- Commander James H. Owens (Ret), formerly in charge of Detachment Fallbrook from 1962 to 1965.
- Mr. Buddy Ingram, former Technician with the Ordnance Department, and subsequently the Head of the Security Department from 1978 to 1994.
- Commander Reginald Fogg (Ret), formerly in charge of Detachment Fallbrook from 1965 to 1970.

4.3. Installation Data Repositories

The data collection team reviewed reports, files, and drawings located in the environmental office at Detachment Fallbrook and made available for review at the site. The team made copies of reports and files of interest, including historical munitions reports, IRP investigation reports, and ecological risk assessments. The team copied documents relating to Detachment Fallbrook IRP activities at the environmental office. The team searched map and flat files at the Detachment Fallbrook Facilities and Engineering offices' vaults for historical maps and aerial photos showing the former ranges.

4.4. Visual Surveys

The data collection team conducted a visual survey of each site/range as part of the data collection effort for the PA. The purpose of the visual survey was to identify any MEC-related materials (e.g., expended rounds, fragmentation, range debris, old targets), any evidence of MC (such as ground scarring, stressed vegetation, or chemical residue), and/or surface features that could provide additional information to aid in the characterization of the site. The visual survey was also used to enhance, augment, or confirm the archival data and, in some cases, to provide new data to the team.

The SF Small Arms Range and the Skeet/Trap Range are moderate in size, as are the five Dunnage Disposal Sites, so the team surveyed the accessible areas of each range. The QE Test Area and the Salvage Yard Landfill are large sites. The team surveyed the sites by walking the perimeter of the sites, then walking several transects across the sites. Both Depot Lake and Lower Lake are water sites, so the team walked the accessible perimeters of each lake. A description of the area surveyed and the results of the survey are provided for the SF Small Arms Range, the QE Test Area, the Salvage Yard Landfill, the Dunnage Disposal Site #1, the Dunnage Disposal Site #2, the Dunnage Disposal Site #3, the Dunnage Disposal Site #4, the Dunnage Disposal Site #5, the Skeet/Trap Range, Depot Lake, and Lower Lake in Sections 5.1.2 through 5.11.2.

4.5. Off-Site Data Sources

The data collection team reviewed the archives at the Naval Facilities Engineering Command (NAVFAC) Historian's office at Port Hueneme. It provided the data collection team with access to historical documentation of Detachment Fallbrook, including aerial photographs and site maps. The data collection team made copies of the maps, photographs, and reports of interest to this PA.

5. SITE CHARACTERISTICS

The following sections provide site-specific information about each of the nine former ranges and sites located on Detachment Fallbrook, including history and site description; land use; access controls and restrictions; visual survey observations; contaminant migration routes; and receptors. The SF Small Arms Training Range, the QE Test Area, the Salvage Yard Landfill, the Dunnage Disposal Site #1, the Dunnage Disposal Site #2, the Dunnage Disposal Site #3, the Dunnage Disposal Site #4, the Dunnage Disposal Site #5, the Skeet/Trap Range, Depot Lake, and Lower Lake are discussed in sections 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 5.10, and 5.11, respectively.

5.1. SF Small Arms Training Range

The SF Small Arms Training Range (hereafter called the SF Small Arms Range) is located northeast of Building 366, in the eastern center of Detachment Fallbrook. The range occupies approximately 0.4 acres. Building 366 is currently not in use. Map 2.1-1 shows the location of the site on Detachment Fallbrook and its boundaries.

5.1.1. *History and Site Description*

The SF Small Arms Range was used from 1945 to 1991 by both the Marine Security Forces (from 1945 to 1988) and the civilian Security Forces (from 1987 to 1991) for handgun marksmanship training. It was also used by station civilians and local law enforcement officers. Munitions used at the range include .38-caliber, .45-caliber, and 9-mm rounds. The SF Small Arms Range was closed in 1991 due to the proximity of the main administration areas of the installation and the town of Fallbrook.

The SF Small Arms Range was oriented for firing to the southwest, with the firing points located on the northernmost portion of the range. MC would likely be located throughout the range fan, including in the soil from the former backstop berm, in surface soils located adjacent to the berm, and near the firing line. The guns were fired at targets positioned in front of a natural soil berm. No firing line was observed during the site survey. Some of the wooden target frames and the natural target berm are still intact, as are the remnants of a shed that was used to store the targets. The area is not currently in use. Figure 5.1-1 shows a view of the SF Small Arms Range.

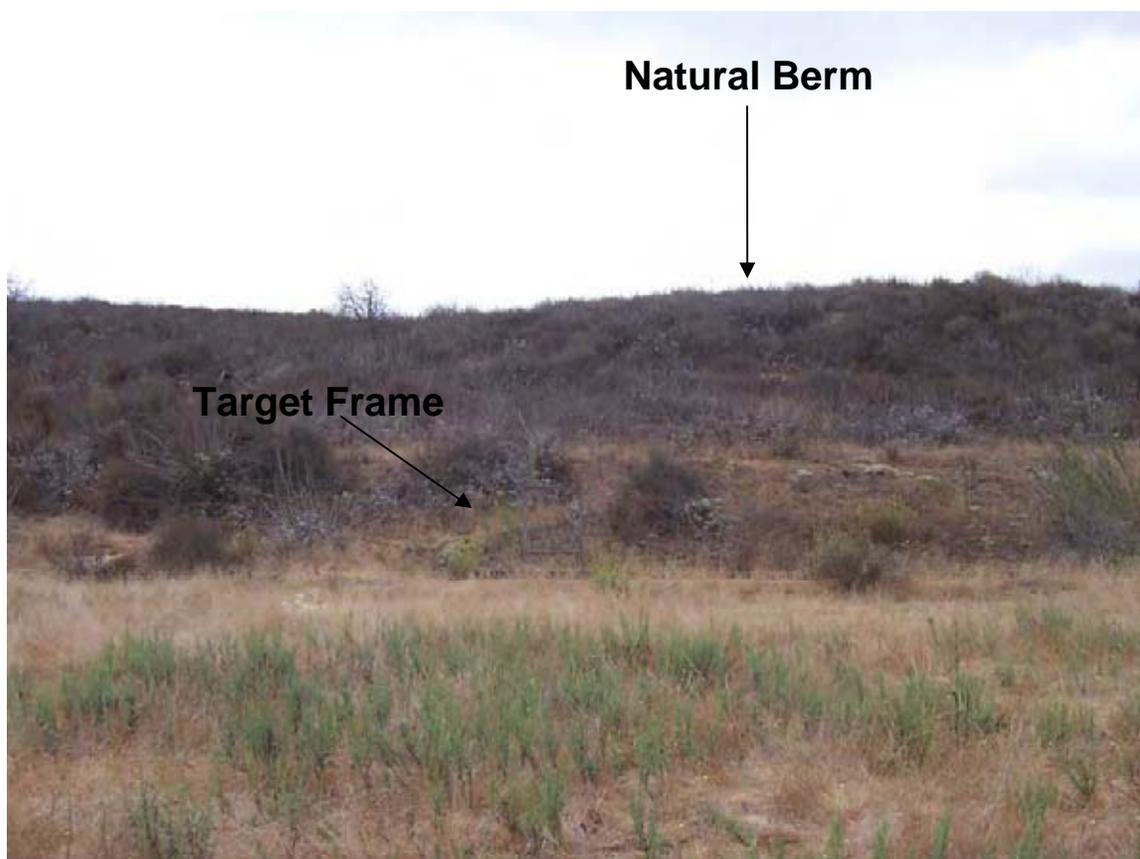


Figure 5.1-1: Photograph was taken during the September 2004 on-site visual survey. View is looking southwest at the remnants of a target frame and the natural berm.

According to Army Technical Manuals (referenced as AR 750-10 and TM 9-855) and the Navy Programming Guide (1958), a typical pistol range was approximately 30 yards wide by 50 yards deep. The range would have been comprised of the firing line, targets, earthen berms, and an area behind the firing line that included the ammunition issue point. The backstop berm was typically constructed along the backside of the range, approximately five feet to the rear of the targets. A five degree angle of fire extended from the firing line down range a distance of 4,800 feet, with an additional 25 degree safety fan (on both sides) extending down range 3,600 feet. The Surface Danger Zone (SDZ), which included the down range hazard area and the safety fan, was roughly diamond-shaped and contained approximately 224 acres. An example of a typical SDZ for a 0.45 caliber pistol range is provided in Figure 5.1-2.

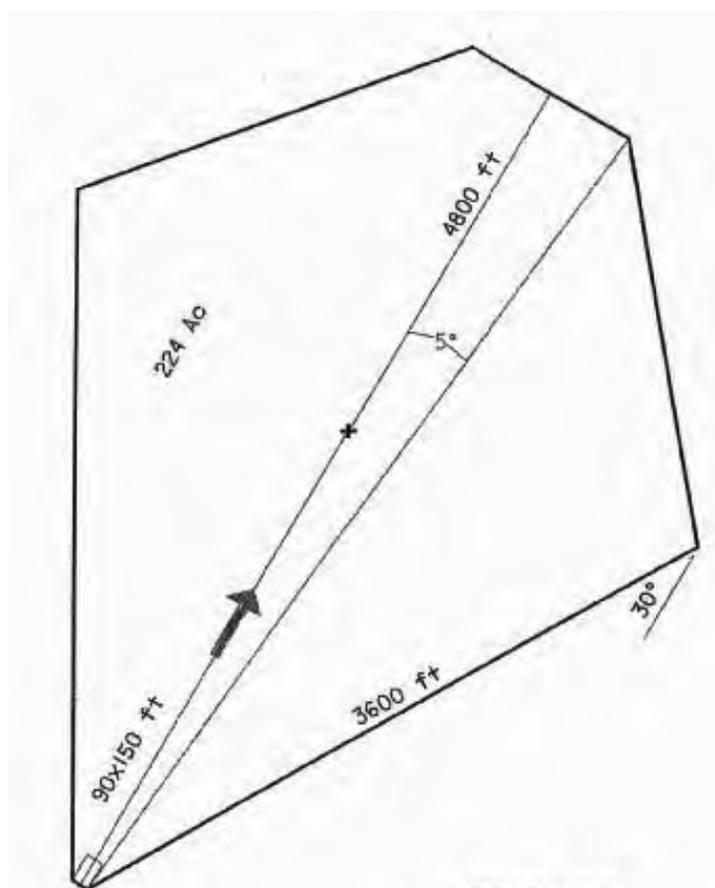


Figure 5.1-2: SDZ for a typical 0.45 caliber pistol range

The site boundary for the SF Small Arms Range encompasses the target areas and the berm at the site. The site includes the area where the bullets and bullet fragments were observed. Whereas, the SDZ represented the portion of the former range that included the area where the weapons, when fired from the firing line, were a potential hazard to personnel. The SDZ was used to define the area that included the firing line, target areas, impact area (i.e., berm), ricochet trajectory area, and secondary danger area. The SDZ for the SF Small Arms Range is shown in Map 5.1-2. The acreage for the SDZ is approximately 220 acres.

5.1.1.1. Topography

The SF Small Arms Range is primarily flat, except for the hills on the southern boundary of the range that form the natural berm. For further information on the topography of Detachment Fallbrook, see [Section 3.2](#).

5.1.1.2. Geology

Site-specific geology for the SF Small Arms Range is unknown. No data from soil borings is available. [Section 3.3](#) includes a general description of the geology of Detachment Fallbrook.

5.1.1.3. Soil and Vegetation Types

The soil at the SF Small Arms Range is classified as a sandy loam of granitic origin and is moderately well drained. [Section 3.4](#) includes a general description of the soil types at Detachment Fallbrook.

The vegetation in the area of the SF Small Arms Range is considered to be part coastal sage scrub and part mixed grassland, with a eucalyptus grove nearby. Common species in coastal sage scrub habitat include coastal sagebrush (*Artemisia californica*), flat-topped buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), sage (*Salvia* spp.), goldenbush (*Isocoma menziesii*), and native grasses (*Nassella* spp.). Species in mixed grassland habitat are mostly native, perennial bunch grasses, such as *Nassella* spp., mixed with nonnative annuals. [Section 3.5](#) includes a general description of the vegetation types at Detachment Fallbrook.

5.1.1.4. Hydrology

The SF Small Arms Range is in the Santa Margarita watershed. The installation includes a central plateau, where the SF Small Arms Range is located. The plateau drains primarily into Fallbrook Creek, about 40 feet north and northwest of the former range's boundary. Fallbrook Creek would naturally be an intermittent or ephemeral stream, but due to runoff from agricultural and urban irrigation, it is now a perennial stream. [Section 3.6](#) includes a general description of the hydrology at Detachment Fallbrook.

5.1.1.5. Hydrogeology

No site-specific groundwater depth data were available. [Section 3.7](#) includes a general description of the hydrogeology at Detachment Fallbrook.

5.1.1.6. Cultural and Natural Resources

The data collection team for the SF Small Arms Range area found no documentation of significant cultural resources within or near the former range. Detachment Fallbrook has large areas of undisturbed land that can serve as suitable habitat to threatened and endangered species.

[Section 3.8](#) includes a general description of the cultural and natural resources at Detachment Fallbrook.

5.1.1.7. Endangered and Special Status Species

Threatened and endangered species data for Detachment Fallbrook are presented in [Section 3.9](#). The on-site coastal sage scrub vegetation, grasslands, and the nearby eucalyptus grove offer roosting, foraging, and nesting resources for raptors. According to the California Wildlife and Habitat Analysis Branch, threatened and endangered species associated with the critical habitats of the former range that are known or have been documented within or adjacent to the Detachment Fallbrook are the coastal California gnatcatcher, Least Bell's vireo, and Stephens' kangaroo rat.

5.1.2. Visual Survey Observations and Results

The data collection team conducted a visual survey of the SF Small Arms Range on 29 September 2004. Present during the visual survey were Mr. Chip Poalinelli, Mr. Al Larkins, and Mr. Scott Lehman, and Navy representatives (Ms. Pei-Fen Tamashiro, Mr. Robbie Knight, and Mr. Si Le). The field team conducted the visual survey by walking the perimeter of the entire range, and then walking several transects across it. During the visual survey, several ammunition fragments consistent with small arms were observed on the natural berm. Some of the wooden target frames and the natural target berm are still intact on the SF Small Arms Range. The remnants of a shed that was used to store the targets were also observed during the site survey. The survey team did not find any evidence of MEC during the visual survey. Figure 5.1-3 shows some of the ammunition fragments consistent with small arms observed on the natural berm. The site reconnaissance path is shown on Map 5.1-1, at the end of Section 5.1. Additional range details are illustrated on Map 5.1-2, also at the end of Section 5.1.



Figure 5.1-3: Photograph was taken during the September 2004 on-site visual survey. View is showing ammunition fragments consistent with small arms on the natural berm at the SF Small Arms Range.

5.1.3. Munitions and Munitions Related Materials Associated with the Site

This section describes the munitions and munitions related materials, including the types and estimated maximum penetration depths, known or suspected to be at the former range. This includes both MEC and non-hazardous munitions related scrap (e.g., fragments, base plates, and inert mortar fins).

The data collection team was able to determine the types of munitions that were used at the SF Small Arms Range from personnel interviews and the limited visual survey. The available technical data sheets on these items are included in [Appendix D](#). The munitions types used at the range include .38-caliber, .45-caliber, and 9-mm rounds.

Based on the information obtained during the data collection process, the SF Small Arms Range is not suspected to contain chemical warfare material (CWM) filled munitions, electrically fuzed munitions, or depleted uranium (DU) associated munitions.

5.1.4. MEC Presence

The entire former range has been subdivided and categorized into one of three levels of MEC presence including: Known MEC Areas, Suspected MEC Areas, and Areas Not Suspected to Contain MEC to indicate that MEC is known or is suspected to be at the former range. Map 5.1-3

illustrates the munitions characterization of the SF Small Arms Range, and is provided at the end of Section 5.1. The MEC presence is discussed below.

5.1.4.1. Known MEC Areas

There are no Known MEC Areas associated with the SF Small Arms Range since the site was used only for small arms training. There is no historical or known evidence of explosives used at the site, so there is no evidence of MEC.

5.1.4.2. Suspected MEC Areas

There are no Suspected MEC Areas associated with the SF Small Arms Range since the site was used only for small arms training. There is no historical or known evidence of explosives used at the site, so there is no evidence of MEC.

5.1.4.3. Areas Not Suspected to Contain MEC

Based on observations made and data collected during the PA process, the 0.4-acre site, as well as the SDZ associated with the SF Small Arms Range, is not suspected to contain MEC.

5.1.5. Ordnance Penetration Estimates

The depth to which munitions penetrate below the ground surface depends on many factors, including the type of soil, the angle of impact, the size of the munitions, the velocity at impact, and site-specific environmental conditions. Over the years, the DoD has studied and modeled munitions penetration depths and has issued various guidance and technical documents on the subject. The technical documents, however, apply to air dropped and indirect fire weapons and do not apply to small arms ranges. By design, a small arms range is a directed fire training range and normally has a backstop (impact) berm located behind the target area that receives/contains the projectiles (bullets) expended on the range. Depending on berm composition, the penetration depths into the backstop berm range from surface to 12 inches. At the SF Small Arms Range, small arms munitions fragments were observed on the surface of the natural berm. Because the range was designed such that small arms ammunition was fired toward targets and retained onsite by the backstop berm, expended rounds are not expected to have penetrated the ground surface or accumulated beyond the berm.

5.1.6. Munitions Constituents

MC associated with small arms activities could be present at the SF Small Arms Range. Small arms ammunition is composed mostly of lead (approximately 85% by weight), which is the primary munitions constituent at small arms ranges. Other MCs include antimony, arsenic, copper, nickel, zinc, and constituents associated with black or smokeless powder. According to installation personnel, surface soil sampling at the SF Small Arms Range has not occurred.

5.1.7. Contaminant Migration Routes

Migration of MC may occur through surface soil erosion due to runoff and wind. Future construction, excavation, and maintenance at the site are also potential release mechanisms. MC in runoff could potentially end up in surface water or sediment. MC could also potentially leach through soils or surface waters to groundwater.

5.1.8. Receptors and Pathways

Potential receptors at the SF Small Arms Range include Navy personnel, visitors, private contractors, and ecological receptors. Ecological receptors may come into direct contact with MC in soil while foraging or burrowing. Ecological receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). There is also a potentially complete exposure pathway for the general public coming into contact with MC migrating off the installation through the surface water system.

5.1.8.1. Nearby Populations

Fallbrook and San Diego County have populations of 29,100, and 2,813,833, respectively (U.S. Census Bureau, 2000). 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. The SF Small Arms Range is approximately 8,200 feet from the housing complex at the installation. See [Section 2.1](#) for more information on the housing complex.

5.1.8.2. Buildings Near/Within Site

There are currently no buildings on the SF Small Arms Range, other than the remnants of a shed that was used to store the targets. Building 366 is the only building in the SDZ and approximately 2,790 feet southwest of the SF Small Arms Range, as shown on Map 5.1-2. As mentioned earlier, the building is not currently in use and is on a list to be demolished. The

eastern boundary of Detachment Fallbrook is approximately 1,395 feet away. Beyond the Detachment's boundary lies the Town of Fallbrook. Figure 5.1-4 shows the remnants of the shed on the SF Small Arms Range.



Figure 5.1-4: Photograph was taken during the September 2004 on-site visual survey. View is showing the remnants of a shed that was used to store the targets.

5.1.8.3. Utilities On/Near Site

While there are no utilities on-site, there are some utility lines near the site. U.S. government underground phone lines are located within 0.2 miles of the western boundary of the site. Just inside the southwest-northeast trending installation fence line, approximately 0.2 miles from the site, is a Fallbrook Sanitation District sewer line.

5.1.9. Land Use

The area was formerly used as a small arms range. Current activities are limited to environmental and ecological surveys. Potential future land use activities must address the issue of the proximity of the main administration areas of the installation and from the town of Fallbrook, and follow any Navy ESQD waivers or exemptions.

5.1.10. Access Controls / Restrictions

The SF Small Arms Range 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. Access to the SF Small Arms Range from within Detachment Fallbrook is controlled by a locked fence.

5.1.11. Conceptual Site Model

This Conceptual Site Model (CSM) was developed following guidance documents issued by the USEPA for hazardous waste sites and the U.S. Army Corps of Engineers (USACE) for Ordnance and Explosives (OE) sites. Guidance documents used in the development of this CSM include the USEPA’s Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/004) and the Final USACE CSM Guidance Development of Integrated Conceptual Site Models for Environmental OE Sites (USACE, 2003).

The CSM describes the site and its environmental setting, and presents information regarding: 1) MEC and/or MC known or suspected to be at the site; 2) current and future reasonably anticipated or proposed uses of the real property; and 3) actual, potentially complete, or incomplete exposure pathways that link MEC and/or MC to receptors.

The CSM is presented in a series of information profiles that provide information about the site. The information profiles are included in Table 5.1-1 below.

Table 5.1-1: Conceptual Site Model Information Profiles –SF Small Arms Range		
Profile Type	Information Needs	Preliminary Assessment Findings
Range Profile	Installation Name	Detachment Fallbrook
	Installation Location	Detachment Fallbrook is located 53 miles north of San Diego in northern San Diego County, CA.
	Range Name	SF Small Arms Training Range
	Range Location	The SF Small Arms Range is located in the central plateau of the installation, near the eastern border, just northeast of Building 366. Building 366 is not currently in use and is on a list to be demolished.
	Range History	The SF Small Arms Range was used from 1945 to 1991. It was used by both the Marine Security Forces (from 1945 to 1988) and the civilian Security Forces (from 1987 to 1991) for handgun marksmanship training. It was also used by station civilians and local law enforcement officers. The SF Small Arms Range was closed due to the proximity of the main administration areas of the installation and the town of Fallbrook.

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Table 5.1-1: Conceptual Site Model Information Profiles –SF Small Arms Range		
Profile Type	Information Needs	Preliminary Assessment Findings
	Range Area and Layout	The SF Small Arms Range occupies approximately 0.4 acres. The range was oriented for firing to the southwest. The guns were fired at targets positioned in front of a natural soil berm. No firing line was observed during the site survey.
	Range Structures	Some of the wooden target frames and the soil berm are relatively intact on the former range. The remnants of a shed that was used to store the targets can also be seen on the range.
	Range Boundaries	Map 2.1-1 shows the location of the former range. N: A line of eucalyptus trees gives way north to Fallbrook Creek, which is approximately 40 feet away from the range’s northern boundary. S: Shrubs and grassland extend southwest towards Building 366, which is approximately 2,790 feet away from the range’s southern boundary. W: Trees, shrubs and grassland extend west towards Fallbrook Creek, which is approximately 65 feet away from the range’s western boundary. E: Trees, shrubs and grassland extend to the eastern boundary of Detachment Fallbrook, which is approximately 1,395 feet away from the range’s eastern boundary. Beyond the Detachment’s boundary lies the Town of Fallbrook.
	Range Security	The SF Small Arms Range is located on Detachment Fallbrook, which is a fenced and guarded installation. Access to the SF Small Arms Range from within Detachment Fallbrook is controlled by a locked fence.
	Munitions/ Release Profile	Munitions Types
	Maximum Probability Penetration Depth	The penetration depths into the natural berm range from zero to 12 inches. During the site survey, expended shells were observed on the natural berm.
	MEC Density	None; no evidence of MEC; small arms use only.
	MEC Scrap/Fragments	None.

Table 5.1-1: Conceptual Site Model Information Profiles –SF Small Arms Range		
Profile Type	Information Needs	Preliminary Assessment Findings
	Associated Munitions Constituents	Small arms ammunition is mainly composed of lead (approximately 85% by weight), which is the primary munitions constituent at small arms ranges. Other MCs include antimony, arsenic, copper, nickel, zinc, and constituents associated with black or smokeless powder. Based on discussions with installation personnel, surface soil sampling at the SF Small Arms Range has not occurred.
	Migration Routes/Release Mechanisms	Migration of MC may occur through surface soil erosion due to runoff and wind. Future construction, excavation, and maintenance at the site are also potential release mechanisms. MC in runoff could potentially end up in surface water or sediment. MC could also potentially leach through soils or surface waters to groundwater.
Physical Profile	Climate	The climate at Detachment 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 being the wettest month and July the driest. Summers at the installation are punctuated by the Santa Ana (offshore) winds.
	Topography	The SF Small Arms Range is mainly flat, except for the hills on the southern boundary of the range that form the natural berm.
	Geology	The region is underlain by plutonic and metasedimentary rocks of the Peninsular Ranges physiomorphic province, but site-specific information was not available.
	Soil	The soil at the SF Small Arms Range is classified as a sandy loam of granitic origin and is moderately well drained.
	Hydrogeology	No site-specific groundwater depth data were available.
	Hydrology	The SF Small Arms Range is in the Santa Margarita watershed. The central plateau of the installation, where the SF Small Arms Range is located, drains primarily into Fallbrook Creek, about 40 feet to the north and northwest of the former range’s boundary.
	Vegetation	The vegetation in the area of the SF Small Arms Range is considered to be part coastal sage scrub and part mixed grassland, with a eucalyptus grove nearby.

Table 5.1-1: Conceptual Site Model Information Profiles –SF Small Arms Range		
Profile Type	Information Needs	Preliminary Assessment Findings
Land Use and Exposure Profile	Current Land Use	The SF Small Arms Range is closed and is no longer in use.
	Current Human Receptors	Navy personnel and Navy-permitted visitors (including contractors). There is also a potentially complete exposure pathway for the general public coming into contact with MC migrating off the installation through the surface water system.
	Current Activities (frequency, nature of activity)	Activities at the range may include environmental and ecological surveys.
	Potential Future Land Use	There is no land use change planned.
	Potential Future Human Receptors	Navy personnel and Navy-permitted visitors (including contractors). There is also a potentially complete exposure pathway for the general public coming into contact with MC migrating off the installation through the surface water system.
	Potential Future Land Use-Related Activities:	Potential future land use activities must address the issue of the proximity of the main administration areas of the installation and the town of Fallbrook, and follow any Navy ESQD waivers or exemptions. Other future activities at the range could include environmental and ecological surveys.
	Zoning/Land Use Restrictions	ESQD Arc restrictions apply to the area of the former SF Small Arms Range.
	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: <ul style="list-style-type: none"> • Town of Fallbrook: Population (U.S. Census, 2000): 29,100 • San Diego County: Population (U.S. Census, 2000): 2,813,833
	Beneficial Resources	The on-site coastal sage scrub vegetation, grasslands, and the nearby eucalyptus grove offer roosting, foraging, and nesting resources for raptors.
Ecological Profile	Habitat Type	The types of habitats associated with the SF Small Arms Range include coastal sage scrub, mixed grasslands, and eucalyptus.

Table 5.1-1: Conceptual Site Model Information Profiles –SF Small Arms Range		
Profile Type	Information Needs	Preliminary Assessment Findings
	Degree of Disturbance	Current and anticipated future activities at the range, 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 include mammals (opossums, coyotes, gophers, skunks, deer, rats, rabbits, and mice), reptiles (lizards, turtles, and rattlesnakes), insects (beetles and butterflies), amphibians (toads, frogs, and salamanders), and birds (owls, finches, wrens, hawks, vultures, and sparrows).
	Federal Endangered Species:	Least Bell’s vireo and Stephens’ kangaroo rat
	Federal Threatened Species:	Coastal California gnatcatcher
	State Endangered Species:	Least Bell’s vireo
	State Threatened Species:	Stephens’ kangaroo rat
Relationship of MEC/MC Sources to Habitat and Potential Receptors	Potential human receptors at the SF Small Arms Range include Navy personnel, visitors, and private contractors. Ecological receptors may come into direct contact with MC in soil while foraging or burrowing. Ecological receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). There is also a potentially complete exposure pathway for the general public coming into contact with MC migrating off the installation through the surface water system.	

A key element of the CSM is the exposure pathway analysis, which is performed separately for MEC and for MC.

For MEC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MEC are expected to be found); 2) access (e.g., controlled or uncontrolled access, items on the surface or within the subsurface); 3) an activity (e.g., non-intrusive grounds maintenance or intrusive construction); and 4) receptors (e.g., Navy personnel, construction workers, recreational users, authorized visitors, or ecological receptors). It is important to recognize that environmental mechanisms (e.g., erosion) and/or human intervention may result in the repositioning of MEC.

For MC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MC are expected to be found); 2) an exposure medium (e.g., surface soil); 3) an exposure route (e.g., dermal contact); and 4) receptors (e.g., Navy personnel, construction workers, recreational users, authorized visitors, or ecological receptors). If the point of exposure is not at the same location as the source, the pathway may also include a release mechanism (e.g., volatilization) and a transport medium (e.g., air).

The potential interactions between the source and receptors are assessed differently between MEC and MC. For MC, interaction between the source and receptors involves a release mechanism for the MC, an exposure medium that contains the MC, and an exposure route that places the receptor into contact with the contaminated medium. For MEC, interaction between the potential receptors and an MEC source has two components. The receptor must have access to the source and must engage in some activity that results in contact with individual MEC items within the source area.

MEC Interactions and Pathway Analysis

No exposure pathway analysis for MEC was prepared for the SF Small Arms Range because it is not suspected to contain MEC. Historical and visual evidence indicate that MEC are not present at the SF Small Arms Range. The site was a small arms range and no evidence has been found that would indicate MEC at the site.

MC Interactions and Pathway Analysis

The exposure pathway analysis for MC is shown in Figure 5.1-5. Potential receptors include both human (Navy personnel and contractor/visitor) and ecological receptors (biota) that may come in contact with MC in the source medium or other potentially contaminated media from the site. Pathways are shown for each medium and are discussed below. For MC, interaction between the source (e.g., the berm) and receptors generally involves a release mechanism for the MC (e.g., uptake into the food chain, runoff to surface water, or leaching to groundwater), an exposure medium containing the MC (e.g., soil, sediment, groundwater), and an exposure route (e.g., incidental ingestion, dermal contact, inhalation) that places the receptor into contact with the contaminated medium.

Surface Water/Sediment

As discussed earlier, Fallbrook Creek is about 40 feet from the northwestern border of the SF Small Arms Range. This creek and its tributaries are used for fish and wildlife enhancement and for wildfire protection. The exposure pathway for surface water and/or sediment is considered potentially complete for human receptors through dermal contact, and for biota living in or near the creek and its tributaries. Navy personnel and contractors may be exposed during site investigations or from potential future land use changes that may require construction. Biota on the site may disturb the sediment through nesting or feeding. MC could affect biota that might ingest the potential MC or absorb it through dermal contact. There is a potentially complete pathway for the general public for any MC that flows out of the installation through the surface water system.

Plant/Animal Uptake

Potentially complete pathways are indicated for biota (wildlife) exposed to MC at the SF Small Arms Range via the food chain. MC may be taken up by plants and prey consumed by biota at the former range.

Surface Soil

Potentially complete pathways exist for all receptors (except for the general public) via all exposure routes for surface soil contaminated with MC at the SF Small Arms Range. It is possible that MC remains in the surface soil (i.e., 0 to 2 feet below ground surface). Exposures to humans and biota from inhalation of dust are anticipated due to the low vegetative cover on the soils. Any future movement or grading of surface soils could make MC available for wind distribution and subsequent inhalation.

Subsurface Soil

The potential for subsurface soil impacts at the SF Small Arms Range is considered to be low, as the contaminants associated with small arms ammunition and range activities are not likely to migrate to subsurface soil. The subsurface soil exposure pathway is considered to be potentially complete for biota and for Navy personnel and contractors. Biota might come into contact with the contaminated soil by burrowing and/or ingesting. Navy personnel and contractors might engage in excavation or drilling activities, during environmental investigations or ecological surveys.

Groundwater

The potential for groundwater impacts at the SF Small Arms Range is considered to be low, as the contaminants associated with small arms ammunition and range activities are not likely to migrate to subsurface soil, and then to groundwater. Potentially complete pathways for Navy personnel and contractors/visitors are indicated for groundwater contaminated with MC at the SF Small Arms Range. Navy personnel and contractors/visitors may come into contact with groundwater during environmental investigations (i.e. monitoring well installation and sampling) at the former range. The potential for groundwater impacts is considered to be incomplete for all other receptors.

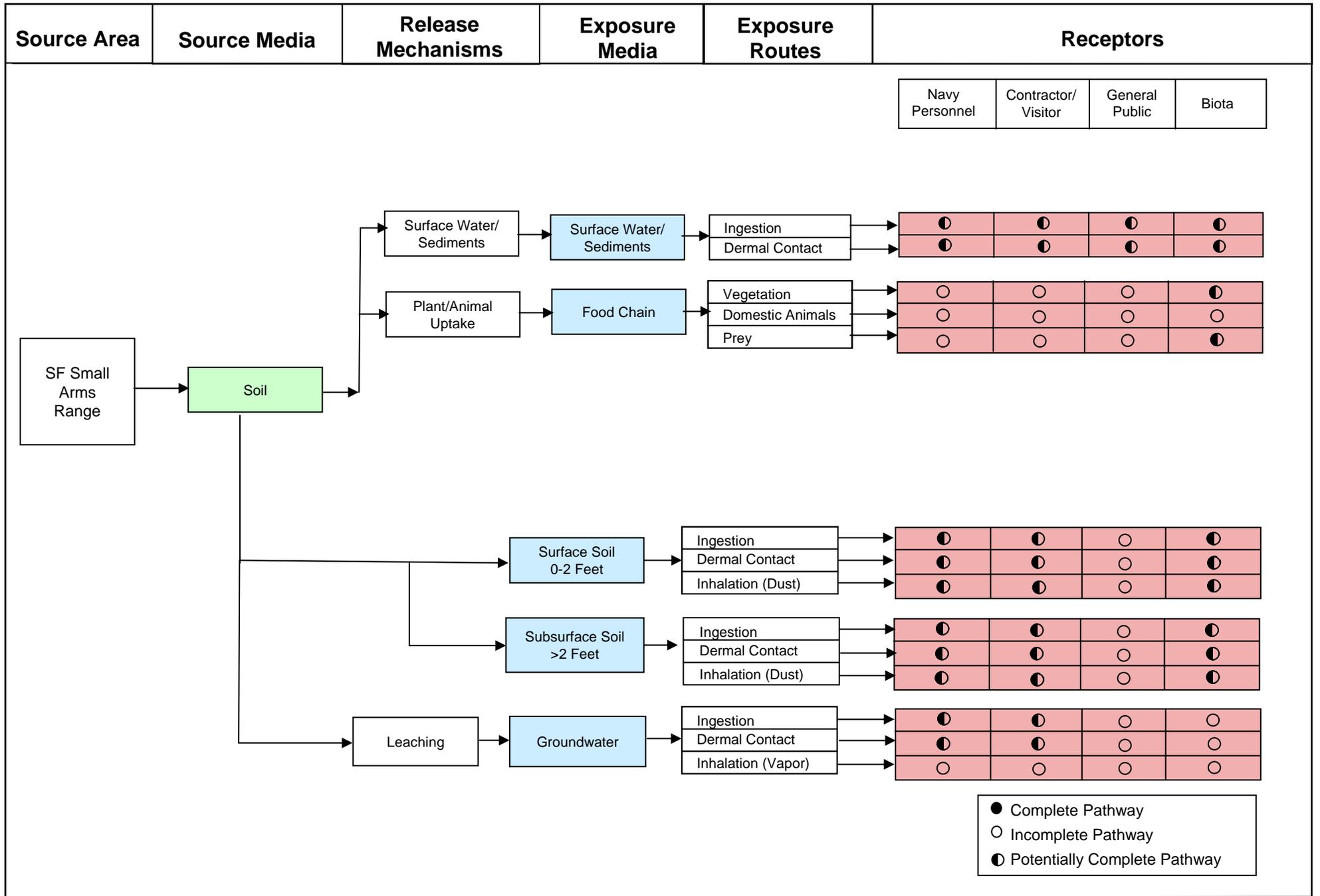
An exposure pathway does not exist for MC volatilizing into the air for all receptors.

5.1.12. Summary

The 0.4-acre SF Small Arms Range is located northeast of Building 366, in the eastern center of Detachment Fallbrook. The SF Small Arms Range was used from 1945 to 1991 by both the Marine Security Forces (from 1945 to 1988) and the civilian Security Forces (from 1987 to 1991) for handgun marksmanship training. It was also used by station civilians and local law enforcement officers. The guns were fired at targets positioned in front of a natural soil berm. No firing line was observed during the site survey. The SF Small Arms Range was closed in 1991 due to the proximity of the main administration areas of the installation and the town of Fallbrook. Munitions used at the range include .38-caliber, .45-caliber, and 9-mm rounds. No evidence was found indicating the presence of MEC on the site. Since the range was used for small arms, the range is not suspected to contain MEC. The potential for MC, specifically lead, exists at the site. Several ammunition fragments consistent with small arms were observed on the natural berm.

5.1.13. Recommendations

Based on the data collected and presented in this PA, No Further Action (NFA) for MEC is recommended at the SF Small Arms Range. MEC is not anticipated at small arms ranges. A Site Inspection (SI) is recommended at the SF Small Arms Range with respect to MC. During the SI, it is recommended that surface and subsurface soils be sampled for the full metal spectrum.



● Complete Pathway
 ○ Incomplete Pathway
 ◐ Potentially Complete Pathway

**Preliminary Assessment
NAVWPNSTA Seal Beach
Detachment Fallbrook, California**



**MALCOLM
PIRNIE**

**Map 5.1-1
Visual Survey
Security Forces Small Arms Range**

Legend

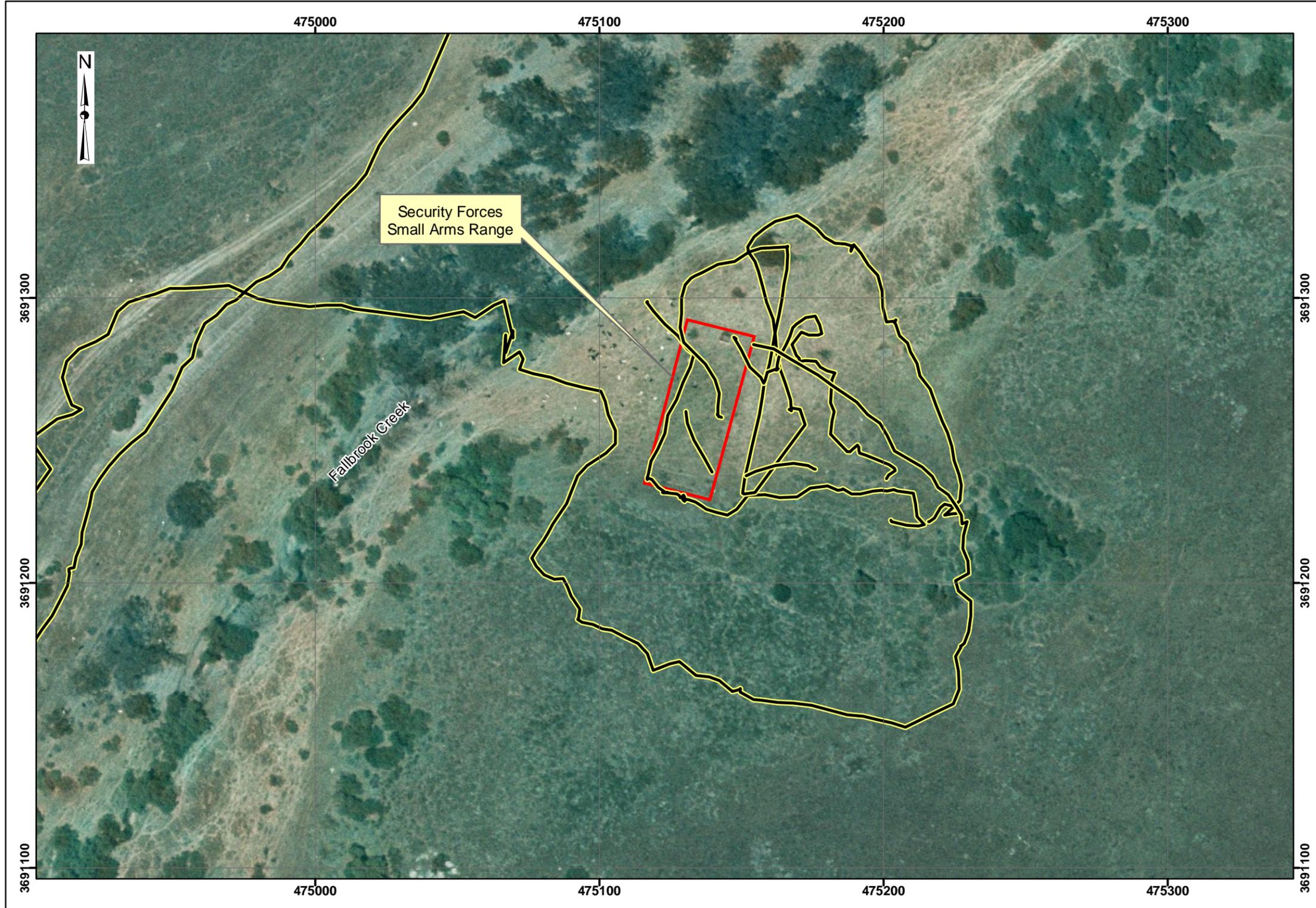
-  Security Forces Small Arms Range
-  Site Reconnaissance Path



Data Source: Anteon Corporation,
Orthophoto, June 3, 2004

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

Contract: N62472-02-D-1300
Edition: Final Preliminary Assessment
Date: June 2006



**Preliminary Assessment
NAWPNSTA Seal Beach
Detachment Fallbrook, California**



**MALCOLM
PIRNIE**

**Map 5.1-2
Site Details
Security Forces Small Arms Range**

Legend

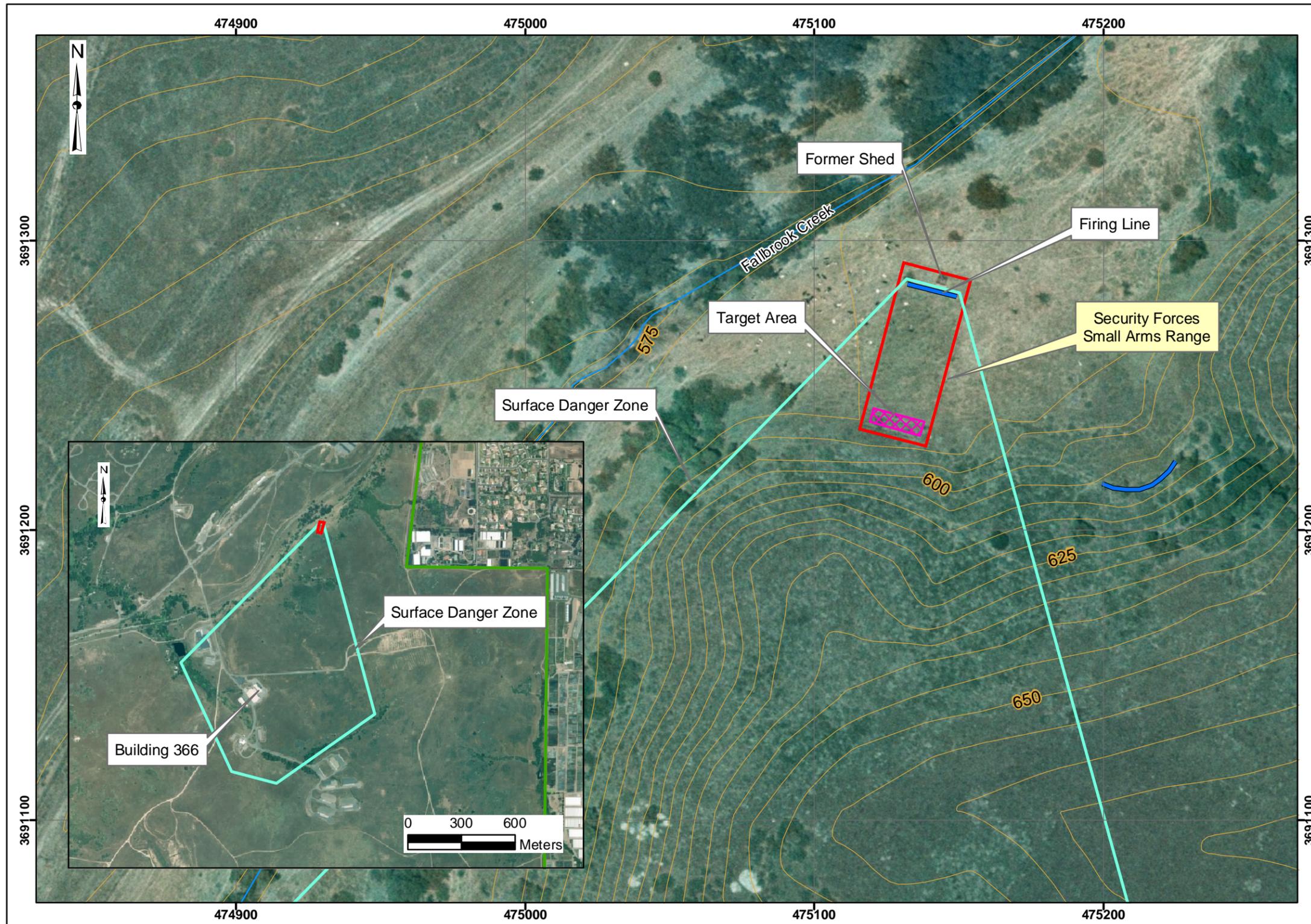
-  Installation Boundary
-  Security Forces Small Arms Range
-  Streams
-  Topographic Contours (ft above MSL)
-  Target Area
-  Firing Line



Data Source: Anteon Corporation,
Orthophoto, June 3, 2004
NAWPNSTA Seal Beach GIS Data
vector data set, 2005

Coordinate System: UTM Zone 11
Datum: NAD 83
Units: Meters

Contract: N62472-02-D-1300
Edition: Final Preliminary Assessment
Date: June 2006



**Preliminary Assessment
NAWPNSTA Seal Beach
Detachment Fallbrook, California**



**MALCOLM
PIRNIE**

**Map 5.1-3
Munitions Characterization
Security Forces Small Arms Range**

Legend

 Security Forces Small Arms Range

MEC Presence*

 Known

 Suspect

* There is no evidence of MEC presence as determined through historical documentation, interview, and visual survey. Visual observations and/or historical documentation indicate that MC may be present at the site, but MC Presence has not been confirmed by sampling or other means.

0 35 Meters



Data Source: Anteon Corporation,
Orthophoto, June 3, 2004

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

Contract: N62472-02-D-1300
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5.2. QE Test Area

The QE Test Area covers approximately 60 acres in the southeast corner of Detachment Fallbrook, about one mile from the southern installation border. Map 2.1-1 shows the location of the site on Detachment Fallbrook and its boundaries.

5.2.1. History and Site Description

The QE Test Area (IRP Site 26) was used as a burn and disposal area beginning in 1942, and included a powder disposal area, two small round metal burn barrels, a drop test tower, and at least three burn/slit trenches (See Map 5.2-2, but not all features are still visible at the site). The 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 the QE Test Area as a munitions testing area from 1977 to 1989. The types of munitions tested included rifle grenades (both live and smoke), 3.5-inch rockets, 75-mm projectiles, and 60- and 81-mm mortars. The majority of the ordnance was picked up or destroyed by EOD personnel after each test. The main burn/disposal area was entirely graded in 1977 and every year thereafter to control the vegetation at the site for wildfire prevention until the site was no longer used as a range. According to personnel interviews and historical records, some parts of the QE Test Area were still used as burn/disposal pits until 1985. There were also some rocket fuel trenches on the northwestern part of the site, which were used in 1969 to bury 423 pounds of liquid rocket fuel and 142 pounds of map-4 amine fuel; however, these trenches were not visually confirmed. The area is not currently in use. The QE Test Area was originally identified under the IRP as Site 26, but is now being addressed under the MRP. Except for a geophysical survey (results not available at the time of this PA), no IRP investigations were undertaken.

The QE Test Area was oriented for firing to the southeast at targets and at a 40-foot-long steel berm. There were several concrete huts that were used for shelter, viewing platforms, and storage of the targets on the QE Test Area. The remnants of several of these concrete huts are present on the former test area. The 40-foot-long steel berm is also intact. The half-cylinder covers for two of the three burn/slit trenches remain, as do the two small round metal burn barrels and the drop test tower. The QE Test Area is located on Detachment Fallbrook, which is a fenced and guarded installation. Figure 5.2-1 shows the former range.



Figure 5.2-1: Photograph was taken during the September 2004 on-site visual survey. The white objects are concrete huts that were used for shelter, viewing platforms, and storage of the targets on the site. View is of the QE Test Area looking north.

5.2.1.1. Topography

The QE Test Area contains low hills, except for the areas that were graded to create the main test area, and the three burn/slit trenches. For further information on the topography of Detachment Fallbrook, see [Section 3.2](#).

5.2.1.2. Geology

The region is underlain by plutonic and metasedimentary rocks of the Peninsular Ranges physiomorphic province, but site-specific information for the QE Test Area was not available. No data from soil borings are available. [Section 3.3](#) includes a general description of the geology of Detachment Fallbrook.

5.2.1.3. Soil and Vegetation Types

The soil at the QE Test Area is classified as a sandy loam of granitic origin and is moderately well drained. [Section 3.4](#) includes a general description of the soil types at Detachment Fallbrook.

The vegetation in the area of the QE Test Area is considered to be mostly mixed grassland with some coastal sage scrub. 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 (*Artemisia californica*), flat-topped buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), sage (*Salvia* spp.), goldenbush (*Isocoma menziesii*), and native grasses (*Nassella* spp.). [Section 3.5](#) includes a general description of the vegetation types at Detachment Fallbrook.

5.2.1.4. Hydrology

The QE Test Area is within both the Santa Margarita and the San Luis Rey watersheds. There are no surface water bodies in the QE Test Area. The southeastern corner of the installation, where the QE Test Area is located, drains primarily into Pilgrim Creek, which flows through MCB Camp Pendleton and the City of Oceanside before joining the San Luis River. The flow in Pilgrim Creek is highest during the summer months, due to runoff from agricultural activities upstream. [Section 3.6](#) includes a general description of the hydrology at Detachment Fallbrook.

5.2.1.5. Hydrogeology

No site-specific groundwater depth data were available. [Section 3.7](#) includes a general description of the hydrogeology at Detachment Fallbrook.

5.2.1.6. Cultural and Natural Resources

The data collection team for the QE Test Area found no documentation of significant cultural resources at the former test area, but there are two bedrock milling sites nearby. To preserve the integrity of the cultural resource, more specific information is not included in this document. Detachment Fallbrook has large areas of undisturbed land that can serve as suitable habitat to threatened and endangered species. [Section 3.8](#) includes a general description of the cultural and natural resources at Detachment Fallbrook.

5.2.1.7. Endangered and Special Status Species

Threatened and endangered species data for Detachment Fallbrook are presented in [Section 3.9](#). According to the California Wildlife and Habitat Analysis Branch, threatened and endangered species associated with the critical habitats of the former test area that are known or have been documented within or adjacent to the Detachment Fallbrook are the coastal California gnatcatcher, Least Bell's vireo, and Stephens' kangaroo rat.

5.2.2. Visual Survey Observations and Results

The data collection team conducted a visual survey of the QE Test Area on September 2004. Present during the visual survey were Mr. Chip Poalinelli, Mr. Al Larkins, and Mr. Scott Lehman, and installation representatives (Ms. Pei-Fen Tamashiro, Mr. Robbie Knight, and Mr. Si Le). The field team conducted the visual survey by walking the perimeter of the entire range, then walking several transects of it. The following munitions were observed during Malcolm Pirnie's site visit: 40-mm cartridges fired from grenade launchers, several pyrotechnic items, and several impulse cartridges. Several blasting caps, igniters, and small arms ammunition were observed in the two small round metal burn barrels still at the former test area, shown in Figure 5.2-4. The remnants of several concrete huts that were used for shelter, viewing platforms, and storage of the targets are still present on the former test area. The 40-foot-long steel berm is also intact. Figure 5.2-2 is a photo taken of one of the three burn/slit trenches on the QE Test Area. The site reconnaissance path is shown on Map 5.2-1, at the end of Section 5.2. Additional range details are illustrated on Map 5.2-2, also located at the end of Section 5.2.



Figure 5.2-2: Photograph was taken during the September 2004 on-site visual survey. View is of one of the three burn/slit trenches on the QE Test Area.

5.2.3. Munitions and Munitions Related Materials Associated with the Site

This section describes the munitions or munitions related materials, including the types and estimated maximum penetration depths, known or suspected to be at the former range. This

includes both MEC and non-hazardous munitions related scrap (e.g., fragments, base plates, and inert mortar fins).

The data collection team was not able to locate historical records stating what specific types and quantities of munitions were used at the QE Test Area. However, they were able to interview personnel who had worked at the QE Test Area. The personnel indicated the types of munitions they had tested on the former range. The available technical data sheets on these items are included in [Appendix D](#). The QE Test Area was originally used as burn/disposal area, then as a testing area for the QE laboratory activities. The types of munitions tested included rifle grenades (both live and smoke), 3.5-inch rockets, 75-mm projectiles, 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 picked up or destroyed by EOD technicians after each test.

Based on the information obtained during the data collection process, the QE Test Area is not suspected to contain CWM filled munitions, electrically fuzed munitions, or DU associated munitions.

5.2.4. MEC Presence

The entire site has been subdivided and categorized into one of three levels of MEC presence including: Known MEC Areas, Suspected MEC Areas, and Areas Not Suspected to Contain MEC to indicate that MEC is known or is suspected to be at the site. Map 5.2-3 illustrates the munitions characterization of the QE Test Area, and is provided at the end of Section 5.2. The MEC presence is discussed below.

5.2.4.1. Known MEC Areas

Based on our observations during the site walk, there are known MEC areas on the QE Test Area. The following munitions were observed during Malcolm Pirnie's site visit: 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. Figure 5.2-3 is a photo showing some of the munitions observed in the burn/slit trenches at the former test area during the visual survey.



Figure 5.2-3: Photograph was taken during the September 2004 on-site visual survey. View is of munitions (a 37-mm cartridge case, a 40-mm cartridge case, and an illumination flare) found in one of the three burn/slit trenches on the QE Test Area.

5.2.4.2. Suspected MEC Areas

Based on historical use of the site, MEC may be present on the surface and subsurface of the QE Test Area. The QE Test Area was used quite extensively and since only a visual survey was conducted, there is a great possibility that MEC could reside in the subsurface.

5.2.4.3. Areas Not Suspected to Contain MEC

Based on available documents, interviews and the visual survey observations, the approximately 60 acres of the QE Test Area are known or suspected to contain MEC, pending further investigation.

5.2.5. Ordnance Penetration Estimates

The depth to which munitions penetrate below the ground surface depends on many factors, including the type of soil, the angle of impact, the size of the munitions, the velocity at impact, and site-specific environmental conditions. Over the years, the DoD has studied and modeled munitions penetration depths and has issued various guidance and technical documents on the subject. For the purposes of the PA, maximum probable penetration depths are estimated

following guidance listed in the latest draft (July 2002) of the DoD Directive on Explosives Safety issued by the DoD Explosives Safety Board [*DoD Directive 6055.9 (DoD Ammunition and Explosives Safety Standards)*]. The Directive refers to *TM 5.855.1* and *NAVFAC P-1080*.

The maximum probability penetration depths for the munitions of concern are approximately:

- Rifle grenades – 0.3 feet
- 3.5-inch rockets - 1 foot
- 75-mm projectiles – 6.4 feet
- 60-mm mortars – 1.5 feet
- 81-mm mortars – 3.5 feet
- Bomblets – 2.4 feet

5.2.6. Munitions Constituents

MC associated with the use of the property as a testing and burning area could be present at the QE Test Area. Based on discussions with installation personnel, surface soil sampling has not occurred. The primary MCs are:

- Rifle grenades: 2,4,6-trinitrotoluene (TNT), royal demolition explosive, (RDX), zinc oxide smoke, hexachloroethane 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, hexachloroethane smoke, aluminum powder, RDX, and TNT;
- Bomblets: octol, RDX, and TNT;
- 3.5-inch 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; and
- Small Arms: lead, arsenic, antimony, copper, chromium, cadmium, black or smokeless powder constituents, nickel, and zinc.

Figure 5.2-4 shows some of the munitions items that were burned at the Fallbrook QE Test Area.

comprised of 63 military, 65 civilian, and 12 contractors, as well as Tenant personnel comprised of 9 military, 126 civilian, and 90 contractors. The QE Test Area is approximately 15,750 feet from the housing complex at the installation. See [Section 2.1](#) for more information on the housing complex.

5.2.8.2. Buildings Near/Within Site

There are no occupied buildings on the QE Test Area or in its immediate vicinity. The remnants of several concrete huts that were used for shelter, viewing platforms, and storage of the targets remain on the former test area. The Town of Fallbrook is approximately 5,400 feet (ft) to the east.

5.2.8.3. Utilities On/Near Site

There are no utilities located on the site. A Fallbrook Sanitation District line is located approximately 0.5 miles to the west of the site.

5.2.9. Land Use

The QE Test Area is closed and no longer in use. Due to the proximity of the site to some of the installation's munitions storage bunkers, the site of the former test area has ESQD Arcs restrictions. No future land use change is planned.

5.2.10. Access Controls / Restrictions

The QE Test Area 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. The QE Test Area is also located within a restricted area guarded by the security force.

5.2.11. Conceptual Site Model

This CSM was developed following guidance documents issued by the USEPA for hazardous waste sites and the USACE for OE sites. Guidance documents included the USEPA's Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/004) and the Final USACE CSM Guidance Development of Integrated Conceptual Site Models for Environmental OE Sites (USACE, 2003).

FINAL PRELIMINARY ASSESSMENT

The CSM describes the site and its environmental setting. The CSM presents information regarding: 1) MEC and/or MC known or suspected to be at the site; 2) current and future reasonably anticipated or proposed uses of the real property; and 3) actual, potentially complete, or incomplete exposure pathways that link MEC and/or MC to receptors.

The CSM is presented in a series of information profiles that provide information about the site.

The information profiles are included in Table 5.2-1 below.

Table 5.2-1: Conceptual Site Model Information Profiles –QE Test Area		
Profile Type	Information Needs	Preliminary Assessment Findings
Range Profile	Installation Name	Detachment Fallbrook
	Installation Location	Detachment Fallbrook is located 53 miles north of San Diego in northern San Diego County, CA.
	Range Name	QE Test Area
	Range Location	The QE Test Area is located in the southeastern corner of the installation, about one mile from the southern installation border.
	Range History	The QE Test Area was originally used as a burn/disposal area starting in 1942. There was a powder disposal area on the northern part of the test area, two small round metal burn barrels, a drop test tower, and at least three burn/slit trenches. The drop test tower (Building 348) was used from the 1950s through the early 1980s to test bomblets from cluster bombs (such as Rockeye’s), and other munitions. QE Laboratory personnel used it as a munitions testing area from 1977 to 1989 because it was already being used for other ordnance activities. The main burn/disposal area, including the thermally-treated ordnance items, was entirely graded in 1977. Certain parts of the test area were still used as burn/disposal areas until 1985, according to personnel interviews and historical records. There were also some rocket fuel trenches on the northwestern part of the QE Test Area, which were used in 1969 to bury 423 pounds of liquid rocket fuel and 142 pounds of map-4 amine fuel.

Table 5.2-1: Conceptual Site Model Information Profiles –QE Test Area		
Profile Type	Information Needs	Preliminary Assessment Findings
	Range Area and Layout	The QE Test Area occupies approximately 60 acres. The personnel test fired at targets or at a 40-ft-long steel berm. The test area was oriented for firing towards the southeast. There was also a powder disposal area on the northern part of the test area, two small round metal burn barrels, a drop test tower, and at least three burn/slit trenches. There are also some rocket fuel trenches on the northwestern part of the site. There were several concrete huts that were used for shelter, viewing platforms, and storage of the targets on the QE Test Area.
	Range Structures	The remnants of several concrete huts that were used for shelter, viewing platforms, and storage of the targets remain on the former test area. The 40-ft-long steel berm is also intact on the site. The half-cylinder covers for two of the three burn/slit trenches remain on the site, as are the two small round metal burn barrels and the drop test tower.
	Range Boundaries	Map 2.1-1 shows the location of the QE Test Area. Grassland with coastal sage scrub extends north to the Missile Maintenance Test Facility, which is approximately 1,800 ft away. Grassland with coastal sage scrub extends east, west, and south to the installation boundaries. The city of Fallbrook is approximately 5,400 ft. to the east.
	Range Security	The QE Test Area is located on Detachment Fallbrook, which is a fenced and guarded installation. The QE Test Area is also located within a restricted area guarded by the security force.
Munitions/ Release Profile	Munitions Types	The QE Test Area was originally used as burn/disposal area, then as a testing area for the QE Laboratory activities. The types of munitions tested included rifle grenades (both live and smoke), 3.5-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 picked up or destroyed by EOD after each test.

Table 5.2-1: Conceptual Site Model Information Profiles –QE Test Area

Profile Type	Information Needs	Preliminary Assessment Findings
	Maximum Probability Penetration Depth	<p>The maximum probability penetration depths for the munitions of concern are approximately:</p> <p>Rifle grenades – 0.3 ft 3.5-in rockets - 1 ft 75-mm shells – 6.4 ft 60-mm mortars – 1.5 ft 81-mm mortars – 3.5 ft Bomblets – 2.4 ft</p>
	MEC Density	<p>The QE Test Area is a known MEC area. The site has a medium MEC density.</p>
	MEC Scrap/Fragments	<p>The following munitions were observed during Malcolm Pirnie’s site visit: 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.</p>
	Associated Munitions Constituents	<p>The primary MC of concern are:</p> <ul style="list-style-type: none"> ○ Rifle grenades: TNT, RDX, zinc oxide smoke, hexachloroethane smoke, aluminum powder, white phosphorus, potassium chlorate, colored smoke, and 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, hexachloroethane 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; and ○ Small Arms: lead, arsenic, antimony, copper, chromium, cadmium, black or smokeless powder constituents, nickel, and zinc.
	Migration Routes/Release Mechanisms	<p>Migration of MEC and MC may occur through surface soil erosion, runoff, and wind and dust generation. Future construction, excavation, and maintenance at the QE Test Area are also potential release mechanisms. MC in runoff could potentially end up in surface water or sediment. MC could also potentially leach through soils or surface waters to groundwater.</p>

Table 5.2-1: Conceptual Site Model Information Profiles –QE Test Area		
Profile Type	Information Needs	Preliminary Assessment Findings
Physical Profile	Climate	The climate at Detachment 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 being the wettest month and July the driest. Summers at the installation are punctuated by the Santa Ana (offshore) winds.
	Topography	The QE Test Area contains low hills, except for the areas that were graded to create the main test area and the burial trenches.
	Geology	The region is underlain by plutonic and metasedimentary rocks of the Peninsular Ranges physiomorphic province, but site-specific information was not available.
	Soil	The soil at the QE Test Area is classified as a sandy loam of granitic origin. Soils at the former test area are moderately well drained.
	Hydrogeology	No site-specific groundwater depth data were available.
	Hydrology	The QE Test Area is within both the Santa Margarita and the San Luis Rey watersheds. There are no surface water bodies in the QE Test Area. The southeastern corner of the installation, where the QE Test Area is located, drains primarily into Pilgrim Creek, which flows through MCB Camp Pendleton and the City of Oceanside before joining the San Luis River.
	Vegetation	The vegetation in the area of the QE Test Area is considered to be mostly mixed grassland with some coastal sage scrub.
Land Use and Exposure Profile	Current Land Use	The QE Test Area is closed and is no longer in use.
	Current Human Receptors	Navy personnel and Navy-permitted visitors (including contractors). There is also a potentially complete exposure pathway for the general public coming into contact with MC migrating off the installation through the surface water system.
	Current Activities (frequency, nature of activity)	Activities at the range may include environmental and ecological surveys.
	Potential Future Land Use	The former QE Test Area was closed in 1989 because the QE Laboratory no longer needed the site as a testing area. There is no land use change planned.

Table 5.2-1: Conceptual Site Model Information Profiles –QE Test Area		
Profile Type	Information Needs	Preliminary Assessment Findings
	Potential Future Human Receptors	Navy personnel and Navy-permitted visitors (including contractors). There is also a potentially complete exposure pathway for the general public coming into contact with MC migrating off the installation through the surface water system.
	Potential Future Land Use-Related Activities:	Any potential future land use activities would have to follow any Navy ESQD Arc waivers or exemptions. Other potential future activities at the range 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, the site of the former test area has ESQD Arc restrictions. The site is also listed as habitat for the Stephens’ kangaroo rat, which is a federally protected species.
	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: <ul style="list-style-type: none"> • Town of Fallbrook: Population (U.S. Census, 2000): 29,100 • San Diego County: Population (U.S. Census, 2000): 2,813,833
	Beneficial Resources	The coastal sage scrub and mixed grasslands habitats offer roosting and foraging resources for raptors.
Ecological Profile	Habitat Type	The QE Test Area contains mixed grasslands and some coastal sage scrub habitat. The former test area is also in a zone designated as habitat for the federally endangered Stephens’ kangaroo rat.
	Degree of Disturbance	The area was graded before its closure in 1989. There are also at least three burial slits/trenches (about 10-15 ft in depth) throughout the site. Current and anticipated future activities at the range, 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 include mammals (mountain lions, bats, opossums, coyotes, foxes, skunks, deer, rats, rabbits, and mice), reptiles (lizards, toads, turtles, and rattlesnakes), insects (beetles and butterflies), amphibians (toads, frogs, and salamanders), and birds (owls, swallows, wrens, hawks, vultures, herons, and ducks).

Table 5.2-1: Conceptual Site Model Information Profiles –QE Test Area		
Profile Type	Information Needs	Preliminary Assessment Findings
	Federal Endangered Species:	Stephens’ kangaroo rat and Least Bell’s vireo
	Federal Threatened Species:	Coastal California gnatcatcher
	State Endangered Species:	Least Bell’s vireo
	State Threatened Species:	Stephens’ kangaroo rat
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	Potential human receptors at the QE Test Area include Navy personnel, visitors, and private contractors. Ecological receptors may come into direct contact with MEC/MC in soil while foraging or burrowing. Ecological receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). There is also a potentially complete exposure pathway for the general public coming into contact with MC migrating off the installation through the surface water system.

A key element of the CSM is the exposure pathway analysis, which is performed separately for MEC and for MC.

For MEC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MEC are expected to be found); 2) access (e.g., controlled or uncontrolled access, items on the surface or within the subsurface); 3) an activity (e.g., non-intrusive grounds maintenance or intrusive construction); and 4) receptors (e.g., Navy personnel, construction workers, recreational users, authorized visitors, or ecological receptors). It is important to recognize that environmental mechanisms (e.g., erosion) and/or human intervention may result in the repositioning of MEC.

For MC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MC are expected to be found); 2) an exposure medium (e.g., surface soil); 3) an exposure route (e.g., dermal contact); and 4) receptors (e.g., Navy personnel, construction workers, recreational users, authorized visitors, or ecological receptors). If the point of exposure is not at the same location as the source, the pathway may also include a release mechanism (e.g., volatilization) and a transport medium (e.g., air).

The potential interactions between the source and receptors are assessed differently between MEC and MC. For MC, interaction between the source and receptors involves a release mechanism for the MC, an exposure medium that contains the MC, and an exposure route that places the receptor into contact with the contaminated medium. For MEC, interaction between the potential receptors and an MEC source has two components. The receptor must have access to the source and must engage in some activity that results in contact with individual MEC items within the source area.

MEC Interactions and Pathway Analysis

The pathway analysis for MEC is shown in Figure 5.2-5 because the QE Test Area is known to contain MEC. Historical and visual evidence indicate that MEC are present at the QE Test Area. MEC was observed on the surface and is likely to be present in the subsurface at the site. The release mechanism of handling/treading underfoot activities creates a complete pathway for all human receptors, and biota for MEC on the surface of the site. The release mechanism of intrusive activities (such as digging or drilling) creates a potentially complete pathway for Navy personnel, contractors and biota both for MEC on the surface (0-2 feet) and subsurface at the site.

MC Interactions and Pathway Analysis

The pathway analysis for MC is shown in Figure 5.2-6. Potential receptors include both human (Navy personnel, and contractor/visitor) and ecological receptors (biota) that may come in contact with MC in the source medium or other potentially contaminated media. Pathways are shown for each medium and are discussed below. For MC, interaction between the source (e.g., the backstop berm) and receptors generally involves a release mechanism for the MC (e.g., uptake into the food chain, runoff to surface water), an exposure medium containing the MC (e.g., soil, sediment), and an exposure route (e.g., incidental ingestion, dermal contact, inhalation) that places the receptor into contact with the contaminated medium.

Surface Water/Sediment

As discussed earlier, there are no surface water bodies at the QE Test Area. However, surface water can accumulate on the surface of certain parts of the site during the rainy season, so MC could become available to receptors in surface water or sediment. The pathway for surface water and/or sediment is considered potentially complete at the former QE Test Area. There is a potentially complete pathway for the general public for MC that flows out of the installation through the surface water system.

Plant/Animal Uptake

Potentially complete pathways are indicated for biota (wildlife) exposed to MC at the QE Test Area via the food chain. MC may be taken up by plants and prey and consumed by animals at the former test area.

Surface Soil

Potentially complete pathways exist for all receptors (except for the general public) via all exposure routes for surface soil contaminated with MC at the QE Test Area. It is possible that MC remains in the surface soil (i.e., 0 to 2 feet below ground surface). Inhalation exposures to humans or biota from inhalation of dust are anticipated due to the low vegetative cover on the existing soils. Any future movement or grading of surface soils could make MC available for wind distribution and subsequent inhalation.

Subsurface Soil

The potential for subsurface soil impacts is considered to be potentially complete for biota and for Navy personnel and contractors. Biota might come into contact with the contaminated soil by burrowing and/or ingesting. Navy personnel and contractors might engage in excavation or drilling activities.

Groundwater

Potentially complete pathways for Navy personnel and contractors/visitors are indicated for groundwater contaminated with MC at the QE Test Area. Navy personnel and contractors/visitors may come into contact with groundwater during environmental investigations (i.e. monitoring well installation and sampling) at the former range. The potential for groundwater impacts is considered to be incomplete for all other receptors.

An exposure pathway does not exist for MC volatilizing into the air for all receptors.

5.2.12. Summary

The 60-acre QE Test Area (IRP Site 26) is located in the southeast corner of Detachment Fallbrook, about one mile from the southern installation border. The QE Test Area was used as a burn/disposal area beginning in 1942, and included a powder disposal area, two small round metal burn barrels, a drop test tower, and at least three burn/slit trenches (not all features are currently visible at the site). The drop test tower (Building 348) was used from the 1950s through

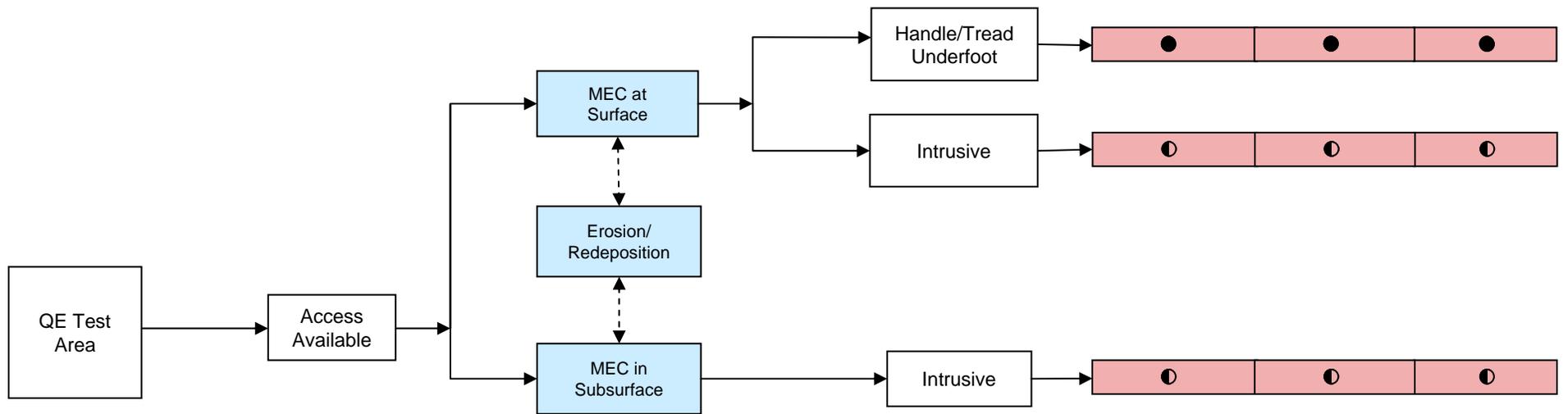
the early 1980s to test bomblets from cluster bombs (such as Rockeyes) and other munitions. QE laboratory personnel used the QE Test Area as a munitions testing area from 1977 to 1989. The types of munitions tested included rifle grenades (both live and smoke), 3.5-inch rockets, 75-mm projectiles, and 60- and 81-mm mortars. The majority of the ordnance was picked up or destroyed by EOD personnel after each test. The main burn/disposal area was entirely graded in 1977. According to personnel interviews and historical records, some parts of the QE Test Area were still used as burn/disposal areas until 1985. There were also some rocket fuel trenches on the northwestern part of the site, which were used in 1969 to bury 423 pounds of liquid rocket fuel and 142 pounds of map-4 amine fuel. The area is not currently in use.

5.2.13. Recommendations

Based on the data collected and presented in this PA, an SI is recommended for both MEC and MC at the QE Test Area. The SI activities should focus on determining the extent of MEC and MC at the site. During the SI, it is recommended that surface and subsurface soil samples be collected from the site and analyzed for ordnance residuals and metals. It is also recommended that groundwater monitoring wells be installed to verify that the groundwater under the site has not been affected. If intrusive activities are planned for the site, the potential receptors should be made aware that the site was a munitions burial site.

Source Area	Access	MEC Location/ Release Mechanisms	Activity	Receptors		
-------------	--------	----------------------------------	----------	-----------	--	--

Navy Personnel	Contractor/ Visitor	Biota
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● Complete Pathway
 ○ Incomplete Pathway
 ◐ Potentially Complete Pathway



Prepared for: 

PRELIMINARY ASSESSMENT – FINAL PA REPORT
 QE TEST AREA – MEC EXPOSURE PATHWAY ANALYSIS
 NAVWPNSTA SEAL BEACH DETACHMENT FALLBROOK, CALIFORNIA

MALCOLM PIRNIE, INC.
 FIGURE 5.2-5 FINAL
 June 2006



Figure 5.2-4: Photograph was taken during the September 2004 on-site visual survey. View is of munitions items found in one of the two small round metal burn barrels at the QE Test Area.

5.2.7. Contaminant Migration Routes

Migration of MEC and MC may occur through surface soil erosion, runoff, and wind and dust generation. Future construction, excavation, and maintenance at the site are also potential release mechanisms for MEC and MC. MC in runoff could potentially end up in surface water or sediment. MC could also potentially leach through soils or surface waters to groundwater.

5.2.8. Receptors and Pathways

Potential human receptors at the QE Test Area include Navy personnel, visitors, and private contractors. Ecological receptors may come into direct contact with MEC/MC in soil while foraging or burrowing. Ecological receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). There is a potentially complete secondary pathway for the general public, who could come into contact with any MC that flow out of the installation through the surface water system.

5.2.8.1. Nearby Populations

Fallbrook and San Diego County have populations of 29,100, and 2,813,833, respectively (U.S. Census Bureau, 2000). The Detachment Fallbrook has a workforce of Command personnel

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PIRNIE

Map 5.2-1
Visual Survey
Quality Evaluation
(QE) Test Area (IRP Site 26)

Legend

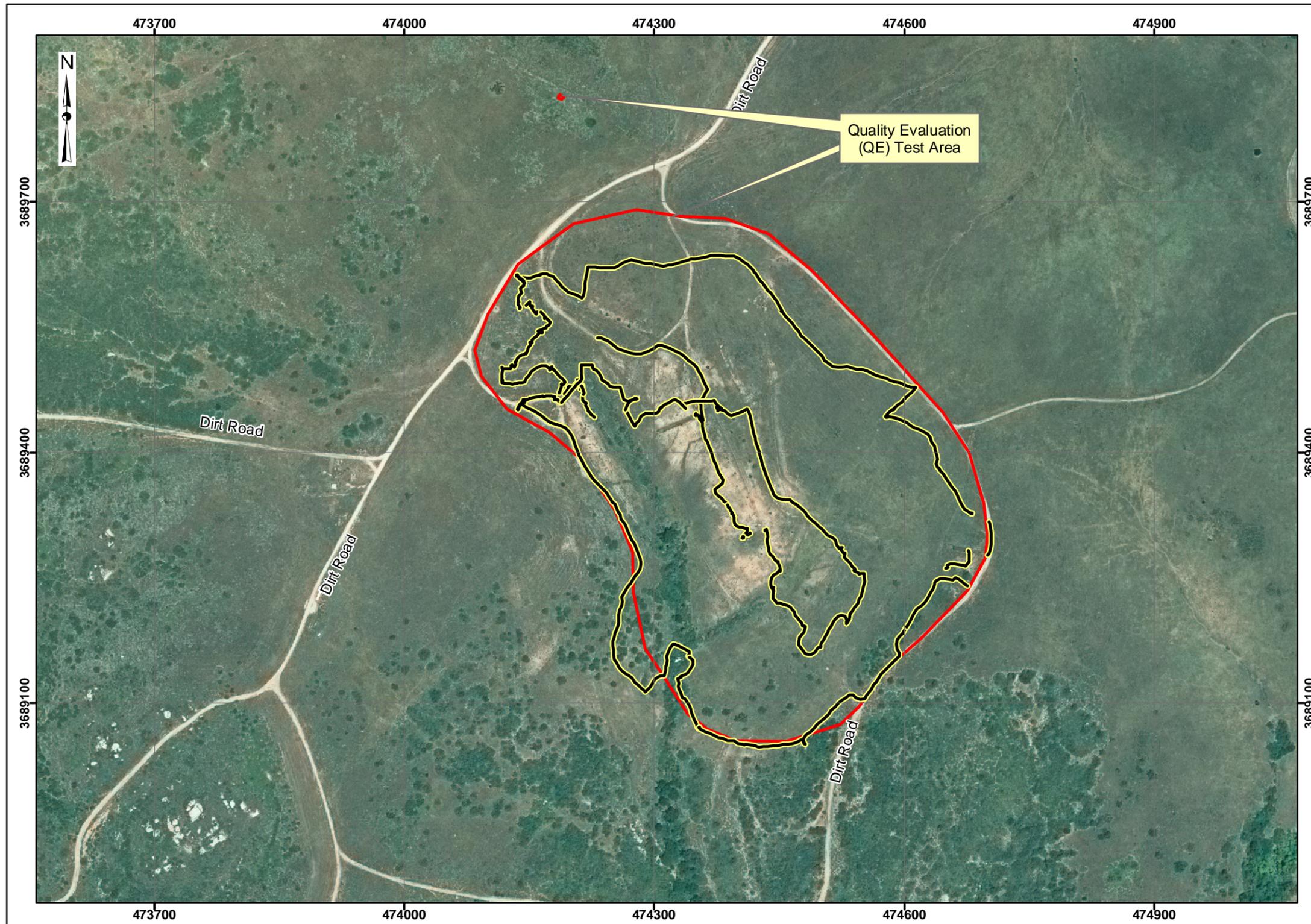
-  Quality Evaluation (QE) Test Area
-  Site Reconnaissance Path

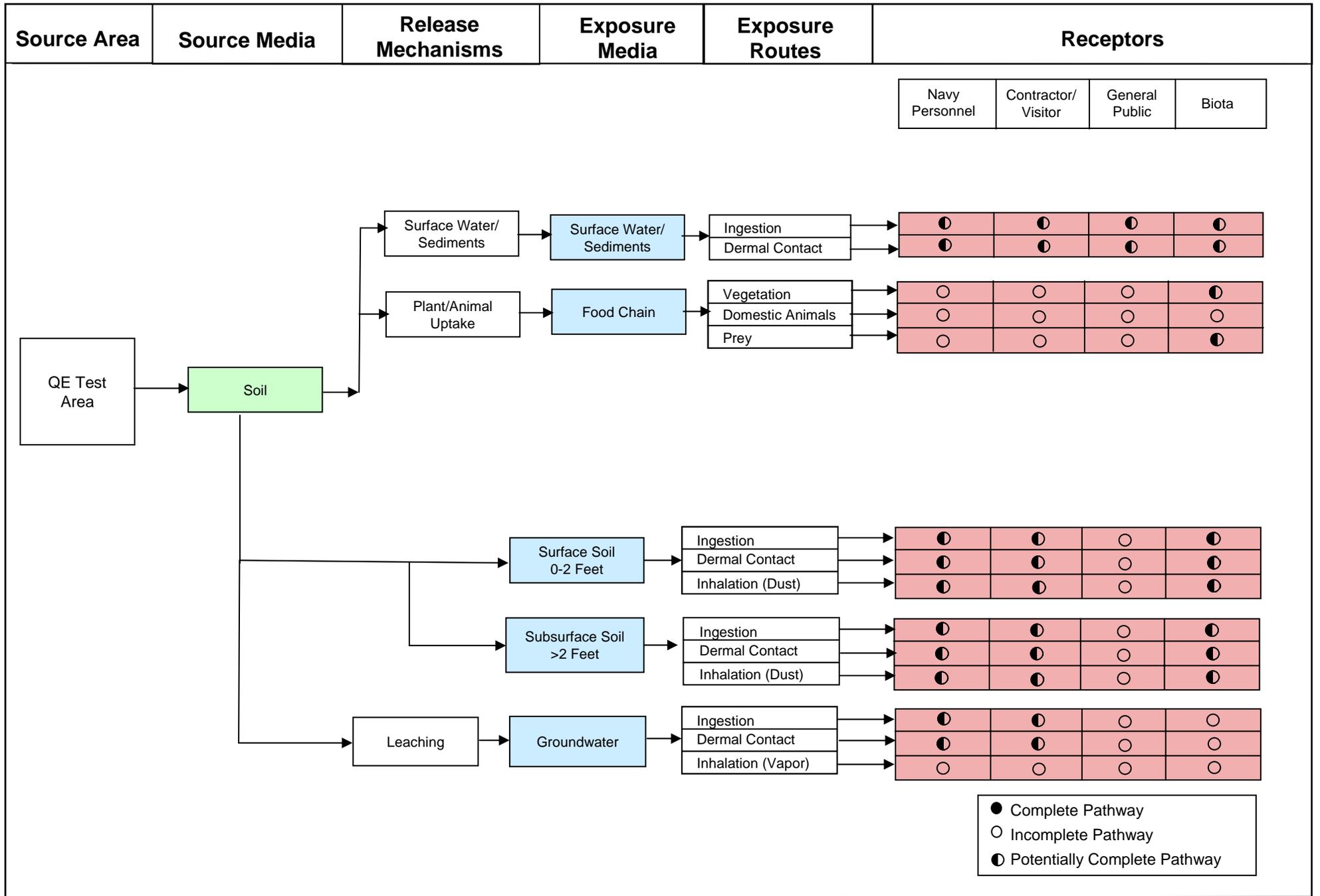


Data Source: Anteon Corporation,
Orthophoto, June 3, 2004

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

Contract: N62472-02-D-1300
Edition: Final Preliminary Assessment
Date: June 2006





● Complete Pathway
 ○ Incomplete Pathway
 ◐ Potentially Complete Pathway



Prepared for: 

PRELIMINARY ASSESSMENT – FINAL PA REPORT
 QE TEST AREA – MC EXPOSURE PATHWAY ANALYSIS
 NAVWPNSTA SEAL BEACH DETACHMENT FALLBROOK, CALIFORNIA

MALCOLM PIRNIE, INC.
 FIGURE 5.2-6 FINAL
 June 2006

**Preliminary Assessment
NAWPNSTA Seal Beach
Detachment Fallbrook, California**



**MALCOLM
PIRNIE**

**Map 5.2-2
Site Details
Quality Evaluation
(QE) Test Area (IRP Site 26)**

Legend

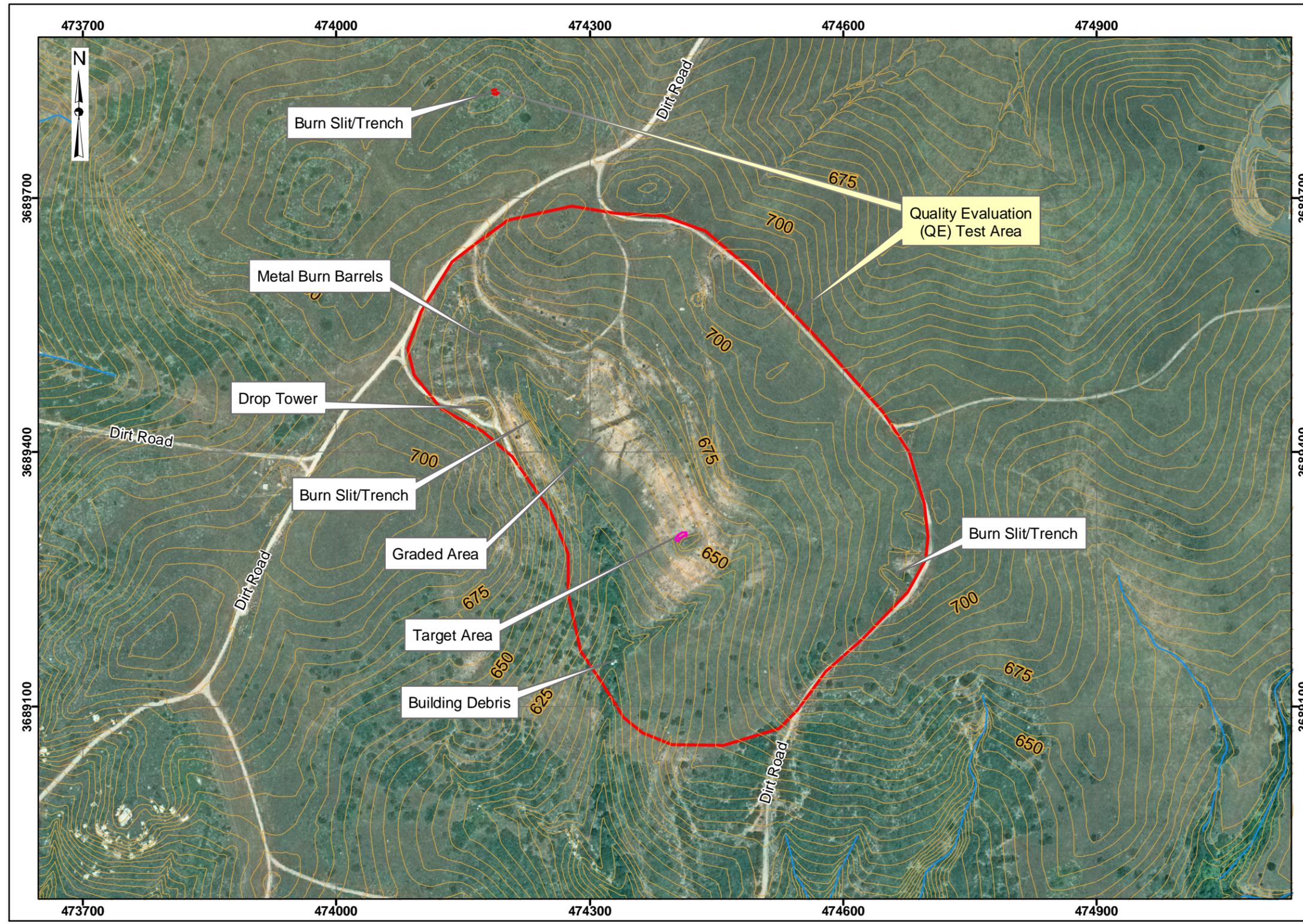
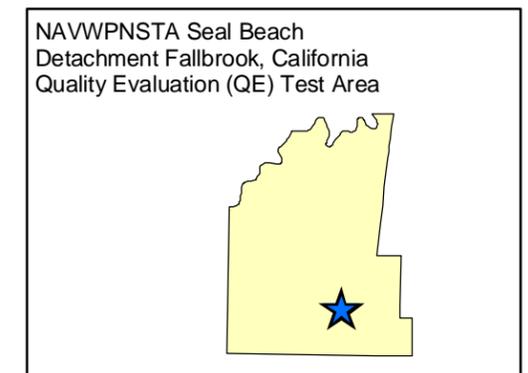
-  Quality Evaluation (QE) Test Area
-  Target Area
-  Topographic Contours (ft above MSL)
-  Streams



Data Source: Anteon Corporation,
Orthophoto, June 3, 2004
NAWPNSTA Seal Beach GIS data,
Vector Data, 2005

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

Contract: N62472-02-D-1300
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Detachment Fallbrook, California**



**MALCOLM
PIRNIÉ**

**Map 5.2-3
Munitions Characterization
Quality Evaluation
(QE) Test Area (IRP Site 26)**

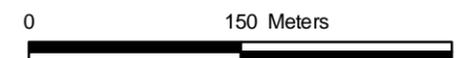
Legend

- Quality Evaluation (QE) Test Area
- + MEC Sighting
- ⊗ Evidence of Munitions Use

MEC Presence*

- Known
- Suspect

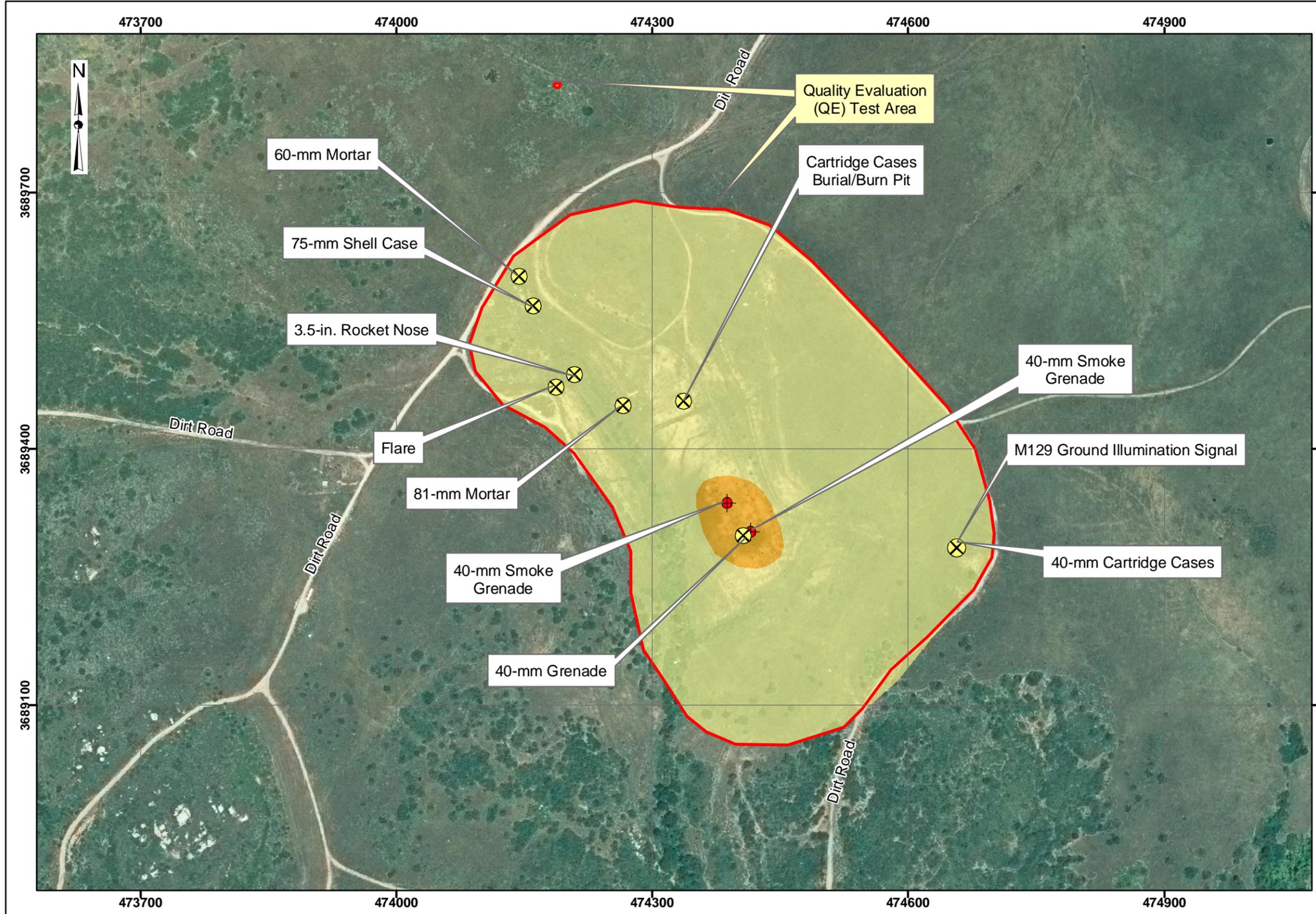
* MEC Presence was determined through review of historical documentation, interviews, and visual survey.



Data Source: Anteon Corporation,
Orthophoto, June 3, 2004

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

Contract: N62472-02-D-1300
Edition: Final Preliminary Assessment
Date: June 2006



5.3. Salvage Yard Landfill

The Salvage Yard Landfill covers approximately 13 acres in the northeast corner of the installation, approximately 1,000 feet from the western corner of the housing complex at the installation. Map 2.1-1 shows the location of the site on Detachment Fallbrook and its boundaries.

5.3.1. History and Site Description

The Salvage Yard Landfill (IRP Site 33) was a burial area for munitions and dunnage, according to personnel interviews, historical records, and recent visual surveys. On historical maps, the area is labeled as a storage yard starting in the 1950s and ending in the late 1960s. It was also used as a disposal area during this time. Historical records indicate that expended cartridges, primers, live projectiles, and inert anti-tank projectiles were buried in the area. An EOD report from February 2002 describes an incident in which EOD technicians from MCB Camp Pendleton were called to the site to handle some suspected 20-mm and 40-mm rounds that were found on the ground surface, as well as some blasting caps. The area is not currently in use. The area is not completely fenced. Figure 5.3-1 shows a view of the former landfill. The Salvage Yard Landfill was originally identified under the IRP, but is now being addressed under the MRP. No IRP investigations were undertaken.



Figure 5.3-1: View is of the Salvage Yard Landfill during the September 2004 on-site visual survey.

5.3.1.1. Topography

The Salvage Yard Landfill contains low hills and natural ravines. For further information on the topography of Detachment Fallbrook, see [Section 3.2](#).

5.3.1.2. Geology

The region is underlain by plutonic and metasedimentary rocks of the Peninsular Ranges physiomorphic province, but site-specific information for the Salvage Yard Landfill was not available. [Section 3.3](#) includes a general description of the geology of Detachment Fallbrook.

5.3.1.3. Soil and Vegetation Types

Soils in the Salvage Yard Landfill are classified as a sandy loam of granitic origin and are moderately well drained. [Section 3.4](#) includes a general description of the soil types at Detachment Fallbrook.

The vegetation in the area of the Salvage Yard Landfill is considered to be mostly of the coastal sage scrub classification with some mixed grasslands. Species common in coastal sage scrub habitat include coastal sagebrush (*Artemisia californica*), flat-topped buckwheat (*Erigonum fasciculatum*), laurel sumac (*Malosma laurina*), sage (*Salvia* spp.), goldenbush (*Isocoma menziesii*), and native grasses (*Nassella* spp.). Species common in mixed grasslands habitat include native, perennial bunch grasses such as *Nassella* spp. mixed with non-native annuals. [Section 3.5](#) includes a general description of the vegetation types at Detachment Fallbrook.

5.3.1.4. Hydrology

The Salvage Yard Landfill is within the Santa Margarita watershed. There are no permanent surface water bodies in the Salvage Yard Landfill, but there is an intermittent stream that drains to the Santa Margarita River on the northern boundary of the landfill. [Section 3.6](#) includes a general description of the hydrology at Detachment Fallbrook.

5.3.1.5. Hydrogeology

No site-specific groundwater depth information was available for the Salvage Yard Landfill. [Section 3.7](#) includes a general description of the hydrogeology at Detachment Fallbrook.

5.3.1.6. Cultural and Natural Resources

The data collection team for the Salvage Yard Landfill found documentation of cultural resources at and near the site. The cultural resources consist of six prehistoric sites, one milling site, and one 1930's cattle trough. To preserve the integrity of the cultural resources, more specific information is not included in this document. Detachment Fallbrook has large areas of undisturbed land that can serve as suitable habitat to threatened and endangered species. [Section 3.8](#) includes a general description of the cultural and natural resources at Detachment Fallbrook.

5.3.1.7. Endangered and Special Status Species

Threatened and endangered species data for Detachment Fallbrook are presented in [Section 3.9](#). According to the California Wildlife and Habitat Analysis Branch, threatened and endangered species associated with the critical habitats of the former range that are known or have been documented within or adjacent to the Detachment Fallbrook are the Stephens' kangaroo rat, Least Bell's vireo, and the coastal California gnatcatcher.

5.3.2. Visual Survey Observations and Results

The data collection team conducted two visual surveys of the Salvage Yard Landfill: one on September 28, 2004 and one on March 10, 2005. During the visual surveys, the following Malcolm Pirnie team members were present: Mr. Chip Poalinelli, Mr. Al Larkins (September 2004), Mr. Dan Hains (March 2005), and Mr. Scott Lehman. The following Navy representatives were present during the September 2004 visual survey: Ms. Pei-Fen Tamashiro, Mr. Robbie Knight, and Mr. Si Le. The field team conducted the visual surveys by walking the perimeter of the entire site, then walking several transects of it. The following munitions were observed during the visual surveys: a 25-pound bomb, a 3-pound pyrotechnic bomb, an MK 76 practice bomb, a 2.36-inch anti-tank HE rocket, a 5-pound practice bomb, 20-mm rounds, other projectiles, several smokeless powder cans and lids, and other munitions scrap. Figure 5.3-3 is a photo taken during the March visual survey, showing a retaining wall of the landfill with exposed munitions. The site reconnaissance path is shown on Map 5.3-1 located at the end of Section 5.3. Additional site details are illustrated on Map 5.3-2 also located at the end of Section 5.3.



Figure 5.3-2: View is of the exposed suspected MEC along the retaining wall at the Salvage Yard Landfill. Photograph was taken during the September 2004 visual survey.



Figure 5.3-3: View of a retaining wall of the landfill with exposed munitions. Photograph was taken during the March 2005 visual survey.

5.3.3. Munitions and Munitions Related Materials Associated with the Site

This section describes the munitions or munitions related materials, including the types and estimated maximum penetration depths, known or suspected to be at the former landfill. This includes both MEC and non-hazardous munitions related scrap (e.g., fragments, base plates, and inert mortar fins).

The data collection team was able to determine the types of munitions suspected to be buried at the Salvage Yard Landfill from the personnel interviews, the February 2002 EOD report, and the visual surveys. The available technical data sheets on these items are included in [Appendix D](#). The site was used as a burial area for munitions and dunnage. The munitions buried included expended cartridges, primers, live projectiles, and inert anti-tank projectiles. Suspected 20-mm and 40-mm rounds, and blasting caps have been found on the ground surface.

Based on the information obtained during the data collection process, the Salvage Yard Landfill is not suspected to contain CWM filled munitions, electrically fuzed munitions, or DU associated munitions.

5.3.4. MEC Presence

The entire site has been subdivided and categorized into one of three levels of MEC presence including: Known MEC Areas, Suspected MEC Areas, and Areas Not Suspected to Contain MEC to indicate that MEC is known or is suspected to be at the site. Map 5.3-3 illustrates the munitions characterization of the Salvage Yard Landfill, and is provided at the end of Section 5.3. The MEC presence is discussed below.

5.3.4.1. Known MEC Areas

The Salvage Yard Landfill has Known MEC Areas. The following MEC were observed during the visual surveys: a 25-pound bomb, a 3-pound pyrotechnic bomb, a 2.36-inch anti-tank HE rocket, 20-mm rounds, other projectiles, and other munitions scrap.

5.3.4.2. Suspected MEC Areas

Based on historical use of the site, MEC may be present on the surface and subsurface of the Salvage Yard Landfill. The Salvage Yard Landfill was used to bury MEC items and since only a visual survey was conducted, there is a possibility that MEC could reside in the subsurface.

5.3.4.3. Areas Not Suspected to Contain MEC

Based upon observations made and data collected during the PA process, some areas of the Salvage Yard Landfill may not contain MEC depending on disposal practices.

5.3.5. Ordnance Penetration Estimates

Munitions below ground surface at the Salvage Yard Landfill were emplaced by burial, not penetration. The depth at which munitions might be buried is unknown.

5.3.6. Munitions Constituents

MC associated with expended cartridges, primers, live projectiles, and inert anti-tank projectiles could be present at the Salvage Yard Landfill. The primary MC based on personal interview, document reviews, and site visits are plastic-based explosives (PBX), RDX, fluoroelastomers, zirconium pellets, and HMX from 20-mm and 40-mm projectiles; titanium tetrachloride, red phosphorus, and smoke mixture, from 25-pound bombs, potassium perchlorate, powdered aluminum, black powder, smoke mixture, and lead from 3-pound pyrotechnic bombs; TNT and PETN from 2.36-inch anti-tank HE rocket; smokeless powder from smokeless powder cans; titanium tetrachloride, white phosphorous, pyrotechnic composition, lithium hydride, magnesium, RDX, lead styphnate, lead azide, barium, and strontium from pyrotechnics/blasting caps; and lead, arsenic, copper, antimony, black and smokeless powder constituents, chromium, cadmium, nickel, and zinc from small arms. Based on discussions with installation personnel, surface soil sampling has not occurred.

5.3.7. Contaminant Migration Routes

Migration of MEC and MC may occur through surface soil erosion, runoff, and wind and dust generation. Future construction, excavation, and maintenance at the site are also potential release mechanisms for MEC and MC. MC in runoff could potentially end up in surface water or sediment. MC could also potentially leach through soils or surface waters to groundwater.

5.3.8. Receptors and Pathways

Potential receptors at the Salvage Yard Landfill include Navy personnel and Navy-permitted visitors (including contractors). Ecological receptors may come into direct contact with MEC and MC in soil while foraging or burrowing. Ecological receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). There is

a potentially complete secondary pathway for the general public, who could come into contact with any MC that flow out of the installation through the surface water system.

5.3.8.1. Nearby Populations

The Town of Fallbrook and San Diego County have populations of 29,100, and 2,813,833, respectively (U.S. Census Bureau, 2000). 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. The Salvage Yard Landfill is approximately 1,000 feet from the housing complex at the installation. See [Section 2.1](#) for more information on the housing complex.

5.3.8.2. Buildings Near/Within Site

There are no buildings on the site. Building 307 is located to the west and Building 365 is located to the east of the Salvage Yard Landfill. Both buildings are used by the Naval Surface Warfare Center (NSWC) Crane for their engineering offices, and have 10 to 15 personnel at any given time.

5.3.8.3. Utilities On/Near Site

The Salvage Yard Landfill has multiple utilities on-site. Water lines run through the central portion of the Salvage Yard Landfill. U.S. government phone lines and phone lines run along the eastern portion of the site. Sewer lines are located in the southern portion of the site. Approximately 0.4 miles to the southwest of the site are additional U.S. government phone lines, water lines, sewer lines, and gas lines.

5.3.9. Land Use

The Salvage Yard Landfill is closed and is no longer in used for disposal.

5.3.10. Access Controls / Restrictions

The Salvage Yard Landfill 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. Once inside the installation, access to the Salvage Yard Landfill is not controlled.

5.3.11. Conceptual Site Model

This CSM was developed following guidance documents issued by the USEPA for hazardous waste sites and the USACE for OE sites. Guidance documents included the USEPA’s Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/004) and the Final USACE CSM Guidance Development of Integrated Conceptual Site Models for Environmental Ordnance and Explosives (OE) Sites (USACE, 2003).

The CSM describes the site and its environmental setting. The CSM presents information regarding: 1) MEC and/or MC known or suspected to be at the site; 2) current and future reasonably anticipated or proposed uses of the real property; and 3) actual, potentially complete, or incomplete exposure pathways that link them.

The CSM is presented in a series of information profiles that provide information about the site. The information profiles are included in Table 5.3-1 below.

Table 5.3-1: Conceptual Site Model Information Profiles – Salvage Yard Landfill		
Profile Type	Information Needs	Preliminary Assessment Findings
Site Profile	Installation Name	Detachment Fallbrook
	Installation Location	Detachment Fallbrook is located 53 miles north of San Diego in northern San Diego County, CA.
	Site Name	Salvage Yard Landfill
	Site Location	The Salvage Yard Landfill is in the northeast corner of the installation, approximately 1,000 feet from the western corner of the installation housing complex.
	Site History	The Salvage Yard Landfill is a burial area for munitions and dunnage, according to employee interviews, historical records, and recent site visual surveys. In February 2002, suspected 20-mm and 40-mm rounds, as well as some blasting caps, were found on the ground surface.
	Site Area and Layout	The Salvage Yard Landfill occupies approximately 13 acres near Building 307 and Building 365. The landfill is approximately 2,200 feet from the eastern boundary of the installation. Beyond the installation’s boundary is the Town of Fallbrook.

Table 5.3-1: Conceptual Site Model Information Profiles – Salvage Yard Landfill		
Profile Type	Information Needs	Preliminary Assessment Findings
	Site Structures	A retaining wall is exposed along western side of the Salvage Yard Landfill. There are no other structures at the landfill.
	Site Boundaries	Map 2.1-1 shows the location of the Salvage Yard Landfill. N: Undeveloped coastal sage scrub, grasslands, and live oak woodland. S: Sparrow Road borders the landfill to the south. Beyond the road is sage dominant vegetation and live oak woodland bordering a creek bed. W: Building 307 and its parking area. E: Building 365 and its parking area and coastal sage scrub.
	Site Security	The Salvage Yard Landfill 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. Once inside the installation, access to the Salvage Yard Landfill is not controlled.
Munitions/ Release Profile	Munitions Types	Historical records indicate that expended cartridges, primers, live projectiles, and inert anti-tank projectiles were buried in the area. An EOD report from February 2002 states that EOD technicians from MCB Camp Pendleton were called to the site to handle some suspected 20-mm and 40-mm rounds that were found on the ground surface, as well as some blasting caps. The following munitions were observed during Malcolm Pirnie’s site visit: a 25-pound bomb, 3-pound pyrotechnic bomb, an MK 76 practice bomb, a 2.36-inch anti-tank HE rocket, a 5-pound practice bomb, 20-mm rounds, other projectiles, several smokeless powder cans and lids, and other munitions scrap.
	Maximum Probability Penetration Depth	Munitions at the Salvage Yard Landfill would be below surface because of burial and not penetration. The depth of MEC would depend on the construction of the landfill.

Table 5.3-1: Conceptual Site Model Information Profiles – Salvage Yard Landfill		
Profile Type	Information Needs	Preliminary Assessment Findings
	MEC Density	The Salvage Yard Landfill has known and suspected MEC areas. The site is suspected to have a medium MEC density; however, some areas of the landfill may have a higher or lower density depending on disposal practices.
	MEC Scrap/Fragments	The following munitions were observed during Malcolm Pirnie’s site visit: a 25-pound bomb, a 3-pound pyrotechnic bomb, an MK 76 practice bomb, a 2.36-inch anti-tank HE rocket, a 5-pound practice bomb, 20-mm rounds, other projectiles, several smokeless powder cans and lids, and other munitions scrap.
	Associated Munitions Constituents	<p>The primary MC of concern are:</p> <ul style="list-style-type: none"> ○ 20-mm and 40-mm projectiles: 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, chromium, copper salt, cumene hydroperoxide, methyl chloroform, sodium nitrate, toluene, triethylamine, xylenes, zinc phosphate, lead chromate (VI), 2-ethoxyethylacetate, and lead naphthenate; ○ 25-pound bomb: red phosphorus, smoke mixture, and titanium tetrachloride; ○ 3-pound pyrotechnic bomb: potassium perchlorate, powdered aluminum, black powder, smoke mixture, and lead; ○ 2.36-inch anti-tank high explosive rocket: TNT and PETN; ○ Smokeless powder cans: smokeless powder; ○ Pyrotechnics/blasting caps: titanium tetrachloride, white phosphorus, pyrotechnic composition, lithium hydride, magnesium, RDX, lead styphnate, lead azide, barium, and strontium; and ○ Small Arms: lead, antimony, black and smokeless powder constituents, arsenic, copper, chromium, cadmium, nickel, and zinc.

Table 5.3-1: Conceptual Site Model Information Profiles – Salvage Yard Landfill		
Profile Type	Information Needs	Preliminary Assessment Findings
	Migration Routes/Release Mechanisms	Migration of MEC and MC may occur through surface soil erosion, runoff, and wind and dust generation. Future construction, excavation, and maintenance at the site are also potential release mechanisms. MC in runoff could potentially end up in surface water or sediment. MC could also potentially leach through soils or surface waters to groundwater.
Physical Profile	Climate	The climate at Detachment 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 being the wettest month and July the driest. Summers at the installation are punctuated by the Santa Ana (offshore) winds.
	Topography	The Salvage Yard Landfill contains low hills and natural ravines.
	Geology	The region is underlain by plutonic and metasedimentary rocks of the Peninsular Ranges physiomorphic province, but site-specific information was not available.
	Soil	The soil at the Salvage Yard Landfill is classified as a sandy loam of granitic origin and is moderately well drained.
	Hydrogeology	No site-specific groundwater depth data were available.
	Hydrology	The Salvage Yard Landfill is within the Santa Margarita watershed. There are no permanent surface water bodies in the Salvage Yard Landfill, but there is an intermittent stream that drains to the Santa Margarita River on the northern boundary of the landfill.
	Vegetation	The vegetation in the area of the Salvage Yard Landfill is considered to be mostly coastal sage scrub with some mixed grassland. Common species in mixed grassland habitat include native, perennial bunch mixed with non-native annuals. Common species in coastal sage scrub habitat include coastal sagebrush, flat-topped buckwheat, laurel sumac, sage, goldenbush, and native grasses.

Table 5.3-1: Conceptual Site Model Information Profiles – Salvage Yard Landfill		
Profile Type	Information Needs	Preliminary Assessment Findings
Land Use and Exposure Profile	Current Land Use	The Salvage Yard Landfill is closed and is no longer in use.
	Current Human Receptors	Navy personnel and Navy-permitted visitors (including contractors). There is also a potentially complete exposure pathway for the general public coming into contact with MC migrating off the installation through the surface water system.
	Current Activities (frequency, nature of activity)	Activities at the site may include environmental and ecological surveys.
	Potential Future Land Use	The Salvage Yard Landfill was closed in the early 1960s. There is no anticipated change in current land use.
	Potential Future Human Receptors	Navy personnel and Navy-permitted visitors (including contractors). There is also a potentially complete exposure pathway for the general public coming into contact with MC migrating off the installation through the surface water system.
	Potential Future Land Use-Related Activities:	Any potential future land use activities would have to follow any Navy ESQD Arc waivers or exemptions. 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 the area of the former landfill.
	Demographics/Zoning	<p>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:</p> <ul style="list-style-type: none"> • Town of Fallbrook: Population (U.S. Census, 2000): 29,100 • San Diego County: Population (U.S. Census, 2000): 2,813,833

Table 5.3-1: Conceptual Site Model Information Profiles – Salvage Yard Landfill		
Profile Type	Information Needs	Preliminary Assessment Findings
Ecological Profile	Beneficial Resources	The coastal sage scrub and mixed grasslands habitats offer roosting and foraging resources for raptors. The site is also listed as habitat for the coastal California gnatcatcher, which is a federally protected species, and as a management area for the Stephens' kangaroo rat.
	Habitat Type	The Salvage Yard Landfill contains coastal sage scrub and some mixed grasslands habitat. The landfill is also in a zone designated as habitat for the federally endangered coastal California gnatcatcher and the Stephens' kangaroo rat.
	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 included 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). Pets from the housing complex are also a potential receptor covered under domestic animals in the CSM.
	Federal Endangered Species:	Stephens' kangaroo rat and Least Bell's vireo
	Federal Threatened Species:	Coastal California gnatcatcher
	State Endangered Species:	Least Bell's vireo
	State Threatened Species:	Stephens' kangaroo rat
Relationship of MEC/MC 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 MEC/MC in soil while foraging or burrowing. Ecological receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). There is also a potentially complete exposure pathway for the general public coming into contact with MC migrating off the installation through the surface water system.	

A key element of the CSM is the exposure pathway analysis, which is performed separately for MEC and for MC.

For MEC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MEC are expected to be found); 2) access (e.g., controlled or uncontrolled access, items on the surface or within the subsurface); 3) an activity (e.g., non-intrusive grounds maintenance or intrusive construction); and 4) receptors (e.g., Navy personnel, construction workers, recreational users, authorized visitors, or ecological receptors). It is important to recognize that environmental mechanisms (e.g., erosion) and/or human intervention may result in the repositioning of MEC.

For MC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MC are expected to be found); 2) an exposure medium (e.g., surface soil); 3) an exposure route (e.g., dermal contact); and 4) receptors (e.g., Navy personnel, construction workers, recreational users, authorized visitors, or ecological receptors). If the point of exposure is not at the same location as the source, the pathway may also include a release mechanism (e.g., volatilization) and a transport medium (e.g., air).

The potential interactions between the source and receptors are assessed differently between MEC and MC. For MC, interaction between the source and receptors involves a release mechanism for the MC, an exposure medium that contains the MC, and an exposure route that places the receptor into contact with the contaminated medium. For MEC, interaction between the potential receptors and an MEC source has two components. The receptor must have access to the source and must engage in some activity that results in contact with individual MEC items within the source area.

MEC Interactions and Pathway Analysis

The exposure pathway analysis for MEC is shown in Figure 5.3-4 because historical and visual evidence indicate that MEC is present at the Salvage Yard Landfill. MEC was observed on the surface and is likely to be present in the subsurface at the site. Potential receptors include both human (Navy personnel and contractors/visitors) and ecological receptors (biota and domestic animals [i.e. pets]) that may come in contact with suspected MEC. The release mechanism of handling/treading underfoot activities creates a complete pathway for all human receptors and ecological receptors (biota and domestic animals) for MEC on the surface of the site. The release

mechanism of intrusive activities (such as digging or drilling) creates a potentially complete pathway for human and ecological receptors (biota and domestic animals) both for MEC on the surface and subsurface at the site.

MC Interactions and Pathway Analysis

The exposure pathway analysis for MC is shown in Figure 5.3-5. Potential receptors include both human (Navy personnel, contractor/visitor, general public) and ecological receptors (biota) that may come in contact with MC in the source medium or other potentially contaminated media. Pathways are shown for each medium and are discussed below. For MC, interaction between the source (e.g., the burial trenches) and receptors generally involves a release mechanism for the MC (e.g., runoff to surface water, uptake into the food chain), an exposure medium containing the MC (e.g., soil, surface water, groundwater), and an exposure route (e.g., incidental ingestion, dermal contact) that places the receptor into contact with the contaminated medium.

Surface Water/Sediment

As discussed earlier, there are no named surface water bodies at the Salvage Yard Landfill. Yet, because the site has an ephemeral stream that drains into the Santa Margarita River, MC could potentially become available to receptors in surface water or sediment. The pathway for surface water and/or sediment is considered potentially complete at the Salvage Yard Landfill for all receptors. There is also a potentially complete exposure pathway for the general public coming into contact with MC migrating off the installation through the surface water system.

Plant/Animal Uptake

Potentially complete pathways are indicated for biota and domestic animals (i.e. pets) exposed to MC at the Salvage Yard Landfill via the food chain. MC may be taken up by plants and/or prey and consumed by biota and/or domestic animals at the landfill.

Surface Soil

Potentially complete pathways exist for all receptors (except the general public) via all exposure routes for surface soil contaminated with MC at the Salvage Yard Landfill because MC are suspected to reside in the surface soil (i.e., 0 to 2 feet below ground surface). Dust inhalation exposures for human receptors, domestic animals, and biota are anticipated due to the low vegetative cover on the existing soils. Any future movement or grading of surface soils could make MC available for wind distribution and subsequent inhalation.

Subsurface Soil

Potentially complete pathways exist for all receptors (except the general public) via all exposure routes at the Salvage Yard Landfill. Biota and domestic animals might come into contact with the contaminated soil by burrowing and/or ingesting. Navy personnel and contractors might engage in excavation or drilling activities, which could facilitate the movement of surface contamination to the subsurface.

Groundwater

Potentially complete pathways for Navy personnel and contractors/visitors are indicated for groundwater contaminated with MC at the Salvage Yard Landfill. Navy personnel and contractors/visitors may come into contact with groundwater during environmental investigations (e.g., monitoring well installation and sampling) at the former site. The potential for groundwater impacts is considered to be incomplete for all other receptors.

An exposure pathway does not exist for MC volatilizing into the air for all receptors.

5.3.12. Summary

The Salvage Yard Landfill (IRP Site 33) covers approximately 13 acres in the northeast corner of the installation, approximately 900 feet from the western corner of the installation. The Salvage Yard Landfill is a burial area for munitions and dunnage, according to personnel interviews, historical records, and recent visual surveys. On historical maps, the area is labeled as a storage yard starting in the 1950s and ending in the late 1960s. It was also used as a disposal area during this time. Historical records indicate that expended cartridges, primers, live projectiles, and inert anti-tank projectiles were buried in the area. An EOD report from February 2002 describes an incident in which EOD technicians from MCB Camp Pendleton were called to the site to handle some suspected 20-mm and 40-mm rounds that were found on the ground surface, as well as some blasting caps. The area is not currently in use. The following MEC were observed during the visual surveys: a 25-pound bomb, a 3-pound pyrotechnic bomb, a 2.36-inch anti-tank HE rocket, 20-mm rounds, other projectiles, and other munitions scrap.

5.3.13. Recommendations

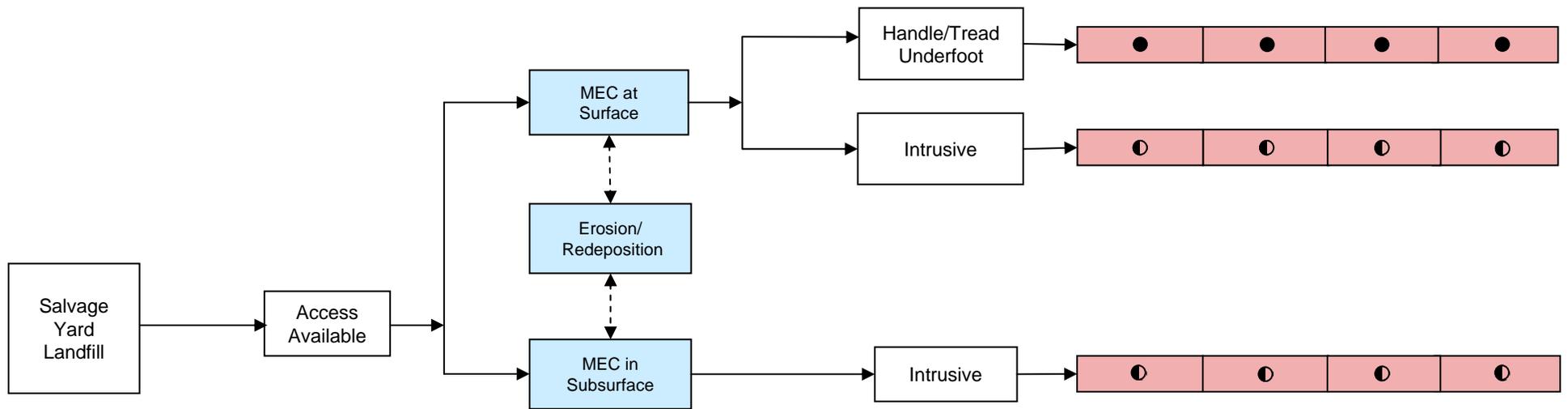
Based on the data collected and presented in this PA, an SI is recommended for both MEC and MC at the Salvage Yard Landfill. The SI activities should focus on determining the extent of MEC and MC at the site. During the SI, it is recommended that surface and subsurface soil

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samples be collected from the site and analyzed for ordnance residuals and metals. It is also recommended that groundwater monitoring wells be installed to verify that the groundwater under the site has not been affected. If intrusive activities are planned for the site, the potential receptors should be made aware that the site was a munitions burial site.

Source Area	Access	MEC Location/ Release Mechanisms	Activity	Receptors
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Navy Personnel	Contractor / Visitor	Domestic Animals	Biota
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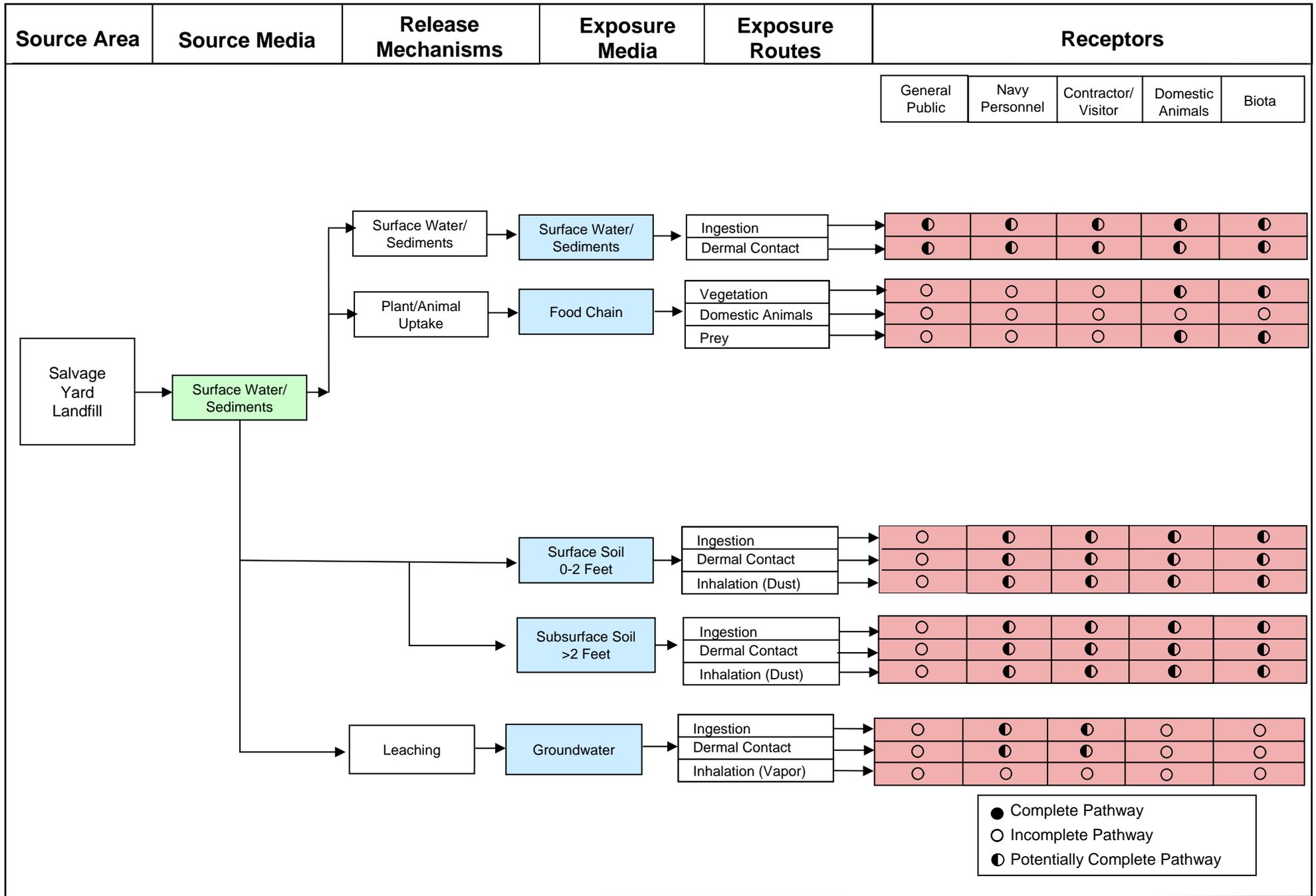
<ul style="list-style-type: none"> ● Complete Pathway ○ Incomplete Pathway ◐ Potentially Complete Pathway
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Prepared for: 

PRELIMINARY ASSESSMENT – FINAL PA REPORT
 SALVAGE YARD LANDFILL – MEC EXPOSURE PATHWAY ANALYSIS
 NAVWPNSTA SEAL BEACH DETACHMENT FALLBROOK, CALIFORNIA

MALCOLM PIRNIE, INC.
 FIGURE 5.3-4 FINAL
 June 2006



Prepared for:



PRELIMINARY ASSESSMENT – FINAL PA REPORT
SALVAGE YARD LANDFILL – MC EXPOSURE PATHWAY ANALYSIS
NAVWPNSTA SEAL BEACH DETACHMENT FALLBROOK, CALIFORNIA

MALCOLM PIRNIE, INC.

FIGURE 5.3-5 FINAL
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Figures 5.3-1 to 5.3-3

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

5.4. Dunnage Disposal Site #1

The Dunnage Disposal Site #1 occupies about 3.3 acres located in the north-central portion of the Detachment Fallbrook. The site is L-shaped, extending north and east along two intermittent stream beds.

5.4.1. History and Site Description

The Dunnage Disposal Site #1 (IRP Site 34a) is a potential munitions burial site. The site occupies approximately 3.3 acres and was in use from 1942 to 1978 as a disposal area for dunnage. According to personnel interviews and historical documents, the site may also have been used as a disposal area for ordnance. The area is not currently in use. There is no evidence of recent deeper excavations or other intrusions that could have redistributed MEC and MC. The Dunnage Disposal Site #1 was originally identified under the IRP as Site 34a, but is now being addressed under the MRP. No IRP investigations were undertaken.

5.4.1.1. Topography

The Dunnage Disposal Site #1 contains low hills with some moderately deep ravines created by runoff and ephemeral streams. For further information on the topography of Detachment Fallbrook, see [Section 3.2](#).

5.4.1.2. Geology

The region is underlain by plutonic and metasedimentary rocks of the Peninsular Ranges physiomorphic province, but site-specific information for the Dunnage Disposal Site #1 was not available. [Section 3.3](#) includes a general description of the geology of Detachment Fallbrook.

5.4.1.3. Soil and Vegetation Types

Soils in the Dunnage Disposal Site #1 are classified as a sandy loam of granitic origin and are moderately well drained. [Section 3.4](#) includes a general description of the soil types at Detachment Fallbrook.

The vegetation in the area of the Dunnage Disposal Site #1 is considered to be mostly coastal sage scrub with some riparian habitat along the intermittent stream beds. Common species in coastal sage scrub habitat include coastal sagebrush (*Artemisia californica*), flat-topped buckwheat (*Erigonum fasciculatum*), laurel sumac (*Malosma laurina*), sage (*Salvia* spp.), goldenbush (*Isocoma menziesii*), and native grasses (*Nassella* spp.). Common species with

riparian habitat include mulefat (*Baccharis salicifolia*) with some arroyo willows (*Salix lasiolepis*) and elderberry (*Sambucus mexicana*). [Section 3.5](#) includes a general description of the vegetation types at Detachment Fallbrook.

5.4.1.4. Hydrology

Dunnage Disposal Site #1 is within the Santa Margarita watershed. There are no permanent surface water bodies in the Dunnage Disposal Site #1, though intermittent streams tend to develop during the rainy season. The site drains primarily into Fallbrook Creek. [Section 3.6](#) includes a general description of the hydrology at Detachment Fallbrook.

5.4.1.5. Hydrogeology

No site-specific groundwater depth data were available. [Section 3.7](#) includes a general description of the hydrogeology at Detachment Fallbrook.

5.4.1.6. Cultural and Natural Resources

The data collection team for the Dunnage Disposal Site #1 found documentation of one significant cultural resource near the site. The cultural resource is a prehistoric site. To preserve the integrity of the cultural resource, more specific information is not included in this document. Detachment Fallbrook has large areas of undisturbed land that can serve as suitable habitat to threatened and endangered species. [Section 3.8](#) includes a general description of the cultural and natural resources at Detachment Fallbrook.

5.4.1.7. Endangered and Special Status Species

Threatened and endangered species data for Detachment Fallbrook are presented in [Section 3.9](#). According to the California Wildlife and Habitat Analysis Branch, threatened and endangered species associated with the critical habitats of the former range that are known or have been documented within or adjacent to the Detachment Fallbrook are the coastal California gnatcatcher, Stephens' kangaroo rat, Arroyo toad, Southwestern willow flycatcher, and the Least Bell's vireo.

5.4.2. Visual Survey Observations and Results

The data collection team conducted two visual surveys of the Dunnage Disposal Site #1: one on September 28, 2004 and the second on March 8, 2005. Present during the two visual surveys were Mr. Chip Poalinelli, Mr. Al Larkins (September 2004 only), Mr. Dan Hains (March 2005

only), and Mr. Scott Lehman. The following Navy representatives were present during the September 2004 visual survey: Ms. Pei-Fen Tamashiro, Mr. Robbie Knight, and Mr. Si Le. The field team conducted the visual survey by walking the perimeter of the disposal site, then walking several transects of it. The following munitions were observed during both visual surveys: various inert rocket motors, practice 2,000-pound bombs, a HE 20-mm projectile, several igniters, and other munitions scrap on the ground surface and in the wash area. There was also a large quantity of non-munitions related trash at the site. Figure 5.4-1 shows a photograph of the site during the September 2004 visual survey. Figure 5.4-2 shows a photograph of a practice bomb identified at the site during the March 2005 visual survey. A visual depiction of the site reconnaissance is provided on Map 5.4-1 located at the end of Section 5.4. Additional site details are illustrated on Map 5.4-2, also located at the end of Section 5.4.



Figure 5.4-1: Photograph was taken during the September 2004 visual survey. View of the 2000-pound bombs at the Dunnage Disposal Site #1 looking northwest.



Figure 5.4-2: Photograph was taken during March 2005 visual survey, showing one of the practice 2,000-pound bombs identified at the Dunnage Disposal Site #1.

5.4.3. Munitions and Munitions Related Materials Associated with the Site

This section describes the munitions or munitions related materials, including the types and estimated maximum penetration depths, known or suspected to be at the Dunnage Disposal Site #1. This includes both MEC and non-hazardous munitions related scrap (e.g., fragments, base plates, and inert mortar fins).

The data collection team did not find any records detailing the types of munitions disposed or buried at the Dunnage Disposal Site #1. The following munitions were observed during Malcolm Pirnie's site visit: inert rocket motors, practice 2,000-pound bombs, a HE 20-mm projectile, several igniters, and other scrap. The available technical data sheets on these items are included in [Appendix D](#).

Based on the information obtained during the data collection process, Dunnage Disposal Site #1 is not suspected to contain CWM filled munitions, electrically fuzed munitions, or DU associated munitions.

5.4.4. MEC Presence

The entire site has been subdivided and categorized into one of three levels of MEC presence including: Known MEC Areas, Suspected MEC Areas, and Areas Not Suspected to Contain MEC to indicate that MEC is known or is suspected to be at the site. Map 5.4-3 illustrates the munitions characterization of the Dunnage Disposal Site #1, and is provided at the end of Section 5.4. The MEC presence is discussed below.

5.4.4.1. Known MEC Areas

The Dunnage Disposal Site #1 has Known MEC Areas. The following munitions were observed during Malcolm Pirnie's site visit: inert rocket motors, practice 2,000-pound bombs, a HE 20-mm projectile, several igniters, and other scrap.

5.4.4.2. Suspected MEC Areas

The Dunnage Disposal Site #1 has Suspected MEC Areas. Based on historical use of the site, MEC may be present on the surface and subsurface of the Dunnage Disposal Site #1. Since only a visual survey was conducted of the site, there is a great possibility that MEC could reside in the subsurface.

5.4.4.3. Areas Not Suspected to Contain MEC

Based on available documents and the site walk, the approximately 3.3 acres of the Dunnage Disposal Site #1 are suspected to contain MEC pending further investigation.

5.4.5. Ordnance Penetration Estimates

Munitions found below the ground surface at the Dunnage Disposal Site #1 would be due to burial not penetration. The depth of MEC would depend on the disposal site's construction.

5.4.6. Munitions Constituents

The primary munitions of concern at the Dunnage Disposal Site #1 include PBX, zirconium pellets, RDX, and aluminum from 20-mm projectiles and white phosphorous, pyrotechnic composition, lithium hydride, magnesium, titanium tetrachloride, RDX, lead styphnate, lead azide, barium, and strontium from pyrotechnics.

5.4.7. Contaminant Migration Routes

Migration of MEC and MC may occur through surface soil erosion, runoff, and wind and dust generation. Future construction, excavation, and maintenance at the site are also potential release mechanisms for MEC and MC. MC in runoff could potentially end up in surface water or sediment. MC could also potentially leach through soils or surface waters to groundwater.

5.4.8. Receptors and Pathways

Potential receptors at the Dunnage Disposal Site #1 include Navy personnel, visitors, and contractors. Ecological receptors may come into direct contact with MEC and/or MC in soil while foraging or burrowing. Ecological receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). There is a potentially complete secondary pathway for the general public, who could come into contact with any MC that flow out of the installation through the surface water system.

5.4.8.1. Nearby Populations

Fallbrook and San Diego County have populations of 29,100, and 2,813,833, respectively (U.S. Census Bureau, 2000). 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. The Dunnage Disposal Site #1 is approximately 8,530 feet from the housing complex at the installation. See [Section 2.1](#) for more information on the housing complex.

5.4.8.2. Buildings Near/Within Site

There are no buildings on the site. The closest building to the Dunnage Disposal Site #1 is Building 301, located to the north of Redeye Road. Building 301 is the VERTREP Storage Locker, which is accessed by two to three people per day.

5.4.8.3. Utilities On/Near Site

There are no visible utilities on the Dunnage Disposal Site #1. To the north and east are phone lines, U.S. government phone lines, and water lines.

5.4.9. Land Use

The Dunnage Disposal Site #1 is closed and is no longer used for disposal.

5.4.10. Access Controls / Restrictions

The Dunnage Disposal Site #1 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. The Dunnage Disposal Site #1 is also located within a restricted area guarded by the security force.

5.4.11. Conceptual Site Model

This CSM was developed following guidance documents issued by the USEPA for hazardous waste sites and the USACE for OE sites. Guidance documents included the USEPA’s Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/004) and the Final USACE CSM Guidance Development of Integrated Conceptual Site Models for Environmental Ordnance and Explosives (OE) Sites (USACE, 2003).

The CSM describes the site and its environmental setting. The CSM presents information regarding: 1) MEC and/or MC known or suspected to be at the site; 2) current and future reasonably anticipated or proposed uses of the real property; and 3) actual, potentially complete, or incomplete exposure pathways that link them.

The CSM is presented in a series of information profiles that provide information about the site. The information profiles are included in Table 5.4-1 below.

Table 5.4-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #1		
Profile Type	Information Needs	Preliminary Assessment Findings
Site Profile	Installation Name	Detachment Fallbrook
	Installation Location	Detachment Fallbrook is located 53 miles north of San Diego in northern San Diego County, CA.
	Site Name	Dunnage Disposal Site #1 (IRP Site 34a)
	Site Location	The Dunnage Disposal Site #1 is in the north-central portion of the installation.
	Site History	The Dunnage Disposal Site #1 is a burial area for dunnage and potentially for munitions, according to employee interviews and historical documents. The site was used from 1942 until 1978.

Table 5.4-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #1		
Profile Type	Information Needs	Preliminary Assessment Findings
	Site Area and Layout	The Dunnage Disposal Site #1 occupies approximately 3.3 acres. It extends north and east in an “L” shape following two intermittent stream beds.
	Site Structures	There are no structures currently on the Dunnage Disposal Site #1.
	Site Boundaries	Map 2.1-1 shows the location of the Dunnage Disposal Site #1. N: An unpaved road borders the site to the north with a coastal sage scrub open area beyond. Further north is Redeye Road, Building 301, and a magazine area. S: To the south, the site is bordered by coastal sage scrub habitat. Magazine and parking areas are located farther south. W: To the west, the site is bordered by coastal sage scrub habitat. Magazine areas are located farther west. E: East of the site is Redeye Road and a magazine area.
	Site Security	The Dunnage Disposal Site #1 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. The Dunnage Disposal Site #1 is also located within a restricted area guarded by the security force.
Munitions/ Release Profile	Munitions Types	The following munitions were observed during Malcolm Pirnie’s site visit: inert rocket motors, practice 2,000–pound bombs, a suspected HE 20-mm projectile, several igniters, and other scrap.
	Maximum Probability Penetration Depth ¹	Munitions at the Dunnage Disposal Site #1 would be below surface because of burial and not penetration. The depth of MEC would depend on the construction of the disposal site.
	MEC Density	The Dunnage Disposal Site #1 has known and suspected MEC areas. The site is suspected to have a medium MEC density; however, some areas of the site may have a higher or lower density depending on disposal practices.

Table 5.4-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #1		
Profile Type	Information Needs	Preliminary Assessment Findings
	MEC Scrap/Fragments	The following munitions were observed during Malcolm Pirnie’s site visit: inert rocket motors, practice 2,000–pound bombs, a HE 20-mm projectile, several igniters, and other scrap.
	Associated Munitions Constituents	The primary MC of concern are: <ul style="list-style-type: none"> o 20-mm projectile: PBX, HMX, zirconium pellets, fluoroelastomers, RDX, aluminum; and o Pyrotechnics: white phosphorus, pyrotechnic composition, lithium hydride, magnesium, titanium tetrachloride, RDX, lead styphnate, lead azide, barium, and strontium
	Migration Routes/Release Mechanisms	Migration of MEC and MC may occur through surface soil erosion, runoff, and by wind and dust generation. Future construction, excavation, and maintenance at the site are also potential release mechanisms. MC in runoff could potentially end up in surface water or sediment. MC could also potentially leach through soils or surface waters to 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 Dunnage Disposal Site #1 contains low hills with some moderately deep ravines created by runoff and ephemeral streams.
	Geology	The region is underlain by plutonic and metasedimentary rocks of the Peninsular Ranges physiomorphic province, but site-specific information was not available.
	Soil	The soil at the Dunnage Disposal Site #1 is classified as a sandy loam of granitic origin and is moderately well drained.
	Hydrogeology	No site-specific groundwater depth data were available.

Table 5.4-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #1		
Profile Type	Information Needs	Preliminary Assessment Findings
	Hydrology	The Dunnage Disposal Site #1 is within the Santa Margarita watershed. There are no permanent surface water bodies in the Dunnage Disposal Site #1 Area, yet intermittent streams develop on the installation during the rainy season and some of them run through Dunnage Disposal Site #1. The Dunnage Disposal Site #1 drains primarily into Fallbrook Creek, about 40 feet to the north and northwest of the site’s boundary.
	Vegetation	The vegetation in the area of Dunnage Disposal Site #1 is considered to be mostly coastal sage scrub with some riparian habitat (along the intermittent stream beds). Common species in coastal sage scrub habitat include coastal sagebrush, flat-topped 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	The Dunnage Disposal Site #1 is closed and is no longer in use.
	Current Human Receptors	Navy personnel and Navy-permitted visitors (including contractors).
	Current Activities (frequency, nature of activity)	Activities at the site may include environmental and ecological surveys.
	Potential Future Land Use	The Dunnage Disposal Site #1 was closed in 1978. There is no change in land use planned.
	Potential Future Human Receptors	Navy personnel and Navy-permitted visitors (including contractors).
	Potential Future Land Use-Related Activities:	Any potential future land use activities would have to follow any Navy ESQD Arc waivers or exemptions. Other potential future activities at the site include environmental and ecological surveys.
	Zoning/Land Use Restrictions	ESQD Arc restrictions apply to the area of the Dunnage Disposal Site #1.

Table 5.4-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #1		
Profile Type	Information Needs	Preliminary Assessment Findings
	Demographics/Zoning	<p>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:</p> <ul style="list-style-type: none"> • Town of Fallbrook: Population (U.S. Census, 2000): 29,100 • San Diego County: Population (U.S. Census, 2000): 2,813,833
	Beneficial Resources	The coastal sage scrub habitat offers roosting and foraging resources for raptors. The site is within the designated habitat for the coastal California gnatcatcher.
Ecological Profile	Habitat Type	The Dunnage Disposal Site #1 contains coastal sage scrub and some riparian habitat. The Dunnage Disposal Site #1 is also in a zone designated as habitat for the federally endangered coastal California gnatcatcher.
	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 included 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 Species:	Least Bell’s vireo, Stephens’ kangaroo rat, Arroyo toad, and Southwestern willow flycatcher
	Federal Threatened Species:	Coastal California gnatcatcher
	State Endangered Species:	Least Bell’s vireo and Southwestern willow flycatcher
	State Threatened Species:	Stephens’ kangaroo rat

Table 5.4-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #1		
Profile Type	Information Needs	Preliminary Assessment Findings
	Relationship of MEC/MC 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 MEC and/or MC in surface and/or subsurface soil while foraging or burrowing. Ecological receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). There is a potentially complete secondary pathway for the general public, who could come into contact with any MC that flow out of the installation through the surface water system.

A key element of the CSM is the exposure pathway analysis, which is performed separately for MEC and for MC.

For MEC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MEC are expected to be found); 2) access (e.g., controlled or uncontrolled access, items on the surface or within the subsurface); 3) an activity (e.g., non-intrusive grounds maintenance or intrusive construction); and 4) receptors (e.g., Navy personnel, construction workers, recreational users, authorized visitors, or ecological receptors). It is important to recognize that environmental mechanisms (e.g., erosion) and/or human intervention may result in the repositioning of MEC.

For MC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MC are expected to be found); 2) an exposure medium (e.g., surface soil); 3) an exposure route (e.g., dermal contact); and 4) receptors (e.g., Navy personnel, construction workers, recreational users, authorized visitors, or ecological receptors). If the point of exposure is not at the same location as the source, the pathway may also include a release mechanism (e.g., volatilization) and a transport medium (e.g., air).

The potential interactions between the source and receptors are assessed differently between MEC and MC. For MC, interaction between the source and receptors involves a release mechanism for the MC, an exposure medium that contains the MC, and an exposure route that places the receptor into contact with the contaminated medium. For MEC, interaction between

the potential receptors and an MEC source has two components. The receptor must have access to the source and must engage in some activity that results in contact with individual MEC items within the source area.

MEC Interactions and Pathway Analysis

The exposure pathway analysis for MEC is shown in Figure 5.4-3 because historical and visual evidence indicate that MEC could be present at the Dunnage Disposal Site #1. MEC and munitions scraps were observed on the surface and could potentially be present in the subsurface at the site. The release mechanism of handling/treading underfoot activities creates a complete exposure pathway for all human receptors and biota for MEC on the surface of the site. The release mechanism of intrusive activities (such as digging or drilling) creates a potentially complete exposure pathway for human and ecological receptors for MEC both on the surface (0 to 2 feet) and in the subsurface at the site.

MC Interactions and Pathway Analysis

The exposure pathway analysis for MC is shown in Figure 5.4-4. Potential receptors include both human (Navy personnel and contractor/visitor) and ecological receptors (biota) that may come in contact with MC in the source medium or other potentially contaminated media. Pathways are shown for each medium and are discussed below. For MC, interaction between the source (e.g., burial pits) and receptors generally involves a release mechanism for the MC (e.g., runoff to surface water, leaching to groundwater, or uptake into the food chain), an exposure medium containing the MC (e.g., soil, sediment, or groundwater), and an exposure route (e.g., incidental ingestion, dermal contact, or inhalation) that places the receptor into contact with the contaminated medium.

Surface Water/Sediment

As discussed earlier, intermittent streams develop on the installation during the rainy season and some of them run through the Dunnage Disposal Site #1. MC in runoff could potentially become available to receptors in surface water or sediment. The exposure pathway for surface water and/or sediment is considered potentially complete for both human and ecological receptors. There is a potentially complete secondary pathway for the general public, who could come into contact with any MC that flow out of the installation through the surface water system.

Plant/Animal Uptake

Potentially complete pathways are indicated for biota (wildlife) exposed to MC at the Dunnage Disposal Site #1 via the food chain. MC may be taken up by plants and prey and consumed by biota.

Surface Soil

Potentially complete pathways exist for all receptors (except for the general public) via all exposure routes for surface soil contaminated with MC at the Dunnage Disposal Site #1. It is suspected that MC resides in the surface soil (i.e., 0 to 2 feet below ground surface) at the Dunnage Disposal Site #1. Inhalation exposures to humans or biota from inhalation of dust are anticipated due to the low vegetative cover on the existing soils. Any future movement or grading of surface soils could make MC available for wind distribution and subsequent inhalation.

Subsurface Soil

Potentially complete subsurface soil pathways for biota and for Navy personnel and contractors are expected to exist at the Dunnage Disposal Site #1. Biota might come into contact with the contaminated soil by burrowing and/or ingesting. Navy personnel and contractors might engage in excavation or drilling activities, which could facilitate the movement of surface contamination to the subsurface.

Groundwater

Potentially complete pathways for Navy personnel and contractors/visitors are indicated for groundwater contaminated with MC at the Dunnage Disposal Site #1. Navy personnel and contractors/visitors may come into contact with groundwater during environmental investigations (e.g., monitoring well installation and sampling) at the site. The potential for groundwater impacts is considered to be incomplete for all other receptors.

An exposure pathway does not exist for MC volatilizing into the air for all receptors.

5.4.12. Summary

The 3.3-acre Dunnage Disposal Site #1 (IRP Site 34a) is located in the north-central portion of the Detachment Fallbrook. The site is L-shaped, extending north and east along two intermittent stream beds. The Dunnage Disposal Site #1 is a potential munitions burial site. The site was in

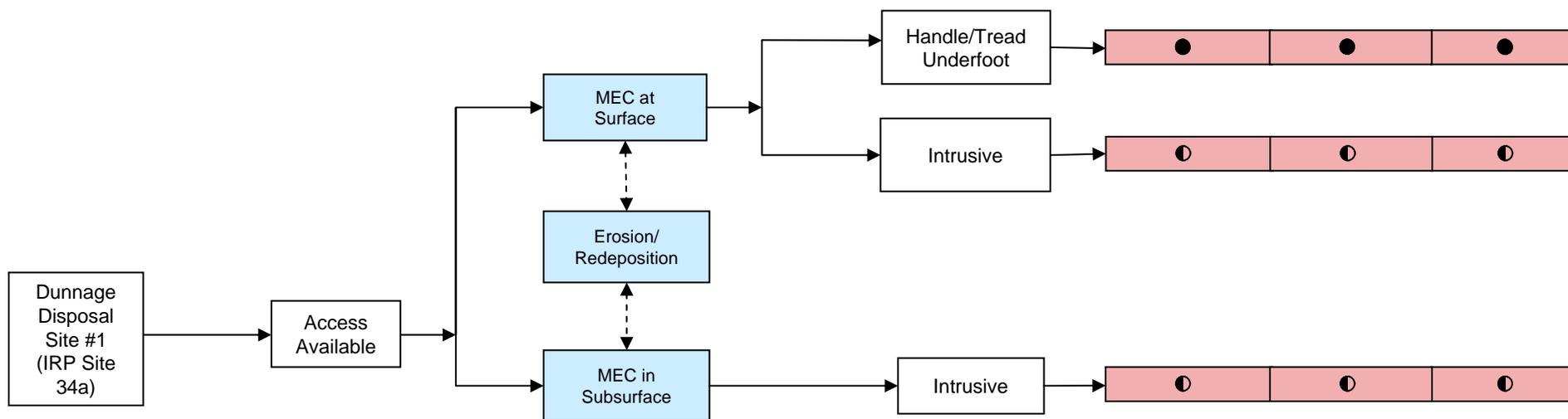
use from 1942 to 1978 as a disposal area for dunnage. According to personnel interviews and historical documents, the site was used as a disposal area for ordnance. A limited visual survey of the area revealed various inert rocket motors, practice 2000-pound bombs, a HE 20-mm projectile, several igniters, and other munition scrap at the site. The site is known to contain MEC and suspected to contain MC. The site is not currently in use.

5.4.13. Recommendations

Based on the data collected and presented in this PA, an extended SI (including a geophysical survey) is recommended for MEC at the Dunnage Disposal Site #1. The SI activities should focus on determining if any additional MEC is present at the site. An SI is also recommended for MC at the disposal site. During the SI, it is recommended that surface and subsurface soil samples be collected from the site and analyzed for ordnance residuals and metals. It is also recommended that a groundwater monitoring well be installed to verify that the groundwater under the site has not been affected. If intrusive activities are planned for the site, the potential receptors should be made aware that the site was a munitions burial site.

Source Area	Access	MEC Location/ Release Mechanisms	Activity	Receptors		
-------------	--------	----------------------------------	----------	-----------	--	--

Navy Personnel	Contractor/ Visitor	Biota
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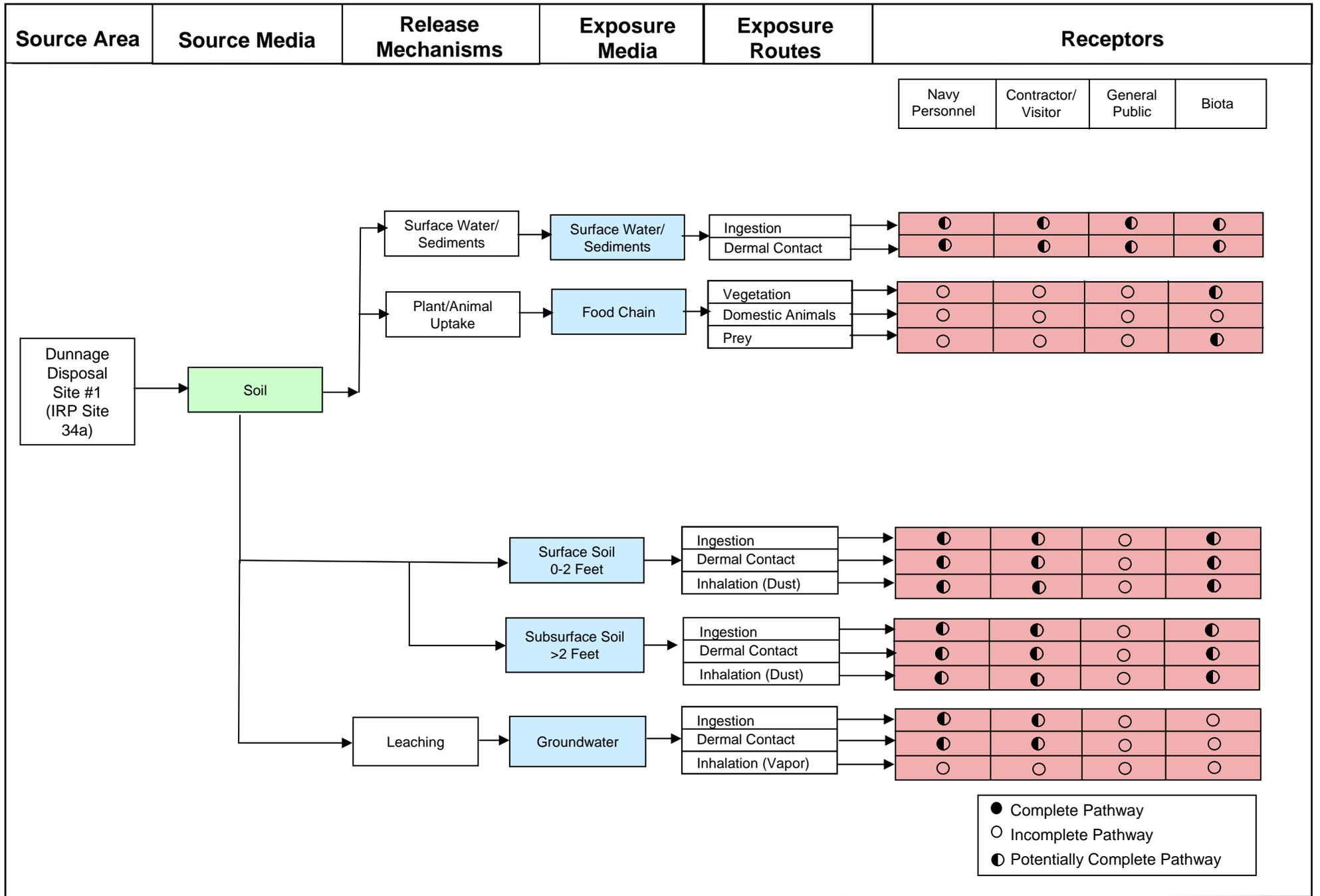
<ul style="list-style-type: none"> ● Complete Pathway ○ Incomplete Pathway ◐ Potentially Complete Pathway
--



Prepared for: 

PRELIMINARY ASSESSMENT – FINAL PA REPORT
 DUNNAGE DISPOSAL SITE #1 – MEC EXPOSURE PATHWAY ANALYSIS
 NAVWPNSTA SEAL BEACH DETACHMENT FALLBROOK, CALIFORNIA

MALCOLM PIRNIE, INC.
 FIGURE 5.4-3 FINAL
 June 2006



● Complete Pathway
 ○ Incomplete Pathway
 ◐ Potentially Complete Pathway



Prepared for: 

PRELIMINARY ASSESSMENT – FINAL PA REPORT
 DUNNAGE DISPOSAL SITE #1– MC EXPOSURE PATHWAY ANALYSIS
 NAVWPNSTA SEAL BEACH DETACHMENT FALLBROOK, CALIFORNIA

MALCOLM PIRNIE, INC.
 FIGURE 5.4-4 FINAL
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Detachment Fallbrook, California

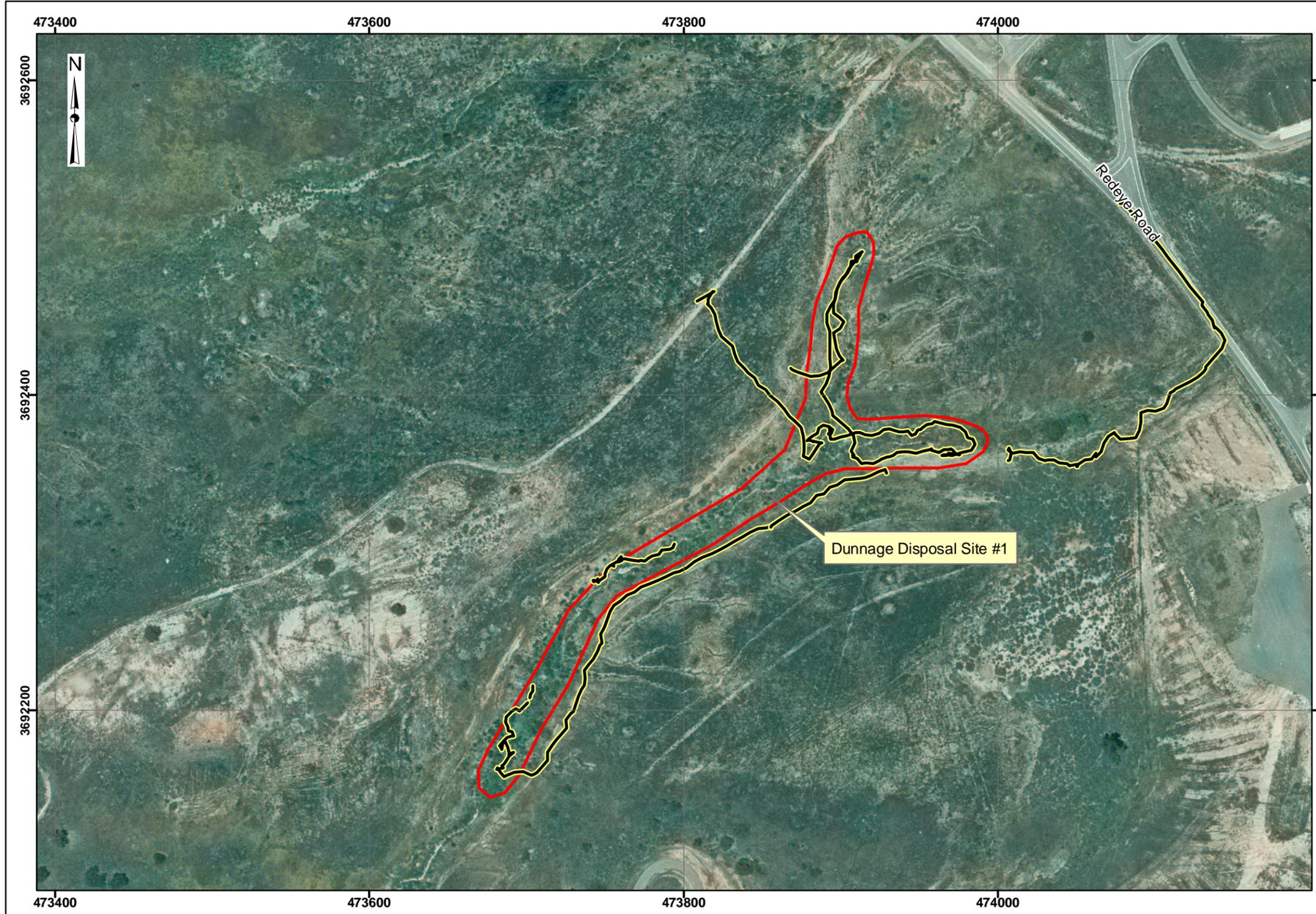


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Map 5.4-1
Visual Survey
Dunnage Disposal Site #1 (IRP Site 34a)

Legend

-  Dunnage Disposal Site #1
-  Site Reconnaissance Path



Data Source: Anteon Corporation,
Orthophoto, June 3, 2004

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

Contract: N62472-02-D-1300
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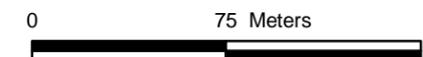


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**Map 5.4-2
Site Details
Dunnage Disposal Site #1 (IRP Site 34a)**

Legend

-  Dunnage Disposal Site #1
-  Streams
-  Topographic Contours (ft above MSL)
-  55 Gallon Drum

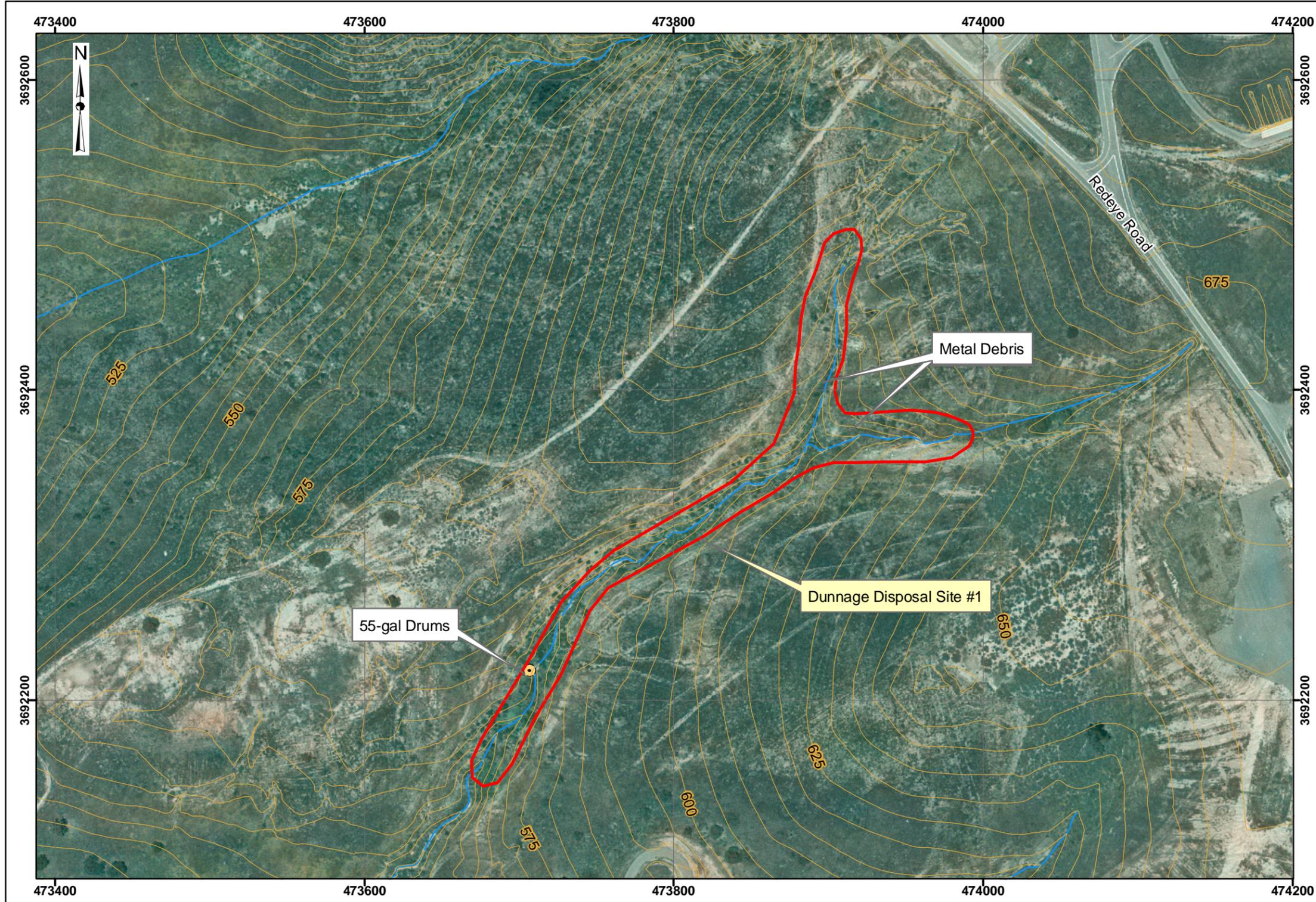


Data Source: Anteon Corporation,
Orthophoto, June 3, 2004
NAWPNSTA Seal Beach GIS Data,
Vector Contour Data

Coordinate System: UTM Zone 11N
Datum: NAD 83
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NAWPNSTA Seal Beach
Detachment Fallbrook, California
Dunnage Disposal Site #1



**Preliminary Assessment
NAVWPNSTA Seal Beach
Detachment Fallbrook, California**



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**Map 5.4-3
Munitions Characterization
Dunnage Disposal Site #1 (IRP Site 34a)**

Legend

- Dunnage Disposal Site #1
- + MEC Sighting
- Evidence of Munitions Use

MEC Presence*

- Known
- Suspect

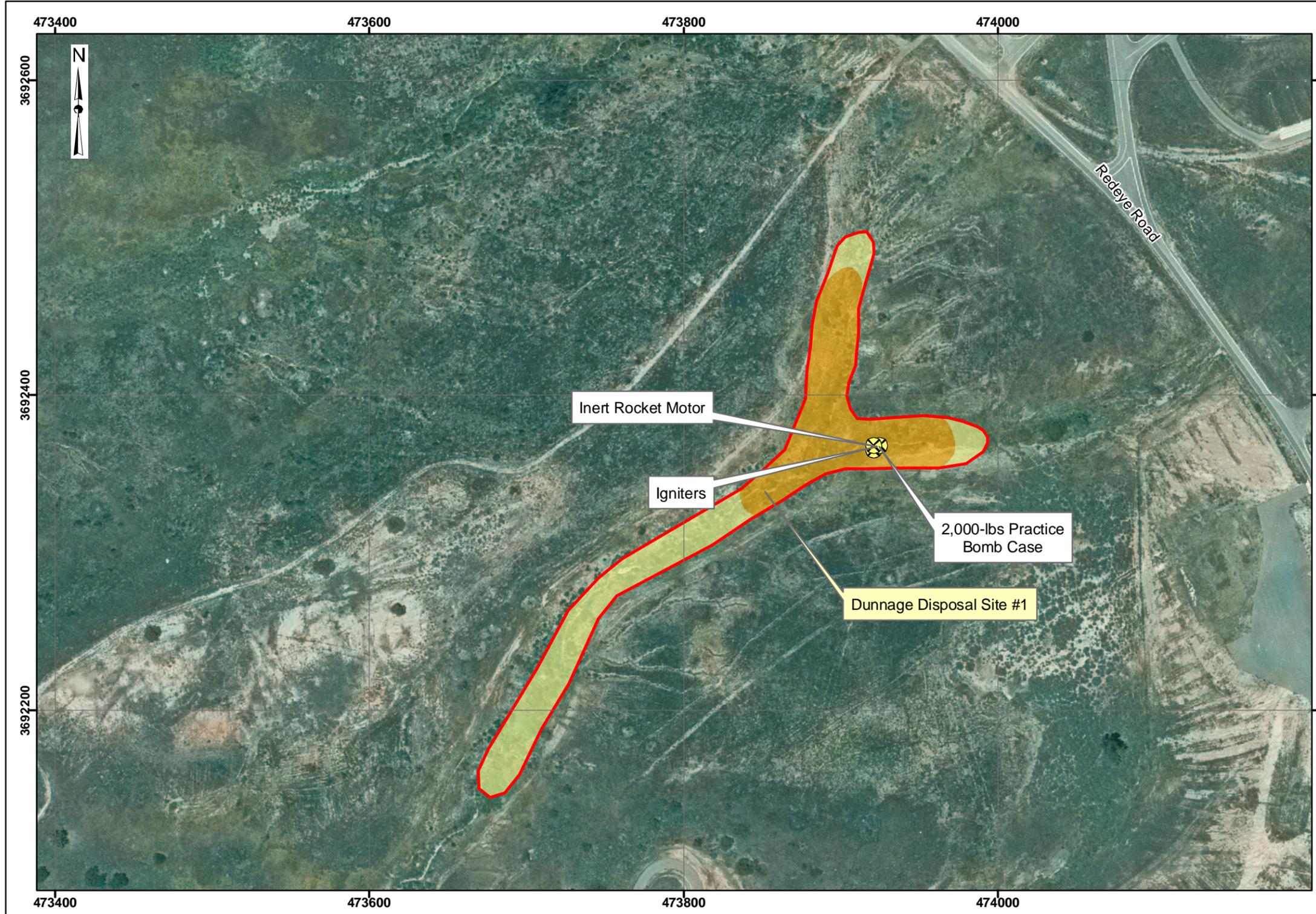
* MEC presence was determined through review of historical documentation, interviews, and visual survey.



Data Source: Anteon Corporation,
Ortho Photo, June 3, 2004

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

Contract: N62472-02-D-1300
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5.5. Dunnage Disposal Site #2

The Dunnage Disposal Site #2 covers approximately 9 acres in the north central portion of the installation and is west of Walleye Road. Map 2.1-1 shows the location of the site on Detachment Fallbrook and its boundaries.

5.5.1. History and Site Description

The Dunnage Disposal Site #2 (IRP Site 34b) was in use from 1942 to 1978 as a disposal area for dunnage. The site is not currently in use. The Dunnage Disposal Site #2 was initially considered a possible munitions burial site because of evidence of MEC and munitions scrap that was found at two similar sites: Dunnage Disposal Site #1 and Dunnage Disposal Site #3. Investigation of the site and installation records, and many follow-up interviews, indicate that the Dunnage Disposal Site #2 was not a munitions burial site. Figure 5.5-1 shows a view of the Dunnage Disposal Site #2 looking north. No IRP investigations have been undertaken.



Figure 5.5-1: View of the Dunnage Disposal Site #2 looking north. Photograph was taken during the September 2004 on-site visual survey.

5.5.1.1. Topography

Dunnage Disposal Site #2 contains low hills. For further information on the topography of Detachment Fallbrook, see [Section 3.2](#).

5.5.1.2. Geology

The region is underlain by plutonic and metasedimentary rocks of the Peninsular Ranges physiomorphic province, but site-specific information for the Dunnage Disposal Site #2 was not available. [Section 3.3](#) includes a general description of the geology of Detachment Fallbrook.

5.5.1.3. Soil and Vegetation Types

Soils in the Dunnage Disposal Site #2 are classified as a sandy loam of granitic origin and are moderately well drained. [Section 3.4](#) includes a general description of the soil types at Detachment Fallbrook.

The vegetation in the area of the Dunnage Disposal Site #2 is considered to be mostly coastal sage scrub. Common species in coastal sage scrub habitat include coastal sagebrush (*Artemisia californica*), flat-topped buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), sage (*Salvia* spp.), goldenbush (*Isocoma menziesii*), and native grasses (*Nassella* spp.). [Section 3.5](#) includes a general description of the vegetation types at Detachment Fallbrook.

5.5.1.4. Hydrology

The Dunnage Disposal Site #2 is located within the Santa Margarita watershed. There are no surface water bodies in the Dunnage Disposal Site #2. The Dunnage Disposal Site #2 drains primarily into Depot Lake, which is dammed, and into Fallbrook Creek. [Section 3.6](#) includes a general description of the hydrology at Detachment Fallbrook.

5.5.1.5. Hydrogeology

No site-specific groundwater depth data were available. [Section 3.7](#) includes a general description of the hydrogeology at Detachment Fallbrook.

5.5.1.6. Cultural and Natural Resources

The data collection team for the Dunnage Disposal Site #2 found no documentation of significant cultural resources at or near the site. Detachment Fallbrook has large areas of undisturbed land that can serve as suitable habitat to threatened and endangered species. [Section 3.8](#) includes a general description of the cultural and natural resources at Detachment Fallbrook.

5.5.1.7. Endangered and Special Status Species

Threatened and endangered species data for Detachment Fallbrook are presented in [Section 3.9](#). According to the California Wildlife and Habitat Analysis Branch, threatened and endangered species associated with the critical habitats of the former range that are known or have been documented within or adjacent to the Detachment Fallbrook are the coastal California gnatcatcher, Least Bell's vireo, and the Stephens' kangaroo rat.

5.5.2. Visual Survey Observations and Results

The data collection team conducted a visual survey of the Dunnage Disposal Site #2 on September 28, 2004. Present during the visual survey were Mr. Chip Poalinelli, Mr. Al Larkins, and Mr. Scott Lehman. The following Navy representatives were present during the visual survey: Ms. Pei-Fen Tamashiro, Mr. Robbie Knight, and Mr. Si Le. The field team conducted the visual survey by walking 2/3 of the perimeter of the site. No evidence of MEC or munitions scrap was identified during the visual survey. There was a large quantity of non-munitions related trash at the site. Figure 5.5-2 shows a view of the non-munitions related trash at the site.



Figure 5.5-2: View of non-munitions related trash (tin cans and bottles) at Dunnage Disposal Site #2. Photograph was taken during the September 2004 on-site visual survey.

5.5.3. Munitions and Munitions Related Materials Associated with the Site

The Dunnage Disposal Site #2 is not suspected to contain MEC. The Dunnage Disposal Site #2 was initially considered a possible munitions burial site because of evidence of MEC and munitions scrap that was found at two similar sites: Dunnage Disposal Site #1 and Dunnage Disposal Site #3. Investigation of the site and the installation records, and many follow-up interviews, indicate that Dunnage Disposal Site #2 was not a munitions burial site.

5.5.4. MEC Presence

The entire site has been subdivided and categorized into one of three levels of MEC presence including: Known MEC Areas, Suspected MEC Areas, and Areas Not Suspected to Contain MEC to indicate that MEC is known or is suspected to be at the site. Map 5.5-3 illustrates the munitions characterization of the Dunnage Disposal Site #2, and is provided at the end of Section 5.5. The MEC presence is discussed below.

5.5.4.1. Known MEC Areas

There are no Known MEC Areas associated with the Dunnage Disposal Site #2 since no MEC was found onsite.

5.5.4.2. Suspected MEC Areas

There are no Suspected MEC Areas associated with the Dunnage Disposal Site #2. Since no MEC was found onsite and no MEC was disposed of at the site, it is not suspected that any MEC Areas exist at the Dunnage Disposal Site #2.

5.5.4.3. Areas Not Suspected to Contain MEC

Based upon observations made and data collected during the PA process, the Dunnage Disposal Site #2 is Not Suspected to Contain MEC.

5.5.5. Ordnance Penetration Estimates

MEC are not expected to be present at the site; therefore, penetration depths are not of concern.

5.5.6. Munitions Constituents

The Dunnage Disposal Site #2 is not suspected to contain MC.

5.5.7. Contaminant Migration Routes

MEC and MC are not expected to be present at the site; migration and release mechanisms are not of concern.

5.5.8. Receptors and Pathways

MEC and MC are not expected to be present at the site; potential receptors and pathways are not of concern.

5.5.8.1. Nearby Populations

Fallbrook and San Diego County have populations of 29,100, and 2,813,833, respectively (U.S. Census Bureau, 2000). 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. The Dunnage Disposal Site #2 is approximately 9,840 feet from the housing complex at the installation. See [Section 2.1](#) for more information on the housing complex.

5.5.8.2. Buildings Near/Within Site

There are no buildings located on the site. Building 701 is located approximately 300 feet from the northern border of the site. Building 679 is located approximately 1,380 feet from the eastern border of the site. Both buildings are currently unused.

5.5.8.3. Utilities On/Near Site

No utilities were visible at the Dunnage Disposal Site #2. Within 0.2 miles to the east are phone lines and U.S. government phone lines.

5.5.9. Land Use

The Dunnage Disposal Site #2 is closed and is no longer used.

5.5.10. Access Controls / Restrictions

The Dunnage Disposal Site #2 is located on Detachment Fallbrook, which is a fenced and guarded installation. Security Forces are responsible for maintaining law and order and for implementing access control policies and procedures. The Dunnage Disposal Site #2 is also located within a restricted area guarded by the security force.

5.5.11. Conceptual Site Model

This CSM was developed following guidance documents issued by the USEPA for hazardous waste sites and the USACE for OE sites. Guidance documents included the USEPA’s Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/004) and the Final USACE CSM Guidance Development of Integrated Conceptual Site Models for Environmental OE Sites (USACE, 2003).

The CSM describes the site and its environmental setting. The CSM presents information regarding: 1) MEC and/or MC known or suspected to be at the site; 2) current and future reasonably anticipated or proposed uses of the real property; and 3) actual, potentially complete, or incomplete exposure pathways that link MEC and/or MC to receptors.

The CSM is presented in a series of information profiles that provide information about the site. The information profiles are included in Table 5.5-1 below.

Table 5.5-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #2		
Profile Type	Information Needs	Preliminary Assessment Findings
Site Profile	Installation Name	Detachment Fallbrook
	Installation Location	Detachment Fallbrook is located 53 miles north of San Diego in northern San Diego County, CA.
	Site Name	Dunnage Disposal Site #2 (IRP Site 34b)
	Site Location	The Dunnage Disposal Site #2 is in the north central portion of the installation, west of Walleye Road.
	Site History	The Dunnage Disposal Site #2 is a burial area for dunnage, used from 1942 until 1978. The Dunnage Disposal Site #2 was initially considered a possible munitions burial site because of evidence of MEC and munitions scrap that was found at two similar sites: Dunnage Disposal Site #1 and Dunnage Disposal Site #3. Investigation of the site and the installation records, and many follow-up interviews, indicate that Dunnage Disposal Site #2 was not a munitions burial site.
	Site Area and Layout	The Dunnage Disposal Site #2 is approximately 9 acres in size.
	Site Structures	There are no structures on the Dunnage Disposal Site #2.

Table 5.5-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #2		
Profile Type	Information Needs	Preliminary Assessment Findings
	Site Boundaries	<p>Map 2.1-1 shows the location of the Dunnage Disposal Site #2.</p> <p>N: The intersection of Walleye Road and Crossover Road is located approximately 900 feet north of the site.</p> <p>S: Mixed grassland covers the area between the site and Sidewinder Road, which is approximately 1,700 feet south of the site.</p> <p>W: Mixed grassland covers the area between the site and Depot Lake, approximately 1,650 feet west of the site.</p> <p>E: Coastal sage scrub stands between the site and Walleye Road, approximately 300 feet east of the site.</p>
	Site Security	The Dunnage Disposal Site #2 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. The Dunnage Disposal Site #2 is also located within a restricted area guarded by the security force.
Munitions/ Release Profile	Munitions Types	The Dunnage Disposal Site #2 is not a suspected MEC area.
	Maximum Probability Penetration Depth	MEC are not expected to be present at the Dunnage Disposal Site #2; therefore, penetration depths are not of concern.
	MEC Density	The Dunnage Disposal Site #2 is not suspected to contain MEC.
	MEC Scrap/Fragments	No evidence of MEC or munitions scrap was identified during the visual survey.
	Associated Munitions Constituents	The Dunnage Disposal Site #2 is not suspected to contain MC.
	Migration Routes/Release Mechanisms	MEC and MC are not expected to be present at the site; therefore, migration and release mechanisms are not of concern.

Table 5.5-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #2		
Profile Type	Information Needs	Preliminary Assessment Findings
Physical Profile	Climate	The climate at Detachment 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 being the wettest month and July the driest. Summers at the installation are punctuated by the Santa Ana (offshore) winds.
	Topography	The Dunnage Disposal Site #2 contains low hills.
	Geology	The region is underlain by plutonic and metasedimentary rocks of the Peninsular Ranges physiomorphic province, but site-specific information was not available.
	Soil	The soil at the Dunnage Disposal Site #2 is classified as a sandy loam of granitic origin and is moderately well drained.
	Hydrogeology	No site-specific groundwater depth data were available.
	Hydrology	The Disposal Site #2 is within the Santa Margarita watershed. There are no surface water bodies in the Dunnage Disposal Site #2. The Dunnage Disposal Site #2 drains primarily into Depot Lake, which is dammed, and into Fallbrook Creek.
	Vegetation	The vegetation in the area of the Dunnage Disposal Site #2 is considered to be mostly coastal sage scrub. Common species in coastal sage scrub habitat include coastal sagebrush, flat-topped buckwheat, laurel sumac, sage, goldenbush, and native grasses.
Land Use and Exposure Profile	Current Land Use	The Dunnage Disposal Site #2 is closed and is no longer in use.
	Current Human Receptors	MEC and MC are not expected to be present at the site; potential receptors are not of concern.
	Current Activities (frequency, nature of activity)	Activities at the site may include environmental and ecological surveys.
	Potential Future Land Use	The Dunnage Disposal Site #2 was closed in 1978. There is no land use change planned.
	Potential Future Human Receptors	MEC and MC are not expected to be present at the site; potential receptors are not of concern.

Table 5.5-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #2		
Profile Type	Information Needs	Preliminary Assessment Findings
	Potential Future Land Use-Related Activities:	Any potential future land use activities would have to follow any Navy ESQD Arc waivers or exemptions. 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, the site has ESQD Arc restrictions. The site is also listed as habitat for the coastal California gnatcatcher, which is a federally protected species.
	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: <ul style="list-style-type: none"> • Town of Fallbrook: Population (U.S. Census, 2000): 29,100 • San Diego County: Population (U.S. Census, 2000): 2,813,833
	Beneficial Resources	The coastal sage scrub and mixed grasslands habitats offer roosting and foraging resources for raptors.
Ecological Profile	Habitat Type	The Dunnage Disposal Site #2 contains coastal sage scrub habitat. The disposal area is within a zone designated as habitat for the federally endangered coastal California gnatcatcher.
	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 included 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 Species:	Least Bell’s vireo and Stephens’ kangaroo rat
	Federal Threatened Species:	Coastal California gnatcatcher

Table 5.5-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #2		
Profile Type	Information Needs	Preliminary Assessment Findings
	State Endangered Species:	Least Bell’s vireo
	State Threatened Species:	Stephens’ kangaroo rat
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	MEC and MC are not expected to be present at the site; therefore, relationship between sources and receptors are not of concern.

MEC and MC exposure pathway analyses were not performed for the Dunnage Disposal Site #2 because MEC and MC are not anticipated at the site. No evidence was found to suggest that the site was ever used as a munitions burial site. No visual evidence of MEC was observed during the visual survey.

5.5.12. Summary

The Dunnage Disposal Site #2 (IRP Site 34b) covers approximately 9 acres in the north central portion of the installation and is west of Walleye Road. The Dunnage Disposal Site #2 was in use from 1942 to 1978 as a disposal area for dunnage. The site is not currently in use. No evidence of MEC or MC was found at the Dunnage Disposal Site #2. The Dunnage Disposal Site #2 was initially considered a possible munitions burial site because of the evidence of MEC and munitions scrap that was found at two similar sites: Dunnage Disposal Site #1 and Dunnage Disposal Site #3. Investigation of the site and the installation records, and many follow-up interviews, indicate that the Dunnage Disposal Site #2 was not a munitions burial site.

5.5.13. Recommendations

Based on the data collected and presented in this PA, NFA for MEC and MC is recommended at the Dunnage Disposal Site #2. Any further investigations at the site will be undertaken under the IRP.

Preliminary Assessment
NAVWPNSTA Seal Beach
Detachment Fallbrook, California



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Map 5.5-1
Visual Survey
Dunnage Disposal Site #2 (IRP Site 34b)

Legend

- Dunnage Disposal Site #2*
- Site Reconnaissance Path

* Approximate boundary of the site.

0 75 Meters



Data Source: Anteon Corporation,
Orthophoto, June 3, 2004

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

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Date: June 2006



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**Map 5.5-2
Site Details
Dunnage Disposal Site #2 (IRP Site 34b)**

Legend

-  Dunnage Disposal Site #2*
-  Streams
-  Topographic Contours (ft above MSL)
-  Buildings

* Approximate boundary of the Site.

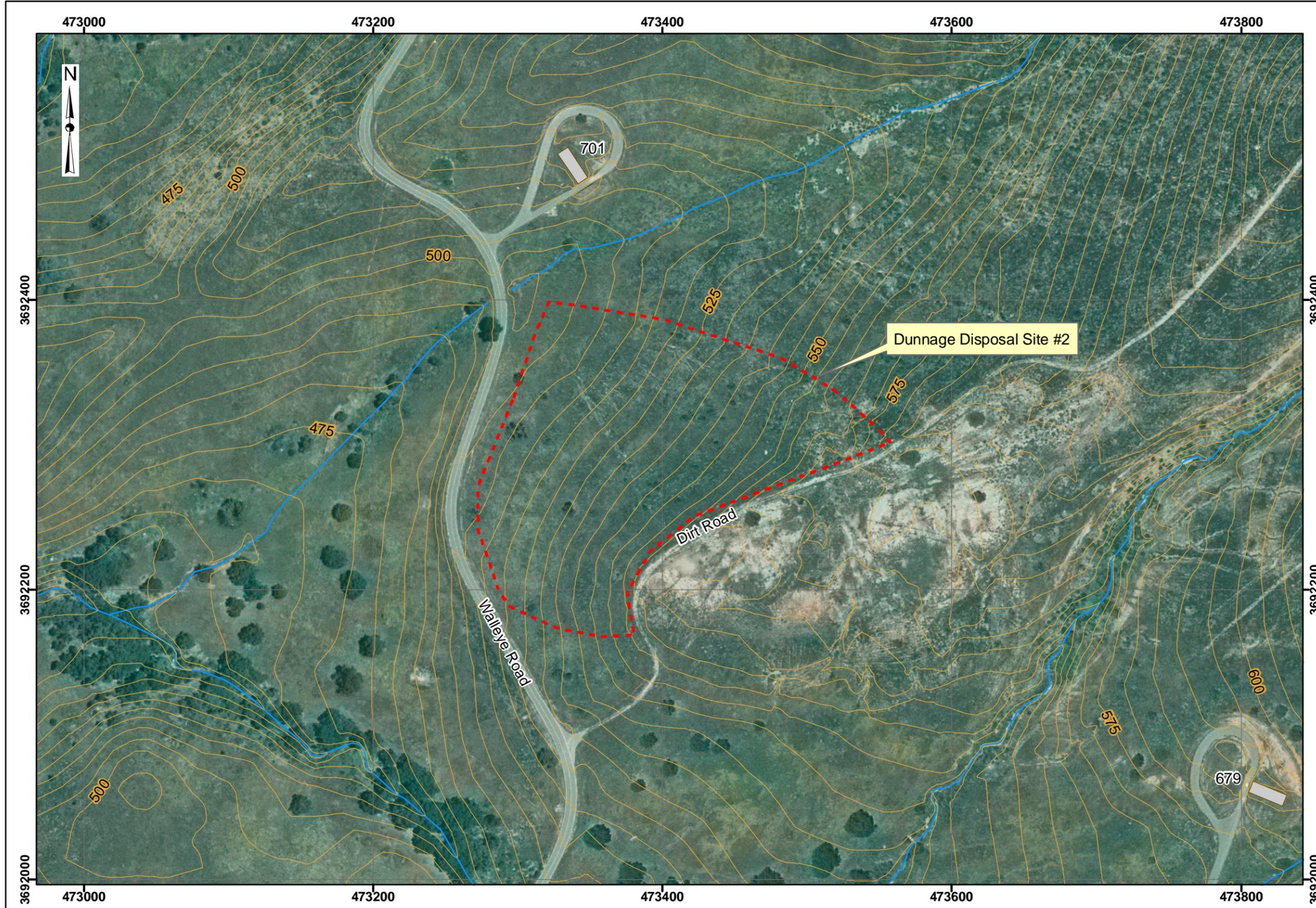


Data Source: Anteon Corporation,
Orthophoto, June 3, 2004
NAWPNSTA Seal Beach GIS Data,
Vector Contour Data

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

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NAWPNSTA Seal Beach
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Dunnage Disposal Site #2



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**Map 5.5-3
Munitions Characterization
Dunnage Disposal Site #2 (IRP Site 34b)**

Legend

 Dunnage Disposal Site #2*

MEC Presence**

-  Known
-  Suspect

* Approximate boundary of the site.

** There is no evidence of MEC presence as determined through historical documentation, interview, and visual survey.



Data Source: Anteon Corporation,
Orthophoto, June 3, 2004

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

Contract: N62472-02-D-1300
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5.6. Dunnage Disposal Site #3

The Dunnage Disposal Site #3 covers approximately 1.5 acres south of Terriea Road in the central portion of Detachment Fallbrook. Map 2.1-1 shows the location of the site on Detachment Fallbrook and its boundaries.

5.6.1. History and Site Description

The Dunnage Disposal Site #3 (IRP Site 34c) is a potential munitions burial site. The area was used from 1942 to 1978 as a disposal area for dunnage. According to personnel interviews, the site was used as a disposal area for ordnance. A 1978 memorandum from Tom Curtis, a former Commanding Officer at Detachment Fallbrook, states that numerous cases of inert-rifle-propelled grenades were buried in the area. The area is not currently in use. There is no evidence of recent excavations or other intrusions that could have redistributed MEC and MC. Figure 5.6-1 shows a view of the site looking east. The Dunnage Disposal Site #3 was originally identified under the IRP as Site 34c, but is now being addressed under the MRP. No IRP investigations were undertaken.



Figure 5.6-1: View of the Dunnage Disposal Site #3 looking east. Photograph was taken during the September 2004 visual survey.

5.6.1.1. Topography

The Dunnage Disposal Site #3 is a ravine that leads to an intermittent stream. For further information on the topography of Detachment Fallbrook, see [Section 3.2](#).

5.6.1.2. Geology

The region is underlain by plutonic and metasedimentary rocks of the Peninsular Ranges physiomorphic province, but site-specific information for the Dunnage Disposal Site #3 was not available. [Section 3.3](#) includes a general description of the geology of Detachment Fallbrook.

5.6.1.3. Soil and Vegetation Types

Soils at the Dunnage Disposal Site #3 are classified as a coarse sandy loam of granitic origin and are moderately well drained. [Section 3.4](#) includes a general description of the soil types at Detachment Fallbrook.

The vegetation in the area of the Dunnage Disposal Site #3 is considered to be mostly mixed grassland. Common species in mixed grassland habitat include native, perennial bunch grasses such as *Nassella* spp. mixed with nonnative annuals. [Section 3.5](#) includes a general description of the vegetation types at Detachment Fallbrook.

5.6.1.4. Hydrology

The Dunnage Disposal Site #3 is within the Santa Margarita watershed. There are no surface water bodies in the Dunnage Disposal Site #3. The site drains primarily into Fallbrook Creek. [Section 3.6](#) includes a general description of the hydrology at Detachment Fallbrook.

5.6.1.5. Hydrogeology

No site-specific groundwater depth data were available. [Section 3.7](#) includes a general description of the hydrogeology at Detachment Fallbrook.

5.6.1.6. Cultural and Natural Resources

The data collection team for the Dunnage Disposal Site #3 found documentation of two significant cultural resources near the site. The cultural resources are both milling sites. To preserve the integrity of the cultural resources, more specific information is not included in this document. Detachment Fallbrook has large areas of undisturbed land that can serve as suitable

habitat to threatened and endangered species. [Section 3.8](#) includes a general description of the cultural and natural resources at Detachment Fallbrook.

5.6.1.7. Endangered and Special Status Species

Threatened and endangered species data for Detachment Fallbrook are presented in [Section 3.9](#). According to the California Wildlife and Habitat Analysis Branch, threatened and endangered species associated with the critical habitats of the site that is known or have been documented within or adjacent to the Detachment Fallbrook is the Stephens' kangaroo rat.

5.6.2. Visual Survey Observations and Results

The data collection team conducted a visual survey of the Dunnage Disposal Site #3 on September 28, 2004 and on March 8, 2005. During the visual surveys, the following Malcolm Pirnie team members were present: Mr. Chip Poalinelli, Mr. Al Larkins (September 2004), Mr. Dan Hains (March 2005), and Mr. Scott Lehman. The following Navy representatives were present during the September 2004 visual survey: Ms. Pei-Fen Tamashiro, Mr. Robbie Knight, and Mr. Si Le. The field team conducted the visual survey by walking the perimeter of the entire disposal site, then walking several transects of it. Inert rifle grenades, a 60-mm mortar, and other munitions scrap were observed on the ground surface and in the wash area during Malcolm Pirnie's site visits. There was also a large quantity of non-munitions related trash at the site. Figure 5.6-2 shows a view of rifle grenades discovered on the site during the September 2004 visual survey. A visual depiction of the site reconnaissance is provided on Map 5.6-1, at the end of Section 5.6. Additional site details are illustrated on Map 5.6-2, also at the end of Section 5.6.



Figure 5.6-2: View of rifle grenades discovered at Dunnage Disposal Site #3. Photograph was taken during the September 2004 visual survey.

5.6.3. Munitions and Munitions Related Materials Associated with the Site

This section describes the munitions or munitions related materials, including the types and estimated maximum penetration depths, known or suspected to be at the Dunnage Disposal Site #3. This includes both MEC and non-hazardous munitions related scrap (e.g., fragments, base plates, and inert mortar fins).

Inert rifle grenades and other munitions scrap were observed on the ground surface and in the wash area during Malcolm Pirnie's site visits. All interviews and documentation relating to the site indicated that only inert ordnance was buried there. One 60-mm mortar was observed on the surface of the site. There is a small possibility that other live ordnance was buried there, but this cannot be verified until an EOD technician checks each item buried at the site. The available technical data sheets on these items are included in [Appendix D](#).

Based on the information obtained during the data collection process, Dunnage Disposal Site #3 is not suspected to contain CWM filled munitions, electrically fuzed munitions, or DU associated munitions.

5.6.4. MEC Presence

The entire site has been subdivided and categorized into one of three levels of MEC presence including: Known MEC Areas, Suspected MEC Areas, and Areas Not Suspected to Contain MEC

to indicate that MEC is known or is suspected to be at the site. Map 5.6-3 illustrates the munitions characterization of the Dunnage Disposal Site #3, and is provided at the end of Section 5.6. The MEC presence is discussed below.

5.6.4.1. Known MEC Areas

There is a small Known MEC Area associated with the Dunnage Disposal Site #3 where the 60-mm mortar was observed on the surface of the site.

5.6.4.2. Suspected MEC Areas

The Dunnage Disposal Site #3 is a Suspected MEC Area, pending inspection of each ordnance item by an EOD technician to verify that it is inert.

5.6.4.3. Areas Not Suspected to Contain MEC

Based upon observations made and data collected during the PA process, the Dunnage Disposal Site #3 could have Areas Not Suspected to Contain MEC.

5.6.5. Ordnance Penetration Estimates

Munitions at the Dunnage Disposal Site #3 would be below the ground surface due to burial not penetration. The depth below ground surface would be dependent on the disposal site's construction.

5.6.6. Munitions Constituents

The MCs related to 60-mm mortars are black powder pellets, TNT, smoke mix, zinc oxide smoke, hexachloroethane smoke, aluminum powder, and RDX. There are no MCs related to inert rifle grenades. Based on discussions with installation personnel, surface soil sampling has not occurred.

5.6.7. Contaminant Migration Routes

For ordnance present at the Dunnage Disposal Site #3, migration of MEC and MC may occur through surface soil erosion, runoff, and by wind and dust generation. Future construction, excavation, and maintenance at the site are also potential release mechanisms for MEC and MC. MC in runoff could potentially end up in surface water or sediment. MC could also potentially leach through soils or surface waters to groundwater.

5.6.8. Receptors and Pathways

Potential human receptors at the Dunnage Disposal Site #3 include Navy personnel, visitors, and private contractors. Ecological receptors may come into direct contact with MC in soil while foraging or burrowing. Ecological receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). There is a potentially complete secondary pathway for the general public, who could come into contact with any MC that flow out of the installation through the surface water system.

5.6.8.1. Nearby Populations

Fallbrook and San Diego County have populations of 29,100, and 2,813,833, respectively (U.S. Census Bureau, 2000). 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. The Dunnage Disposal Site #3 is approximately 10,830 feet from the housing complex at the installation. See [Section 2.1](#) for more information on the housing complex.

5.6.8.2. Buildings Near/Within Site

There are no buildings on or within a half-mile radius of the site.

5.6.8.3. Utilities On/Near Site

The only utilities on or near the site are U.S. government phone lines along the southern extent of the Dunnage Disposal Site #3.

5.6.9. Land Use

The Dunnage Disposal Site #3 is closed and is no longer used.

5.6.10. Access Controls / Restrictions

The Dunnage Disposal Site #3 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. The Dunnage Disposal Site #3 is also located within a restricted area guarded by the security force.

5.6.11. Conceptual Site Model

This CSM was developed following guidance documents issued by the USEPA for hazardous waste sites and the USACE for OE sites. Guidance documents included the USEPA’s Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (EPA/540/G-89/004) and the Final USACE CSM Guidance Development of Integrated Conceptual Site Models for Environmental Ordnance and Explosives (OE) Sites (USACE, 2003).

The CSM describes the site and its environmental setting. The CSM presents information regarding: 1) MEC and/or MC known or suspected to be at the site; 2) current and future reasonably anticipated or proposed uses of the real property; and 3) actual, potentially complete, or incomplete exposure pathways that link MEC and/or MC to receptors.

The CSM is presented in a series of information profiles that provide information about the site. The information profiles are included in Table 5.6-1 below.

Table 5.6-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #3		
Profile Type	Information Needs	Preliminary Assessment Findings
Site Profile	Installation Name	Detachment Fallbrook
	Installation Location	Detachment Fallbrook is located 53 miles north of San Diego in northern San Diego County, CA.
	Site Name	Dunnage Disposal Site #3 (IRP Site 34c)
	Site Location	The Dunnage Disposal Site #3 is in the central portion of the installation, just south of Terria Road.
	Site History	The Dunnage Disposal Site #3 is a burial area for dunnage and possibly for munitions, according to employee interviews. The site was used from 1942 until 1978. A 1978 memorandum from Tom Curtis, a former Commanding Officer at Detachment Fallbrook, states that numerous cases of inert-rifle-propelled grenades were buried in the area.
	Site Area and Layout	The Dunnage Disposal Site #3 occupies approximately 1.5 acres in a ravine between Terria and Sidewinder Roads, which were constructed in 1945.
	Site Structures	There are no structures on the Dunnage Disposal Site #3.

Table 5.6-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #3		
Profile Type	Information Needs	Preliminary Assessment Findings
	Site Boundaries	<p>Map 2.1-1 shows the location of the Dunnage Disposal Site #3.</p> <p>N: Terriea Road bounds the site to the north with magazine storage buildings beyond.</p> <p>S: Sidewinder Road bounds the site to the south with grassland beyond.</p> <p>W: Grassland bounds the site to the west.</p> <p>E. The intersection of Terriea and Sidewinder Roads borders the site to the east.</p>
	Site Security	<p>The Dunnage Disposal Site #3 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. The Dunnage Disposal Site #3 is also located within a restricted area guarded by the security force.</p>
Munitions/ Release Profile	Munitions Types	<p>The following munitions were observed during Malcolm Pirnie’s site visit: inert rifle grenades, a 60-mm mortar, and other munitions scrap. All interviews and documentation relating to the site indicated that only inert ordnance was buried at the site. There is a possibility that other live ordnance are buried at the site.</p>
	Maximum Probability Penetration Depth	<p>Munitions at the Dunnage Disposal Site #3 would be below surface because of burial and not penetration. The depth of MEC would depend on the construction of the disposal site.</p>
	MEC Density	<p>The Dunnage Disposal Site #3 has a small Known MEC Area and the rest of the site is a Suspected MEC area. The site is suspected to have a low MEC density.</p>
	MEC Scrap/Fragments	<p>The following munitions scrap was observed during Malcolm Pirnie’s site visit: inert rifle grenades and other munitions scrap.</p>

Table 5.6-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #3		
Profile Type	Information Needs	Preliminary Assessment Findings
	Associated Munitions Constituents	<p>There are no MC concerns related to the inert rifle grenades. The primary MC for the live ordnance at the site and if any of the rifle grenades are live are:</p> <ul style="list-style-type: none"> ○ 60-mm mortars: RDX, black powder pellets, zinc oxide smoke, hexachloroethane smoke, aluminum powder, and TNT; and ○ Rifle grenades: TNT, RDX, zinc oxide smoke, hexachloroethane smoke, aluminum powder, white phosphorus, potassium chlorate, colored smoke, and PETN.
	Migration Routes/Release Mechanisms	<p>Migration of MEC and MC may occur through surface soil erosion, runoff, and by wind and dust generation. Future construction, excavation, and maintenance at the site are also potential release mechanisms. MC in runoff could potentially end up in surface water or sediment. MC could also potentially leach through soils or surface waters to groundwater.</p>
Physical Profile	Climate	<p>The climate at Detachment 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 being the wettest month and July the driest. Summers at the installation are punctuated by the Santa Ana (offshore) winds.</p>
	Topography	<p>The Dunnage Disposal Site #3 is a drainage area that leads to an intermittent stream.</p>
	Geology	<p>The region is underlain by plutonic and metasedimentary rocks of the Peninsular Ranges physiomorphic province, but site-specific information was not available.</p>
	Soil	<p>The soil at the Dunnage Disposal Site #3 is classified as a coarse sandy loam of granitic origin and is moderately well drained.</p>
	Hydrogeology	<p>No site-specific groundwater depth data were available.</p>

Table 5.6-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #3		
Profile Type	Information Needs	Preliminary Assessment Findings
	Hydrology	The Dunnage Disposal Site #3 is within the Santa Margarita watershed. There are no surface water bodies in the Dunnage Disposal Site #3. The central plateau of the installation, where the Dunnage Disposal Site #3 is located, drains primarily into Fallbrook Creek.
	Vegetation	The vegetation in the area of the Dunnage Disposal Site #3 is considered to be 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 Dunnage Disposal Site #3 is closed and is no longer in use.
	Current Human Receptors	Navy personnel and Navy-permitted visitors (including contractors). There is also a potentially complete exposure pathway for the general public coming into contact with MC migrating off the installation through the surface water system.
	Current Activities (frequency, nature of activity)	Activities at the site may include environmental and ecological surveys.
	Potential Future Land Use	The Dunnage Disposal Site #3 was closed in 1978. There is no change in land use planned.
	Potential Future Human Receptors	Navy personnel and Navy-permitted visitors (including contractors). There is also a potentially complete exposure pathway for the general public coming into contact with MC migrating off the installation through the surface water system.
	Potential Future Land Use-Related Activities:	Any potential future land use activities would have to follow any Navy ESQD Arc waivers or exemptions. 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 this site. The site is also listed as habitat for the Stephens’ kangaroo rat, which is a federally protected species.

Table 5.6-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #3		
Profile Type	Information Needs	Preliminary Assessment Findings
	Demographics/Zoning	<p>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:</p> <ul style="list-style-type: none"> • Town of Fallbrook: Population (U.S. Census, 2000): 29,100 • San Diego County: Population (U.S. Census, 2000): 2,813,833
	Beneficial Resources	Mixed grasslands habitats offer roosting and foraging resources for raptors.
Ecological Profile	Habitat Type	The Dunnage Disposal Site #3 contains mixed grasslands habitat. The area is also in a zone designated as habitat for the federally endangered Stephens' kangaroo rat.
	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 included 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 Species:	Stephens' kangaroo rat
	State Threatened Species:	Stephens' kangaroo rat

Table 5.6-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #3		
Profile Type	Information Needs	Preliminary Assessment Findings
	Relationship of MEC/MC 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 MEC and/or MC in surface and/or subsurface soil while foraging or burrowing. Ecological receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). There is also a potentially complete exposure pathway for the general public coming into contact with MC migrating off the installation through the surface water system.

A key element of the CSM is the exposure pathway analysis, which is performed separately for MEC and for MC.

For MEC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MEC are expected to be found); 2) access (e.g., controlled or uncontrolled access, items on the surface or within the subsurface); 3) an activity (e.g., non-intrusive grounds maintenance or intrusive construction); and 4) receptors (e.g., Navy personnel, construction workers, recreational users, authorized visitors, or ecological receptors). It is important to recognize that environmental mechanisms (e.g., erosion) and/or human intervention may result in the repositioning of MEC.

For MC, a complete or potentially complete exposure pathway must include the following components: 1) a source (e.g., locations where MC are expected to be found); 2) an exposure medium (e.g., surface soil); 3) an exposure route (e.g., dermal contact); and 4) receptors (e.g., Navy personnel, construction workers, recreational users, authorized visitors, or ecological receptors). If the point of exposure is not at the same location as the source, the pathway may also include a release mechanism (e.g., volatilization) and a transport medium (e.g., air).

The potential interactions between the source and receptors are assessed differently between MEC and MC. For MC, interaction between the source and receptors involves a release mechanism for the MC, an exposure medium that contains the MC, and an exposure route that places the receptor into contact with the contaminated medium. For MEC, interaction between

the potential receptors and an MEC source has two components. The receptor must have access to the source and must engage in some activity that results in contact with individual MEC items within the source area.

MEC Interactions and Pathway Analysis

The exposure pathway analysis for MEC is shown in Figure 5.6-3; Dunnage Disposal Site #3 is suspected to contain MEC. Historical and visual evidence indicate that there is a low incidence of MEC on the surface at the Dunnage Disposal Site #3. A 60-mm mortar and inert rifle grenades were observed on the surface and are likely to be present in the subsurface at the site. There is a small possibility that some of the ordnance is still live, which is why the majority of the site is labeled a suspected MEC area. The release mechanism of handling/treading underfoot activities creates a complete pathway for all human receptors and biota (wildlife) for MEC on the surface of the site. The release mechanism of intrusive activities (such as digging or drilling) could create a potentially complete pathway for Navy personnel and contractors and ecological receptors both for MEC on the surface and subsurface at the site.

MC Interactions and Pathway Analysis

The exposure pathway analysis for MC is shown in Figure 5.6-4. Potential receptors include both human (Navy personnel and contractor/visitor) and ecological receptors (biota) that may come in contact with MC in the source medium or other potentially contaminated media. Pathways are shown for each medium and are discussed below. For MC, interaction between the source (e.g., burial pits) and receptors generally involves a release mechanism for the MC (e.g., runoff to surface water and uptake into the food chain), an exposure medium containing the MC (e.g., soil, surface water, and sediment), and an exposure route (e.g., incidental ingestion and dermal contact) that places the receptor into contact with the contaminated medium.

Surface Water/Sediment

As discussed earlier, Dunnage Disposal Site #3 is a ravine and drains towards Fallbrook Creek, so MC are available to receptors in surface water or sediment. The pathway for surface water and/or sediment is considered potentially complete for all receptors. There is a potentially complete pathway for the general public for any MC that flows out of the installation through the surface water system.

Plant/Animal Uptake

Potentially complete pathways are indicated for biota (wildlife) exposed to MC at the Dunnage Disposal Site #3 via the food chain. MC may be taken up by plants and prey and consumed by animals at the disposal site.

Surface Soil

Potentially complete pathways exist for all receptors (except for the general public) via all exposure routes for surface soil contaminated with MC at the Dunnage Disposal Site #3. It is suspected that MC resides in the surface soil (i.e., 0 to 2 feet below ground surface). Inhalation exposures to humans or biota from inhalation of dust are anticipated, due to the low vegetative cover on the existing soils and the dry climate. Any future movement or grading of surface soils could make MC available for wind distribution and subsequent inhalation.

Subsurface Soil

Potentially complete subsurface soil pathways are expected to exist for all receptors (except for the general public) via all exposure routes at the Dunnage Disposal Site #3. The pathways are considered to be potentially complete for biota and for Navy personnel and contractors. Biota might come into contact with the contaminated soil by burrowing and/or ingesting. Navy personnel and contractors might engage in excavation or drilling activities, which could make it possible for receptors to come into contact with MC in subsurface soil.

Groundwater

Potentially complete pathways for Navy personnel and contractors/visitors are indicated for groundwater contaminated with MC at the Dunnage Disposal Site #1. Navy personnel and contractors/visitors may come into contact with groundwater during environmental investigations (i.e. monitoring well installation and sampling) at the former site. The potential for groundwater impacts is considered to be incomplete for all other receptors.

An exposure pathway does not exist for MC volatilizing into the air for all receptors.

5.6.12. Summary

The 1.5-acre Dunnage Disposal Site #3 (IRP Site 34c) is located south of Terriea Road in the central portion of Detachment Fallbrook. The Dunnage Disposal Site #3 is a munitions burial site. The area was used from 1942 to 1978 as a disposal area for dunnage. According to personnel interviews, the site was used as a disposal area for ordnance. A 1978 memorandum

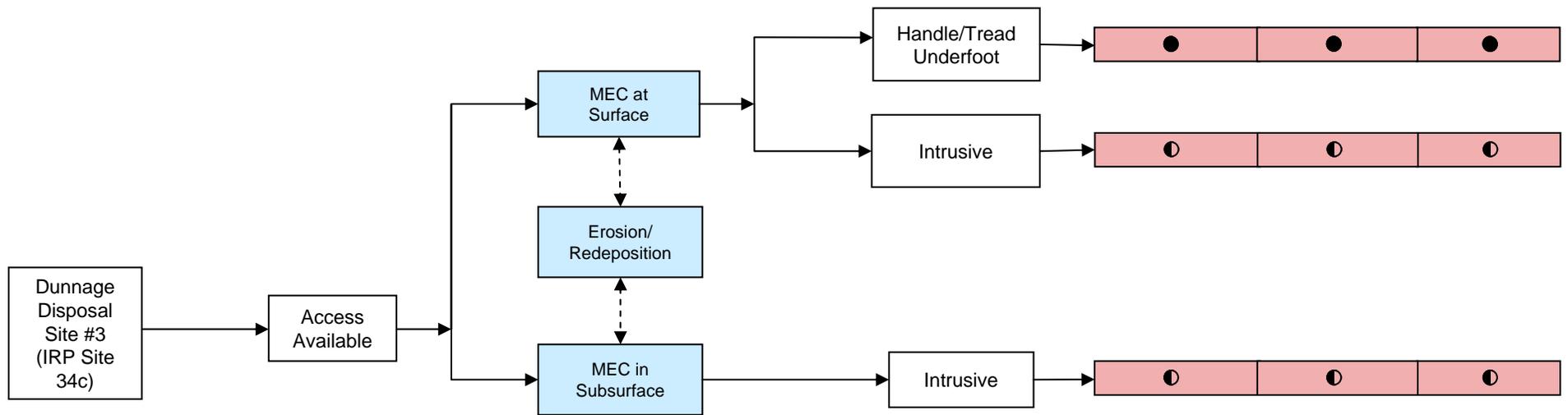
from Tom Curtis, a former Commanding Officer at Detachment Fallbrook, states that numerous cases of inert-rifle-propelled grenades were buried in the area. Inert rifle grenades and other munition scrap were observed on the ground surface and in the wash area during Malcolm Pirnie's site visits. All interviews and documentation relating to the site indicated that only inert ordnance was buried there. One 60-mm mortar was observed on the surface of the site. There is a possibility that other live ordnance was buried there. The area is not currently in use.

5.6.13. Recommendations

Based on the data collected and presented in this PA, an SI is recommended for both MEC and MC at the Dunnage Disposal Site #3. The SI activities should focus on determining the extent of MEC and MC at the site. During the SI, it is recommended that surface and subsurface soil samples be collected from the site and analyzed for ordnance residuals and metals. Performing a geophysical survey at the site will help determine the extent of MEC at the site. It is also recommended that a groundwater monitoring well be installed to verify that the groundwater under the site has not been affected. If intrusive activities are planned for the site, the potential receptors should be made aware that the site was a munitions burial site.

Source Area	Access	MEC Location/ Release Mechanisms	Activity	Receptors		
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Navy Personnel	Contractor/ Visitor	Biota
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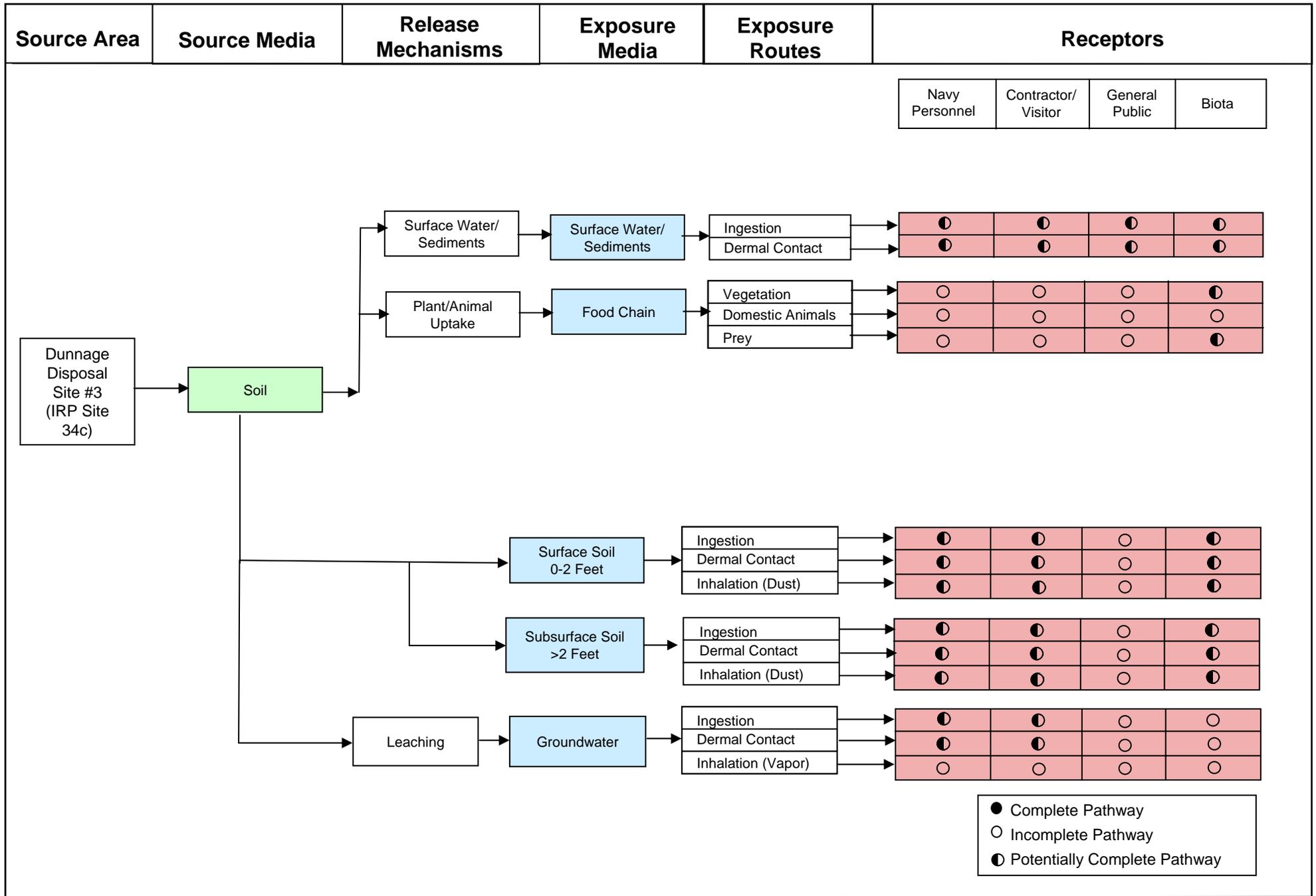
● Complete Pathway
 ○ Incomplete Pathway
 ◐ Potentially Complete Pathway



Prepared for: 

PRELIMINARY ASSESSMENT – FINAL PA REPORT
 DUNNAGE DISPOSAL SITE #3 – MEC EXPOSURE PATHWAY ANALYSIS
 NAVWPNSTA SEAL BEACH DETACHMENT FALLBROOK, CALIFORNIA

MALCOLM PIRNIE, INC.
 FIGURE 5.6-3 FINAL
 June 2006



● Complete Pathway
 ○ Incomplete Pathway
 ◐ Potentially Complete Pathway



Prepared for: 

PRELIMINARY ASSESSMENT – FINAL PA REPORT
 DUNNAGE DISPOSAL SITE #3 – MC EXPOSURE PATHWAY ANALYSIS
 NAVWPNSTA SEAL BEACH DETACHMENT FALLBROOK, CALIFORNIA

MALCOLM PIRNIE, INC.
 FIGURE 5.6-4 FINAL
 June 2006

Preliminary Assessment
NAVWPNSTA Seal Beach
Detachment Fallbrook, California



MALCOLM
PIRNIE

Map 5.6-1
Visual Survey
Dunnage Disposal Site #3 (IRP Site 34c)

Legend

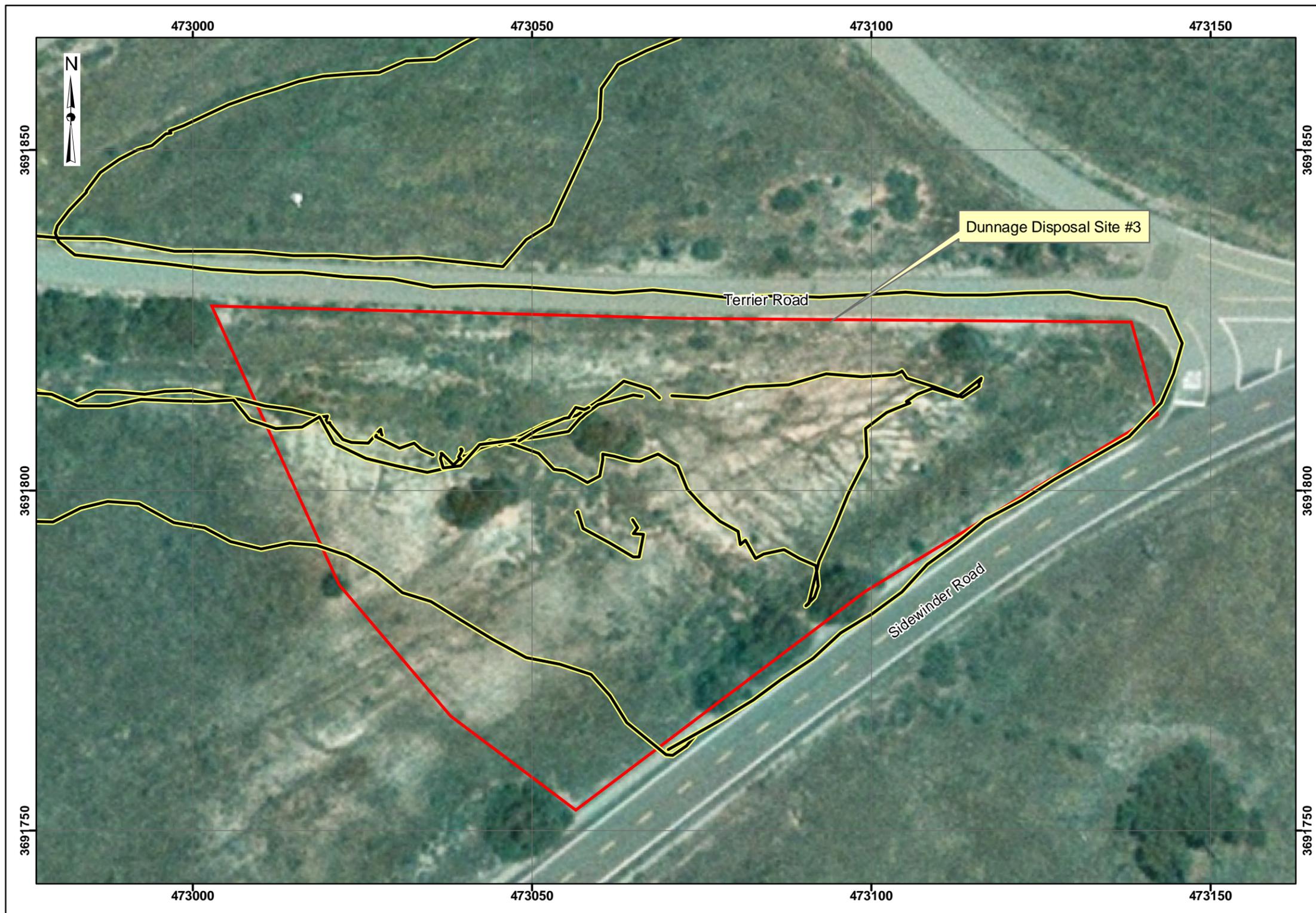
- Dunnage Disposal Site #3
- Site Reconnaissance Path



Data Source: Anteon Corporation,
Orthophoto, June 3, 2004

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

Contract: N62472-02-D-1300
Edition: Final Preliminary Assessment
Date: June 2006



**Preliminary Assessment
NAWPNSTA Seal Beach
Detachment Fallbrook, California**



**MALCOLM
PIRNIE**

**Map 5.6-2
Site Details
Dunnage Disposal Site #3 (IRP Site 34c)**

Legend

-  Dunnage Disposal Site #3
-  Streams
-  Topographic Contours (ft above MSL)



Data Source: Anteon Corporation,
Orthophoto, June 3, 2004
NAWPNSTA Seal Beach GIS Data,
Vector Contour Data

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

Contract: N62472-02-D-1300
Edition: Final Preliminary Assessment
Date: June 2006

NAWPNSTA Seal Beach
Detachment Fallbrook, California
Dunnage Disposal Site #3



**Preliminary Assessment
NAWPNSTA Seal Beach
Detachment Fallbrook, California**



**MALCOLM
PIRNIE**

**Map 5.6-3
Munitions Characterization
Dunnage Disposal Site #3 (IRP Site 34c)**

Legend

Dunnage Disposal Site #3

MEC Sighting

Evidence of Munitions Use

MEC Presence*

Known

Suspect

RPG - Rifle Propelled Grenade

* MEC presence was determined through review of historical documentation, interviews, and visual survey.

0 15 Meters



Data Source: Anteon Corporation,
Orthophoto, June 3, 2004

Coordinate System: UTM Zone 11N
Datum: NAD 83
Units: Meters

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