

**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 2, Sections 5.7 to 5.11 and Appendixes**

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**June 2006**

Prepared for:

**Naval Facilities Engineering Command**  
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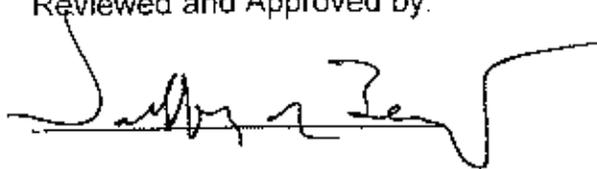
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**June 2006**

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## 5.7. Dunnage Disposal Site #4

The Dunnage Disposal Site #4 covers approximately 1.8 acres west of Building 388 in the central portion of Detachment Fallbrook. Map 2.1-1 shows the location of the site on Detachment Fallbrook and its boundaries.

### 5.7.1. History and Site Description

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. The Dunnage Disposal Site #4 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 #1 and Dunnage Disposal Site #3. Investigation of the site and the installation records, and many follow-up interviews, indicate that Dunnage Disposal #4 was not a munitions burial site. The remnant foundation of what may once have been Building 338 remains on the site. Figure 5.7-1 shows a view of the building foundation at the site. No IRP investigations have been undertaken.



**Figure 5.7-1: View of the building foundation at Dunnage Disposal Site #4. Photograph was taken during the March 2005 visual survey.**

#### 5.7.1.1. Topography

The Dunnage Disposal Site #4 has low hills. For further information on the topography of Detachment Fallbrook, see [Section 3.2](#).

#### 5.7.1.2. 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 #4 was not available. [Section 3.3](#) includes a general description of the geology of Detachment Fallbrook.

#### 5.7.1.3. Soil and Vegetation Types

Soils in the Dunnage Disposal Site #4 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 #4 is mostly riparian with some coastal sage scrub and eucalyptus forest. Common species in coastal sage scrub habitat include coastal sage brush (*Artemisia californica*), flat-topped buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), sage (*Salvia* spp.), goldenbush (*Isocoma menziesii*), and native grasses (*Nassella* spp.). Common species in riparian habitat include mulefat (*Baccharis salicifolia*), arroyo willows (*Salix lasiolepis*), and elderberry (*Sambucus mexicana*). [Section 3.5](#) includes a general description of the vegetation types at Detachment Fallbrook.

#### 5.7.1.4. Hydrology

Dunnage Disposal Site #4 is in the Santa Margarita watershed. There are no surface water bodies in the Dunnage Disposal Site #4, but the site drains towards Fallbrook Creek. [Section 3.6](#) includes a general description of the hydrology at Detachment Fallbrook.

#### 5.7.1.5. Hydrogeology

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

#### 5.7.1.6. Cultural and Natural Resources

The data collection team for the Dunnage Disposal Site #4 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.

### 5.7.1.7. 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 Least Bell's vireo, Stephens' kangaroo rat, Arroyo toad, and the Southwestern willow flycatcher.

### 5.7.2. Visual Survey Observations and Results

The data collection team conducted a visual survey of the Dunnage Disposal Site #4 on March 9, 2005. Malcolm Pirnie representatives participating in the visual survey were Mr. Chip Poalinelli, Mr. Dan Hains, and Mr. Scott Lehman. The field team conducted the visual survey by walking the perimeter of the entire site, then walking several transects across the site. The limited visual survey of the area by the data collection team revealed no evidence of MEC or munitions scrap except for an empty ammunition canister. The canister appeared to have washed into the area due to runoff and did not appear to be related to disposal activities at the site. There was construction debris and non-munitions related trash at the site. The remnant foundation of what may once have been Building 338 remains on the site. Figure 5.7-2 shows a view of the wash and the empty canister. A visual depiction of the site reconnaissance is provided on Map 5.7-1 located at the end of Section 5.7. Additional site details are illustrated on Map 5.7-2 also located at the end of Section 5.7.



**Figure 5.7-2: View of wash. Photograph was taken during the March 2005 visual survey.**

***5.7.3. Munitions and Munitions Related Materials Associated with the Site***

The Dunnage Disposal Site #4 is not suspected to contain MEC. The Dunnage Disposal Site #4 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 #1 and Dunnage Disposal Site #3. Investigation of the site and the installation records, and many follow-up interviews, indicate that the Dunnage Disposal #4 was not a munitions burial site.

***5.7.4. 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 5.7-3 illustrates the munitions characterization of the Dunnage Disposal Site #4, and is provided at the end of Section 5.7. The MEC presence is discussed below.

**5.7.4.1. Known MEC Areas**

There are no Known MEC Areas associated with the Dunnage Disposal Site #4.

**5.7.4.2. Suspected MEC Areas**

There are no Suspected MEC Areas associated with the Dunnage Disposal Site #4 since MEC was not disposed of at the site.

**5.7.4.3. Areas Not Suspected to Contain MEC**

Based upon observations made and data collected during the PA process, the Dunnage Disposal Site #4 is Not Suspected to Contain MEC.

***5.7.5. Ordnance Penetration Estimates***

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

***5.7.6. Munitions Constituents***

The Dunnage Disposal Site #4 is not suspected to contain MC.

### ***5.7.7. Contaminant Migration Routes***

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

### ***5.7.8. Receptors and Pathways***

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

#### **5.7.8.1. 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 #4 is approximately 11,150 feet from the housing complex at the installation. See [Section 2.1](#) for more information on the housing complex.

#### **5.7.8.2. Buildings Near/Within Site**

The remnant foundation of what may once have been Building 338 remains on the site. It is not clear what the former use of the building was. There are no buildings within 0.5 miles of the Dunnage Disposal Site #4.

#### **5.7.8.3. Utilities On/Near Site**

There are no utilities on the Dunnage Disposal Site #4. Phone lines are within 0.1 miles to the south and west of the Dunnage Disposal Site #4,

### ***5.7.9. Land Use***

The Dunnage Disposal Site #4 is closed and is no longer used for disposal.

### ***5.7.10. Access Controls / Restrictions***

The Dunnage Disposal Site #4 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 #4 is also located within a restricted area guarded by the security force.

**5.7.11. 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 5.7-1 below.

<b>Table 5.7-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #4</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Site Profile</b>	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 #4 (IRP Site 34d)
	Site Location	The Dunnage Disposal Site #4 is in the central portion of the installation.
	Site History	The Dunnage Disposal Site #4 is a burial area for dunnage that was used from 1942 until 1978.
	Site Area and Layout	The Dunnage Disposal Site #4 covers approximately 1.8 acres.
	Site Structures	The remnant foundation of what may once have been Building 338 remains on the site.

Table 5.7-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #4		
Profile Type	Information Needs	Preliminary Assessment Findings
	Site Boundaries	<p>Map 2.1-1 shows the location of the Dunnage Disposal Site #4.</p> <p>N: The northern boundary of the site is at the intersection of Fallbrook Creek and Maverick Road. North of the site extends an eucalyptus forest.</p> <p>S: South of the site is Ammunition Road.</p> <p>W: Coastal sage scrub extends west of the site.</p> <p>E: Fallbrook Creek and coastal sage scrub extend east of the site.</p>
	Site Security	The Dunnage Disposal Site #4 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 #4 is also located within a restricted area guarded by the security force.
Munitions/ Release Profile	Munitions Types	The Dunnage Disposal Site #4 is not a suspected MEC area.
	Maximum Probability Penetration Depth	MEC are not expected at the site; therefore, penetration depths are not of concern.
	MEC Density	The Dunnage Disposal Site #4 is not suspected to contain MEC.
	MEC Scrap/Fragments	No evidence of MEC or munitions scrap was identified during the visual survey except for an empty ammunition canister. The canister appeared to have washed into the area due to runoff and did not appear to be related to disposal activities at the site.
	Associated Munitions Constituents	The Dunnage Disposal Site #4 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 5.7-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #4		
Profile Type	Information Needs	Preliminary Assessment Findings
<b>Physical Profile</b>	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 #4 has 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 #4 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 Dunnage Disposal Site #4 is in the Santa Margarita watershed. There are no surface water bodies in the Dunnage Disposal Site #4, which drains towards Fallbrook Creek.
	Vegetation	The vegetation in the area of the Dunnage Disposal Site #4 is considered to be mostly riparian with some coastal sage scrub and eucalyptus forest. 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.
<b>Land Use and Exposure Profile</b>	Current Land Use	The Dunnage Disposal Site #4 is closed and 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 #4 was closed in 1978. There is no change in land use planned.
	Potential Future Human Receptors	MEC and MC are not expected to be present at the site; potential receptors are not of concern.

Table 5.7-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #4		
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, ESQD Arc restrictions apply to this site. The site is also listed as habitat for the Least Bell’s vireo, 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"> <li>• Town of Fallbrook: Population (U.S. Census, 2000): 29,100</li> <li>• San Diego County: Population (U.S. Census, 2000): 2,813,833</li> </ul>
	Beneficial Resources	The coastal sage scrub and riparian habitats offer roosting and foraging resources for raptors.
<b>Ecological Profile</b>	Habitat Type	The Dunnage Disposal Site #4 contains riparian, coastal sage scrub, and eucalyptus habitat. The site is also in a zone designated as habitat for the federally endangered Least Bell’s vireo.
	Degree of Disturbance	Current and anticipated future activities at the site, such as environmental and ecological surveys, may disturb habitat and or ecological receptors known or potentially present within range areas.
	Ecological Receptors	
	General:	Common fauna 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 Threatened Species:	Coastal California gnatcatcher
	Federal Endangered Species:	Least Bell’s vireo, Stephens’ kangaroo rat, Arroyo toad, and Southwestern willow flycatcher

Table 5.7-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #4		
Profile Type	Information Needs	Preliminary Assessment Findings
	State Endangered Species:	Least Bell’s vireo and Southwestern willow flycatcher
	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 created for the Dunnage Disposal Site #4 because MEC and MC sources 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.

**5.7.12. Summary**

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 was used from 1942 to 1978 as a disposal area for dunnage. The area is not currently in use. The remnant foundation of what may once have been Building 338 remains on the site. No evidence of MEC or MC was found at the Dunnage Disposal Site #4. The Dunnage Disposal Site #4 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 #4 was not a munitions burial site.

**5.7.13. Recommendations**

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 undertaken under the IRP.

Preliminary Assessment  
NAWPNSTA Seal Beach  
Detachment Fallbrook, California



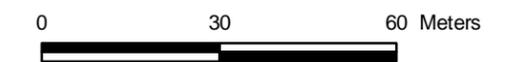
MALCOLM  
PIRNIE

Map 5.7-1  
Visual Survey  
Dunnage Disposal Site #4 (IRP Site 34d)

Legend

- Dunnage Disposal Site #4\*
- Site Reconnaissance Path

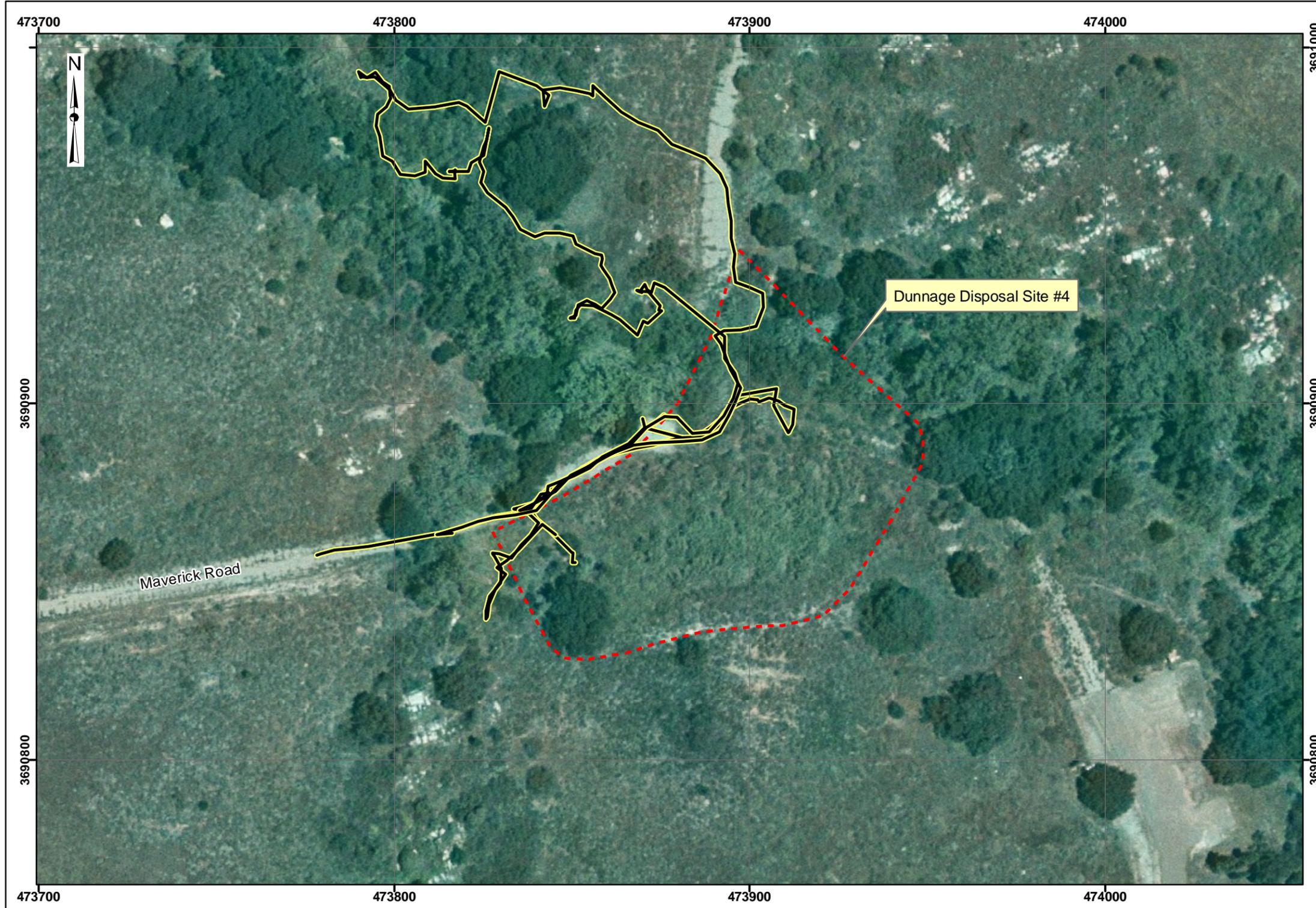
\* Approximate boundary of the site.



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  
PIRNIÉ**

**Map 5.7-2  
Site Details  
Dunnage Disposal Site #4 (IRP Site 34d)**

**Legend**

-  Dunnage Disposal Site #4 (IRP Site 34d)\*
-  Streams
-  Topographic Contours (ft above MSL)

\* Approximate boundary of the Site.

0 30 Meters

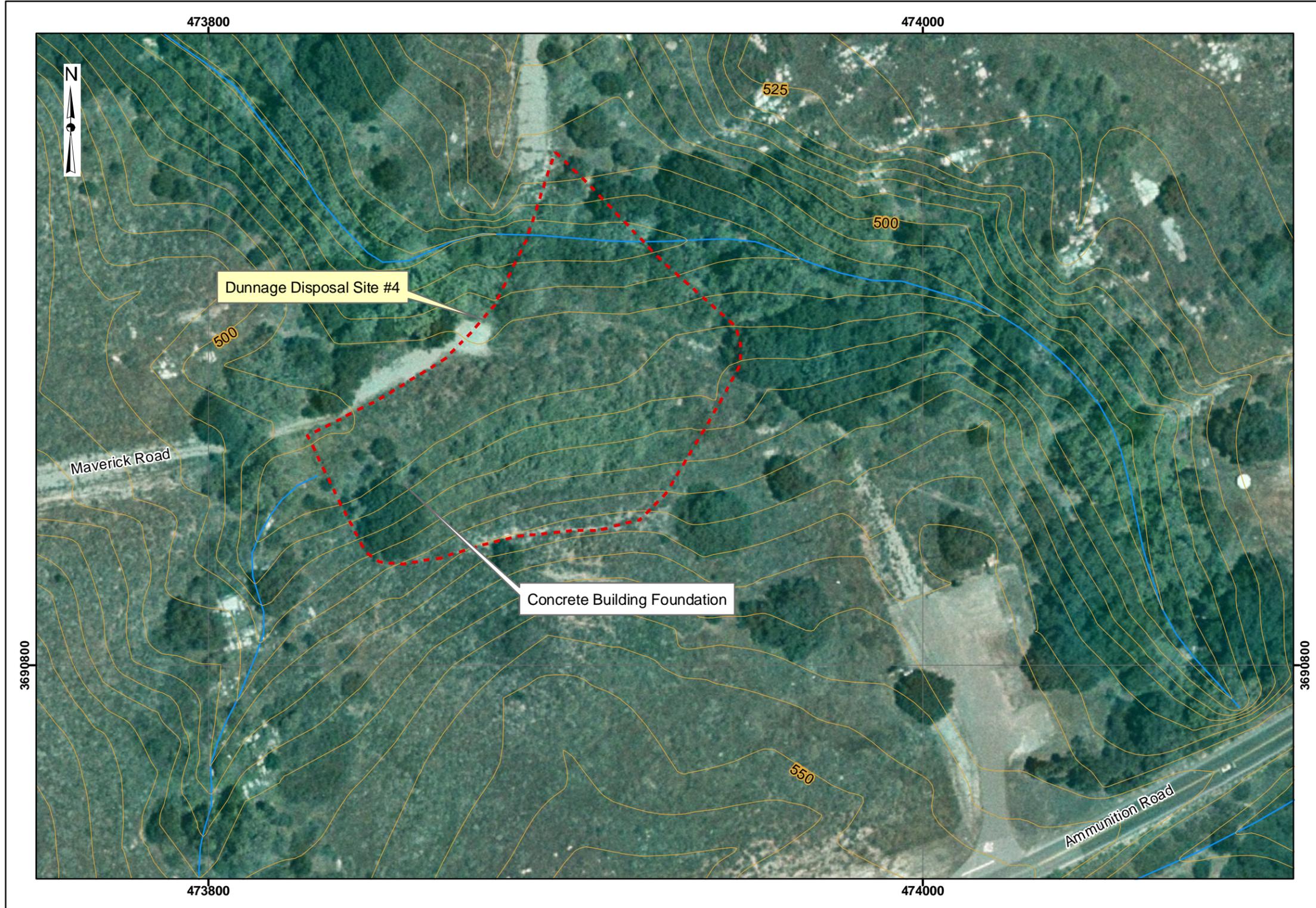


Data Source: Anteon Corporation,  
Orthophoto, June 3, 2004  
NAWPNSTA Seal Beach GIS Data,  
Vector Contour Data

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

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NAWPNSTA Seal Beach  
Detachment Fallbrook, California  
Dunnage Disposal Site #4



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



**MALCOLM  
PIRNIE**

**Map 5.7-3  
Munitions Characterization  
Dunnage Disposal Site #4 (IRP Site 34d)**

**Legend**

 Dunnage Disposal Site #4\*

**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.

0 30 60 Meters

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

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

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## 5.8. Dunnage Disposal Site #5

The Dunnage Disposal Site #5 is in the southwest corner of Detachment Fallbrook. The site straddles Harm Road west of Ammunition Road and covers approximately 0.7 acres.

### 5.8.1. History and Site Description

The Dunnage Disposal Site #5 (IRP Site 34e) was used from 1942 to 1978 as a disposal area for dunnage. The area is not currently in use. The Dunnage Disposal Site #5 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 #5 was not used for munitions burial. Figure 5.8-1 shows a view of the Dunnage Disposal Site #5. No IRP investigations have been undertaken.



**Figure 5.8-1: View of the Dunnage Disposal Site #5 looking south. Photograph was taken during the March 2005 on-site visual survey.**

#### 5.8.1.1. Topography

The Dunnage Disposal Site #5 is an artificial raised foundation for Harm Road, which is paved. For further information on the topography of Detachment Fallbrook, see [Section 3.2](#).

#### 5.8.1.2. 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 #5 was not available. [Section 3.3](#) includes a general description of the geology of Detachment Fallbrook.

#### 5.8.1.3. Soil and Vegetation Types

The soil at the Dunnage Disposal Area #5 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 Dunnage Disposal Site #5 is considered to be mostly mixed grasslands 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.

#### 5.8.1.4. Hydrology

The Dunnage Disposal Site #5 is within the San Luis Rey watershed. There are no surface water bodies on Dunnage Disposal Site #5. The site drains into Pilgrim Creek, which flows through MCB Camp Pendleton and the City of Oceanside before joining the San Luis River. [Section 3.6](#) includes a general description of the hydrology at Detachment Fallbrook.

#### 5.8.1.5. Hydrogeology

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

#### 5.8.1.6. Cultural and Natural Resources

The data collection team for the Dunnage Disposal Site #5 found no documentation of significant cultural resources at or near the former 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.

#### **5.8.1.7. 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, coastal California gnatcatcher, and Least Bell's vireo.

#### ***5.8.2. Visual Survey Observations and Results***

The data collection team conducted a visual survey of the Dunnage Disposal Site #5 on March 8, 2005. During the visual survey, the following Malcolm Pirnie team members were present: Mr. Chip Poalinelli, Mr. Dan Hains, and Mr. Scott Lehman. The field team conducted the visual survey by walking the perimeter of the site. No evidence of MEC or munitions scrap was identified during the visual survey. Construction debris and other non-munitions related trash were observed at the site.

#### ***5.8.3. Munitions and Munitions Related Materials Associated with the Site***

The Dunnage Disposal Site #5 is not suspected to contain MEC. The Dunnage Disposal Site #5 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 #5 was not a munitions burial site.

#### ***5.8.4. 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 5.8-3 illustrates the munitions characterization of the Dunnage Disposal Site #5, and is provided at the end of Section 5.8. The MEC presence is discussed below.

##### **5.8.4.1. Known MEC Areas**

There are no Known MEC Areas at the Dunnage Disposal Site #5.

**5.8.4.2. Suspected MEC Areas**

There are no Suspected MEC Areas at the Dunnage Disposal Site #5.

**5.8.4.3. Areas Not Suspected to Contain MEC**

The Dunnage Disposal Site #5 is Not Suspected to Contain MEC.

***5.8.5. Ordnance Penetration Estimates***

MEC are not expected at the Dunnage Disposal Site #5; therefore, penetration depths are not of concern.

***5.8.6. Munitions Constituents***

The Dunnage Disposal Site #5 is not suspected to contain MC.

***5.8.7. Contaminant Migration Routes***

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

***5.8.8. Receptors and Pathways***

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

**5.8.8.1. 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 #5 is approximately 17,710 feet from the housing complex at the installation. See [Section 2.1](#) for more information on the housing complex.

**5.8.8.2. Buildings Near/Within Site**

There are no buildings on the site or within 1 mile of the Dunnage Disposal Site #5.

### **5.8.8.3. Utilities On/Near Site**

There were no utilities on the Dunnage Disposal Site #5. A Fallbrook Sanitation District line is located approximately 0.1 miles to the east of the site. To the north and east of the site are U.S. government phone lines, approximately 0.05 miles and 0.1 miles away, respectively.

### **5.8.9. Land Use**

The Dunnage Disposal Site #5 is closed and is no longer used.

### **5.8.10. Access Controls / Restrictions**

The Dunnage Disposal Site #5 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 #5 is also located within a restricted area guarded by the security force.

### **5.8.11. 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 them.

The CSM is presented in a series of information profiles that provide information about the site. The information profiles are included in Table 5.8-1 below.

Table 5.8-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #5		
Profile Type	Information Needs	Preliminary Assessment Findings
<b>Site Profile</b>	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 #5 (IRP Site 34e)
	Site Location	The Dunnage Disposal Site #5 is in the southwest corner of the installation.
	Site History	The Dunnage Disposal Site #5 is a burial area for dunnage, which was used from 1942 until 1978. The Dunnage Disposal Site #5 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 Dunnage Disposal Site #5 was not a munitions burial site.
	Site Area and Layout	The Dunnage Disposal Site #5 is approximately 0.7 acres.
	Site Structures	Part of the Dunnage Disposal Site #5 is currently under a paved road.
	Site Boundaries	Map 2.1-1 shows the location of the Dunnage Disposal Site #5. N: Harm Road runs north of the site with storage magazines located off of the road. S: Ammunition Road runs south of the site to the gate with MCB Camp Pendleton. W: West of the site is mixed grassland and coastal sage scrub habitat bordered by Harm Road. E: Ammunition Road borders the site to the east.
	Site Security	The Dunnage Disposal Site #5 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 #5 is also located within a restricted area guarded by the security force.
<b>Munitions/Release</b>	Munitions Types	The Dunnage Disposal Site #5 is not a suspected MEC area.

Table 5.8-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #5		
Profile Type	Information Needs	Preliminary Assessment Findings
<b>Profile</b>	Maximum Probability Penetration Depth	MEC are not expected to be present at the site; therefore, penetration depths are not a concern.
	MEC Density	The Dunnage Disposal Site #5 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 #5 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.
<b>Physical Profile</b>	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 #5 is an artificial foundation for a paved road.
	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 #5 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 Dunnage Disposal Site #5 is within the San Luis Rey watershed. There are no surface water bodies in the Dunnage Disposal Site #5. The Dunnage Disposal Site #5 drains primarily into Pilgrim Creek, which flows through MCB Camp Pendleton and the City of Oceanside before joining the San Luis River.

Table 5.8-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #5		
Profile Type	Information Needs	Preliminary Assessment Findings
	Vegetation	The vegetation in the area of the Dunnage Disposal Site #5 is considered to be mostly mixed grassland with some coastal sage scrub. Common species in mixed grassland habitat include native, perennial bunch grasses mixed with nonnative annuals. Common species in coastal sage scrub habitat include coastal sagebrush, flat-topped buckwheat, laurel sumac, sage, goldenbush, and native grasses.
Land Use and Exposure Profile	Current Land Use	The Dunnage Disposal Site #5 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 #5 was closed in 1978. There is no change in land use planned.
	Potential Future Human Receptors	MEC and MC are not expected to be present at the site; potential receptors are not of concern.
	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.
	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"> <li>• Town of Fallbrook: Population (U.S. Census, 2000): 29,100</li> <li>• San Diego County: Population (U.S. Census, 2000): 2,813,833</li> </ul>
	Beneficial Resources	The coastal sage scrub and mixed grasslands habitats offer roosting and foraging resources for raptors.

Table 5.8-1: Conceptual Site Model Information Profiles – Dunnage Disposal Site #5		
Profile Type	Information Needs	Preliminary Assessment Findings
Ecological Profile	Habitat Type	The Dunnage Disposal Site #5 contains mixed grasslands and some coastal sage scrub habitat. The site 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 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	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 #5 because MEC and MC sources are not suspected 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.

**5.8.12. Summary**

The 0.7-acre Dunnage Disposal Site #5 is in the southwest corner of Detachment Fallbrook. The Dunnage Disposal Site #5 (IRP Site 34e) was used from 1942 to 1978 as a disposal area for dunnage. The area is not currently in use. No evidence of MEC or MC was found at the Dunnage Disposal Site #5. The Dunnage Disposal Site #5 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 #5 was not a munitions burial site.

***5.8.13. Recommendations***

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 undertaken under the IRP.

Preliminary Assessment  
NAVWPNSTA Seal Beach  
Detachment Fallbrook, California



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PIRNIE

Map 5.8-1  
Visual Survey  
Dunnage Disposal Site #5 (IRP Site 34e)

Legend

-  Dunnage Disposal Site #5\*
-  Site Reconnaissance Path



\* Approximate boundary of the site.



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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Date: June 2006

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



**MALCOLM  
PIRNIÉ**

**Map 5.8-2  
Site Details  
Dunnage Disposal Site #5 (IRP Site 34e)**

**Legend**

-  Dunnage Disposal Site #5\*
-  Streams
-  Topographic Contours (ft above MSL)

\* Approximate boundary of the Site.

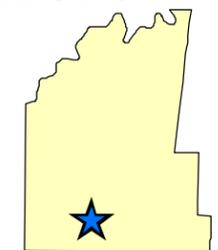


Data Source: Anteon Corporation,  
Orthophoto, June 3, 2004  
NAWPNSTA Seal Beach GIS Data,  
Vector Contour Data

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

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NAWPNSTA Seal Beach  
Detachment Fallbrook, California  
Dunnage Disposal Site #5



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Detachment Fallbrook, California**



**MALCOLM  
PIRNIE**

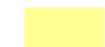
**Map 5.8-3  
Munitions Characterization  
Dunnage Disposal Site #5 (IRP Site 34e)**

**Legend**

 Dunnage Disposal Site #5\*

**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  
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## 5.9. Skeet/Trap Range

The Skeet/Trap Range is 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 covers approximately 31 acres.

### 5.9.1. History and Site Description

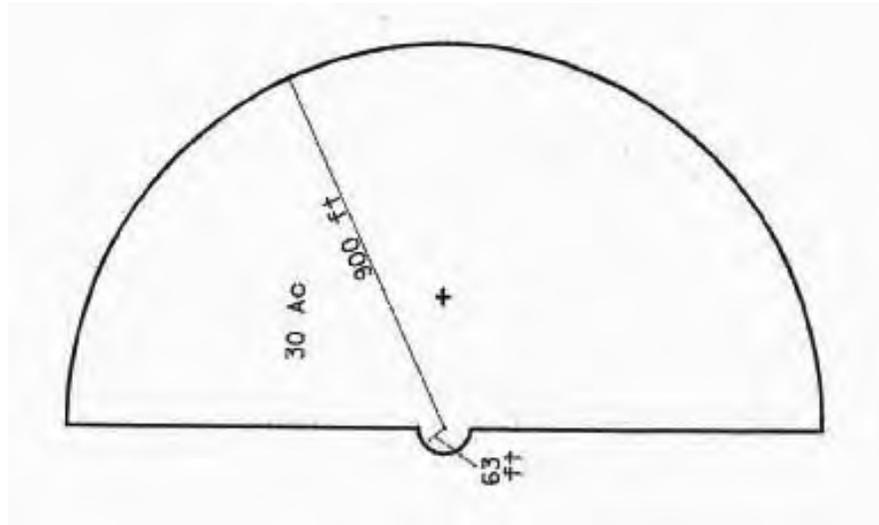
The Skeet/Trap Range is adjacent to the northwestern border of the SF Small Arms Range and was a recreational skeet/trap range that was used by the Marine Security Forces and other station personnel after work hours from 1950 to 1987. Munitions use at the range was limited to 12-gauge shotgun ammunition according to Mr. Kenneth A. Kaptein and other interviewees. The firing lines and the skeet shooting equipment were located on a shelf at the top of a hill. The range was oriented for firing to the west. The area is not currently in use. Figure 5.9-1 shows the firing point for the range.



**Figure 5.9-1: View of firing point for range. Photograph was taken during the September 2004 visual survey.**

Based on review of aerial and still photographs, information obtained from interviews, and observations made during the visual survey, the Skeet/Trap Range was constructed and used as a single field shotgun range. According to Army Technical Manuals (referenced as AR 750-10 and

TM 9-855) and the Navy Programming Guide (1958), the shooting field (i.e., firing arc) was laid out as a 63 foot radius semi-circle. The surface danger zone (which includes the down range hazard area and safety fan) consisted of a semi-circle with a 900-foot radius that utilized the same apex as the shooting field. For a single field range, the acreage of the surface danger zone (SDZ) was approximately 30 acres. An example of a typical SDZ for a single field skeet range is provided in Figure 5.9-2.



**Figure 5.9-2: SDZ for a typical single field skeet range**

The site boundary, which is also the SDZ, for the Skeet/Trap Range encompasses the firing arc, target area, and impact area where the lead shot and broken clay targets would be found plus the area where the weapons, when fired from the firing arc, could endanger personnel. The SDZ was used to define the area between the firing arc and target area, the impact area, the ricochet trajectory area, and the secondary danger area. The boundary/SDZ for the Skeet/Trap Range is shown in Map 5.9-2.

### 5.9.1.1. Topography

The Skeet/Trap Range is mainly flat, except for the hills on the northeastern boundary of the range. For further information on the topography of Detachment Fallbrook, see [Section 3.2](#).

#### 5.9.1.2. Geology

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

#### 5.9.1.3. Soil and Vegetation Types

Soil at the Skeet/Trap 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 Skeet/Trap Range is composed of coastal sage scrub and 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.). Common 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.

#### 5.9.1.4. Hydrology

The Skeet/Trap Range is in the Santa Margarita watershed. There are no surface water bodies on the Skeet/Trap Range. The site primarily drains into Fallbrook Creek. [Section 3.6](#) includes a general description of the hydrology at Detachment Fallbrook.

#### 5.9.1.5. Hydrogeology

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

#### 5.9.1.6. Cultural and Natural Resources

The data collection team for the Skeet/Trap Range found no documentation of significant cultural resources at 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.

#### **5.9.1.7. 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.

#### ***5.9.2. Visual Survey Observations and Results***

The data collection team conducted a visual survey of the Skeet/Trap Range on September 29, 2004. Present during the first 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 the perimeter of the entire range, then walking several transects across the Skeet/Trap Range. During the visual survey, the data collection team did not observe lead shot or broken clay targets. According to interviewees, the range was used infrequently, which could explain the lack of munitions scrap in the area. Another explanation could be that the soil was disked to keep the vegetative fuel load low. This could have disturbed and buried any evidence of munitions scrap.

Figure 5.9-3 shows a photograph of the site. A visual depiction of the site reconnaissance is provided on Map 5.9-1 located at the end of Section 5.9. Additional range/site details are illustrated on Map 5.9-2 also located at the end of Section 5.9.



**Figure 5.9-3: View of the Skeet/Trap Range. Photograph was taken during the September 2004 on-site visual survey.**

### ***5.9.3. 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 the potential types of munitions that were used at the Skeet/Trap Range. According to personnel interviewed, munitions used at the range would have been limited to 12-gauge shotgun ammunition. The available technical data sheet on the item is included in [Appendix D](#).

Based on the information obtained during the data collection process, the Skeet/Trap Range is not suspected to contain CWM filled munitions, electrically fuzed munitions, or DU associated munitions.

#### ***5.9.4. 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 5.9-3 illustrates the munitions characterization of the Skeet/Trap Range, and is provided at the end of Section 5.9. The MEC presence is discussed below.

##### **5.9.4.1. Known MEC Areas**

There are no Known MEC Areas associated with the Skeet/Trap Range because the site was used only for shotgun training. There is no historical or known evidence of explosives used at the site, so there is no evidence of MEC.

##### **5.9.4.2. Suspected MEC Areas**

There are no Suspected MEC Areas associated with the Skeet/Trap Range because the site was used only for shotgun training. There is no historical or known evidence of explosives used at the site, so there is no evidence of MEC.

##### **5.9.4.3. Areas Not Suspected to Contain MEC**

Based on observations made and data collected during the PA process, the 31-acre site, as well as the SDZ associated with the Skeet/Trap Range, is not suspected to contain MEC.

#### ***5.9.5. 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 skeet ranges. By design, skeet ammunition is dispersed as pellets over a small area in the direction of fire. According to the Navy Programming Guide (1958), the minimum surface danger zone for a skeet range is 900 feet. Pellets dispersed from a shotgun would be deposited on the ground surface well within this zone and would not penetrate the ground surface unless disturbed.

### ***5.9.6. Munitions Constituents***

MC associated with the use of the property as a skeet/trap range could be present at the Skeet/Trap Range. The primary MC is the lead from shotgun ammunition. Other MCs include antimony, arsenic, copper, nickel, zinc, and other constituents associated with black or smokeless powder. Polycyclic aromatic hydrocarbons (PAHs) may also be a MC if clay targets were used at the range. PAHs in clay targets tend to be tightly bound to the matrix of the target and are not readily available to the environment. Based on discussions with installation personnel, surface soil sampling has not occurred.

### ***5.9.7. 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.

### ***5.9.8. Receptors and Pathways***

Potential human receptors at the Skeet/Trap Range include Navy personnel, visitors, and 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).

#### **5.9.8.1. 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 Skeet/Trap Range is approximately 7,870 feet from the housing complex at the installation. See [Section 2.1](#) for more information on the housing complex.

#### **5.9.8.2. Buildings Near/Within Site**

There are currently no buildings on the Skeet/Trap Range. Building 366 is located approximately 2,790 feet southwest of the site. The building is currently not 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.

### **5.9.8.3. Utilities On/Near Site**

While there are no utilities on the Skeet/Trap Range, there are some utility lines near the site. U.S. government phone lines are located within 0.2 miles of the western extent of the site. Approximately 0.2 miles from the site, is a Fallbrook Sanitation District line.

### **5.9.9. Land Use**

The Skeet/Trap Range is closed and is no longer in use as a range.

### **5.9.10. Access Controls / Restrictions**

The Skeet/Trap 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 Skeet/Trap Range from within Detachment Fallbrook is controlled by a locked fence.

### **5.9.11. 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 them.

The CSM is presented in a series of information profiles that provide information about the site. The information profiles are included in Table 5.9-1 below.

**Table 5.9-1: Conceptual Site Model Information Profiles – Skeet/Trap Range**

Profile Type	Information Needs	Preliminary Assessment Findings
<b>Range Profile</b>	Installation Name	Detachment Fallbrook
	Installation Location	Detachment Fallbrook is located 53 miles north of San Diego in northern San Diego County, CA.
	Range Name	Skeet/Trap Range
	Range Location	The Skeet/Trap Range is located in the central plateau of the installation, near the eastern border.
	Range History	The Skeet/Trap Range was used from 1950 to 1987. It was used by both the Marine Security Force and other station personnel after hours for recreation.
	Range Area and Layout	The Skeet/Trap Range occupies approximately 31 acres. The range was oriented for firing to the west. The firing lines and the skeet shooting equipment were located on a shelf at the top of a natural berm. No firing line was observed during the site survey.
	Range Structures	There are no structures presently on the Skeet/Trap Range.
	Range Boundaries	<p>Map 2.1-1 shows the location of the former range.</p> <p>N: A line of eucalyptus trees extends north to Fallbrook Creek, approximately 40 feet away.</p> <p>S: Shrubs and grassland extend southwest towards Building 366, approximately 2,790 feet away.</p> <p>W: Trees, shrubs and grassland extend west from the small arms range towards Fallbrook Creek.</p> <p>E: SF Small Arms Range. Trees, shrubs and grassland extend to the eastern boundary of Detachment Fallbrook, approximately 1,390 feet away. Beyond the Detachment’s boundary lies the Town of Fallbrook.</p>
Range Security	The Skeet/Trap 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 Skeet/Trap Range from within Detachment Fallbrook is controlled by a locked fence.	

Table 5.9-1: Conceptual Site Model Information Profiles – Skeet/Trap Range		
Profile Type	Information Needs	Preliminary Assessment Findings
<b>Munitions/ Release Profile</b>	Munitions Types	The former range was used for recreation. The munitions types used at the range were limited to 12-gauge shotgun ammunition.
	Maximum Probability Penetration Depth	Pellets dispersed from a shotgun would be deposited on the ground surface well within this zone and would not penetrate the ground surface unless disturbed.
	MEC Density	None; no evidence of MEC; small arms use only.
	MEC Scrap/Fragments	None were observed.
	Associated Munitions Constituents	The primary MC associated with shotgun ammunition is lead. Other MCs include antimony, arsenic, copper, nickel, zinc, and constituents associated with black or smokeless powder. PAHs could also be an MC if clay targets were used at the Skeet/Trap Range. PAHs in clay targets tend to be tightly bound to the matrix of the target and are not readily available to the environment. Base on discussions with installation personnel, surface soil sampling at the Skeet/Trap 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.
<b>Physical Profile</b>	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 Skeet/Trap Range is mainly flat, except for the hills on the northeastern boundary of the range.
	Geology	The region is underlain by plutonic and metasedimentary rocks of the Peninsular Ranges physiomorphic province, but site-specific information was not available.

**Table 5.9-1: Conceptual Site Model Information Profiles – Skeet/Trap Range**

Profile Type	Information Needs	Preliminary Assessment Findings
	Soil	The soil at the Skeet/Trap 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 Skeet/Trap Range is in the Santa Margarita watershed. The Skeet/Trap Range 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 Skeet/Trap 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, flat-topped buckwheat, laurel sumac, sage, goldenbush, and native grasses. Common species in mixed grassland habitat are mostly native, perennial bunch grasses, mixed with nonnative annuals.
<b>Land Use and Exposure Profile</b>	Current Land Use	The Skeet/Trap Range 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 range may include environmental and ecological surveys.
	Potential Future Land Use	There is no change in land use currently planned.
	Potential Future Human Receptors	Navy personnel and Navy-permitted visitors (including contractors).
	Potential Future Land Use-Related Activities:	Potential future land use activities must address the issue of proximity and follow any Navy ESQD Arc waivers or exemptions. Other future activities at the range could include environmental and ecological surveys.
	Zoning/Land Use Restrictions	ESQD Arcs restrictions from nearby magazines would apply to the area of the former Skeet/Trap Range. The range was operated under an exemption of the restrictions when it was in use.

Table 5.9-1: Conceptual Site Model Information Profiles – Skeet/Trap Range		
Profile Type	Information Needs	Preliminary Assessment Findings
	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"> <li>• Town of Fallbrook: Population (U.S. Census, 2000): 29,100</li> <li>• San Diego County: Population (U.S. Census, 2000): 2,813,833</li> </ul>
	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 Skeet/Trap Range include coastal sage scrub, mixed grasslands, and eucalyptus.
	Degree of Disturbance	There are no current activities at the disposal site. Potential future activities at the site, such as environmental and ecological surveys, may disturb habitat and/or ecological receptors known or potentially present within the site.
	Ecological Receptors	
	General:	Common fauna included mammals (voles, weasels, mice, ground squirrels, jackrabbits, and coyotes), reptiles (orange-throated whiptails, rattlesnakes, and horned lizards), and birds (burrowing owls, kingbirds, flycatchers, and hawks).
	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

Table 5.9-1: Conceptual Site Model Information Profiles – Skeet/Trap Range		
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 MC in soil and/or surface water while foraging or burrowing. Ecological receptors may also come into contact with MCs that have been incorporated into the food chain (bioaccumulated in plants and prey).

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 Skeet/Trap Range because it is not suspected to contain MEC. Historical and visual evidence indicate that MEC are not present at the Skeet/Trap 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 5.9-4. 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 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., runoff to surface water, uptake into the food chain), an exposure medium containing the MC (e.g., soil, surface water, sediment), and an exposure route (e.g., incidental ingestion, dermal contact) that places the receptor into contact with the contaminated medium.

#### Surface Water/Sediment

Fallbrook Creek is about 40 feet from the northwestern border of the Skeet/Trap 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 (wildlife) 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 Skeet/Trap Range via the food chain. MC may be taken up by plants and prey and consumed by animals 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 Skeet/Trap Range. It is possible that MC exists 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 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

The potential for subsurface soil impacts at the Skeet/Trap 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

Potentially complete pathways for Navy personnel and contractors/visitors are indicated for groundwater contaminated with MC at the Skeet/Trap 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.

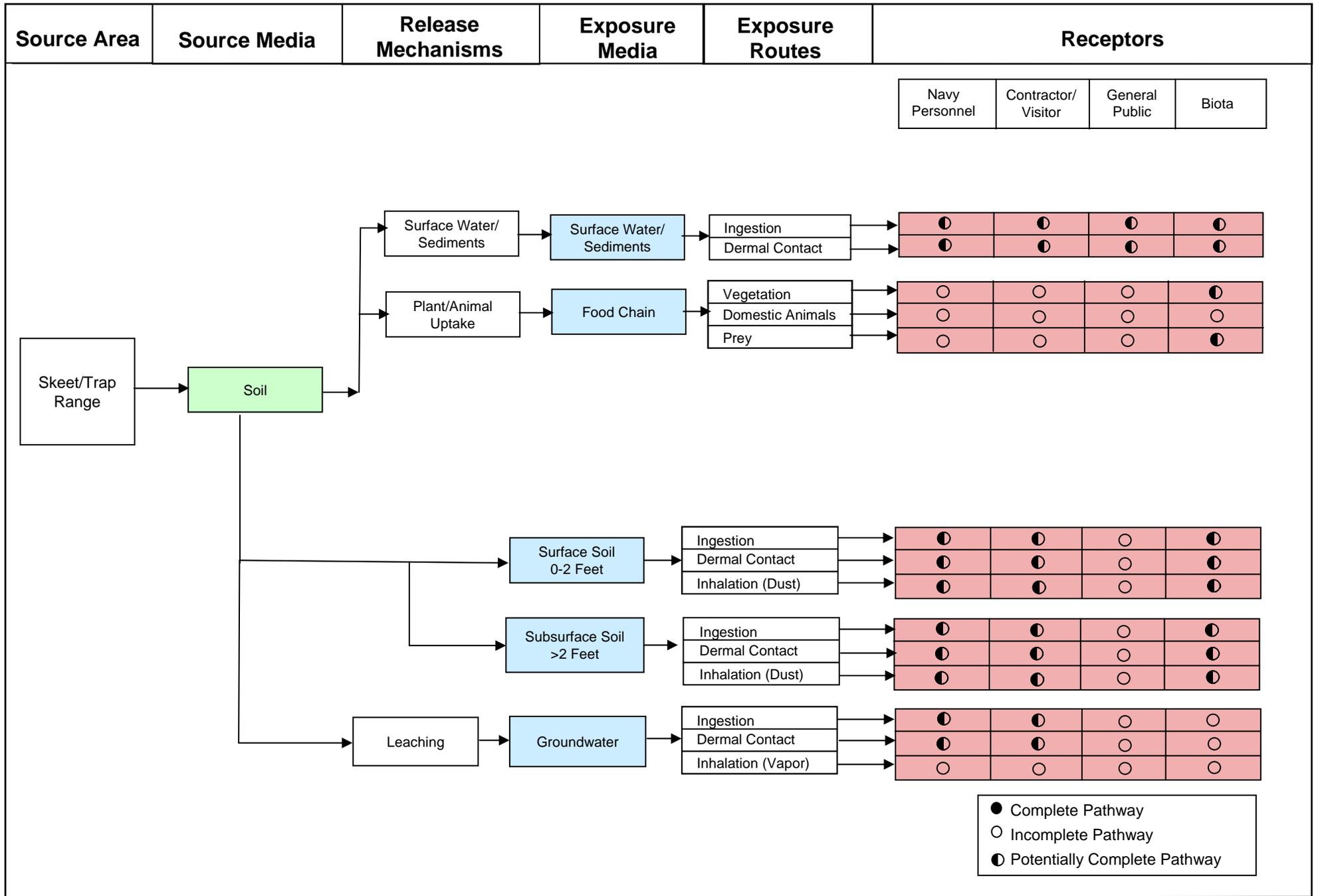
### ***5.9.12. Summary***

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. Munitions use at the range was limited to 12-gauge shotgun ammunition according to interviewees. The firing lines and the skeet shooting equipment were located on a shelf at the top of a hill. No evidence of MEC was found at the

former range. The potential for MC exists at the site, specifically lead and PAHs. The area is not currently in use.

***5.9.13. Recommendations***

Based on the data collected and presented in this PA, NFA for MEC is recommended at the Skeet/Trap Range. MEC is not anticipated at skeet/trap ranges. An SI is recommended at the Skeet/Trap Range with respect to MC. During the SI, it is recommended that surface and subsurface soil be sampled and analyzed for the full spectrum of metals and for PAHs.



● Complete Pathway  
 ○ Incomplete Pathway  
 ◐ Potentially Complete Pathway



Prepared for:

PRELIMINARY ASSESSMENT – FINAL PA REPORT  
 SKEET/TRAP RANGE– MC EXPOSURE PATHWAY ANALYSIS  
 NAVWPNSTA SEAL BEACH DETACHMENT FALLBROOK, CALIFORNIA

**MALCOLM PIRNIE, INC.**  
 FIGURE 5.9-4 FINAL  
 June 2006

Preliminary Assessment  
NAVWPSTA Seal Beach  
Detachment Fallbrook, California

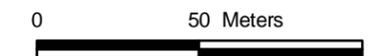
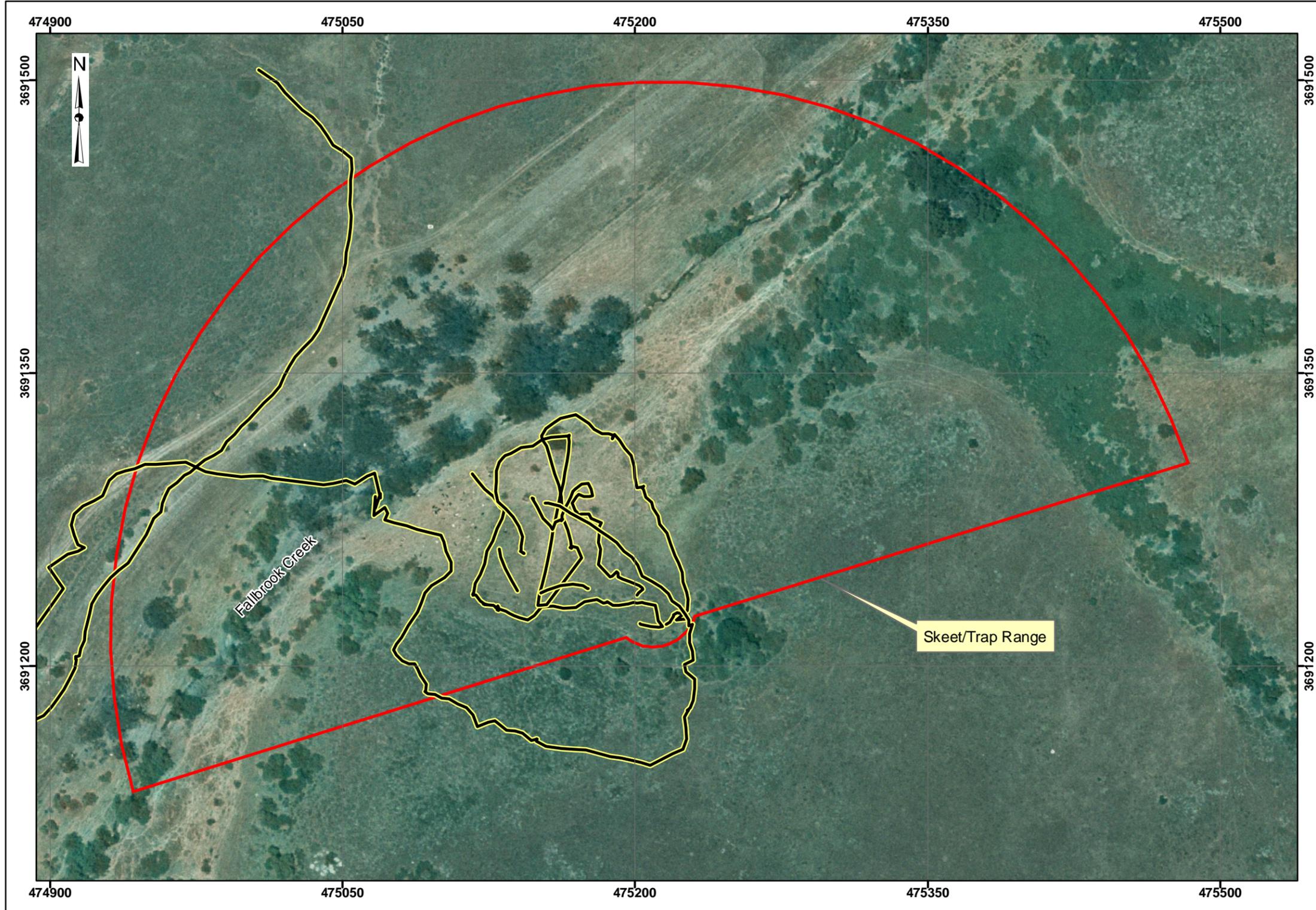


MALCOLM  
PIRNIE

Map 5.9-1  
Visual Survey  
Skeet/Trap Range

Legend

-  Skeet/Trap 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 5.9-2  
Site Details  
Skeet/Trap Range**

- Legend**
-  Skeet/Trap Range
  -  Streams
  -  Firing Line
  -  Topographic Contours (ft above MSL)

0 Meters

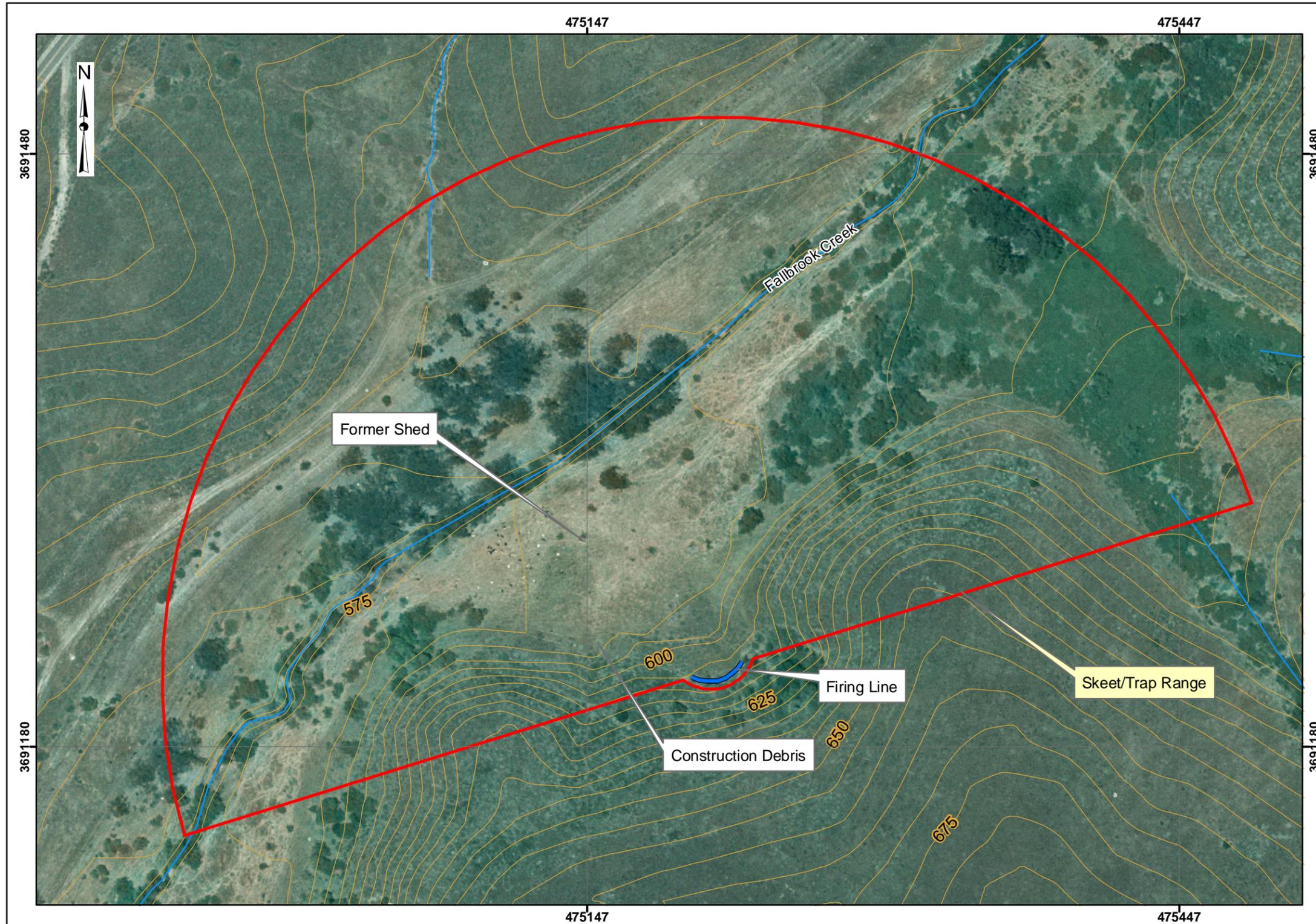


Data Source: Anteon Corporation,  
Orthophoto, June 3, 2004  
NAWPNSTA Seal Beach GIS Data,  
Vector Contour Data

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

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

NAWPNSTA Seal Beach  
Detachment Fallbrook, California  
Skeet/Trap Range



Preliminary Assessment  
NAWPNSTA Seal Beach  
Detachment Fallbrook, California



MALCOLM  
PIRNIE

Map 5.9-3  
Munitions Characterization  
Skeet/Trap Range

Legend

 Skeet/Trap Range

MEC Presence\*

 Known  
 Suspect

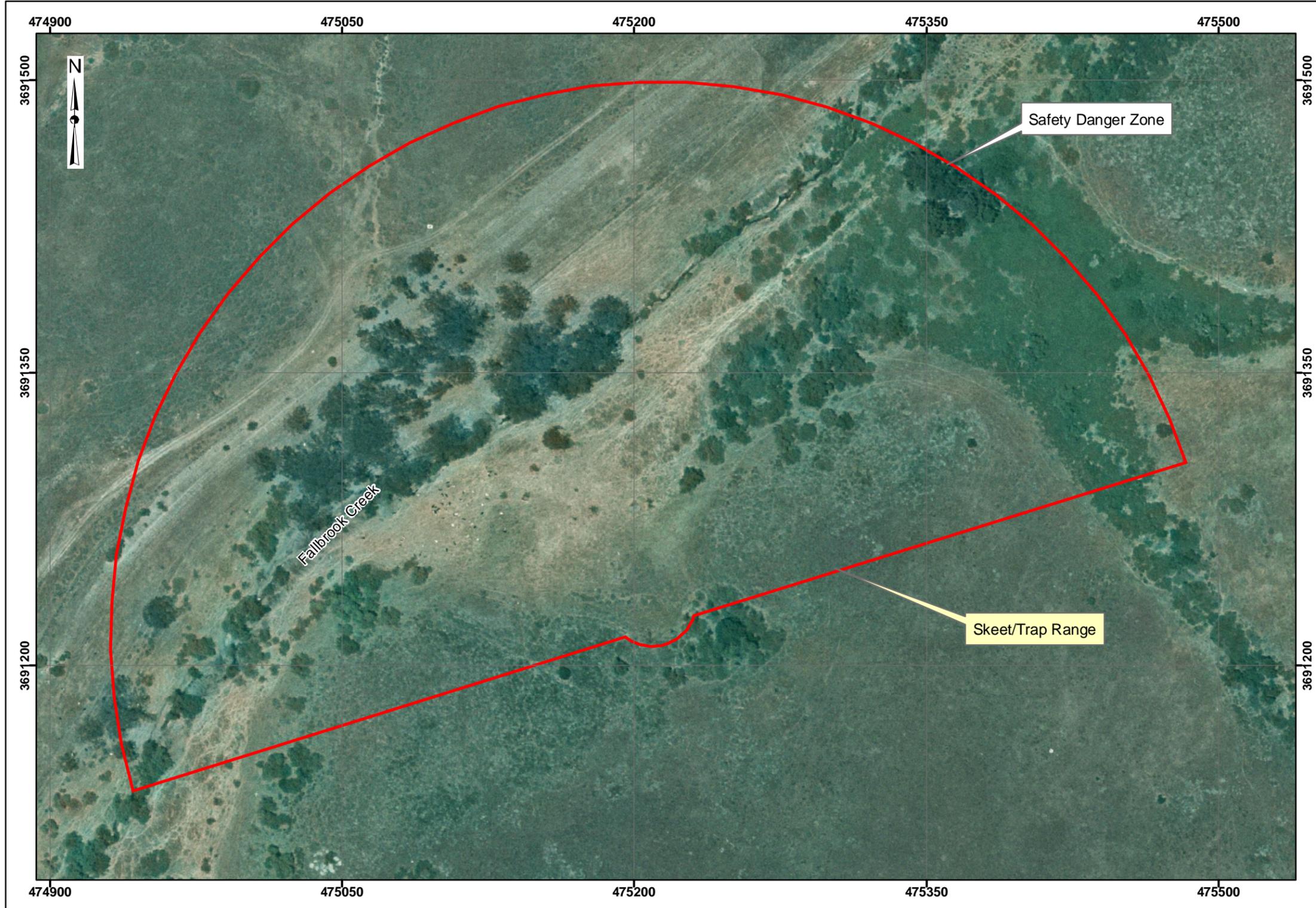
\* There is no evidence of MEC presence as determined through historical documentation, interview, and visual survey. Visual observations and/or historical documentation indicate that MC may be present at the site, but MC Presence has not been confirmed by sampling or other means.

0 50 100 Meters  


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



## 5.10. Depot Lake

Depot Lake is a 12-acre artificial lake on the western part of Detachment Fallbrook. It is located just north of Terriea Road and between buildings 763 and 736. Neither building is currently being used. Map 2.1-1 shows the location of the lake on Detachment Fallbrook and its boundaries.

### *5.10.1. History and Site Description*

Depot Lake was constructed sometime after 1944. The lake is fed by two tributaries from the north and east and is held by an earthen dam at the southern end. Water is released from the lake by a spillway running beneath Terriea Road to the south. The lake was identified as a disposal site for munitions in a 1958 memorandum. The 1958 memorandum from the officer in charge to the commanding officer states that certain munitions (20-mm, 40-mm, and 60-mm cartridges, and 7.2-inch projector charges) were dumped into “Main lake and West lake” during WWII. According to Mr. Robbie Knight, Natural Resource Manager, Main Lake referred to in the memorandum is currently known as Depot Lake. It states that other types of munitions may have been dumped, and that munitions had been recovered from the lake in the past during dry summer seasons. The same memorandum requests that EOD technicians perform diving operations at the lake to salvage MEC. No records were found to indicate whether diving operations took place or whether additional munitions were found in the lake. Personnel interviewed during the site visit stated that before 1953 the Marine Security Forces might have dumped unexpended shells into the lake instead of turning them in to be inventoried. Currently, Depot Lake is used to store water on the installation for fish and wildlife enhancement, and for wildfire protection. The fire department (Station 9) uses a helicopter and bucket method to remove water from Depot Lake. The bucket holds 300 gallons of water and only goes down 4 feet into the water. This action is performed on average twice a year during wildfire season. The water is only used to fight fires inside Detachment Fallbrook. The lake has 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 Lake.



**Figure 5.10-1: Photograph was taken during the March 2005 on-site visual survey. View is of Depot Lake looking north.**

#### **5.10.1.1. Topography and Bathymetry**

Depot Lake is surrounded by level terrain with hills to the north. Specific bathymetry for the lake is unknown. For further information on the topography of Detachment Fallbrook, see [section 3.2](#).

#### **5.10.1.2. Geology**

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

#### **5.10.1.3. Soil and Vegetation Types**

Soils surrounding Depot Lake and the sediment in the lake are classified as coarse sandy loam of granitic origin. [Section 3.4](#) includes a general description of the soil types at Detachment Fallbrook.

The vegetation in the vicinity of Depot Lake is considered to be riparian surrounded by mixed grassland to the north and east and coastal sage scrub to the south and west. Common species associated with riparian habitat include mulefat (*Baccharis salicifolia*) with some arroyo willows (*Salix lasiolepis*) and elderberry (*Sambucus mexicana*). Mixed grassland habitat typically includes native, perennial bunch grasses such as *Nassella* spp. mixed with nonnative annuals.

Common species associated with coastal sage scrub habitat include coastal sagebrush (*Artemisia californica*), flat-topped buckwheat (*Eriogonum fasciculatum*), laurel sumac (*Malosma laurina*), sage (*Saliva* spp.), goldenbush (*Isocoma menziesii*), and native grasses (*Nassella* spp.). The 1996 Integrated Natural Resources Management Plan for Detachment Fallbrook reports that fenced enclosures have been built around sensitive riparian areas at Depot Lake. [Section 3.5](#) includes a general description of the vegetation types at Detachment Fallbrook.

#### **5.10.1.4. Hydrology**

Depot Lake is within the Santa Margarita Watershed. The surrounding area drains into Depot Lake. The lake is fed by two tributaries from the north and east and held by an earthen dam at the southern end. The lake is approximately 4 to 10 feet deep in the summer months and 6 to 18 feet deep in the winter months. It holds more than 10 acre per feet of water. 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. [Section 3.6](#) includes a general description of the hydrology at Detachment Fallbrook.

#### **5.10.1.5. Hydrogeology**

No site-specific groundwater depth data were available. [Section 3.7](#) includes a general description of the hydrogeology at Detachment Fallbrook and describes the status of water rights as it relates to Depot Lake.

#### **5.10.1.6. Cultural and Natural Resources**

The data collection team for Depot Lake found documentation of a milling site near the lake. To preserve the integrity of the cultural resource, more specific information is not included in this document. The 1996 Integrated Natural Resources Management Plan reports the presence of sensitive riparian vegetative communities surrounding Depot Lake. [Section 3.8](#) includes a general description of the cultural and natural resources at Detachment Fallbrook.

#### **5.10.1.7. Endangered and Special Status Species**

Threatened and endangered species data for Detachment Fallbrook are presented in [Section 3.9](#). The 1996 Integrated Natural Resources Management Plan lists the Least Bell's vireo, arroyo toad, and the coastal California gnatcatcher as protected species that are known to or have the potential to inhabit the vegetation surrounding the site.

### ***5.10.2. Visual Survey Observations and Results***

A visual survey of Depot Lake was conducted on March 9, 2005. During the visual survey, the following Malcolm Pirnie team members were present: Mr. Chip Poalinelli, Mr. Dan Hains, and Mr. Scott Lehman. The field team conducted the visual survey by walking along the southern and western shores of the lake. Figure 5.10-1 is a photograph of the lake taken during the March 2005 survey.

A visual depiction of the site reconnaissance is provided on Map 5.10-1 located at the end of Section 5.10. Additional details are illustrated on Map 5.10-2 also located at the end of Section 5.10.

### ***5.10.3. 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). Potential ordnance concentration areas are presented along with a discussion on the presence of special consideration munitions.

According to historical records, the munitions that might be found in Depot Lake include 20-mm, 40-mm, and 60-mm cartridges and 7.2-inch projector charges. The available technical data sheets on these items are included in [Appendix D](#). Other unknown munitions may also have been disposed of in the lake.

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

### ***5.10.4. MEC Presence***

The entire site has been categorized into one of three levels of MEC presence including: Known MEC Areas, Suspect MEC Areas, and Areas where No Evidence exists to indicate that MEC is known or is suspected to be at the site. The MEC presence is discussed below.

Map 5.10-3 illustrates the munitions characterization of the Depot Lake and is provided at the end of Section 5.10.

**5.10.4.1. Known MEC Areas**

There are no Known MEC Areas associated with Depot Lake.

**5.10.4.2. Suspected MEC Areas**

Depot Lake is a Suspected MEC Area. The site is expected to have a medium MEC density; however, some areas of the site will have a higher or lower density depending on disposal practices.

**5.10.4.3. Areas Not Suspected to Contain MEC**

Until further investigations are completed, Depot Lake is suspected to contain MEC.

***5.10.5. Ordnance Penetration Estimates***

Penetration from firing would not be a factor at Depot Lake because historical records indicate that munitions were dumped into the lake. MEC at Depot Lake could be buried or partially buried in the sediment below the water surface. The depth of MEC burial would depend on sediment loading.

***5.10.6. Munitions Constituents***

Based on historical records, the primary MCs are PBX, zirconium pellets, RDX, black powder, HMX, beryllium, cobalt, copper, lead, manganese, lead azide, lead styphnate, phosphorus, antimony sulfide, zinc, zinc stearate, aluminum, cadmium, chromium, copper salt, cumene hydroperoxide, methyl chloroform, sodium nitrate, toluene, triethylamine, xylenes, 2-ethoxyethylacetate, lead chromate (VI), lead naphthenate, and zinc phosphate (from 20-mm, 40-mm, and 60-mm cartridges), and TNT, RDX, lead, and aluminum (from 7.2-inch projector charges).

***5.10.7. Contaminant Migration Routes***

Migration of MEC and MC may occur through sediment transport and deposition. Future construction, excavation, and maintenance at the site are also potential release mechanisms. MC could leach from the munitions into the water and sediments. MC may flow out of the lake and off of the installation through the surface water system. Potentially contaminated lake water could also migrate during its use for wildfire suppression. Lake water contaminated with MC might infiltrate into the groundwater.

### ***5.10.8. Receptors and Pathways***

Human receptors at Depot Lake include Navy personnel and Navy-permitted visitors (including contractors). Ecological receptors (including benthic aquatic life) may come into direct contact with MC in the sediment and/or water. Ecological receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). The general public (including MCB Camp Pendleton military personnel and civilians) could also come into contact with MC flowing out of the lake and off of the installation base through the surface water system.

#### **5.10.8.1. 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. Depot Lake is approximately 10,820 feet from the housing complex at the installation. See [Section 2.1](#) for more information on the housing complex.

#### **5.10.8.2. Buildings Near/Within Site**

There are no buildings in or on the shores of Depot Lake. The nearest building is approximately one mile to the northeast.

#### **5.10.8.3. Utilities On/Near Site**

There are no utilities running under or over Depot Lake. U.S. government phone lines are located approximately 0.2 miles (1,056 feet) from the lake's northern, eastern, and southern extents. Phone lines are located on all four sides of the lake, ranging from 0.1 miles (528 feet) to the southeast to 0.4 miles (2,112 feet).

### ***5.10.9. Land Use***

Depot Lake is mostly used to store water on the installation for fish and wildlife enhancement, and for wildfire protection. Depot Lake has also been used occasionally for recreational fishing by boat and wading by installation personnel and visitors. As of 2004, all recreational activities were discontinued at Depot Lake.

**5.10.10. Access Controls / Restrictions**

Detachment Fallbrook is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order, and for implementing access control policies and procedures. Once inside the installation, Depot Lake is located inside a controlled area. Portions of Depot Lake are fenced to protect habitat around the lake.

**5.10.11. Conceptual Site Model**

This CSM was developed following guidance documents issued by the USEPA for hazardous waste sites and the U.S. Army Corps of Engineers (USACE) for 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 5.10-1 below.

<b>Table 5.10-1: Conceptual Site Model Information Profiles – Depot Lake</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Range Profile</b>	Installation Name	NAVWPNSTA Seal Beach Detachment Fallbrook
	Installation Location	Detachment Fallbrook is located 53 miles north of San Diego in northern San Diego County, CA.
	Range Name	Depot Lake
	Range Location	Depot Lake is in the western portion of the installation.

Table 5.10-1: Conceptual Site Model Information Profiles – Depot Lake		
Profile Type	Information Needs	Preliminary Assessment Findings
	Range History	Depot Lake was constructed sometime after 1944. A 1958 memorandum from the officer in charge to the commanding officer states that certain munitions were dumped into the lake during WWII. It also stated that other types of munitions may have been dumped, and that munitions had been recovered from the lake in the past during dry summer seasons.
	Range Area and Layout	Depot Lake covers approximately 12 acres. The lake is fed by two tributaries from the north and east and held by an earthen dam at the southern end. Water is released from the lake by a spillway running beneath Terria Road to the south.
	Range Structures	There are no structures currently in or on the shores of Depot Lake.
	Range Boundaries	Map 2.1-1 shows the location of Depot Lake. N: Coastal sage scrub extends north of the lake. S: Terria Road follows the shoreline of the lake on the south and west. A spillway under Terria Road to the south is used to release water from Depot Lake. Magazines are located within 200 feet south of the lake. W: Terria Road follows the shoreline of the lake on the south. Magazines are located within 850 feet west of the lake. E: The northeast portion of the lake is bounded by grassland. Magazines are located within 200 feet east of the lake.
	Range Security	Detachment Fallbrook is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order, and for implementing access control policies and procedures. Once inside the installation, Depot Lake is located inside a controlled area. Portions of Depot Lake are fenced to protect habitat around the lake.
Munitions/ Release Profile	Munitions Types	Historical records indicate that 20-mm, 40-mm, and 60-mm cartridges, 7.2-inch projector charges, and potentially other munitions were dumped into the lake during WWII.
	Maximum Probability Penetration Depth	Penetration from firing is not a factor at Depot Lake. MEC at Depot Lake could be partially buried in the sediment below the water surface. The depth of MEC would depend on sediment loading.

Table 5.10-1: Conceptual Site Model Information Profiles – Depot Lake		
Profile Type	Information Needs	Preliminary Assessment Findings
	MEC Density	Depot Lake is a suspected MEC area. 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.
	MEC Scrap/Fragments	The presence of MEC scrap or fragments is unknown.
	Associated Munitions Constituents	The primary MC of concern are: <ul style="list-style-type: none"> <li>○ 20-mm, 40-mm, and 60-mm cartridges: PBX, zirconium pellets, RDX, black powder, HMX, beryllium, chromium, cobalt, copper, lead, manganese, lead azide, lead styphnate, phosphorus, antimony sulfide, zinc, zinc stearate, aluminum, cadmium, copper salt, cumene hydroperoxide, methyl chloroform, sodium nitrate, toluene, triethylamine, xylenes, zinc phosphate, lead chromate (VI), 2-ethoxyethylacetate, and lead naphthenate; and</li> <li>○ 7.2-inch projector charges: TNT, RDX, lead, and aluminum.</li> </ul>
	Migration Routes/Release Mechanisms	Migration of MEC and MC may occur through sediment transport and deposition. Future construction, excavation, and maintenance at the site are also potential release mechanisms. MC could leach from the munitions into the lake and the lake can carry contaminated water and sediments off the installation via the spillway. Potentially contaminated lake water could also migrate during its use for wildfire suppression. Lake water contaminated with MC might infiltrate into the groundwater.
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 & Bathymetry	Depot Lake is surrounded by level terrain with hills to the north. Specific bathymetry for the lake is unknown.
	Geology	The region is underlain by plutonic and meta-sedimentary rocks of the Peninsular Ranges geomorphic province, but site-specific information was not available.

**Table 5.10-1: Conceptual Site Model Information Profiles – Depot Lake**

Profile Type	Information Needs	Preliminary Assessment Findings
	Soil	The soil surrounding Depot Lake and the sediment in the lake are classified as course sandy loam of granitic origin.
	Hydrogeology	No site-specific groundwater depth data were available.
	Hydrology	Depot Lake is within the Santa Margarita watershed. Depot Lake is used to store water on the installation for fish and wildlife enhancement, and for wildfire protection. The lake is approximately 4 to 10 feet deep in the summer months and 6 to 18 feet deep in the winter months. The lake is fed by two tributaries from the north and east and held by an earthen dam at the southern end. Water is released from the lake by a spillway running beneath Terriea Road to the south. The surrounding area would drain into Depot Lake.
	Vegetation	The vegetation in the area of Depot Lake is considered to be riparian on the shoreline surrounded by mixed grassland to the north and east, and coastal sage scrub to the south and west. Common species in mixed grassland habitat include native, perennial bunch grasses mixed with nonnative annuals. Common species in coastal sage scrub habitat include coastal sagebrush, flat-topped buckwheat, laurel sumac, sage, goldenbush, and native grasses. Species common in riparian habitat include mulefat, arroyo willows, and elderberry.
<b>Land Use and Exposure Profile</b>	Current Land Use	Depot Lake is used to store water on the installation for fish and wildlife enhancement, and for wildfire protection. Depot Lake has been used for recreational fishing by Navy personnel and visitors by boat and wading. As of 2004, all recreational activities on the lake have been suspended until further investigation under IRP and MRP.
	Current Human Receptors	Navy personnel and Navy-permitted visitors (including contractors).
	Current Activities (frequency, nature of activity)	Supplying water for wildfire suppression.
	Potential Future Land Use	There is no change in land use planned.
	Potential Future Human Receptors	Navy personnel and Navy-permitted visitors (including contractors).

Table 5.10-1: Conceptual Site Model Information Profiles – Depot Lake		
Profile Type	Information Needs	Preliminary Assessment Findings
	Potential Future Land Use-Related Activities:	Any potential future 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, ESQD Arc restrictions apply to Depot Lake.
	Demographics/Zoning	The Detachment Fallbrook has a workforce of Command personnel comprised of 63 military, 65 civilian, and 12 contractors, as well as Tenant personnel comprised of 9 military, 126 civilian, and 90 contractors. Demographic data include the following: <ul style="list-style-type: none"> <li>• Town of Fallbrook: Population (U.S. Census, 2000): 29,100</li> <li>• San Diego County: Population (U.S. Census, 2000): 2,813,833</li> </ul>
	Beneficial Resources	Depot Lake is used wildfire protection. The 1996 Integrated Natural Resources Management Plan reports the presence of sensitive riparian vegetative communities surrounding Depot Lake. Depot Lake is surrounded by habitat for the coastal California gnatcatcher, and a management area for the Least Bell’s vireo.
<b>Ecological Profile</b>	Habitat Type	Depot Lake is a riparian habitat and is surrounded by mixed grasslands and some coastal sage scrub habitat.
	Degree of Disturbance	Disturbance at Depot Lake is expected to be low. The lake is used as a water supply. Disturbance below the water level is expected to be minimal.
	Ecological Receptors	
	General:	Common flora/fauna includes mammals (kangaroo rats, voles, deer, mice, ground squirrels, opossum, rabbits, and coyotes), amphibians (tree frogs and bull frogs), reptiles (orange-throated whiptails, rattlesnakes, and horned lizards), and birds (burrowing owls, kites, quails, sparrows, kingbirds, and hawks). Fish species occurring in the lake include catfish, sunfish, and bass.
	Federal Endangered Species:	Arroyo toad, Least Bell's vireo, Southwestern willow flycatcher, and Stephen’s kangaroo rat.

Table 5.10-1: Conceptual Site Model Information Profiles – Depot Lake		
Profile Type	Information Needs	Preliminary Assessment Findings
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	Potential human receptors at the Depot Lake include Navy personnel, visitors, and private contractors. Ecological receptors may come into direct contact with MEC and/or MC in the water. Receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). 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 5.10-2 because historical evidence indicates that MEC were disposed at Depot Lake. No MEC was observed during the visual inspection. The release mechanism of handling/treading underfoot activities is a potentially complete exposure pathway for both human receptors and biota (wildlife). Biota on the site may disturb the sediment through nesting and/or burrowing on the banks of the lake, or feeding. The release mechanism of intrusive activities (such as digging or drilling) is a potentially complete exposure pathway for both human and ecological receptors. Navy personnel and contractors may be exposed during site investigations or from potential future land use changes that may require construction.

### **MC Interactions and Pathway Analysis**

The exposure pathway analysis for MC is shown in Figure 5.10-3. Potential receptors include both human (Navy personnel, contractor/visitor) and ecological receptors (biota) that may come in contact with MC in the source medium or other potentially contaminated media. Exposure pathways are shown for each medium and are discussed below. For MC, interaction between the source (i.e., disposed munitions) and receptors generally involves a release mechanism for the MC (e.g., runoff into the surface water or uptake into the food chain), an exposure medium containing the MC (e.g., surface water or sediment), and an exposure route (e.g., incidental ingestion or dermal contact) that places the receptor into contact with the contaminated medium.

#### Surface Water/Sediment

The most direct release mechanism for MC from Depot Lake is surface water and/or sediment. Because the lake is not used for drinking water, the exposure pathway for surface water and/or sediment is considered potentially complete for human receptors through dermal contact and ingestion and for biota living in or near the lake. 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 and/or burrowing on the banks of the lake, or feeding. Water removed during wildfire suppression actions could potentially transfer MC in the surface water from the lake onto the wildfire area. As mentioned in [Section 3.7](#), MCB Camp Pendleton uses surface water from the Santa Margarita River Watershed for municipal and

domestic purposes. This could potentially affect both civilians and military personnel at MCB Camp Pendleton. The general public could also come into contact with MC migrating off the installation through the surface water system.

#### Plant/Animal Uptake

Potentially complete pathways are indicated for biota (wildlife) exposed to MC at Depot Lake via the food chain. MC may be taken up by plants and prey and consumed by animals (wildlife) at the lake.

#### Groundwater

Potentially complete pathways for Navy personnel and contractors/visitors are indicated for groundwater contaminated with MC at and near Depot Lake. Navy personnel and contractors/visitors may come into contact with groundwater during environmental investigations (i.e. monitoring well installation and sampling) at and near the lake. As mentioned in [Section 3.7](#), MCB Camp Pendleton extracts and uses groundwater from the Santa Margarita Watershed; this could potentially affect both civilians and military personnel at MCB Camp Pendleton. The potential for groundwater impacts is considered to be incomplete for all other receptors.

An exposure pathway does not exist for MC in the air, surface soil, and subsurface soil for any receptors.

#### ***5.10.12. Summary***

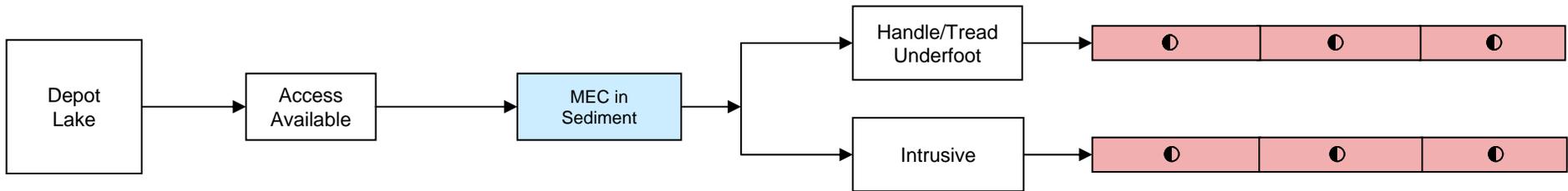
Depot Lake is a 12-acre artificial lake which historical records indicate was used for munitions (20-mm, 40-mm, and 60-mm cartridges and 7.2-inch projector charges) disposal during WWII. Records show that other types of munitions may have been dumped as well, and that, during past dry summer seasons, munitions have been recovered from the lake. Depot Lake is used to store water on the installation for fish and wildlife enhancement, and for wildfire protection. Potential receptors include Navy personnel, Navy-permitted visitors, and ecological receptors. Though no munitions or munitions scrap were observed during the site visit in March 2005, the lake is suspected to contain MEC and MC.

#### ***5.10.13. Recommendations***

Based on the data collected and presented in this PA, an SI is recommended for both MEC and MC at Depot Lake.

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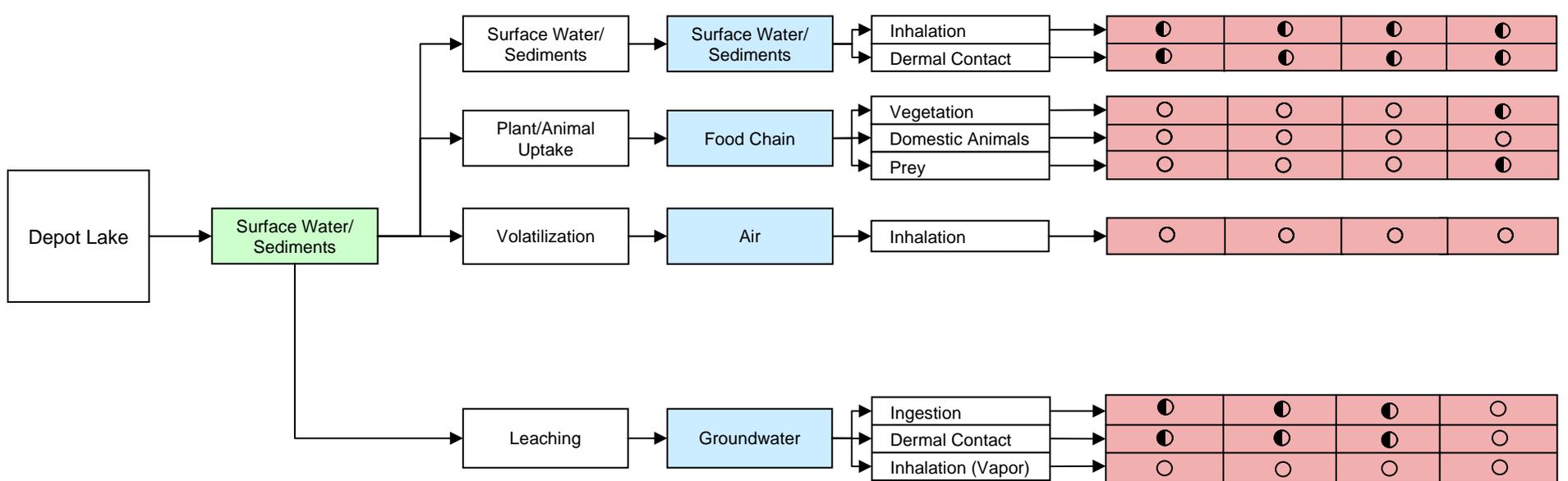
Prepared for: 

PRELIMINARY ASSESSMENT – FINAL PA REPORT  
 DEPOT LAKE – MEC EXPOSURE PATHWAY ANALYSIS  
 NAVWPNSTA SEAL BEACH DETACHMENT FALLBROOK, CALIFORNIA

**MALCOLM PIRNIE, INC.**  
 FIGURE 5.10-2 FINAL  
 June 2006

Source Area	Source Media	Release Mechanisms	Exposure Media	Exposure Routes	Receptors			
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Navy Personnel	Contractor/ Visitor	General Public	Biota
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● Complete Pathway  
 ○ Incomplete Pathway  
 ◐ Potentially Complete Pathway



Preliminary Assessment  
NAVWPNSTA Seal Beach  
Detachment Fallbrook, California

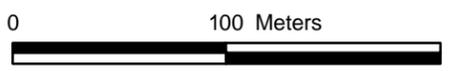


MALCOLM  
PIRNIE

Map 5.10-1  
Visual Survey  
Depot Lake

Legend

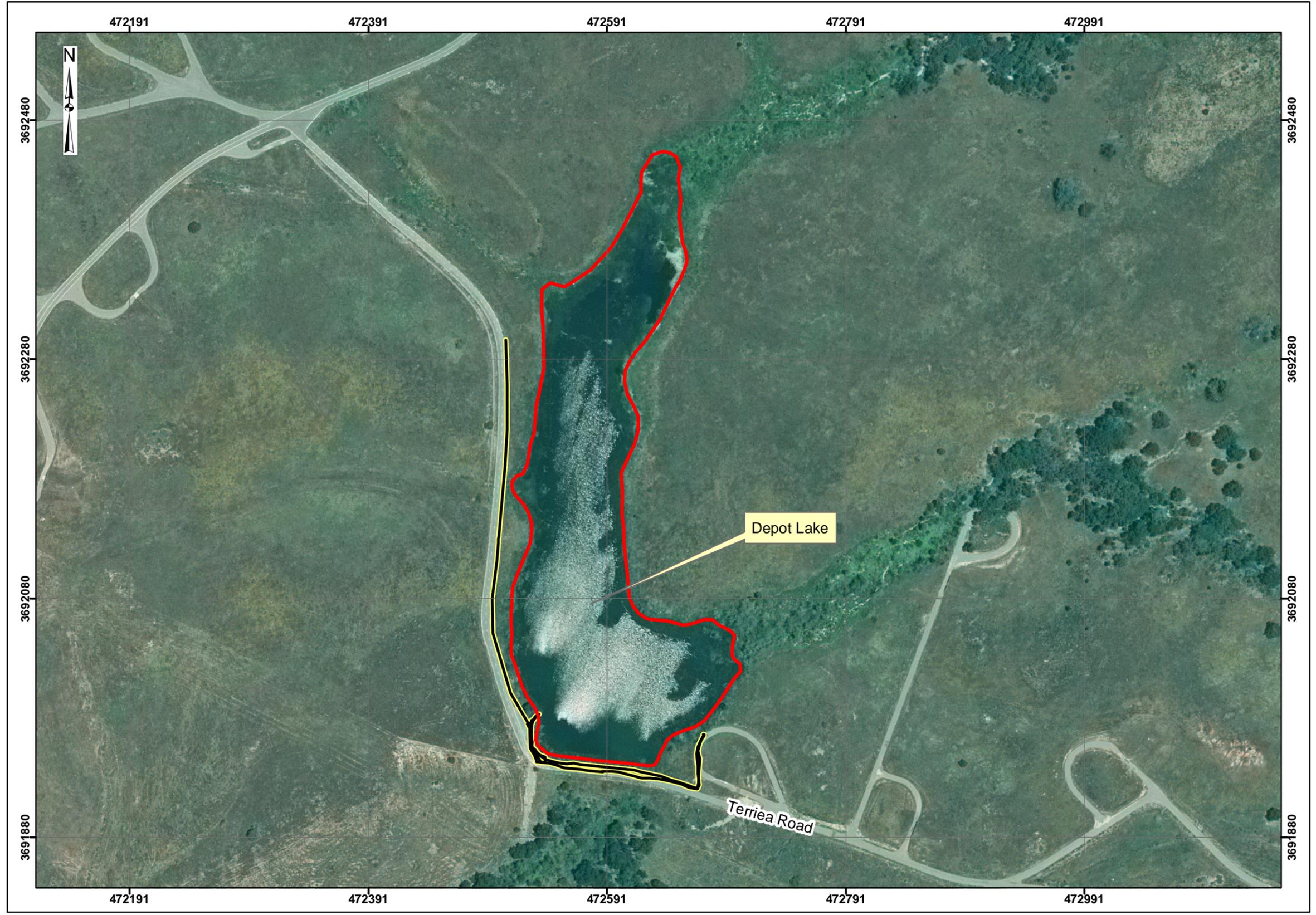
-  Site Reconnaissance Path
-  Depot Lake



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 5.10-2  
Site Details  
Depot Lake

Legend

- Depot Lake
- Streams
- Topographic Contours  
(ft above MSL)



Data Source: Anteon Corporation,  
Ortho photo, 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



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



**MALCOLM  
PIRNIE**

**Map 5.10-3  
Munitions Characterization  
Depot Lake**

**Legend**

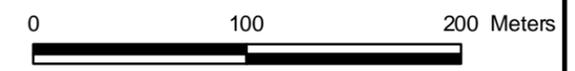
 Depot Lake

**MEC Presence\***

 Known

 Suspect

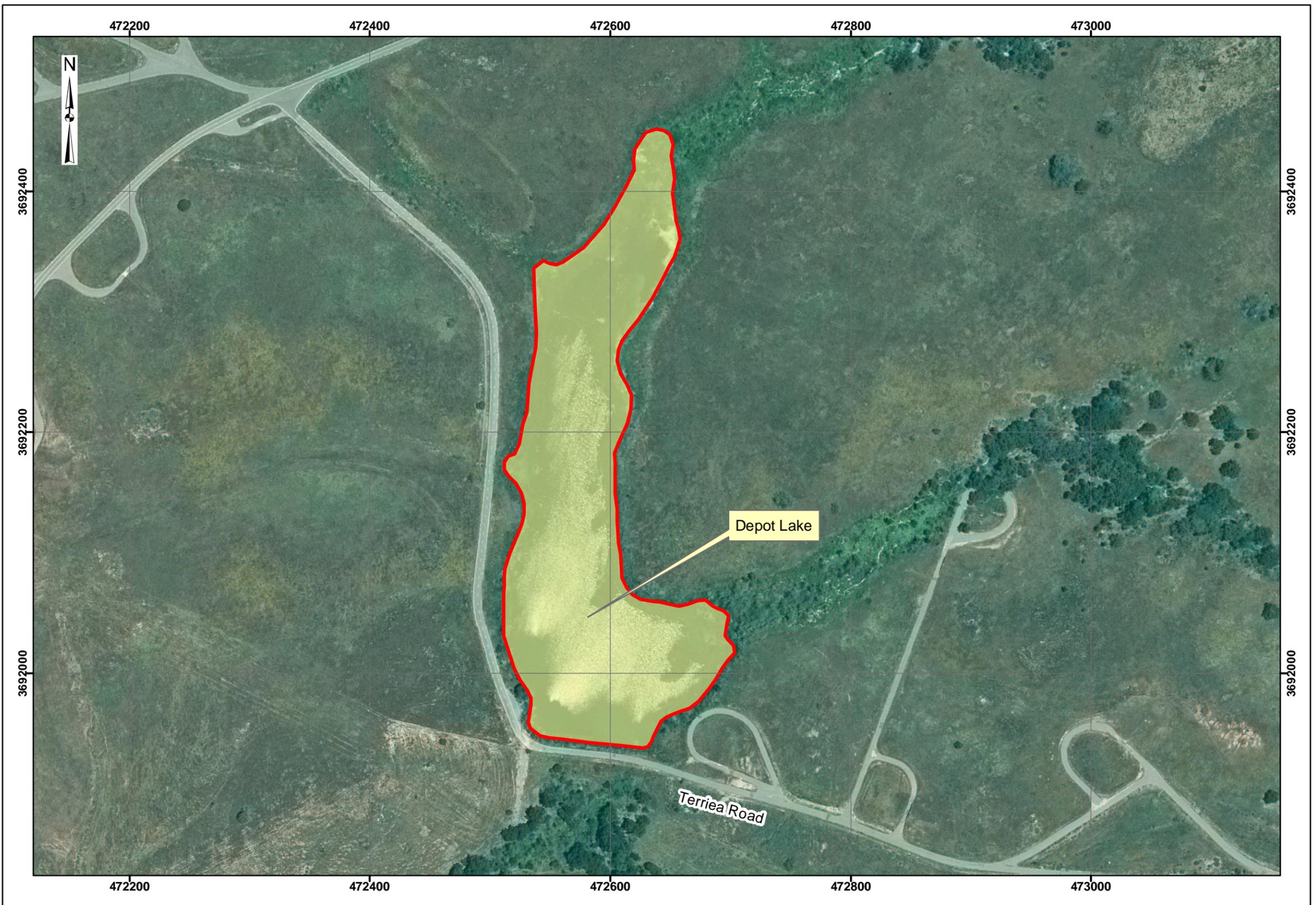
\*MEC Presence was determined through review of historical documentation, interviews, and visual survey.



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



## **5.11. Lower Lake**

Lower Lake is a 3-acre artificial lake on the southwestern part of Detachment Fallbrook, approximately 300 feet north of Shaik Road and just west of the Group 13 magazines. Map 2.1-1 shows the location of the lake on Detachment Fallbrook and its boundaries.

### ***5.11.1. History and Site Description***

Lower Lake is an artificial lake created prior to development of the installation. The lake is fed by tributaries from the north, east, and west and held by an earthen dam at the western end. The lake was identified as a disposal site for munitions in a 1958 memorandum. The 1958 memorandum from the officer in charge to the commanding officer states that certain munitions (20-mm, 40-mm, and 60-mm cartridge, and 7.2-inch projector charges) were dumped into two lakes during WWII, and that other types of munitions may also have been dumped into the lake. According to Mr. Knight, Natural Resource Manager, Lower Lake is one of the lakes referred to in the memorandum. The 1958 memorandum states that munitions had been recovered from the lake in the past during dry summer seasons. The same memorandum requests that EOD technicians perform diving operations at the lake to salvage MEC. No records were found to indicate whether diving operations took place or whether additional munitions were found in the lake. Personnel interviewed during the site visit stated that before 1953 the Marine Security Forces might have dumped unexpended shells into the lake instead of turning them in to be inventoried. Currently, Lower Lake is used to store water on the installation for fish and wildlife enhancement, and for wildfire protection. The fire department (Station 9) uses a helicopter and bucket method to remove water from Lower Lake. The bucket holds 300 gallons of water and only goes down 4 feet into the water. This action is performed on average twice a year during wildfire season. The water is only used to fight fires inside Detachment Fallbrook. From this description, it would not appear that the bucket method would significantly disturb the sediments in the lakes. The lake has also been used for recreational boating and fishing (strict catch and release policy). As of 2004, all recreational activities were discontinued at Lower Lake.

#### **5.11.1.1. Topography and Bathymetry**

The area surrounding Lower Lake contains low hills. Specific bathymetry for Lower Lake is unknown. For further information on the topography of Detachment Fallbrook, see [Section 3.2](#).

### 5.11.1.2. Geology

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



**Figure 5.11-1: Photograph was taken during the March 2005 on-site visual survey.  
View of Lower Lake.**

### 5.11.1.3. Soil and Vegetation Types

Soils surrounding Lower Lake and the sediment in the lake are classified as coarse sandy loam of granitic origin. [Section 3.4](#) includes a general description of the soil types at Detachment Fallbrook.

The vegetation in the area of Lower Lake is considered to be riparian surrounded by mixed grassland to the south and east and coastal sage scrub to the north and west. Species commonly associated with riparian habitat include mulefat (*Baccharis salicifolia*), arroyo willows (*Salix lasiolepis*), and elderberry (*Sambucus mexicana*). Mixed grassland habitat typically includes native, perennial bunch grasses such as *Nassella* spp. mixed with nonnative annuals. Common species associated with coastal sage scrub 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.

#### **5.11.1.4. Hydrology**

Lower Lake is within the Santa Margarita River watershed. The 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 Camp Pendleton. The lake is approximately 8 to 16 feet deep during the summer months and 12 to 25 feet during the winter months. It holds less than 10 acres per foot of water. [Section 3.6](#) includes a general description of the hydrology at Detachment Fallbrook.

#### **5.11.1.5. Hydrogeology**

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

#### **5.11.1.6. Cultural and Natural Resources**

The data collection team for Lower Lake 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.

#### **5.11.1.7. Endangered and Special Status Species**

Threatened and endangered species data for Detachment Fallbrook are presented in [Section 3.9](#). The 1996 Integrated Natural Resources Management Plan lists the Least Bell's vireo and the coastal California gnatcatcher as protected species known to or having the potential to inhabit the vegetation surrounding the lake area.

### ***5.11.2. Visual Survey Observations and Results***

A visual survey of Lower Lake was conducted on March 29, 2005. During the visual survey, the following Malcolm Pirnie team members were present: Mr. Chip Poalinelli, Mr. Dan Hains, and Mr. Scott Lehman. The field team conducted the visual survey by walking the western and southern shores of the lake.

A visual depiction of the site reconnaissance is provided on Map 5.11-1 located at the end of Section 5.11. Additional details are illustrated on Map 5.11-2 also located at the end of Section 5.11.

### ***5.11.3. 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). Potential ordnance concentration areas are presented along with a discussion on the presence of special consideration munitions.

According to historical records, the munitions that might be found in Lower Lake include 20-mm, 40-mm, and 60-mm cartridges and 7.2-inch projector charges. Other unknown munitions may also have been dumped in the lake. The available technical data sheets on these items are included in [Appendix D](#).

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

### ***5.11.4. MEC Presence***

The entire site has been categorized into one of three levels of MEC presence including: Known MEC Areas, Suspect MEC Areas, and Areas where No Evidence exists to indicate that MEC is known or is suspected to be at the site. The MEC presence is discussed below.

Map 5.11-3 illustrates the munitions characterization of the Lower Lake and is provided at the end of Section 5.11.

#### **5.11.4.1. Known MEC Areas**

There are no Known MEC Areas associated with Lower Lake.

#### **5.11.4.2. Suspected MEC Areas**

Lower Lake is a Suspected MEC Area of medium MEC density. Some areas of the lake may have a higher or lower density, depending on disposal practices.

#### **5.11.4.3. Areas Not Suspected to Contain MEC**

Until further investigations are completed, Lower Lake is suspected to contain MEC.

#### ***5.11.5. Ordnance Penetration Estimates***

Penetration from firing is not a factor at Lower Lake because historical records indicate that munitions were dumped into the lake. MEC at Lower Lake could be buried or partially buried in the sediment below the water surface. The depth of MEC would depend on sediment loading.

#### ***5.11.6. Munitions Constituents***

Based on historical records, the primary MC are PBX, zirconium pellets, RDX, aluminum, black powder, HMX, beryllium, chromium, cobalt, copper, lead, manganese, lead azide, lead styphnate, phosphorus, antimony sulfide, zinc, zinc stearate, cadmium, copper salt, cumene hydroperoxide, methyl chloroform, sodium nitrate, toluene, triethylamine, xylenes, 2-ethoxyethylacetate, lead chromate (VI), lead naphthenate, zinc phosphate (from 20-mm, 40-mm, and 60-mm cartridges), and TNT, RDX, lead, and aluminum (from 7.2-inch projector charges).

#### ***5.11.7. Contaminant Migration Routes***

Migration of MEC and MC may occur through sediment transport and deposition. Future construction, excavation, and maintenance at the site are also potential release mechanisms. MC could leach from the munitions into the lake. MC may flow out of the lake and installation through the surface water system. Potentially contaminated lake water could also migrate during its use for wildfire suppression. Lake water contaminated with MC might infiltrate into the groundwater.

#### ***5.11.8. Receptors***

Human receptors at Lower Lake include Navy personnel and Navy-permitted visitors (including contractors). Ecological receptors (including benthic aquatic life) may come into direct contact with MC in the sediments and/or water. Ecological receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). The general public (including MCB Camp Pendleton military personnel and civilians) could also come into contact with MC flowing out of the lake and off of the installation base through the surface water system.

#### **5.11.8.1. 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. Lower Lake is approximately 18,700 feet from the housing complex at the installation. See [Section 2.1](#) for more information on the housing complex.

#### **5.11.8.2. Buildings Near/Within Site**

There are no buildings within Lower Lake. The nearest building within the installation's boundary is more than two miles to the west. Magazines are located 0.3 miles to the southeast and 0.65 miles to the northeast.

#### **5.11.8.3. Utilities On/Near Site**

There are no utilities running under or through Lower Lake. To the west along the installation border (approximately 0.4 miles) are existing firebreaks. Phone lines and U.S. government phone lines service the magazines located 0.3 miles to the southeast and 0.65 miles to the northeast.

#### ***5.11.9. Land Use***

Lower Lake is mostly used to store water on the installation for fish and wildlife enhancement, and for wildfire protection. Lower Lake has also been used occasionally for recreational fishing by boat and wading by installation personnel. As of 2004, all recreational activities were discontinued at Lower Lake.

#### ***5.11.10. Access Controls / Restrictions***

Detachment Fallbrook is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order, and for implementing access control policies and procedures. Once inside the installation, Lower Lake is located inside a controlled area.

#### ***5.11.11. 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-

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89/004) and the USACE CSM Guidance Development of Integrated Conceptual Site Models for Environmental OE Sites, which was final as of February 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 5.11-1 below.

<b>Table 5.11-1: Conceptual Site Model Information Profiles – Lower Lake</b>		
<b>Profile Type</b>	<b>Information Needs</b>	<b>Preliminary Assessment Findings</b>
<b>Range/Site Profile</b>	Installation Name	NAVWPNSTA Seal Beach Detachment Fallbrook
	Installation Location	Detachment Fallbrook is located 53 miles north of San Diego in northern San Diego County, CA.
	Range/Site Name	Lower Lake
	Range/Site Location	Lower Lake is in the southwestern portion of the installation.
	Range/Site History	Lower Lake is an artificial lake created prior to development of the installation. A 1958 memorandum from the officer in charge to the commanding officer states that certain munitions were dumped into the lake during WWII. It states that other types of munitions may have been dumped, and that munitions had been recovered from the lake in the past during dry summer seasons.
	Range/Site Area and Layout	Lower Lake is approximately 3 acres. The lake is fed by streams from the north, east, and west and held by an earthen dam at the western end.
	Range/Site Structures	There are no structures currently on Lower Lake.

Table 5.11-1: Conceptual Site Model Information Profiles – Lower Lake		
Profile Type	Information Needs	Preliminary Assessment Findings
	Range/Site Boundaries	<p>Map 2.1-1 shows the location of Lower Lake.</p> <p>N: Coastal sage scrub extends north of the lake.</p> <p>S: Mixed grassland and coastal sage scrub habitat are located south of the lake.</p> <p>W: The boundary of the installation is within approximately 1,000 feet west of the lake.</p> <p>E: Mixed grassland and coastal sage scrub habitat are located east of the lake. Magazines are located within approximately 1,500 feet east of the lake.</p>
	Range/Site Security	<p>Detachment Fallbrook is a fenced and guarded installation. Security Forces personnel are responsible for maintaining law and order, and for implementing access control policies and procedures. Once inside the installation, Lower Lake is located inside a controlled area.</p>
<b>Munitions/ Release Profile</b>	Munitions Types	<p>Historical records indicate that 20-mm, 40-mm, and 60-mm cartridges, 7.2-inch projector charges, and potentially other munitions were dumped into the lake during WWII.</p>
	Maximum Probability Penetration Depth	<p>Penetration from firing is not a factor at Lower Lake. MEC at Lower Lake could be below the water surface, buried in sediment, or partially buried, depending on sediment loading.</p>
	MEC Density	<p>Lower Lake is a suspected MEC area. The site is suspected to have a medium MEC density; however, some areas of the lake may have a higher or lower density depending on disposal practices.</p>
	MEC Scrap/Fragments	<p>The presence of MEC scrap or fragments is unknown.</p>

Table 5.11-1: Conceptual Site Model Information Profiles – Lower Lake		
Profile Type	Information Needs	Preliminary Assessment Findings
	Associated Munitions Constituents	<p>The primary MC of concern are:</p> <ul style="list-style-type: none"> <li>○ 20-mm, 40-mm, and 60-mm cartridges: PBX, zirconium pellets, RDX, black powder, HMX, beryllium, cobalt, copper, lead, manganese, lead azide, lead styphnate, phosphorus, antimony sulfide, zinc, zinc stearate, aluminum, cadmium, chromium, copper salt, cumene hydroperoxide, methyl chloroform, sodium nitrate, toluene, triethylamine, xylenes, zinc phosphate, lead chromate (VI), 2-ethoxyethylacetate, and lead naphthenate; and</li> <li>○ 7.2-inch projector charges: TNT, RDX, lead, and aluminum.</li> </ul>
	Migration Routes/Release Mechanisms	<p>Migration of MEC and MC may occur through sediment transport and deposition. Future construction, excavation, and maintenance at the site are also potential release mechanisms. MC could leach from the munitions into the lake. Potentially contaminated lake water could also migrate during its use for fire suppression. Lake water contaminated with MC might infiltrate into the groundwater.</p>
<b>Physical Profile</b>	Climate	<p>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.</p>
	Topography & Bathymetry	<p>The area surrounding Lower Lake contains low hills. Specific bathymetry for Lower Lake is unknown.</p>
	Geology	<p>The region is underlain by plutonic and metasedimentary rocks of the Peninsular Ranges geomorphic province, but site-specific information was not available.</p>
	Soil	<p>The soil surrounding Lower Lake and the sediment in the lake are classified as coarse sandy loam of granitic origin.</p>

Table 5.11-1: Conceptual Site Model Information Profiles – Lower Lake		
Profile Type	Information Needs	Preliminary Assessment Findings
	Hydrogeology	No site-specific groundwater depth data were available.
	Hydrology	Lower Lake is within the watershed of the Santa Margarita River. The lake is approximately 8 to 16 feet deep during the summer months and 12 to 25 feet during the winter months.
	Vegetation	The vegetation in the area of Lower Lake is considered to be riparian in the shoreline surrounded by mixed grassland to the south and east and coastal sage scrub to the north and west. Common species in mixed grassland habitat include native, perennial bunch grasses such as <i>Nassella</i> spp. mixed with nonnative annuals. Common species in coastal sage scrub habitat include coastal sagebrush, flat-topped buckwheat, laurel sumac, sage, goldenbush, and native grasses. Species common in riparian habitat include mulefat, arroyo willow, and elderberry.
<b>Land Use and Exposure Profile</b>	Current Land Use	Lower Lake is used to store water on the installation for fish and wildlife enhancement, and for wildfire protection. Lower Lake has been used for recreational fishing by boat and wading. As of 2004, all recreational activities on the lake have been suspended until further investigation under IRP and MRP.
	Current Human Receptors	Navy personnel and Navy-permitted visitors (including contractors).
	Current Activities (frequency, nature of activity)	Supplying water for wildfire suppression.
	Potential Future Land Use	There is no planned change in the use of the site.
	Potential Future Human Receptors	Navy personnel and Navy-permitted visitors (including contractors).
	Potential Future Land Use-Related Activities:	Any potential future use activities would have to follow any Navy ESQD Arc 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 Lower Lake.	

Table 5.11-1: Conceptual Site Model Information Profiles – Lower Lake		
Profile Type	Information Needs	Preliminary Assessment Findings
<b>Ecological Profile</b>	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"> <li>• Town of Fallbrook: Population (U.S. Census, 2000): 29,100</li> <li>• San Diego County: Population (U.S. Census, 2000): 2,813,833</li> </ul>
	Beneficial Resources	Least Bell’s vireo habitat and water storage.
	Habitat Type	Lower Lake is a riparian habitat and is surrounded by mixed grasslands and coastal sage scrub habitat.
	Degree of Disturbance	Disturbance at Lower Lake is expected to be low. The lake supplies water for wildfire suppression. Disturbance below the water level is expected to be minimal.
	Ecological Receptors	
	General	Common flora/fauna includes mammals (kangaroo rats, voles, deer, mice, ground squirrels, opossum, rabbits, and coyotes), amphibians (tree frogs and bull frogs), reptiles (orange-throated whiptails, rattlesnakes, and horned lizards), and birds (burrowing owls, kites, sparrows, kingbirds, and hawks). Fish species occurring in the lake include catfish, sunfish, and bass.
	Federal Endangered Species:	Arroyo toad, Least Bell's vireo, Southwestern willow flycatcher, and Stephen’s kangaroo rat
	Relationship of MEC/MC Sources to Habitat and Potential Receptors	Potential human receptors at the Lower Lake include Navy personnel, visitors, and private contractors. Ecological receptors may come into direct contact with MEC and/or MC in the water. 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 5.11-2 because historical evidence indicates that MEC were disposed at Lower Lake. No MEC was observed during visual inspection. The release mechanism of handling/treading underfoot activities is a potentially complete exposure pathway for both human receptors and biota. Biota on the site may disturb the sediment through nesting on the lake's banks or feeding. The release mechanism of intrusive activities (such as digging or drilling) is a potentially complete exposure pathway for both human

and ecological receptors. Navy personnel and contractors may be exposed during site investigations or from potential future land use changes that may require construction.

### **MC Interactions and Pathway Analysis**

The exposure pathway analysis for MC is shown in Figure 5.11-3. Potential receptors include both human (Navy personnel, contractor/visitor, and trespasser) 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 (i.e., disposed munitions) and receptors generally involves a release mechanism for the MC (e.g., runoff into the surface water or uptake into the food chain), an exposure medium containing the MC (e.g., sediment or surface water), and an exposure route (e.g., incidental ingestion or dermal contact) that places the receptor into contact with the contaminated medium.

#### Surface Water/Sediment

The most direct release mechanism for MC from Lower Lake is surface water or sediment. Because the lake is not used for drinking water, the exposure pathway for surface water and/or sediment is considered potentially complete for human receptors through dermal contact and ingestion and for biota living in or near the lake. 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 on the lake's banks or feeding. Water removed during wildfire suppression actions could potentially transfer MC in the surface water from the lake onto the wildfire area. As mentioned in [Section 3.7](#), MCB Camp Pendleton uses surface water from the Santa Margarita River Watershed for municipal and domestic purposes. This could potentially affect both civilians and military personnel at MCB Camp Pendleton. The general public could also come into contact with MC migrating off the installation through the surface water system.

#### Plant/Animal Uptake

Potentially complete pathways are indicated for biota (such as rattlesnakes) exposed to MC at Lower Lake via the food chain. MC may be taken up by plants and prey and consumed by animals (wildlife) at the lake.

Groundwater

Potentially complete pathways for Navy personnel and contractors/visitors are indicated for groundwater contaminated with MC at and near Lower Lake. Navy personnel and contractors/visitors may come into contact with groundwater during environmental investigations (i.e. monitoring well installation and sampling) at and near the lake. As mentioned in [Section 3.7](#), MCB Camp Pendleton extracts and uses groundwater from the Santa Margarita Watershed; this could potentially affect both civilians and military personnel at MCB Camp Pendleton. The potential for groundwater impacts is considered to be incomplete for all other receptors.

An exposure pathway does not exist for MC in the air, surface soil, and subsurface soil for human or ecological receptors.

**5.11.12. Summary**

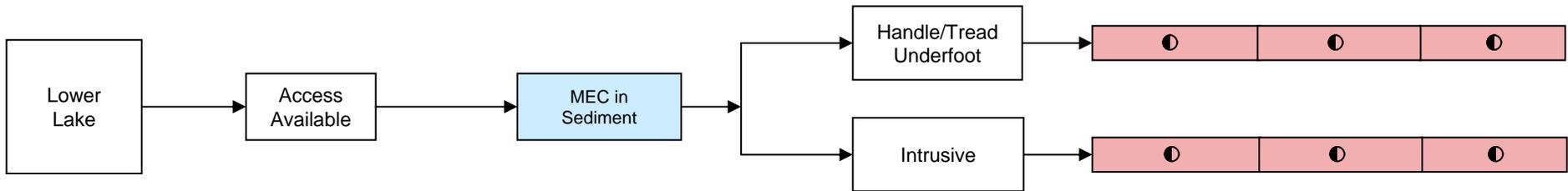
Lower Lake is a 3-acre artificial lake which historical records indicate had munitions (20-mm, 40-mm, and 60-mm cartridges and 7.2-inch projector charges) dumped into during WWII. Records also show that other types of munitions may have been dumped as well, and that, during past dry summer seasons, munitions have been recovered from the lake. Lower Lake is used to store water on the installation for fish and wildlife enhancement, and for wildfire protection. Potential receptors include Navy personnel, Navy-permitted visitors, and ecological receptors. Though no munitions or munitions scrap were observed during the site visit in March 2005, the lake is suspected to contain MEC and MC.

**5.11.13. Recommendations**

Based on the data collected and presented in this PA, an SI is recommended for both MEC and MC at Lower Lake.

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



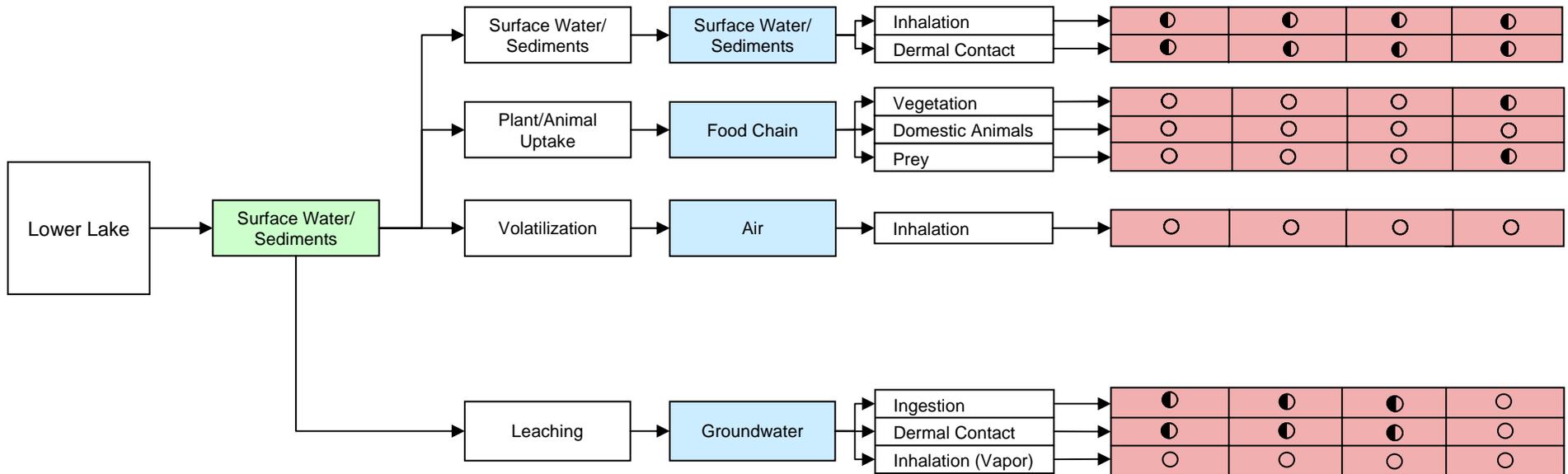
Prepared for: 

PRELIMINARY ASSESSMENT – FINAL PA REPORT  
 LOWER LAKE – MEC EXPOSURE PATHWAY ANALYSIS  
 NAVWPNSTA SEAL BEACH DETACHMENT FALLBROOK, CALIFORNIA

**MALCOLM PIRNIE, INC.**  
 FIGURE 5.11-2 FINAL  
 June 2006

Source Area	Source Media	Release Mechanisms	Exposure Media	Exposure Routes	Receptors			
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Navy Personnel	Contractor/ Visitor	General Public	Biota
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●	Complete Pathway
○	Incomplete Pathway
◐	Potentially Complete Pathway



Prepared for:



PRELIMINARY ASSESSMENT – FINAL PA REPORT  
 LOWER LAKE – MC EXPOSURE PATHWAY ANALYSIS  
 NAVWPNSTA SEAL BEACH DETACHMENT FALLBROOK, CALIFORNIA

**MALCOLM PIRNIE, INC.**

FIGURE 5.11-3 FINAL  
 June 2006

Preliminary Assessment  
NAVWPNSTA Seal Beach  
Detachment Fallbrook, California



MALCOLM  
PIRNIE

Map 5.11-1  
Visual Survey  
Lower Lake

Legend

-  Site Reconnaissance Path
-  Lower Lake



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  
NAVWPNSTA Seal Beach  
Detachment Fallbrook, California



MALCOLM  
PIRNIE

Map 5.11-2  
Site Details  
Lower Lake

Legend

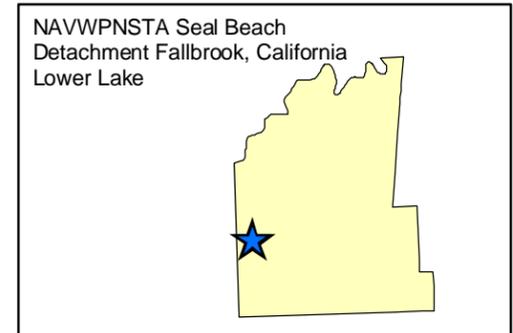
-  Lower Lake
-  Topographic Contours  
(feet above MSL)



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



Preliminary Assessment  
NAVWPNSTA Seal Beach  
Detachment Fallbrook, California



MALCOLM  
PIRNIE

Map 5.11-3  
Munitions Characterization  
Lower Lake

Legend

 Lower Lake

MEC Presence\*

 Known

 Suspect



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

0 30 Meters



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  
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[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Memorandums and Letters\February 1942 Commissioning of Fallbrook. PDF](#)

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[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Memorandums and Letters\September 1945 Obsolete or Inert Ordnance Disposition. PDF](#)

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[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Memorandums and Letters\October 1946 Mission of NAD Fallbrook. PDF](#)

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[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Memorandums and Letters\April 1947 Disposition of Sulfur Trioxide Smoke. PDF](#)

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[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Memorandums and Letters\September 1949 Disposition of Ammonium Nitrate Cratering Charges. PDF](#)

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[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Memorandums and Letters\July 1952 Approval of Ammunition Disposal Area. PDF](#)

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[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Memorandums and Letters\February 1969 Fallbrook Junior Rifle Club. PDF](#)

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[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Memorandums and Letters\April 1969 Civilian Use of Target Range. PDF](#)

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### Guidance Documents

USEPA's Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, Interim Final (1988, EPA/540/G-89/004)

Available at <http://nepis.epa.gov>

Final USACE CSM Guidance Development of Integrated Conceptual Site Models for Environmental OE Sites (2003).

<http://www.usace.army.mil/inet/usace-docs/eng-manuals/em1110-1-1200/toc.htm>

### Websites

<http://www.navyrangeinventory.net> (Fallbrook SF Small Arms Range information), September 2004.

[http://www.sbeach.navy.mil/Info/station\\_det/Fallbrook.htm](http://www.sbeach.navy.mil/Info/station_det/Fallbrook.htm) (General information regarding Detachment Fallbrook), September 2004.

<http://www.globalsecurity.org/military/facility/fallbrook.htm> (General information regarding Detachment Fallbrook), September 2004.

[http://www.consrv.ca.gov/cgs/information/publications/cgs\\_notes/note\\_36/note\\_36.pdf](http://www.consrv.ca.gov/cgs/information/publications/cgs_notes/note_36/note_36.pdf) (Geologic information for San Diego County), November 2004.

<http://fallbrook.areaconnect.com/statistics.htm> (Fallbrook population information), November 2004.

<http://www.census.gov/popest/counties/CO-EST2003-01.html> (General information on San Diego County), November 2004.

<http://www.sdnhm.org/research/paleontology/sdgeol.html> (General information on San Diego County Geology), January 2005.

[http://www.dfg.ca.gov/whdab/html/quick\\_viewer\\_launch.html](http://www.dfg.ca.gov/whdab/html/quick_viewer_launch.html) (California Wildlife and Habitat Data Analysis Branch), July 2005.

Maps and Aerial Photos

General Development Map for U.S. Naval Weapons Station Seal Beach, Fallbrook Detachment, October 1965.

File: [Reference\\_Documents\Source\\_Data\Appendix\\_B\Maps and Arial Photos\October 1965 Map. PDF](#)

Map of U.S. Naval Weapons Station Fallbrook, Undated.

File: [Reference\\_Documents\Source\\_Data\Appendix\\_B\Maps and Arial Photos\Undated Map 1. PDF](#)

General Development Map for U.S. Naval Weapons Station Seal Beach, Fallbrook Detachment, June 1951.

File: [Reference\\_Documents\Source\\_Data\Appendix\\_B\Maps and Arial Photos\June 1951 Map. PDF](#)

Map of U.S. Naval Weapons Station Fallbrook, Undated.

File: [Reference\\_Documents\Source\\_Data\Appendix\\_B\Maps and Arial Photos\Undated Map 2. PDF](#)

Photo showing one of the three burn/slit trenches in use at the Fallbrook QE Test Area, June 1968.

File: [Reference\\_Documents\Source\\_Data\Appendix\\_B\Maps and Arial Photos\June 1968 Photo of Burn Trenches 1. PDF](#)

Photo showing inside view of one of the three burn/slit trenches at the Fallbrook QE Test Area, June 1968.

File: [Reference\\_Documents\Source\\_Data\Appendix\\_B\Maps and Arial Photos\ June 1968 Photo of Burn Trenches 2. PDF](#)

## FINAL PRELIMINARY ASSESSMENT

Master Shore Station Development Plan Map for U.S. Naval Weapons Station Seal Beach, Fallbrook Detachment, February 1954.

[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Maps and Arial Photos\February 1954 Map. PDF](#)

Master Shore Station Development Plan Map for U.S. Naval Weapons Station Seal Beach, Fallbrook Detachment, June 1953.

[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Maps and Arial Photos\June 1953 Map. PDF](#)

Map of Naval Ammunition Depot, Fallbrook, California, Eleventh Naval District, San Diego, California, Showing Conditions on June 30, 1942.

[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Maps and Arial Photos\June 1942 Map. PDF](#)

Aerial photo showing East view of the U.S. Naval Ammunition Depot, Alt.: 10000 - Fallbrook, CA, January 16, 1959

[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Maps and Arial Photos\JAN 16 1959 US Naval Ammunition Depot-East. PDF](#)

Aerial photo showing aerial coverage of the US Marine Corps Ammunition Depot, Alt.: 12,000 Fallbrook, CA, May 27, 1949

[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Maps and Arial Photos\May 27 1949 US Marine Corps Ammunition Depot. PDF](#)

Aerial photo showing Fallbrook Ammunition Depot, ALT.: 10,000, April 28, 1948

[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Maps and Arial Photos\APR 28 1948 Fallbrook Ammo. Depot. PDF](#)

Aerial photo showing Aerial coverage of the Naval Ammunition Depot, Fallbrook, ALT.: 13,500 April 7, 1948

[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Maps and Arial Photos\APR 7 1948 N.A.D. Fallbrook 3. PDF](#)

**FINAL PRELIMINARY ASSESSMENT**

Aerial photo showing Aerial coverage of the Naval Ammunition Depot, Fallbrook, ALT.: 13,500  
April 7, 1948

[File: Reference\\_Documents\Source\\_Data\Appendix\\_B\Maps and Arial Photos\APR 7 1948](#)

[N.A.D. Fallbrook 1. PDF](#)

## **Appendix B: Project Source Data – General**

Electronic copies of reference materials for Appendix B are provided on the CD-ROM in folder: Reference\_Documents\Source\_Data\Appendix \_B

Links to all reference documents are provided in [Appendix A](#).

## **Appendix C: Project Source Data – Site Specific**

# Interview Record

---

**Installation/Range or Site:**

NAVWPNSTA Seal Beach, Detachment Fallbrook, California

**Date/Time:** September 29, 2004

**Person Conducting the Interview/Title/Organization:**

Monique De Jesus/Project Engineer/Malcolm Pirnie

**Person Being Interviewed/Title/Organization:**

Master Gunnery Sergeant Samuel Larter/EOD Detachment at MCB Camp Pendleton

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):**

His team responds to munitions incidents at Detachment Fallbrook.

---

**Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

Master Gunnery Seargeant Samuel Larter allowed the team access to any responses his team had performed at Detachment Fallbrook.



# Interview Record

---

**Installation/Range or Site:**

NAVWPNSTA Seal Beach, Detachment Fallbrook, California

**Date/Time:** September 29, 2004

**Person Conducting the Interview/Title/Organization:**

Monique De Jesus/Project Engineer/Malcolm Pirnie

**Person Being Interviewed/Title/Organization:**

Greg Town/Quality Assurance/Ordnance Department

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):**

His knowledge from working at the Ordnance Department.

---

**Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

Mr Town was familiar with the location of the Salvage Yard Landfill, the five Dunnage Disposal Sites, and the QE Test Area. He gave us information on these sites like years of use, plus he gave us other names of personnel to interview. He had heard that munitions may have been dumped in the lakes and in the ravines throughout Detachment Fallbrook.



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# Interview Record

---

**Installation/Range or Site:**

NAVWPNSTA Seal Beach, Detachment Fallbrook, California

**Date/Time:** September 29, 2004

**Person Conducting the Interview/Title/Organization:**

Monique De Jesus/Project Engineer/Malcolm Pirnie

**Person Being Interviewed/Title/Organization:**

Kevin Bourelle/Head of the Facilities Department

Richard Spinello/Maintenance Supervisor/Facilities Department

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):**

Their knowledge of Detachment Fallbrook and its facilities.

---

**Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

Mr. Bourelle and Mr Spinello helped the team with the delineation of boundaries for the sites and years of use. They also gave the team access to the map and photograph archives for Detachment Fallbrook.



# Interview Record

**Installation/Range or Site:**

NAVWPNSTA Seal Beach, Detachment Fallbrook, California

**Date/Time:** September 29, 2004

**Person Conducting the Interview/Title/Organization:**

Monique De Jesus/Project Engineer/Malcolm Pirnie

**Person Being Interviewed/Title/Organization:**

Ken Scofield/Security Department

Leslie Hawkins/Physical Security Specialist/Security Department

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):**

They had worked at the Security Forces (SF) Small Arms Range.

---

**Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

Both Mr. Scofield and Ms. Hawkins gave us information on the SF Small Arms Range:

-when it was used (by Marine SF from 1945 to 1988 and by civilian SF from 1987 to 1991); it was used for handgun marksmanship training and by station civilians and local law enforcement officers.

-what munitions were used there(.38 cal, .45 cal, and 9-mm); the weapons were fired at targets set up in front of a natural berm.

-it was closed due to its proximity to the main administration areas at Detachment Fallbrook and to the town of Fallbrook.

-the possibility that before 1953, the Marine SF might have dumped unexpended shells into Depot and/or Lower Lake instead of turning them into inventory.



# Interview Record

---

**Installation/Range or Site:**

NAVWPNSTA Seal Beach, Detachment Fallbrook, California

**Date/Time:** September 29, 2004

**Person Conducting the Interview/Title/Organization:**

Monique De Jesus/Project Engineer/Malcolm Pirnie

**Person Being Interviewed/Title/Organization:**

Members from the Marine Corps Program Division (MCPD)

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):**

They were part of the group that had worked on the QE Test Area.

---

**Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

The members interviewed were: Wayne Ventuleth (head of the MCPD ), Daniel Reagle (Supervising Engineer Technician), John Korchick (Mechanical Engineer), and Jim Francis (Mechanical Engineer).

They told us how long the TA had been in use as a test area (from 1977 to 1989), what was used on it (rifle grenades, rockets, 75-mm shells, and 60- and 81-mm mortars), and that most of the munitions were picked up after every test. They used it as a test area because it was already being used for OB/OD purposes and other munitions uses.

They also gave us access to their personal archives about the site and activities carried out there.



# Interview Record

**Installation/Range or Site:**

NAVWPNSTA Seal Beach, Detachment Fallbrook, California

**Date/Time:** September 28, 2004

**Person Conducting the Interview/Title/Organization:**

Monique De Jesus/Project Engineer/Malcolm Pirnie

**Person Being Interviewed/Title/Organization:**

Kenneth A. Kaptain/Member of the MCB Camp Pendleton Fire Department/760-725-3959

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):**

He worked at Detachment Fallbrook with the Marine Corps Security from 1973 to 1976, and has been working at the installation with the fire department since 1979.

---

**Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

Ms. Kaptain gave us the following data:

- He knew about the SF Small Arms Range, the weapons they used on it (.38 cal, .45 cal, and 9-mm), and dates of use (by the Marines SF from 1945 to 1988 and by the civilian SF from 1987 to 1991).

-He was very familiar with the Skeet/Trap Range (he had used it himself): it was a recreational range used mostly by the Marine SF, but also by other station personnel from 1950 to 1987. Munitions on the range were limited to 12-gauge shotguns. The range was oriented to the west.



# Interview Record

---

**Installation/Range or Site:**

NAVWPNSTA Seal Beach, Detachment Fallbrook, California

**Date/Time:** September 29, 2004

**Person Conducting the Interview/Title/Organization:**

Monique De Jesus/Project Engineer/Malcolm Pirnie

**Person Being Interviewed/Title/Organization:**

Lisa Bosalet/Cultural Resources Manager/562-626-7637

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):**

Her knowledge of cultural resources at Detachment Fallbrook.

---

**Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

Ms. Bosalet gave us the following data:

- she gave us access to the cultural resources inventory, although most of the information in it was too sensitive for inclusion in the PA;
- she helped us determine which of our eleven sites had cultural resources on them or near them that any future investigations would have to be watchful of.



# Interview Record

---

**Installation/Range or Site:**

NAVWPNSTA Seal Beach, Detachment Fallbrook, California

**Date/Time:** September 28, 2004

**Person Conducting the Interview/Title/Organization:**

Monique De Jesus/Project Engineer/Malcolm Pirnie

**Person Being Interviewed/Title/Organization:**

Robbie Knight/Natural Resources Manager/760-731-3425

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):**

His position at the installation.

---

**Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

Mr. Knight gave us the following data:

- contact information for other people to interview, and helped us arrange the interviews;
- access to the archives vault at the Environmental Department, where we found a lot of records and photographs describing munitions use and disposal at Detachment Fallbrook;
- took us on the initial tours of the sites; and
- detailed information on the natural resources at Detachment Fallbrook, including soils, vegetation, ecological receptors, hydrology, and hydrogeology.



# Interview Record

**Installation/Range or Site:**

NAVWPNSTA Seal Beach, Detachment Fallbrook, California

**Date/Time:** March 8, 2005

**Person Conducting the Interview/Title/Organization:**

Monique De Jesus/Project Engineer/Malcolm Pirnie

**Person Being Interviewed/Title/Organization:**

Don McNamara/Retired Personnel/760-728-4037

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):**

He was a Special Weapons Officer from 1974 to 1976.

---

**Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

Mr McNamara gave us the following data:

-he closed out the nuclear weapons area.

-there were not a lot of disposal activities during his time on the base; it was a stand down period.



# Interview Record

---

**Installation/Range or Site:**

NAVWPNSTA Seal Beach, Detachment Fallbrook, California

**Date/Time:** March 8, 2005

**Person Conducting the Interview/Title/Organization:**

Monique De Jesus/Project Engineer/Malcolm Pirnie

**Person Being Interviewed/Title/Organization:**

Bill Houlder/Retired Personnel/760-723-8469

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):**

He was the former Facilities Officer from 1973 to 1976.

---

**Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

Mr Houlder gave us the following data:

- he was not aware of any fuel trenches at the QE Test Area or near it.
- he was not aware of any dumping of munitions; the lakes always had water in them according to him.
- the biggest problem during his time was what to do with the Napalm on base.
- he thinks most of the dumping happened when the WWII stuff came back to the continental U.S. from overseas.



# Interview Record

**Installation/Range or Site:**

NAVWPNSTA Seal Beach, Detachment Fallbrook, California

**Date/Time:** March 8, 2005

**Person Conducting the Interview/Title/Organization:**

Monique De Jesus/Project Engineer/Malcolm Pirnie

**Person Being Interviewed/Title/Organization:**

Commander James H. Owens/Retired Personnel/520-818-0520

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):**

He was formerly in charge of Detachment Fallbrook from 1962 to 1965.

---

**Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

Commander Owens gave us the following data:

-according to him, everything relating to munitions testing, disposal, and burning was done in and around the QE Test Area. Most of this work was carried out by the Ordnance Department, at least three times while he was there.

-he did not know of a pistol or skeet range on base.

-he did not know about any dumping of munitions in the lakes. The lakes were very shallow while he was there.



# Interview Record

**Installation/Range or Site:**

NAVWPNSTA Seal Beach, Detachment Fallbrook, California

**Date/Time:** March 8, 2005

**Person Conducting the Interview/Title/Organization:**

Monique De Jesus/Project Engineer/Malcolm Pirnie

**Person Being Interviewed/Title/Organization:**

Buddy Ingram/Retired Personnel/760-758-7276

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):**

He was a former Technician with the Ordnance Department, and subsequently the Head of the Security Department from 1978 to 1994.

---

**Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

Mr. Ingram gave us the following data:

-he worked in Building 366, which was the missile building back then.

-he worked at Detachment Fallbrook from 1978 to 1994.

-he had three brothers that also worked at Detachment Fallbrook:

-Paul Ingram (former Public Works Officer), deceased.

-Walter Ingram (worked in Ordnance and Airlaunch division), still alive.

-Bill Ingram, deceased.



# Interview Record

---

**Installation/Range or Site:**

NAVWPNSTA Seal Beach, Detachment Fallbrook, California

**Date/Time:** March 8, 2005

**Person Conducting the Interview/Title/Organization:**

Monique De Jesus/Project Engineer/Malcolm Pirnie

**Person Being Interviewed/Title/Organization:**

Commander Reginald Fogg /Retired Personnel/760-728-9157

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):**

He was formerly in charge of Detachment Fallbrook from 1965 to 1970.

---

**Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

Commander Fogg gave us the following data:

- he oversaw the destruction of munitions at the burn areas.
- he thought we should try the Fallbrook Historical Society records.



# Interview Record

**Installation/Range or Site:**

NAVWPNSTA Seal Beach, Detachment Fallbrook, California

**Date/Time:** March 8, 2005

**Person Conducting the Interview/Title/Organization:**

Monique De Jesus/Project Engineer/Malcolm Pirnie

**Person Being Interviewed/Title/Organization:**

LCDR Thom Curtis/Retired Personnel/760-728-2945

**Reason for Selecting Person to Interview (i.e., Years at Installation, Position, Previous History, etc.):**

He was the Assistant Commanding Officer at Detachment Fallbrook from 1974 to 1977 and the Commanding Officer from 1977 to 1980.

---

**Interview Notes (i.e., Range History, Ordnance Types, Land Use, Historical Records/Maps Available):**

LCDR Curtis gave us the following data:

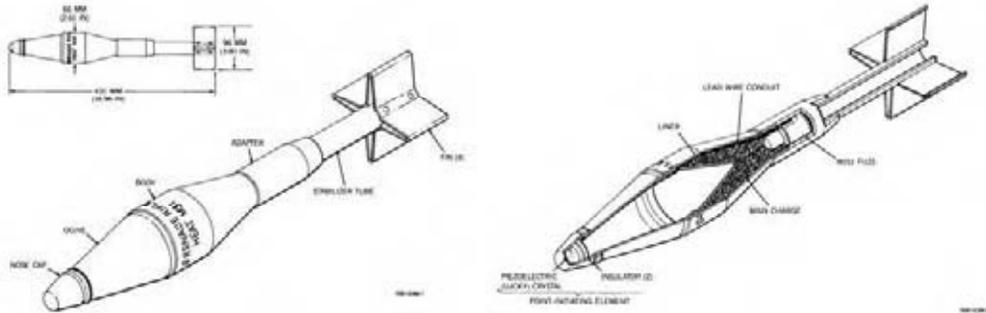
- Depot Lake used to flow into another lake.
- Stuff was buried in the ravines by Bldg. 307; supposedly munitions and munitions scrap returned from the Korean War.
- Bldg 338: maybe a torpedo testing site built into the hill near Site 34D.
- Bldg 365: a re-inforced building that was probably used for testing.
- Tony Perez was the bulldozer operator that helped bury the munitions and munitions scrap in the Ravines (lives in Escondido?)



## **Appendix D: Ordnance Technical Data Sheets**

# Ordnance Technical Data Sheet

## U.S. GRENADE, RIFLE, HEAT, M31



<b>Nomenclature:</b>	U.S. Grenade, Rifle, Heat, M31
<b>Ordnance Family:</b>	Grenades
<b>DODIC:</b>	Not provided
<b>Filler:</b>	Composition B
<b>Filler weight:</b>	280.67 g (9.9 oz)
<b>Item weight:</b>	708.00 g (24.97 oz)
<b>Propelling Charge:</b>	Single or Double Base Powder
<b>Diameter:</b>	66.00 mm (2.598 in)
<b>Length:</b>	431.00 mm (16.97 in)
<b>Maximum Range:</b>	Not provided
<b>Fuze:</b>	Point-initiating base-detonating fuze, M211

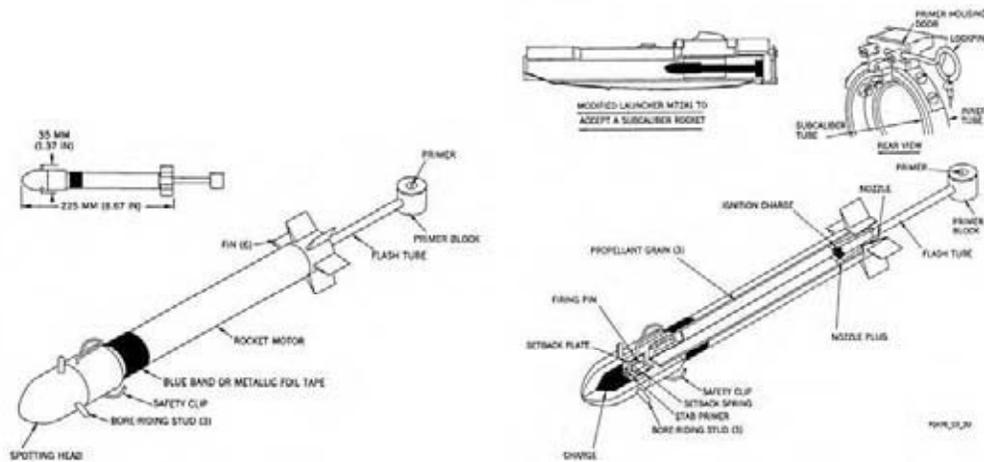
**Usage:** This is a fin-stabilized high-explosive antitank rifle grenade that has an integral setback-armed, point-initiating base-detonating fuze M211, which contains a piezoelectric crystal and an electric detonator.

**Description:** The grenade is painted olive drab and the markings are in yellow. The practice version is painted blue with white markings.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. ROCKET, 35-MM, SUBCALIBER, PRACTICE, M73



<b>Nomenclature:</b>	U.S. Rocket, 35-MM, Sub caliber, Practice, M73
<b>Ordnance Family:</b>	Rocket
<b>DODIC:</b>	Not Provided
<b>Filler:</b>	Propellant, Rocket, Double-Base
<b>Filler weight:</b>	10.00 g (.3527 oz)
<b>Item weight:</b>	145.00 g (5.115 oz)
<b>Diameter:</b>	35.00 mm (1.3878 in)
<b>Length:</b>	225.00 mm (8.858 in)
<b>Maximum Range:</b>	220 m (240.6 yds)
<b>Fuze:</b>	Impact-inertia fuze

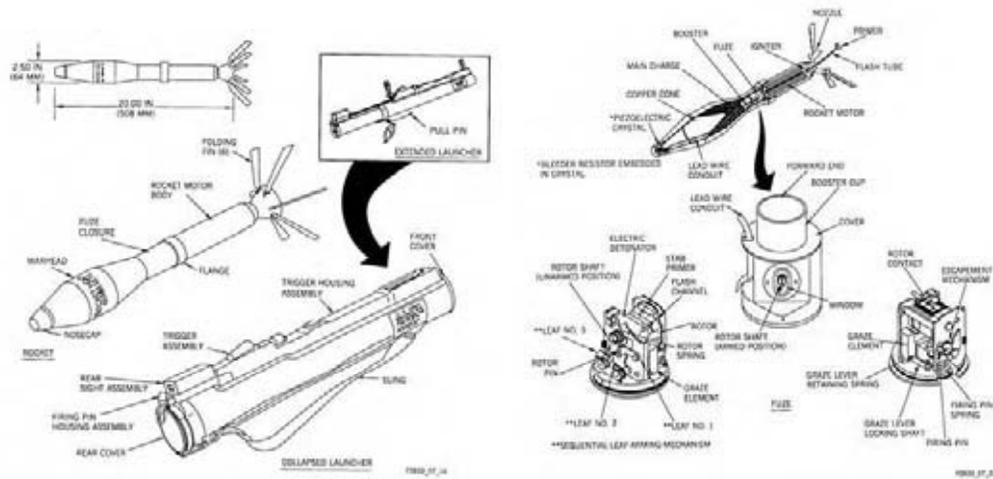
**Usage:** This is a sub-caliber practice rocket incorporating an integral, impact-inertia fuze. It is used for training and simulates the rocket for the light antitank weapon (LAW) system. The rocket is fired from a practice M190 launcher (a modified M72A1 LAW launcher). The figure shows the appearance and dimensions of the M73 practice rocket and M190 launcher.

**Description:** The spotting head and fins are painted black; the remainder of the rocket is olive drab. A blue band appears on the forward end of the rocket motor. On later production rockets, the spotting head is painted blue and the fins are painted brown. The rocket motor section is olive drab with white markings. A metallic foil covered tape is attached around the forward end of the rocket motor for weight adjustment.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. ROCKET, 66-MM, LAW, M72, M72A1, M72A2, AND M72A3



<b>Nomenclature:</b>	66-MM, LAW, M72, M72A1, M72A2, AND M72A3
<b>Ordnance Family:</b>	Rockets
<b>DODIC:</b>	Not Provided
<b>Filler:</b>	Octol
<b>Filler weight:</b>	454.00 g (16.01 oz)
<b>Item weight:</b>	2.18 kg (4.8 lbs)
<b>Diameter:</b>	64.00 mm (2.52 in)
<b>Length:</b>	508.00 mm (20 in)
<b>Maximum Range:</b>	Not Provided
<b>Fuze:</b>	M412 PIBD or M412A1

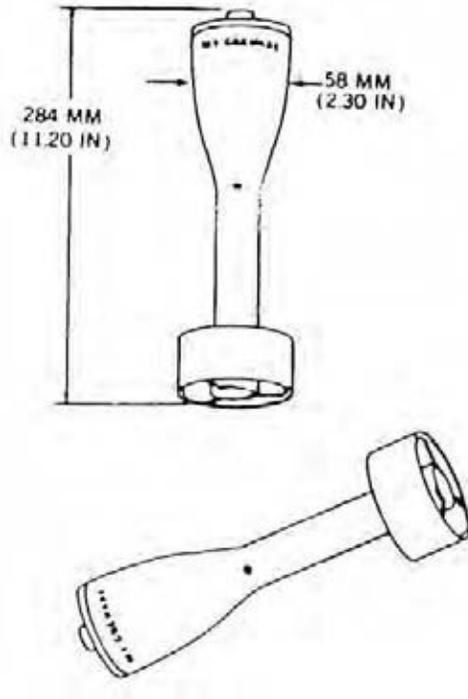
**Usage:** These are shoulder-fired, fin-stabilized, high-explosive light antitank weapons used primarily to penetrate armored targets. The rockets use an M54 rocket motor. The M72 uses an M18 warhead and an M412 point-initiating base-detonating (PIBD) fuze. The M72A1 uses an M18A1 warhead and an M412 PIBD fuze. The M72A2 and M72A3 use an M18A1 warhead and an M412A1 PIBD fuze.

**Description:** The rocket launcher is painted olive drab with instruction labels on olive drab backgrounds with white printing. The manufacturing information is printed in white. Those launchers with limited light sights have a decal stating such and front sights coated with a yellow- or white-colored radioactive material at the 100- and 150-meter range markings with remaining markings in red. Front sights not coated for night use will have all range markings in red. The rocket motor is brown and the warhead is black with yellow markings.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. GRENADE, RIFLE, M9



<b>Nomenclature:</b>	<b>U.S. GRENADE, RIFLE, M9</b>
<b>Ordnance Family:</b>	Grenades
<b>DODIC:</b>	
<b>Filler:</b>	TNT
<b>Filler weight:</b>	113.40 g (4 oz)
<b>Item weight:</b>	557.00 g (19.68 oz)
<b>Diameter:</b>	58.00 mm (2.283 in)
<b>Length:</b>	284.00 mm (11.18 in)
<b>Maximum Range:</b>	
<b>Fuze:</b>	Point-detonating fuze

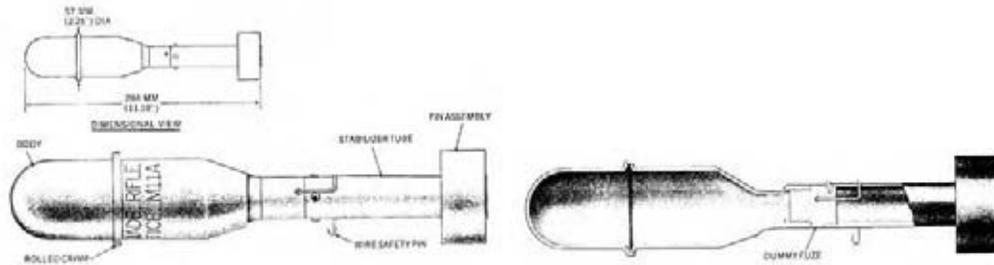
**Usage:** The figure shows the appearance and dimensions of the M9 grenade. The M9 is an earlier model of the M9A1. It has the same tail assembly, but the head is acorn-shaped and is equipped with a point detonating fuze. It is slightly less sensitive than the M9A1. The safety pin of the M9 is located in the base of the grenade body instead of in the stabilizer tube. Its pull ring is secured to the body with adhesive tape. It has a shrouded fin assembly which aids in stabilization.

**Description:** The grenade is painted olive drab in color.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## **U.S. GRENADE, PRACTICE, INERT, M11 SERIES**



<b>Nomenclature:</b>	<b>U.S. GRENADE, PRACTICE, INERT, M11 SERIES</b>
<b>Ordnance Family:</b>	Grenades
<b>DODIC:</b>	Not provided
<b>Filler:</b>	None
<b>Filler weight:</b>	N/A
<b>Item weight:</b>	558.00 g (19.68 oz)
<b>Propelling Charge:</b>	Single or Double Base Powder
<b>Diameter:</b>	57.00 mm (2.244 in)
<b>Length:</b>	284.00 mm (11.18 in)
<b>Maximum Range:</b>	Not provided
<b>Fuze:</b>	Impact inertia, base detonating fuze

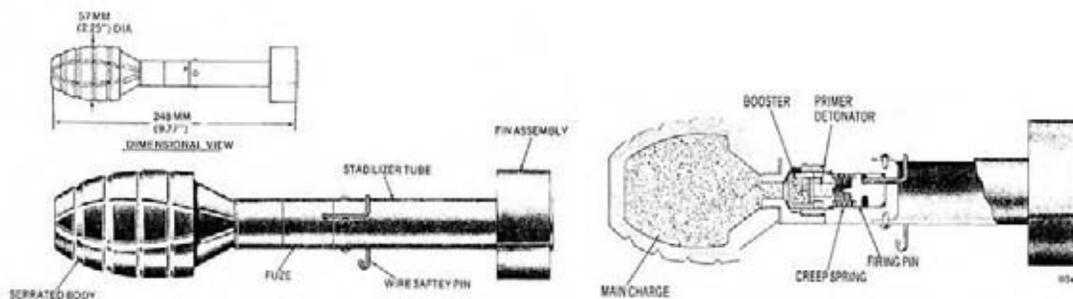
**Usage:** These are rifle-projected grenades that, except for the M11 series, contain a simple impact inertia, base detonating fuze. The M11 series practice grenades contain a dummy fuze that only has a safety pin hole. .

**Description:** The painting and markings for each grenade are blue or black with white markings.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. GRENADE, RIFLE, FRAGMENTATION, M17



**Nomenclature:** U.S. GRENADE, RIFLE, FRAGMENTATION, M17  
**Ordnance Family:** Grenades  
**DODIC:**  
**Filler:** Flaked TNT  
**Filler weight:** 22.00 g (.776 oz)  
**Item weight:** 667.00 g (23.53 oz)  
**Diameter:** 57.00 mm (2.244 in)  
**Length:** 248.00 mm (9.764 in)  
**Maximum Range:**  
**Fuze:** Impact inertia, base detonating fuze

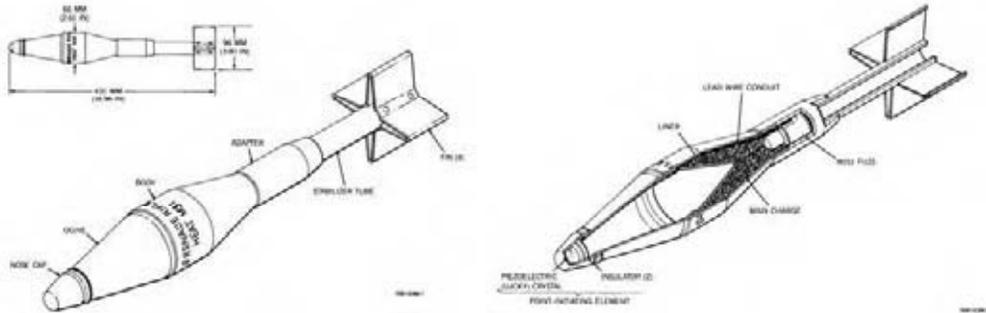
**Usage:** These are rifle-projected grenades that contain a simple impact inertia, base detonating fuze.

**Description:** The painting and markings for each grenade are Olive Drab with yellow markings.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. GRENADE, RIFLE, HEAT, M31



<b>Nomenclature:</b>	U.S. Grenade, Rifle, Heat, M31
<b>Ordnance Family:</b>	Grenades
<b>DODIC:</b>	Not provided
<b>Filler:</b>	Composition B
<b>Filler weight:</b>	280.67 g (9.9 oz)
<b>Item weight:</b>	708.00 g (24.97 oz)
<b>Propelling Charge:</b>	Single or Double Base Powder
<b>Diameter:</b>	66.00 mm (2.598 in)
<b>Length:</b>	431.00 mm (16.97 in)
<b>Maximum Range:</b>	Not provided
<b>Fuze:</b>	Point-initiating base-detonating fuze, M211

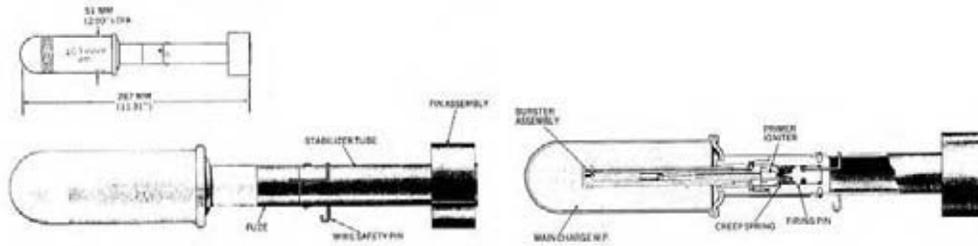
**Usage:** This is a fin-stabilized high-explosive antitank rifle grenade that has an integral setback-armed, point-initiating base-detonating fuze M211, which contains a piezoelectric crystal and an electric detonator.

**Description:** The grenade is painted olive drab and the markings are in yellow. The practice version is painted blue with white markings.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. GRENADE, RIFLE, SMOKE, HC, M20



<b>Nomenclature:</b>	U.S. GRENADE, RIFLE, SMOKE, HC, M20
<b>Ordnance Family:</b>	Grenades
<b>DODIC:</b>	Not provided
<b>Filler:</b>	Smoke Mix, HC
<b>Filler weight:</b>	306.00 g (10.79 oz)
<b>Item weight:</b>	712.00 g (25.12 oz)
<b>Propelling Charge:</b>	Single or Double Base Powder
<b>Diameter:</b>	51.00 mm (2.008 in)
<b>Length:</b>	287.00 mm (4.3 in)
<b>Maximum Range:</b>	Not provided
<b>Fuze:</b>	Impact inertia, base detonating fuze

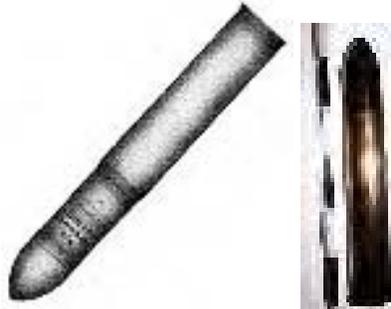
**Usage:** These are rifle-projected grenades that, except for the M11 series, contains a simple impact inertia, base detonating fuze

**Description:** The painting and markings for each grenade are either light gray or light green with yellow markings.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. PROJECTILE, 75-MM, AP, M72



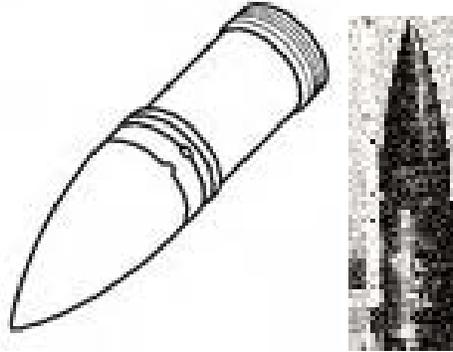
<b>Nomenclature:</b>	U.S. Projectile, 75 MM, AP, M72
<b>Ordnance Family:</b>	Projectile
<b>DODIC:</b>	Not Provided
<b>Filler:</b>	Solid Shot
<b>Filler weight:</b>	Not Provided
<b>Item Weight:</b>	6.32 kg (13.93 lbs)
<b>Diameter:</b>	75.00 mm (2.953 in)
<b>Length:</b>	239.92 mm (9.446 in)
<b>Maximum Range:</b>	Not Provided
<b>Fuze:</b>	None

**Usage:** Armor-piercing which contain only a small percentage of their weight as high explosive or none, in which case they are known as shot. Projectiles depend on their material of construction or the face-hardening treatment gives the armor-piercing cap, which may be used, for their penetrating quality. This projectile is a solid shot.

**Description:** Projectile painted black except rotating band. Stenciled in white: "75 G, Shot A.P. M72, with Tracer".

**Reference:** ORDATA Online.

**Ordnance Technical Data Sheet**  
**U.S. PROJECTILE, 75-MM, APC & APC-T,  
M61A1**



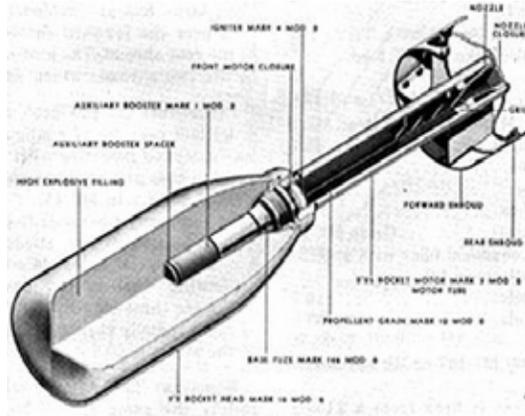
<b>Nomenclature:</b>	U.S. Projectile, 75 mm, APC & APC-T, M61A1
<b>Ordnance Family:</b>	Projectile
<b>DODIC:</b>	Not Provided
<b>Filler:</b>	Explosive D
<b>Filler weight:</b>	Not Provided
<b>Item Weight:</b>	Not Provided
<b>Diameter:</b>	75.00 mm (2.953 in)
<b>Length:</b>	279.40 mm (11 in)
<b>Maximum Range:</b>	Not Provided
<b>Fuze:</b>	BD (Base Detonating Fuze)

**Usage:** This is an Army gun fired armor piercing capped projectile. APC-T (Army) and AP (Navy). These projectiles have a hardened AP cap over the nose of the body to which the windshield is secured. The AP cap increases the penetration ability of the projectile. Most APC-T projectiles, and all Navy AP projectiles 3 inches and larger, incorporate a small HE main charge in the base with a BD fuze which detonates after the projectile penetrates a target.

**Description:** Projectile is painted black with white lettering.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet U.S. Rocket, 7.2-IN, Hedgehog



**Nomenclature:** U.S. Rocket, 7.2-inch, Hedgehog  
**Ordnance Family:** Rockets  
**DODIC:** Not Provided  
**Filler:** TNT or Torpex  
**Filler weight:** ± 15.88 kg (35 lbs)  
**Item weight:** 29.88 kg (65 lbs)  
**Diameter:** 182.88 mm (7.2in)  
**Length:** 980.44 mm (38.6in)  
**Maximum Range:** 228.6 m (250 yds)  
**Fuze:** Hydrostatic/Contact Fuze

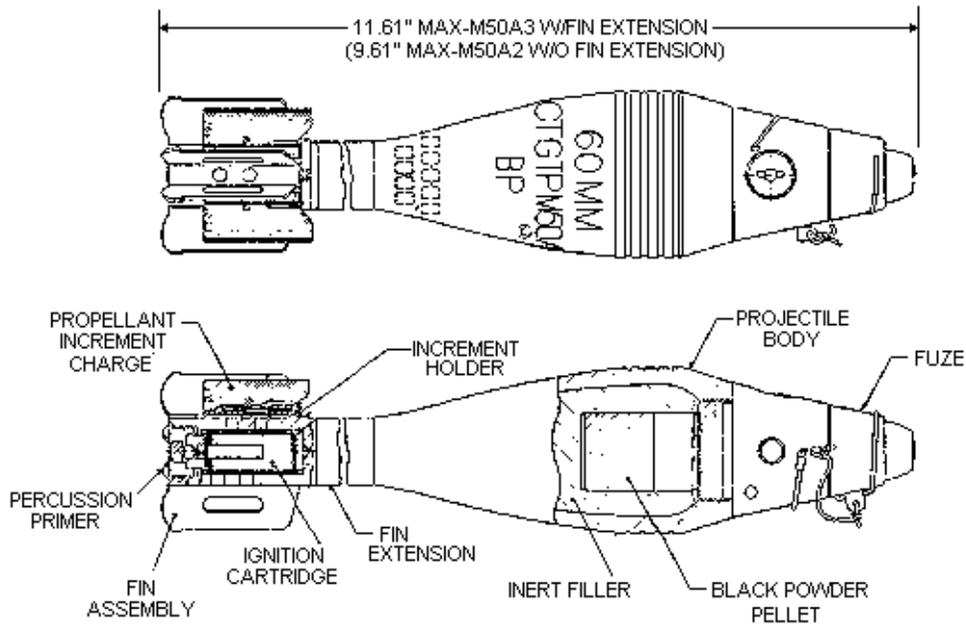
**Usage:** Ship launched Anti-submarine weapon.

**Description:** The rocket consists of a flat-nosed head with a conical tail fairing and parallel sides. The adapter and fuze thread into the nose. The motor unit consists of a smokeless powder cartridge with primer, which is lodged forward in the tail tube, the tube fitting over a firing post. The primer is detonated by electric contacts in the post. This charge is for use on Projectors Mk 10 and Mk 11.

**Reference:** ORDATA Online

# Ordnance Technical Data Sheet

## CARTRIDGE, 60MM TP, M50 SERIES



**NOTE: FIN EXTENSION NOT INCLUDED ON THE M50A2**

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<b>Nomenclature:</b>	U.S. 60MM Mortar M50 Series (Practice)
<b>Ordnance Family:</b>	Projectile
<b>DODIC:</b>	B634
<b>Filler:</b>	Black Powder Pellet
<b>Filler weight:</b>	$\pm$ 226.8 g (.5 lbs)
<b>Item weight:</b>	1.33 kg (2.94 lbs)
<b>Diameter:</b>	60 mm (2.362in.)
<b>Length:</b>	294.9mm (11.61in)
<b>Range:</b>	1815.00 m (1985 yds)
<b>Fuze:</b>	M935 Point Detonating Fuze or M734 Multi-Option Fuze

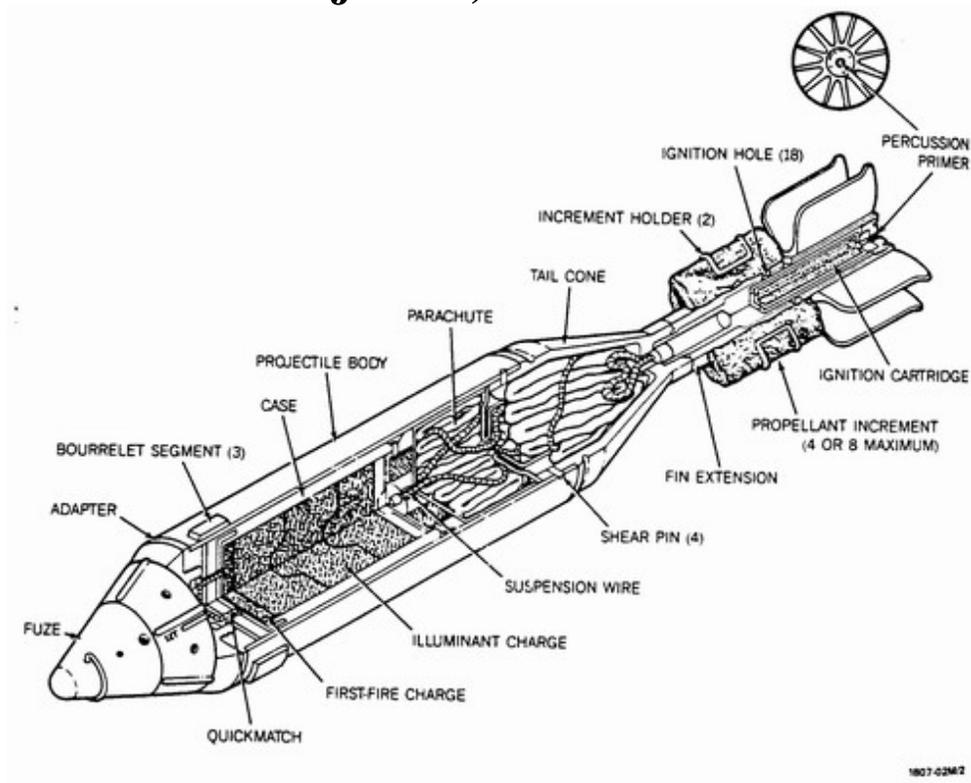
**Usage:** Light support weapon. Provided capability for High Explosive, Screening Smoke, and Illumination rounds delivered out to a maximum range of 1815 m (1985 yards).

**Description:** The cartridge is painted Olive Drab, except for the fin assembly which is unpainted aluminum. Nomenclature and manufacturing data are stenciled in black.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. Projectile, 81 MM Mortar



<b>Nomenclature:</b>	U.S. Projectile, 81 mm (3.18in) Mortar
<b>Ordnance Family:</b>	Projectile
<b>DODIC:</b>	C225
<b>Filler:</b>	Round dependent
<b>Filler weight:</b>	± 645.00 g (22.75 oz)
<b>Item weight:</b>	3.4 kg (7.5 lbs)
<b>Diameter:</b>	81 mm (3.189 in)
<b>Length:</b>	571.00mm (22.48 in)
<b>Maximum Range:</b>	2400 m (2625 yards)
<b>Fuze:</b>	M935 Point Detonating Fuze or M734/734A1 Multi-Option Fuze

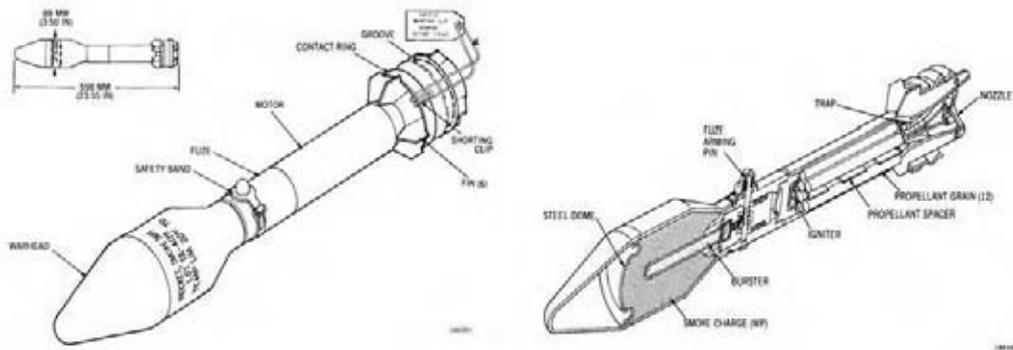
**Usage:** Light Support Weapon. Provides infantry units with the capability of light artillery in the form of , High Explosive, Screening Smoke, and Illumination rounds deliverable out to a maximum range of 2400 meters (2625 yards).

**Description:** The projectiles are painted white with stenciled black identification markings on the projectile bodies. Projectiles also may be gray with a white band and white markings

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. ROCKET, 3.5-INCH, SMOKE (WP), M30 (T127E3) & (T127E2)



<b>Nomenclature:</b>	3.5-inch, Smoke (WP), M30, (T127E3) & (T127E2)
<b>Ordnance Family:</b>	Rockets
<b>DODIC:</b>	Not Provided
<b>Filler:</b>	RDX
<b>Filler weight:</b>	1.10 kg (2.425 lbs)
<b>Item weight:</b>	4.10 kg ( 9.039 lbs)
<b>Diameter:</b>	98.00 mm (3.5 in)
<b>Length:</b>	589.00 mm (23.19 in)
<b>Maximum Range:</b>	Not Provided
<b>Fuze:</b>	Impact, base detonating fuze

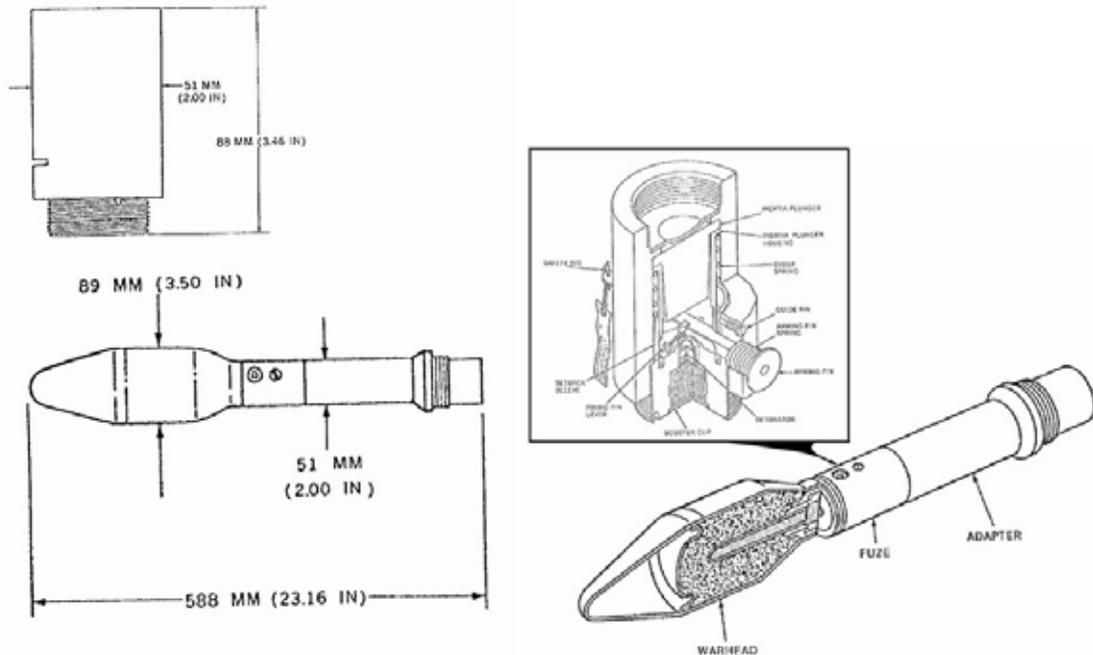
**Usage:** These are 3.5-inch, ground-fired, fixed-fin, smoke (white phosphorus) rockets.

**Description:** The warheads are light green with light red markings and a light red band. Older warheads are painted gray with yellow markings. The rocket motor is brown or olive drab. The fuzes are painted olive drab or black, and have the designation and loading information stamped in the body.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. ROCKET WARHEAD, 3.5-INCH



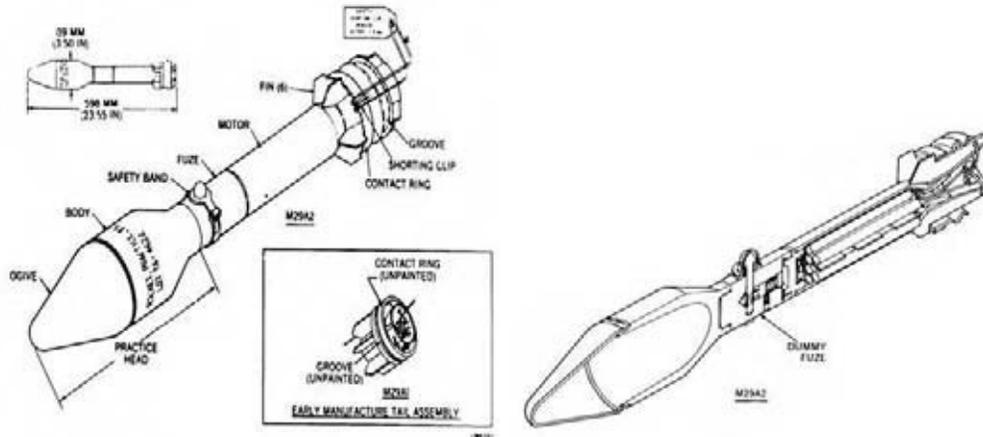
<b>Nomenclature:</b>	U.S. Rocket Warhead, 3.5-inch Smoke, WP, Aircraft
<b>Ordnance Family:</b>	Rockets
<b>DODIC:</b>	Not Provided
<b>Filler:</b>	RDX
<b>Filler weight:</b>	1.00 kg (2.2 lbs)
<b>Item weight:</b>	4.90 kg (10.8 lbs)
<b>Diameter:</b>	89.00 mm (3.5 in)
<b>Length:</b>	588.00 mm (23.15 in)
<b>Maximum Range:</b>	Not Provided
<b>Fuze:</b>	M404A1 base detonating (BD)

**Usage:** The figures show the appearance, dimensions, and general arrangement of the 3.5 inch warhead. This is a 3.5-inch phosphorus (WP) rocket warhead. It uses the M404A1 (modified) fuze which is a direct-arming, base-detonating (BD), non-delay fuze. The warhead and fuze are coupled to a 2.75-inch rocket motor by an adapter and are used against aircraft.

**Description:** The fuze is painted olive drab or black, and has the designation and loading information stamped in the body. Older warheads are painted gray with yellow markings.

**Reference:** ORDATA Online.

**Ordnance Technical Data Sheet**  
**U.S. ROCKET, 3.5-INCH, PRACTICE, M29,  
M29A1, & M29A2**



<b>Nomenclature:</b>	3.5-INCH, PRACTICE, M29, M29A1, & M29A2
<b>Ordnance Family:</b>	Rockets
<b>DODIC:</b>	Not Provided
<b>Filler:</b>	None
<b>Filler weight:</b>	N/A
<b>Item weight:</b>	3.90 kg (8.6 lbs)
<b>Diameter:</b>	89.00 mm (3.5 in)
<b>Length:</b>	598.00 mm (23.54 in)
<b>Maximum Range:</b>	Not Provided
<b>Fuze:</b>	None

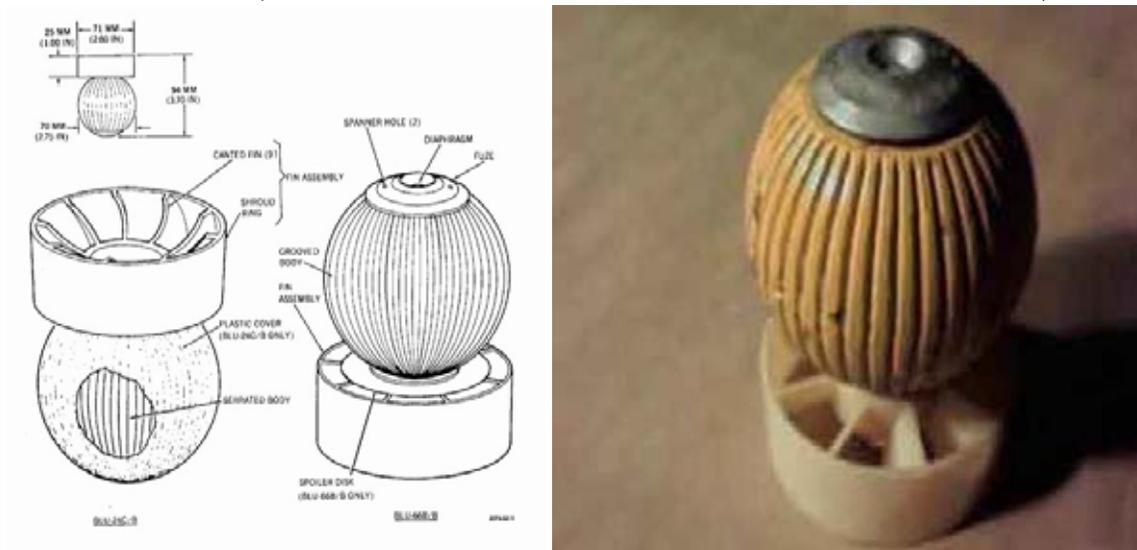
**Usage:** The M29-series rockets are inert and are used for training. The M29A2 rocket is modified for use in the M69 practice landmine system.

**Description:** The fuzes are painted olive drab or black, and have the designation and loading information stamped in the body. The M29 warhead and rocket motor are blue. The M29A1 and M29A2 warheads are blue, and the rocket motors are brown, or olive drab with brown bands. The M29-series practice heads have white markings. The contact ring and groove or notch on all the rockets are unpainted.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. BOMB UNIT, FRAG, BLU-24C/B & BLU-66B/B (JUNGLE/ALL-TERRAIN BOMB)



<b>Nomenclature:</b>	BLU-24C/B & BLU-66 B/B
<b>Ordnance Family:</b>	Submunitions
<b>DODIC:</b>	Not Provided
<b>Filler:</b>	Cyclotol
<b>Filler weight:</b>	125.00 g (4.409 oz)
<b>Item weight:</b>	907.00 g (31.99 oz)
<b>Diameter:</b>	70.00 mm (2.576 in)
<b>Length:</b>	94.00 mm (3.701 in)
<b>Maximum Range:</b>	Not Provided
<b>Fuze:</b>	Spin-decay-fired

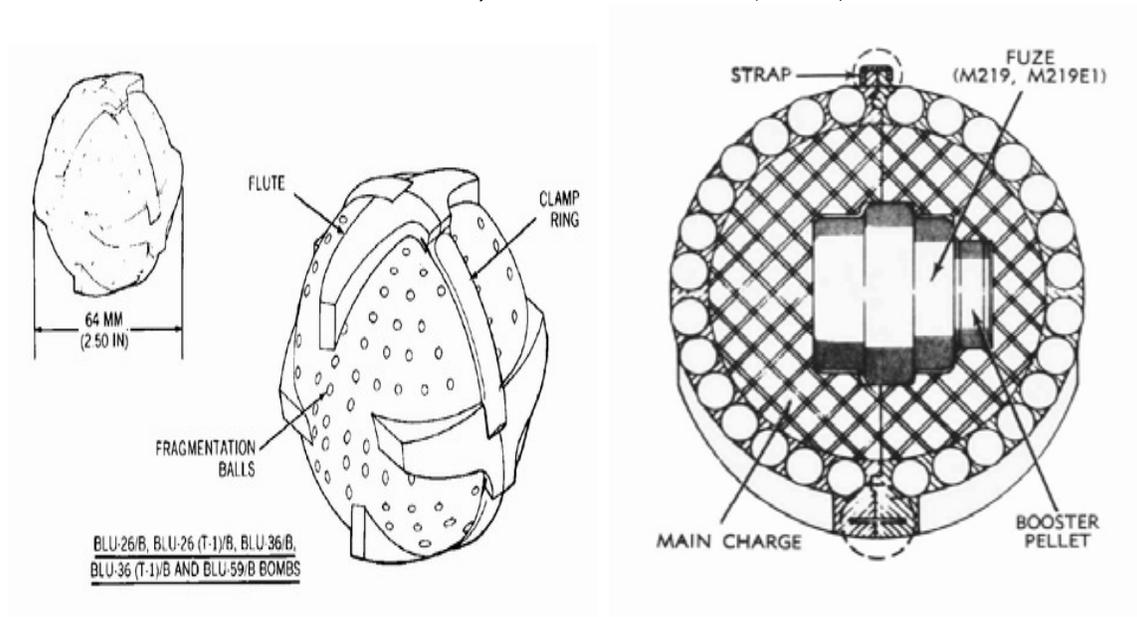
**Usage:** These are small, aerial dispensed, fin-stabilized, antipersonnel, anti-material, jungle penetrating fragmentation (frag) bombs. They are centrifugal armed (spin armed) and fired when centrifugal force decreases (spin-decay fired) or when the bomb impacts water or mud.

**Description:** The bomb body is yellow, with designation, lot number, and date of manufacture stenciled in black on the side of the body. The fuze on the front of the bomb is unpainted. The fin assembly is white.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. BOMB UNIT, FRAG, BLU-26/B, BLU-36/B, BLU-59/B, & BLU-36(T-1)/B




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<b>Nomenclature:</b>	BLU-26, 36, 59
<b>Ordnance Family:</b>	Submunitions
<b>DODIC:</b>	Not Provided
<b>Filler:</b>	Cyclotol
<b>Filler weight:</b>	85.00 g (2.998 oz)
<b>Item weight:</b>	454.00 g (16.01 oz)
<b>Diameter:</b>	64.00 mm (2.52 in)
<b>Length:</b>	19.51 mm (.7842 in)
<b>Maximum Range:</b>	N/A
<b>Fuze:</b>	Impact or Time delay fired

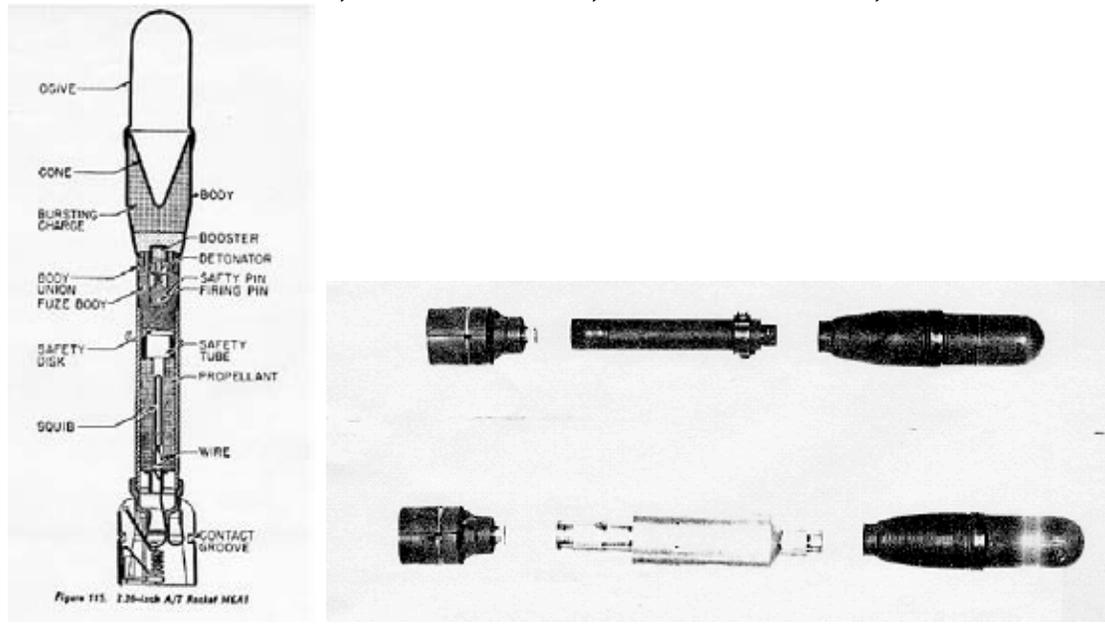
**Usage:** These are all small, aerial dispensed, centrifugal armed, high-explosive fragmentation bombs. The bombs all consist of two hemispheres held together by a crimp ring. The BLU-26/B bombs are impact-fired and the BLU-36/B and BLU-59/B bombs are time-delay-fired. The BLU-26(T-1)/B and BLU-36(T-1)/B are training versions of the BLU-26/B and BLU-36/B, respectively. These training bombs contain a live fuze but no main charge, and are used for fuze reliability testing and establishing delivery tactics. The outer wall has a weakened area which ruptures when the fuze functions.

**Description:** These bombs are olive drab with a small yellow dot on one hemisphere. Designation and loading data may be stenciled in yellow on all the bombs. The BLU-26(T-1)/B and BLU-36(T-1)/B are painted blue with white markings.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## **U.S. Rocket, M6 Series, A1 thru A5, HEAT**



<b>Nomenclature:</b>	U.S. Rocket, 2.36 in Heat, M6 Series
<b>Ordnance Family:</b>	Rockets
<b>DODIC:</b>	Obsolete
<b>Filler:</b>	Pentolite
<b>Filler weight:</b>	Not Provided
<b>Item Weight:</b>	(8.4 lbs)
<b>Diameter:</b>	60.00 mm (
<b>Length:</b>	546.00 mm (21.6 in)
<b>Maximum Range:</b>	(800 yds)
<b>Fuze:</b>	Impact

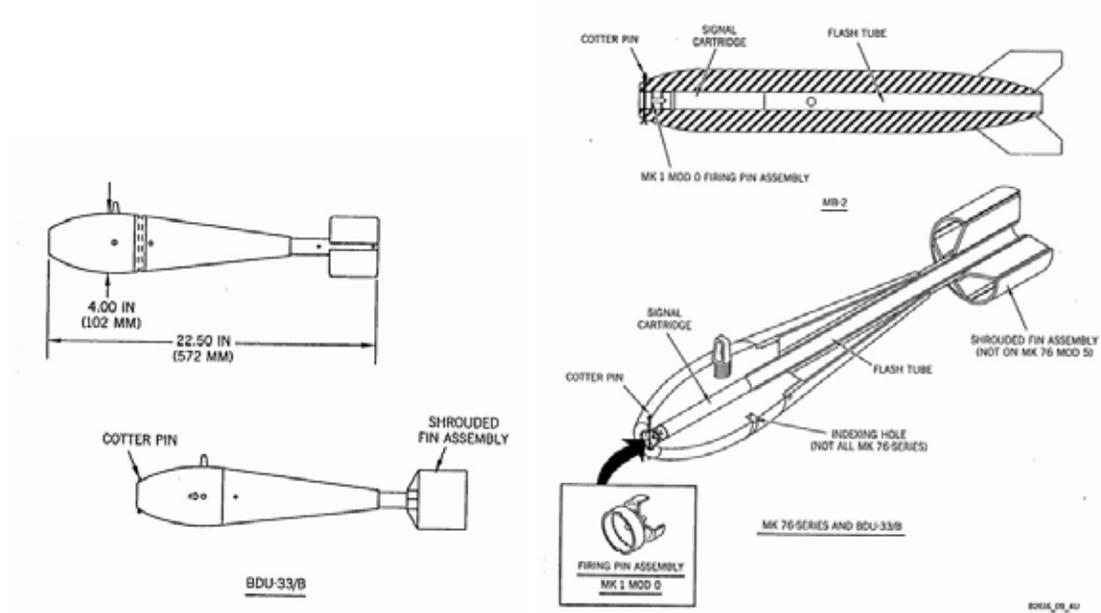
**Usage:** This is a fin stabilized high explosive antitank rocket. The figure shows the appearance and dimensions of the M6 series rocket. The M6A1 and M6A3 are identical except for difference in the ogive and the tail assembly.

**Description:** The rocket is painted olive drab. The M6A1 has six fins 5 ½ inches long, and the M6A3 has four fins 2 5/16 inches long attached to a ring which provides a conical appearance.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. BOMB, 25-LB, PRACTICE, BDU-33/B, BDU-33A/B



<b>Nomenclature:</b>	BDU-33/B, BDU-33A/B
<b>Ordnance Family:</b>	Bomb
<b>DODIC:</b>	E963
<b>Filler:</b>	Signal Cartridge specific
<b>Filler weight:</b>	Not Provided
<b>Item weight:</b>	11.00 kg (24.25 lbs)
<b>Diameter:</b>	102.00 mm (4.016 in)
<b>Length:</b>	572.00 mm (24.69 in)
<b>Maximum Range:</b>	Not Provided
<b>Fuze:</b>	MK 4 series Signal Cartridge

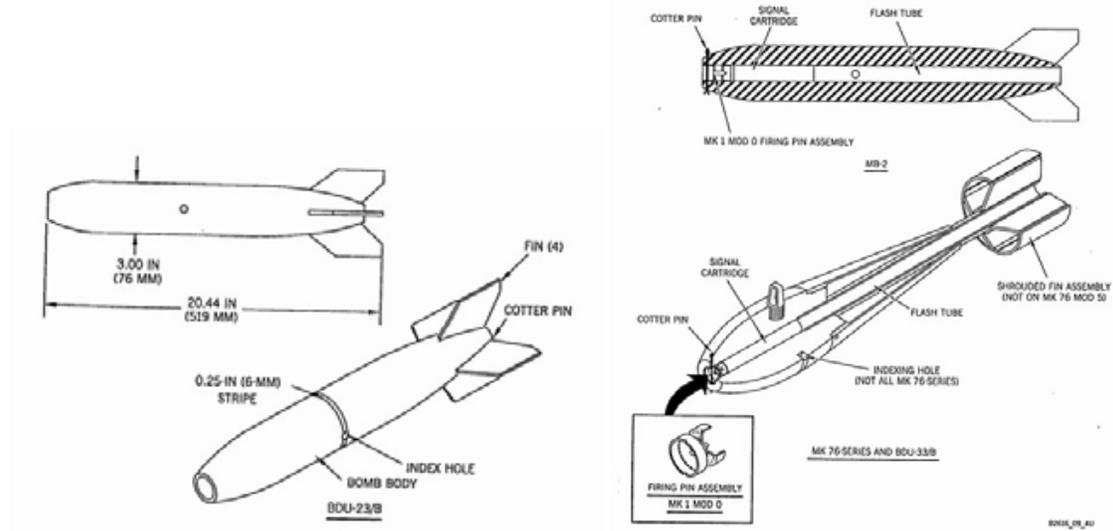
**Usage:** These bombs are signal-generating, impact-or impact-inertia-fired practice/simulated bombs.

**Description:** The BDU-33-series bombs are painted light blue; additionally, the BDU-33/B has white arrowheads and white stenciled markings. The BDU-33A/B, 33B/B, and 33D/B have white stenciled markings only.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. BOMB, 25-LB, PRACTICE, BDU-23/B



<b>Nomenclature:</b>	BDU-23/B Practice Bomb
<b>Ordnance Family:</b>	Bomb
<b>DODIC:</b>	E963
<b>Filler:</b>	Titanium Tetrachloride (Spotting Charge)
<b>Filler weight:</b>	Not provided
<b>Item weight:</b>	11.34 kg (25 lbs)
<b>Diameter:</b>	76.00 mm (2.992 in)
<b>Length:</b>	519.00 mm (20.43 in)
<b>Maximum Range:</b>	Not Provided
<b>Fuze:</b>	MK 4 series Signal Cartridge

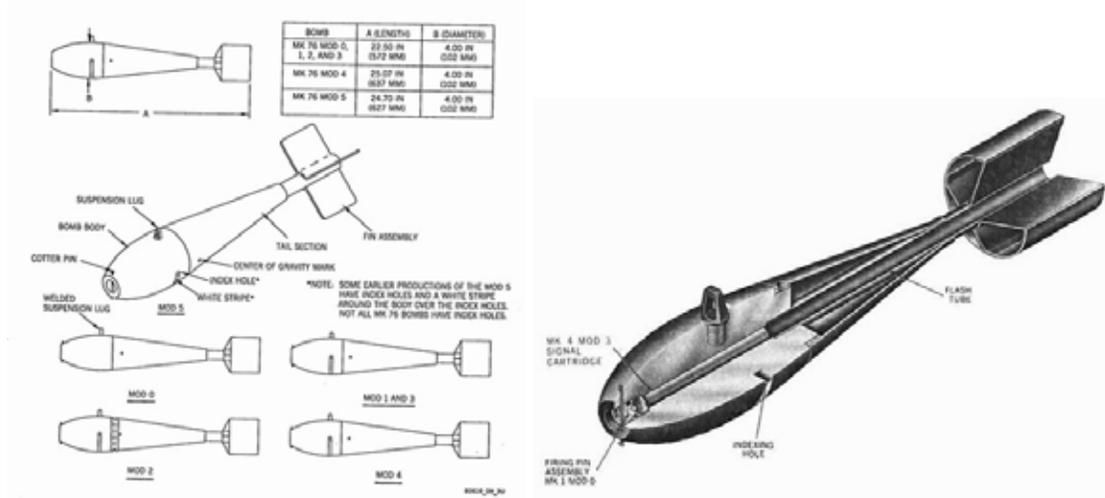
**Usage:** These bombs are signal-generating; impact- or impact-inertia-fired practice/simulated bombs. These bombs use either the Mk 4-series, Mk 5 Mod 0, CXU-3/B, CXU-3A/B signal cartridge, or the CXU-2/B spotting charge.

**Description:** The BDU-23/B bomb is painted black with a 0.25-inch (6-millimeter) white stripe over the index holes and white stenciled markings.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## U.S. BOMB, 25-LB, PRACTICE, MK 76 MOD 0, 1, 2, & 3



**Nomenclature:** MK 76 Practice  
**Ordnance Family:** Bomb  
**DODIC:** E973  
**Filler:** MK 5 Signal Cartridge  
**Filler weight:** Not Provided  
**Item weight:** 11.00 kg (24.25 lbs)  
**Diameter:** 102.00 mm (4.016 in)  
**Length:** 572.00 mm (24.69 in)  
**Maximum Range:** Not Provided  
**Fuze:** Impact

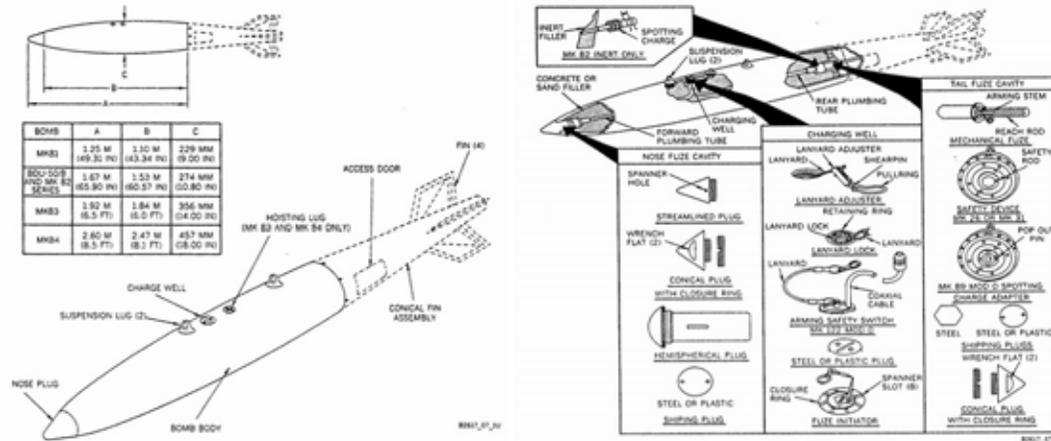
**Usage:** These bombs are signal-generating, impact-or impact-inertia-fired practice/simulated bombs. These bombs use either the Mk 4-series, Mk 5 Mod 0, CXU-3/B, CXU-3A/B signal cartridge, or the CXU-2/B spotting charge.

**Description:** The Mk 76-series bombs are painted black or blue. The Mk 76 Mods 1, 2, 3, 4, and some Mod 5 bombs have a 0.25-inch (6-millimeter) white stripe over the index holes.

**Reference:** ORDATA Online, Midas.

# Ordnance Technical Data Sheet

## U.S. BOMB, 2,000-LB, PRACTICE, MK 84



**Nomenclature:** MK 84 Practice 2,000lb  
**Ordnance Family:** Bomb  
**DODIC:** F267  
**Filler:** N/A  
**Filler weight:** N/A  
**Item weight:** 907.00 kg (2000 lbs)  
**Diameter:** 457.00 mm (17.99 in)  
**Length:** 2.50 m (8.202 ft)  
**Maximum Range:** Not Provided  
**Fuze:** Mission Dependent

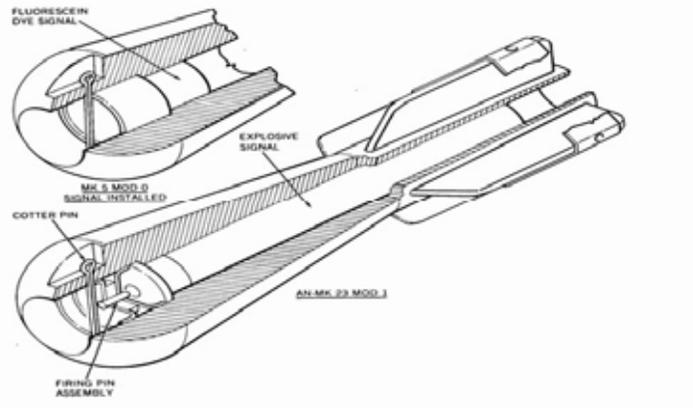
**Usage:** The Mk(s) 81 through 84 concrete or sand-filled practice bombs are used to train pilots in delivery techniques. These bombs normally do not contain explosive fillers or spotting charges. Explosive-loaded practice bombs have been found; therefore, all Mk 81 through Mk 84 concrete and sand-filled bombs should be treated as suspect. These bombs may contain live internal fuzes with boosters, live external fuzes and adapter-boosters, or a spotting charge adapter with a signal cartridge installed. They are all designed to function on impact, producing blast and fragmentation or a puff of white smoke.

**Description:** The Mk(s) 81 through Mk 84 concrete- or sand-filled bombs are painted blue or olive drab, with white or black markings. Bombs fitted with a signal charge will have a brown or yellow band no wider than 76 millimeters (3.00 inches) circumscribed near the nose of the bomb. However, explosive-loaded practice bombs may be found without markings or color band indicating the explosive content. Inert-loaded Mk 82 Mod 2 practice bombs may be found with an olive drab thermal coating and a 76-millimeter (3.00-inch)-wide blue nose band. Loading information is stenciled on the thermal coating. Thermally protected practice bombs are also die-stamped on the base plate to indicate their inert filler.

**Reference:** ORDATA Online, MIDIAS.

# Ordnance Technical Data Sheet

## U.S. Bomb, MK 3 & MK 4 (Practice)



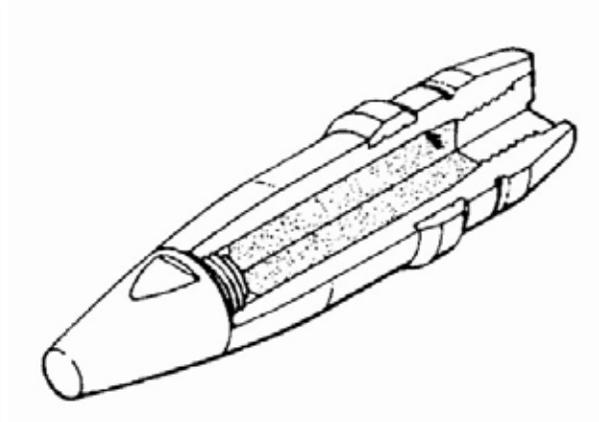
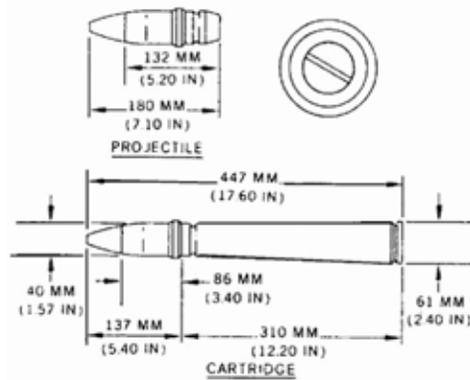
<b>Nomenclature:</b>	Bomb, Practice, MKs 3 & 4
<b>Ordnance Family:</b>	Bomb
<b>DODIC:</b>	Not Provided
<b>Filler:</b>	Photo Flash Powder Spotting Charge
<b>Filler weight:</b>	Not Provided
<b>Item Weight:</b>	1.36 kg (2.998 lbs)
<b>Diameter:</b>	55.37 mm (2.18 in)
<b>Length:</b>	209.55 mm (8.25 in)
<b>Maximum Range:</b>	Not Provided
<b>Fuze:</b>	Impact

**Usage:** These bombs are impact fired signal-generating, practice bombs used for training aircrews. **WARNINGS:** Do not drop or jar a loaded practice bomb. These bombs contain no positive safety features. Keep hands clear of the flash tube and emission holes. Accidental firing of the signal cartridge could cause injury. Do not attempt to pry the firing pin assembly or signal cartridge out of a practice bomb. Prying could initiate the signal cartridge.

**Description:** The Mk 3 and Mk 4 bombs are unpainted with markings cast into the bomb body. The Mk 5 Mods 0, 1, 2, & 3, AN-Mk 23 Mods 0 & 1, and Mk 43 Mods 0 & 1 bombs are unpainted with markings cast or stamped into the bomb body. The Mk 3, Mk 4, Mk 5, and Mk 43 practice bombs (not shown) are externally identical to the AN-Mk 23 bomb.

**Reference:** ORDATA Online.

**Ordnance Technical Data Sheet**  
**U.S. PROJECTILE, 40-MM, AA, BL&P, MK 1,  
MK 2**



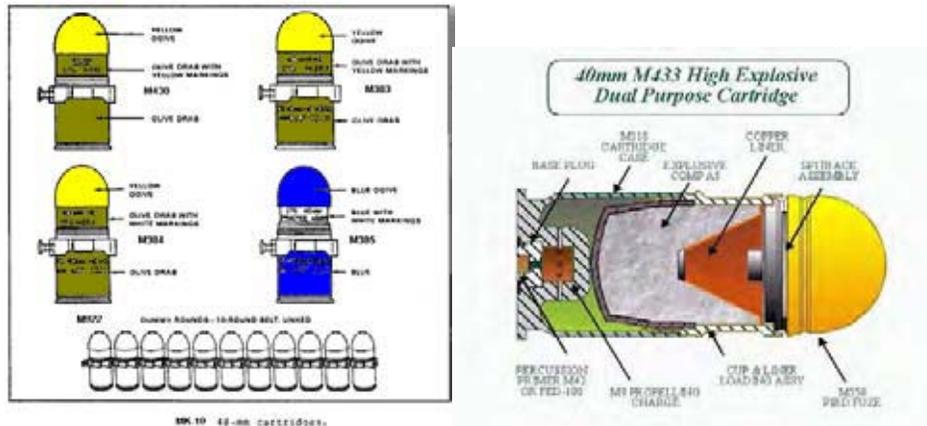
<b>Nomenclature:</b>	40 mm Anti-Aircraft BL & P MK1, MK2
<b>Ordnance Family:</b>	Projectile
<b>DODIC:</b>	Not Provided
<b>Filler:</b>	N/A
<b>Filler weight:</b>	N/A
<b>Item weight:</b>	907.20 g (32 oz)
<b>Diameter:</b>	40.00 mm (1.575 in)
<b>Length:</b>	180.00 mm (7.987 in)
<b>Maximum Range:</b>	Not Provided
<b>Fuze:</b>	Not provided

**Usage:** These are Navy, spin stabilized, gun fired projectiles.

**Description:** The BL&P type contains the ALN prefix "UF" stenciled in black. If of early manufacture, the projectile and fuze or nose plug is red. If of recent manufacture, the projectile is blue with white body stenciling.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet U.S Grenade, 40 MM (HEAT)



**Nomenclature:** 40 MM Grenade  
**Ordnance Family:** Projectile  
**DODIC:** B564  
**Filler:** Explosive Comp A5  
**Filler weight:** ± 57.00 g (2.01 oz)  
**Item weight:** 340 g (11.99 oz)  
**Diameter:** 40 mm (1.57in)  
**Length:** 79 mm (3.11in)  
**Fuze:** M550 (Impact Fuze)

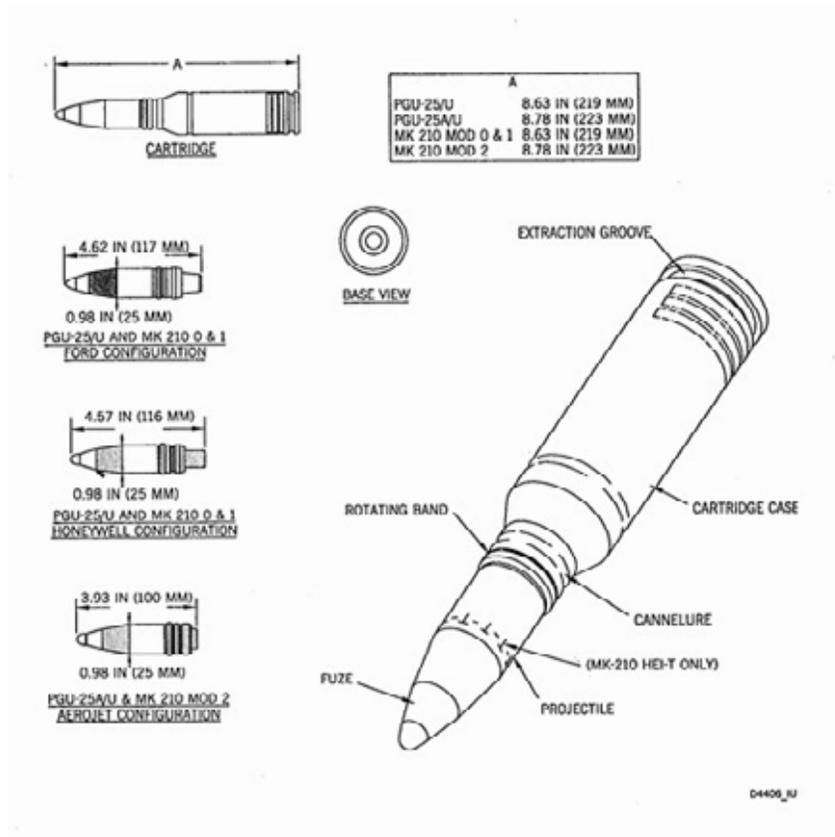
**Usage:** Light Support Weapon. Providing capability for Anti-personnel, anti-vehicle, anti-material, and training depending on type of round selected. Maximum range 400m (437 yards)

**Description:** The projectiles are olive drab with anodized gold ogives. The M383 has white markings; the M384 and M677 have yellow markings.

**Reference:** ORDATA Online, Midas.

# Ordnance Technical Data Sheet

## 20 MM HEI-T



**Nomenclature:** 20 mm HEI-T  
**Ordnance Family:** Projectile  
**DODIC:** A775  
**Filler:** PBXN-5 and Zirconium Pellets  
**Filler weight:**  $\pm$  31.9 g  
**Item weight:** 185.9 g  
**Diameter:** 25.00 mm  
**Length:** 100.00 mm  
**Maximum Range:** 2000m (6560 ft)  
**Fuze:** M505A3 (Mechanical Time Super Quick)

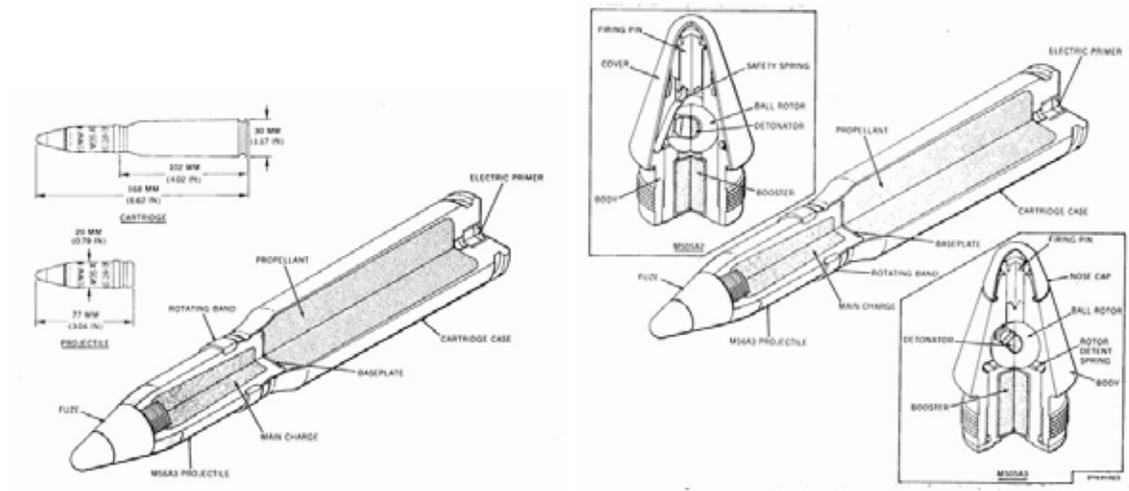
**Usage:** The PGU-25/U and PGU-25A/U are percussion-primed, fixed-ammunition cartridges incorporating a high-explosive-incendiary projectile. The Mk 210 Mod 2 is a percussion-primed, fixed-ammunition cartridges incorporating a high-explosive-incendiary-with-tracer projectile. The projectile use an M505A3 centrifugally armed, point-detonating superquick fuze.

**Description:** The cartridge cases are unpainted. The PGU-28/B projectile has an unpainted noseplug and a yellow-painted body with red and black bands.

**Reference:** ORDATA Online

# Ordnance Technical Data Sheet

## U.S. CARTRIDGE, 20-MM, HEI, M56, M56A1, M56A2, M56A3, & M56A4



<b>Nomenclature:</b>	20 mm HEI (High Explosive Incendiary)
<b>Ordnance Family:</b>	Projectile
<b>DODIC:</b>	A582
<b>Filler:</b>	RDX, Wax, Aluminum (A-1X-2)
<b>Filler weight:</b>	9.00 g (.3675 oz)
<b>Item weight:</b>	102.06 g (3.619 oz)
<b>Diameter:</b>	20.00 mm (.7874 in)
<b>Length:</b>	77.00 mm (3.031 in)
<b>Maximum Range:</b>	Not Provided
<b>Fuze:</b>	PD (Point Detonating)

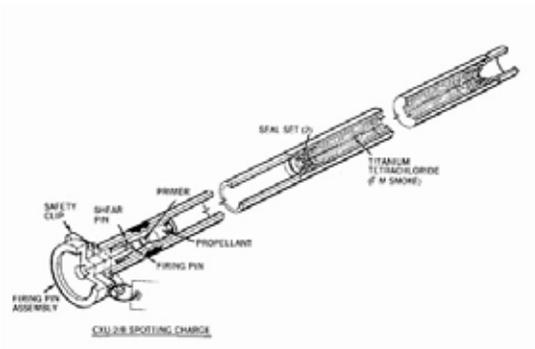
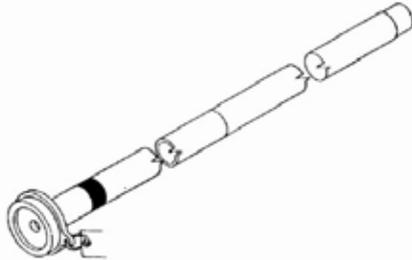
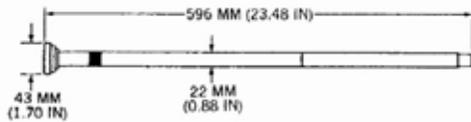
**Usage:** These are electrically primed cartridges with high-explosive-incendiary projectiles and centrifugally armed, point-detonating fuzes. They are used in the M39, M61, and M168, and M195 automatic cannons.

**Description:** The cartridge case is unpainted but has nomenclature and loading information stenciled on it. Cartridges of current manufacture have projectiles painted yellow with a red band below the fuze. Projectiles of earlier manufacture were painted yellow overall, or red with an olive drab ogive. Nomenclature and loading information is stenciled in black on the projectile body and may be stamped in the rotating band. The fuze is unpainted and unmarked.

**Reference:** ORDATA Online, Midas.

# Ordnance Technical Data Sheet

## U.S. BOMB, SPOTTING CHARGE, CXU-2/B



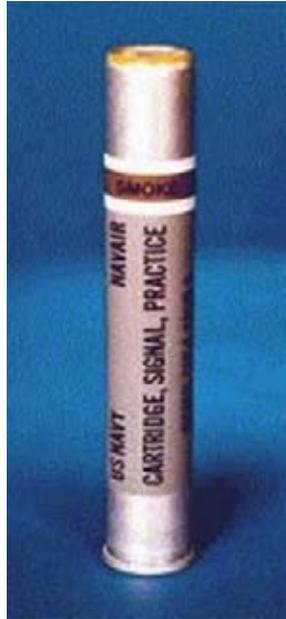
<b>Nomenclature:</b>	SPOTTING CHARGE, CXU-2/B
<b>Ordnance Family:</b>	Pyrotechnic/Signals
<b>DODIC:</b>	obsolete
<b>Filler:</b>	Smoke, FM (Titanium Tetrachloride)
<b>Filler weight:</b>	42.53 g (1.5 oz)
<b>Item weight:</b>	295.00 g (10.41 oz)
<b>Diameter:</b>	22.00 mm (.8661 in)
<b>Length:</b>	596.00 mm (23.46 in)
<b>Maximum Range:</b>	
<b>Fuze:</b>	Impact

**Usage:** These are signal-generating signal cartridges and spotting charges. They are used in various size practice bombs to provide visual observance of target impact in the bombing of surface and water targets.

**Description:** The CXU-2/B is painted light green with a 13-millimeter (0.50-inch) red band with markings depicting nomenclature, part number, NSN, DOD No., and Lot No.

**Reference:** ORDATA Online.

**Ordnance Technical Data Sheet**  
**U.S. CARTRIDGE, BOMB, PRACTICE, KC 4**



<b>Nomenclature:</b>	Cartridge, Bomb, Practice, KC 4
<b>Ordnance Family:</b>	Bombs
<b>DODIC:</b>	Not Provided
<b>Filler:</b>	Red Phosphorus
<b>Filler weight:</b>	24.00 g (.85 oz)
<b>Item weight:</b>	45.40 g (1.6 oz)
<b>Diameter:</b>	20.00 mm (.7874 in)
<b>Length:</b>	127.00 mm (5 in)
<b>Maximum Range:</b>	Not Provided
<b>Fuze:</b>	Impact fired

**Usage:** The KC 4 Cartridge Practice Bomb is used with other aircraft-dropped practice bombs to indicate the point of bomb impact. It is suitable for both day and night operations. When the bomb is dropped, the impact forces the firing pin against the signal primer. This ignites the expelling charge and releases the marker compound. The cartridge expels red phosphorus at impact, producing a brilliant flash of light and a puff of dense white smoke.

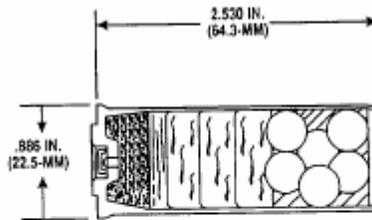
**Description:** The cartridge is unpainted.

**Reference:** ORDATA Online.

# Ordnance Technical Data Sheet

## 12 Gauge Shotgun, NO 00

CARTRIDGE, 12 GAGE, SHOTGUN, NO. 00, M162



<b>Nomenclature:</b>	12 Gauge Shotgun, NO 00
<b>Ordnance Family:</b>	Small Arms
<b>DODIC:</b>	A011
<b>Filler:</b>	Smokeless Powder
<b>Filler weight:</b>	± Various
<b>Item weight:</b>	0.736 gr
<b>Diameter:</b>	.886 in
<b>Length:</b>	2.53 in. (64.3 mm)

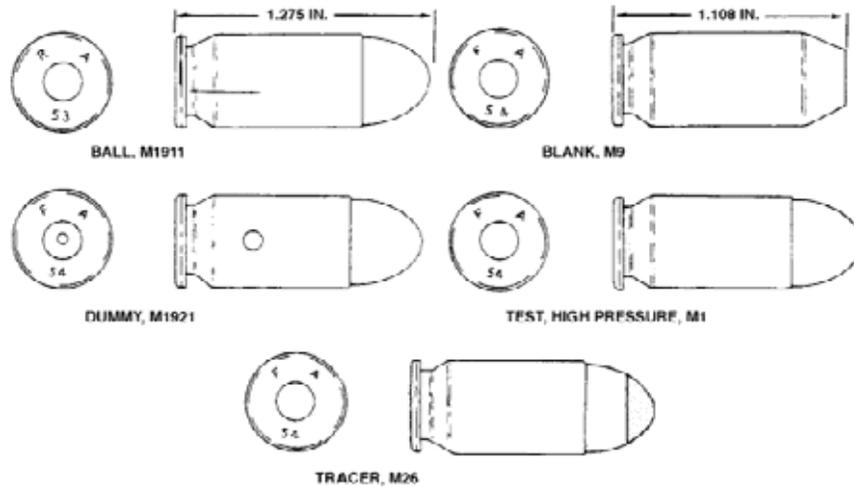
**Usage:** Military issue shotgun, 2-3/4 inch chamber. The cartridge is intended for guard and combat use.

**Description:** The cartridge case is all plastic, and is loaded with smokeless powder and No. 00 commercial shot.

**Reference:** TM 43-0001-27

# Ordnance Technical Data Sheet

## .45 Caliber Small Arms



<b>Nomenclature:</b>	.45 Caliber Small Arms Ammunition
<b>Ordnance Family:</b>	Small Arms
<b>DODIC:</b>	A086
<b>Filler:</b>	Double Base Powder*
<b>Filler weight:</b>	.311 gram
<b>Item weight:</b>	17.63 grams
<b>Projectile Weight:</b>	5.64 grams
<b>Diameter:</b>	.45 caliber
<b>Length:</b>	1.256 inches

**Usage:** This cartridge is designed and procured for use in semiautomatic pistols for target practice and Navy Competitive Match Programs.

**Description:** The gilding metal jacketed bullet has a lead-antimony slug. It is 0.68 inch (1.72 centimeters) long and weighs approximately 234 grains. The cartridge is 1.256 inches (3.19 centimeters) long, contains a lead-styphnate primer and approximately 4.8 grains (.311 gram) of propellant composition.

\* Double base propellants contain nitrocellulose and a liquid organic nitrate, such as nitroglycerine. As with single base, stabilizers and additives may be present. Double base propellants are used in cannon, small arms, mortars, rockets, and jet propulsion units.

**Reference:** TM 43-0001-27

# Ordnance Technical Data Sheet

## 9 Millimeter, Small Arms

<b>Nomenclature:</b>	9 millimeter Small Arms Ammunition
<b>Ordnance Family:</b>	Small Arms
<b>DODIC:</b>	
<b>Filler:</b>	Double Base Powder*
<b>Filler weight:</b>	.388 gram
<b>Item weight:</b>	11.79 grams
<b>Projectile Weight:</b>	5.64 grams
<b>Diameter:</b>	9 millimeter
<b>Length:</b>	1.169 inches

**Usage:** This cartridge is for firing in revolvers, pistols, and sub-machine guns chambered for the 9mm cartridge.

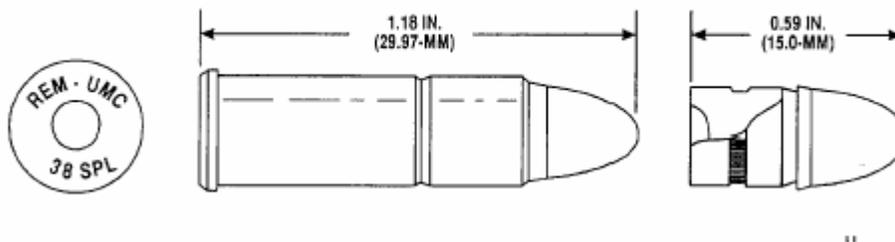
**Description:** The cartridge is 1.169 inches (2.96 centimeters) long, weighs approximately 182 grains (11.79 grams) and contains approximately 6 grains (.388 gram) of propellant composition.

\* Double base propellants contain nitrocellulose and a liquid organic nitrate, such as nitroglycerine. As with single base, stabilizers and additives may be present. Double base propellants are used in cannon, small arms, mortars, rockets, and jet propulsion units.

**Reference:** TM 43-0001-27

# Ordnance Technical Data Sheet

## .38 Caliber Small Arms



<b>Nomenclature:</b>	.38 Caliber Small Arms Ammunition
<b>Ordnance Family:</b>	Small Arms
<b>DODIC:</b>	A408
<b>Filler:</b>	Single or Double Base Powder
<b>Filler weight:</b>	4.8 gr
<b>Item weight:</b>	196 gr
<b>Projectile Weight:</b>	60.5 gr
<b>Diameter:</b>	.38 Caliber
<b>Length:</b>	1.18 in. (29.97mm)

**Usage:** Caliber .38 weapons. The cartridge is for CONUS-guard or security use in caliber .38 weapons.

**Description:** BALL Cartridge. The cartridge is identified by a plain bullet tip.

**Reference:** TM 43-0001-27

# SMALL-ARMS AMMUNITION

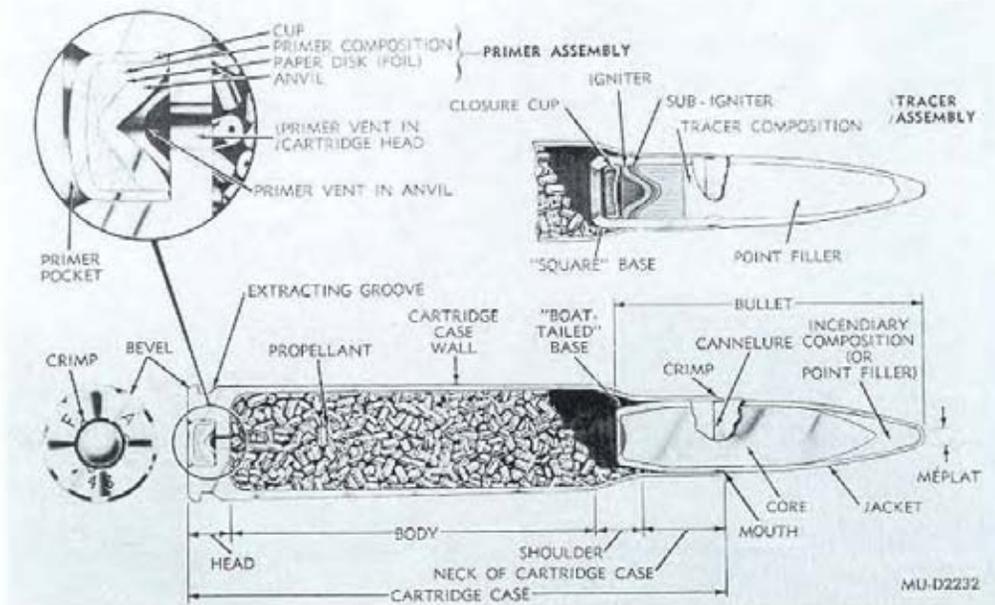


Figure 1. Typical cartridge (sectional)

**General.** Small-arms ammunition, as used herein, describes a cartridge or families of cartridges intended for use in various types of hand-held or mounted weapons through 30 millimeter. Within a caliber designation, these weapons may include one or more of the following: rifles (except recoilless), carbines, pistols, revolvers, machineguns and shotguns. For purposes of this publication, small-arms ammunition may be grouped as cartridges intended primarily for combat or training purposes (API, HEI, tracer or ball); for training purposes only (blank or dummy); or for special purposes (rifle grenade or spotter-tracer). Refer to TM 9-1306-200 for more detailed information on small-arms ammunition.

**Cartridges.** In general, a small-arms cartridge is identified as an assembly of a cartridge case, primer, a quantity of propellant within the cartridge case, and a bullet or projectile. Blank and rifle grenade cartridges are sealed with paper closure disks in lieu of bullets. Dummy cartridges are composed of a cartridge case and a bullet. Some dummy cartridges contain inert granular materials to simulate the weight and balance of live cartridges. A typical cartridge and the terminology of its components are shown in figure 1.

**Case.** Although steel, aluminum, zinc and plastic materials have been used experimentally, brass, a composition of 70 percent copper and 30 percent zinc, is the most commonly used material for cartridge cases. Steel, as well as brass, is an approved material for caliber .45 cartridge cases. Brass, paper and plastic are used for 12 gage shotshell bodies. Aluminum is used for military-type .410 gage shotshell bodies. Configurations of cartridges and bullets are illustrated in figures 2 through 11.

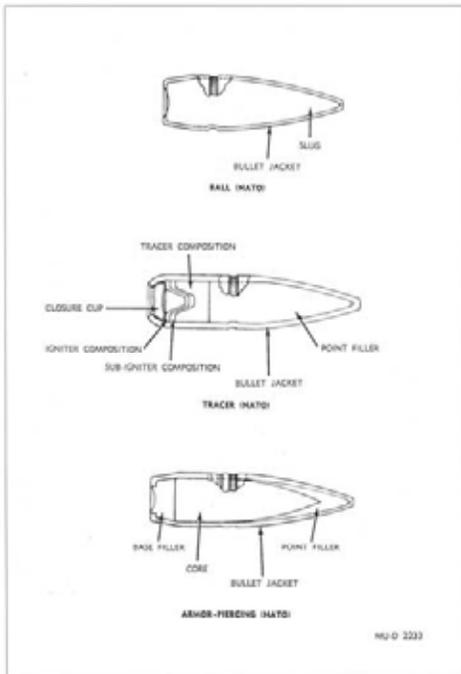


Figure 2. 7.62 mm bullets (sectional)

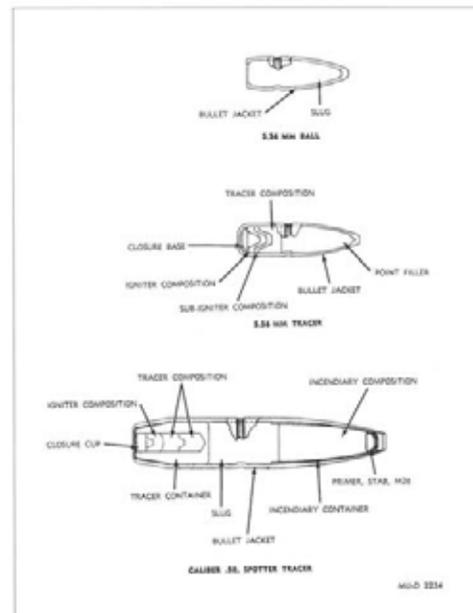


Figure 3. 5.56mm and caliber .50 spotter tracer bullets (sectioned)

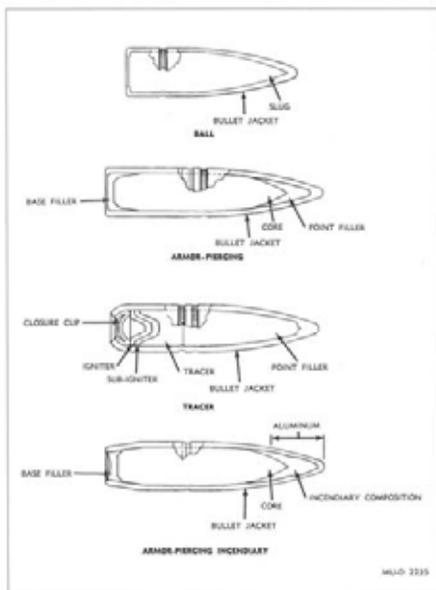


Figure 4. Caliber .30 bullets (sectional)



Figure 5. 7.62mm cartridges

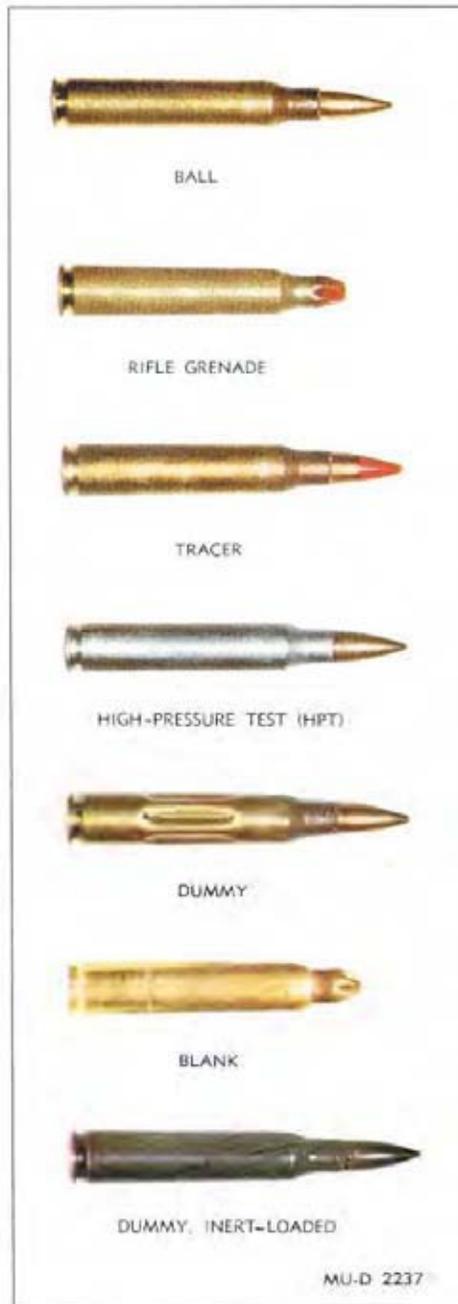


Figure 6. 5.56mm cartridges

*Propellant.* Cartridges are loaded with varying weights of propellant. This is to impart sufficient velocity (within safe pressures) to the projectile to obtain the required ballistic performance. These propellants are either of the single-base (nitrocellulose) or double-base (nitrocellulose and nitroglycerine) type. The propellant grain configuration may be cylindrical with a single, lengthwise perforation, spheroid (ball) or flake. Most propellants are coated with a deterrent (to assist in controlling the rate of combustion) and with a final coating of graphite (to facilitate flow of propellant and eliminate static electricity in loading cartridges).

*Primer.* Small-arms cartridges contain either a percussion or electric primer. The percussion primer consists of a brass or gilding metal cup that contains a pellet of sensitive explosive material secured by a paper disk and a brass anvil. The electric primer consists of an electrode button in contact with the priming composition, a primer cup assembly and insulator. A blow from the firing pin of the weapon on the center of the percussion primer cup base compresses the primer composition between the cup and the anvil. This causes the composition to explode. The function of the electric primer is accomplished by a firing pin with electrical potential, which contacts the electrode button. This allows current to flow through the energy-sensitive priming composition to the grounded primer cup and cartridge case, exploding the priming composition. Holes or vents in the anvil or closure cup allow the flame to pass through the primer vent in the cartridge case and ignite the propellant. Rimfire ammunition, such as the caliber .22 cartridge, does not contain a primer assembly. Instead, the primer composition is spun into the rim of the cartridge case and the propellant is in intimate contact with the composition. On firing, the firing pin strikes the rim of the cartridge case, compressing the primer composition and initiating its explosion.



Figure 7. Caliber .30 cartridges



Figure 8. Caliber .30 carbine and caliber .45 cartridges

**Bullet.** With few exceptions, bullets through caliber .30 are assemblies of a jacket and a lead or steel core. They may contain other components or chemicals which provide the terminal ballistic characteristics of the bullet type. The bullet jacket may be either gilding metal, gliding metal clad steel, or copper plated steel. Caliber .30 and 7.62mm frangible bullets are molded of powdered lead and a brittle plastic which pulverizes into dust upon impact with the target. The pellets used in the shotgun shells are spheres of lead alloys varying from 0.08 inch to 0.33 inch in diameter.



Figure 9. Caliber .50 cartridges

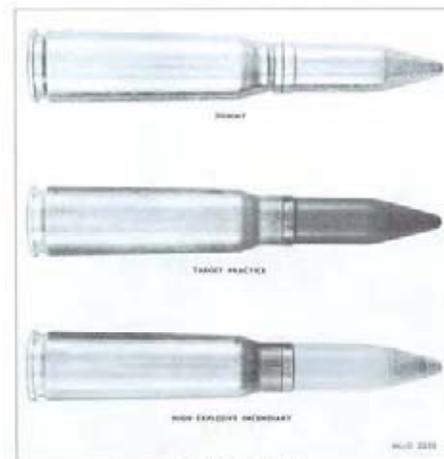


Figure 10. .50mm cartridges

**Ball Cartridge.** The ball cartridge is intended for use in rifles, carbines, pistols, revolvers and/or machineguns against personnel and unarmored targets. The bullet, as designed for general purpose combat and training requirements, normally consists of a metal jacket and a lead slug. Caliber .50 ball bullet and 7.62mm Ball M59 bullet contain soft steel cores.

**Tracer Cartridge.** By means of a trail of flame and smoke, the tracer cartridge is intended to permit visible observation of the bullet's in-flight path or trajectory and the point of impact. It is used primarily to observe the line of fire. It may also be used to pinpoint enemy targets or ignite flammable materials and for signaling purposes. The tracer element consists of a compressed, flammable, pyrotechnic composition in the base of the bullet. This composition is ignited by the propellant when the cartridge is fired. In flight, the bullet emits a bright flame which is visible to the gunner. Tracer burnout occurs at a range between 400 and 1,600 yards, depending upon the caliber of ammunition.

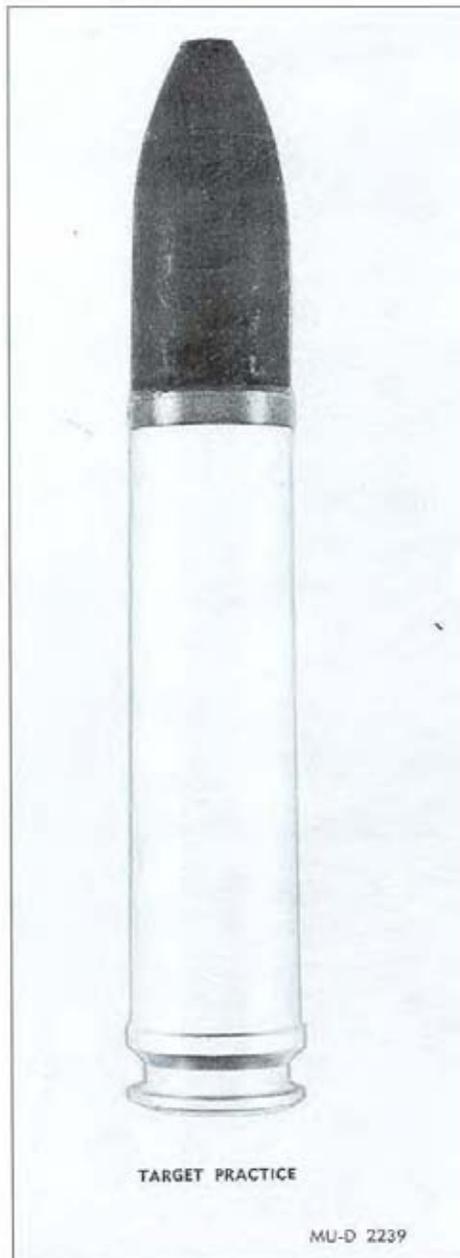


Figure 11. Typical 30mm projectile.

*Match Cartridge.* The match cartridge is used in National and International Match Shooting competitions. The bullet consists of a gliding-metal jacket over a lead slug.

The cartridges are identified on the head face with the designation NM (National Match) or Match.

*Armor-Piercing Cartridges.* The armor-piercing cartridge is intended for use in machine-guns or rifles against personnel and light armored and unarmored targets, concrete shelters, and similar bullet-resisting targets. The bullet consists of a metal jacket and a hardened steel-alloy core. In addition, it may have a base filler and/or a point filler of lead.

*Armor-Piercing-Incendiary Cartridge.* The armor-piercing-incendiary cartridge is used in rifles or machineguns as a single combination cartridge in lieu of separate armor-piercing and incendiary cartridges. The bullet is similar to the armor-piercing bullet, except that the point filler is incendiary mixture instead of lead. Upon impact with the target, the incendiary mixture burst into flame and ignites flammable material.

*Armor-Piercing-Incendiary Tracer Cartridge.* The bullet of the armor-piercing-incendiary-tracer cartridge combines the features of the armor-piercing, incendiary, and tracer bullets and may be used to replace those cartridges. The bullet consists of a hard steel core with compressed pyrotechnic mixture in the cavity in the base of the core. The core is covered by a gilding-metal jacket with incendiary mixture between the core point and jacket. This cartridge is for use in caliber .50 weapons only.

*Duplex Cartridge.* The duplex cartridge contains two special ball type bullets in tandem. The front bullet is positioned partially in the case neck, similarly to a standard ball bullet. The rear bullet, positioned completely within the case, is held in position by a compressed propellant charge. The base of the rear bullet is angled so that in flight, it follows a path slightly dispersed from that of the front bullet.

## Appendix E: Response to Comments

Naval Weapons Seal Beach, Detachment Fallbrook  
 Draft Final Preliminary Assessment for the Munitions Response Program, August 2005  
 Comments (received from DTSC and CA RWQCB) and Responses (Malcolm Pirnie)  
 May 2006

Document: Draft Final Preliminary Assessment for the Munitions Response Program - Naval Weapons Seal Beach, Detachment Fallbrook

<b>Commenter</b>	<b>Comment Number</b>	<b>Page Number/ Section</b>	<b>Comment</b>	<b>Response</b>
CA RWQCB	1	General Comment	Several of the sites presented in the PA that require additional environmental activities to address munitions related waste, also involve non-munitions related waste. The proposed recommendations for these sites solely address munitions issues. It is the Regional Board's positions that the non-munitions related waste at these sites might pose a threat to the quality of waters of the state and warrant investigation. Please provide the Navy's intention, including time frame, to address these wastes.	The focus of this PA is munitions and explosives of concern (MEC) and munitions constituents (MC). For those sites requiring further investigation under the Munitions Response Program (MRP), the presence or absence of potential chemicals of concern beyond MC will be evaluated as necessary. Those sites not being recommended for further action are being addressed under the Installation Response Program (IRP).
CA RWQCB	2	General Comment	Throughout the PA the Installation is described as a fenced installation. If possible, please provide information regarding the fence construction, materials, height, etc. Such information is useful to evaluate the potential for individuals and domestic animals to access the installation	The basic details about the fence were added to the PA. Section 2.1 now reads: "The installation currently occupies 8,852 acres and is surrounded by a chainlink fence."

<b>Commenter</b>	<b>Comment Number</b>	<b>Page Number/ Section</b>	<b>Comment</b>	<b>Response</b>
			and MMRP Sites and be exposed to munitions and explosives of concern (MEC) and munitions constituents (MC).	
CA RWQCB	3	General Comment	According to the PA, cattle are allowed to graze at the installation to reduce vegetative fuel load. Please identify the type(s) of cattle. It would seem that there is a potential for these cattle to be an exposure route for human and domestic animal receptors ingesting contaminated bovine products (milk, meat), which does not appear to be identified as potentially complete pathway in the exposure pathway analyses for the Sites with munition constituents (MC) concerns. Please provide a discussion as to why this pathway is not considered to be potentially complete.	The grazing program involving dairy cows was discontinued towards the end of 2004. Therefore, cattle are no longer considered an ecological receptor.
CA RWQCB	4	General Comment	There appears to be a discrepancy in the Exposure Routes identified for the Food Chain Exposure Media in the MC Exposure Pathway Analyses presented for different sites. As an example, Figure 5.1-5 identifies prey as an exposure route, whereas Figure 5.2-6 identifies game/fish/prey. It is unclear, whether this is intentional or an oversight. Please review, and either rectify the discrepancy or provide clarification, whichever is appropriate.	The discrepancies have been corrected in each of the exposure pathway figures. Prey is considered the only exposure route at the installation. The installation does not support hunting, so game is not considered a potential exposure pathway through the food chain. At this time, fishing at the lakes has been suspended until further investigation by IRP and MRP. Therefore, fish are not considered a potential pathway through the food

Commenter	Comment Number	Page Number/ Section	Comment	Response
				chain.
CA RWQCB	5	General Comment	Discussions of receptors and pathways for each site include the building identification number for buildings near/ within the Site. To the extent practicable, augment the discussions to include the activity type, duration, and frequency. Additionally, provide the distance between the Sites and the nearest housing area.	<p>Information was added to the PA for the following buildings: 301, 307, 338, 365, 366, 679, 701, 736, and 763. The following text has been added:</p> <ul style="list-style-type: none"> <li>• "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.";</li> <li>• "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.";</li> <li>• For Dunnage Disposal Site #4: "The remnant foundation of what may once have been Building 338 remains on the site.";</li> <li>• For the Skeet/Trap Range: "Building 366 is located approximately 2,790 feet southwest of the site. The building is currently not in use and is</li> </ul>

Commenter	Comment Number	Page Number/ Section	Comment	Response
				<p>on a list to be demolished.";</p> <ul style="list-style-type: none"> <li>• Depot Lake "is located just north of Terriea Road and between buildings 763 and 736. Neither building is currently being used."; and</li> <li>• Dunnage Disposal Site #2: "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."</li> </ul>
CA RWQCB	6	General Comment	<p>The MC discussion for several sites mentions metals only for small arms. Based on the information presented in PA Appendix D (Ordnance Technical Data Sheets), it seems that metals as an MC also is appropriate for the other non-small arms munitions found at Sites. Additionally, at sites where activities involved waste burning, and assessment of the fuel(s) used to ignite the waste and waste burning by/breakdown products is warranted as part of future environmental investigative activities.</p>	<p>The MC discussion was clarified, where it was appropriate, to include metals for non small arms munitions. The presence or absence of potential chemicals of concern will be further evaluated as part of future investigations.</p> <p>The text discussing the munitions below now includes the following metals:</p> <ul style="list-style-type: none"> <li>• Rifle grenades: zinc oxide smoke and aluminum powder;</li> <li>• 75-mm projectiles: iron;</li> <li>• 60-mm and 81-mm mortars: zinc oxide smoke and aluminum powder;</li> </ul>

Commenter	Comment Number	Page Number/ Section	Comment	Response
				<ul style="list-style-type: none"> <li>• Pyrotechnics/blasting caps: titanium tetrachloride, lead styphnate, magnesium, barium, strontium, and lead azide;</li> <li>• 20-mm, 40-mm, and 60-mm cartridges: zirconium pellets, beryllium, chromium, cobalt, copper, lead, manganese, lead azide, lead styphnate, antimony sulfide, zinc, zinc stearate, aluminum, cadmium, copper salt, zinc phosphate, lead chromate (VI), and lead naphthenate;</li> <li>• 25-pound bomb: titanium tetrachloride;</li> <li>• 3-pound pyrotechnic bomb: powdered aluminum and lead; and</li> <li>• 7.2-inch projector charges: lead and aluminum.</li> </ul>
CA RWQCB	7	General Comment	There is a discrepancy in the MEC Exposure Pathway Analyses presented for the QE Test Area Site, Salvage Yard Landfill Site, and Dunnage Disposal Sites #1 and #3 regarding whether the pathway is complete or potentially complete for intrusive activity. The exposure pathway is identified as complete for the QE Test Area Site and	All MEC Exposure Pathway Analyses were modified to show the following: Given that MEC was observed on the surface at QE Test Area Site, Salvage Yard Landfill Site, and Dunnage Disposal Sites #1 and #3, the handling/ treading pathway was selected as complete.

Commenter	Comment Number	Page Number/ Section	Comment	Response
			<p>potentially complete for the other three Sites. Based on the presence of MEC at all the Sites and similar site conditions, it is unclear as to why there is a discrepancy regarding the completion of the exposure pathway at the Sites. Please review the relevant MEC Exposure Pathway Analyses Figures and rectify the discrepancy or provide the rationale supporting discrepancy. Additionally, consider including a discussion of the distinction between complete and potentially complete exposure pathways.</p>	<p>All intrusive pathways were selected as potentially complete until it is known that MEC exists underneath the surface.</p>
CA RWQCB	8	Page 1-4, Subsection 1.4 Preliminary Assessment Approach	<p>The preliminary assessment approach description does not specifically mention the review of historical aerial photographs of the Installation and each site. Provide clarification as to whether or not these records were reviewed. If the aerial photos were reviewed, please include relevant and detailed information (dates and scale), findings, and conclusions for the entire Installation and each site the PA addresses. Additionally, the aerial photographs need to be included in a PA Appendix, if possible. If the aerial photographs were not reviewed, based on the Regional Board's experience, historical aerial photographs can provide</p>	<p>Aerial photos were acquired from the National Archives and from the Seabee Museum at Port Hueneme. The text has been revised to clarify the data sources and types. Section 1.4 now reads: "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." Photos that provided useful information were added to Appendices A and B.</p>

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			<p>useful information regarding the type, location, and boundaries of historical activities conducted at the Installation and each site, and should be reviewed as part of the PA. A potentially useful resource regarding this matter is the extensive historical aerial photographs collection maintained at Whittier College, which provided very useful information regarding sites and military installations in the past.</p>	
CA RWQCB	9	Page 2-1, Section 2.0 Installation Background	<p>Expand the description of the Installation to include the presence and location of installation housing discussed in Table 5.3-1. The discussion should include whether or not children and pets are allowed in the residential units. With the exception of the subsurface soil media, it seems there is potential for pets to encounter all the exposure media, which are not considered in the Exposure Pathway Analysis for any of the Sites. Please provide the rationale for eliminating this receptor.</p>	<p>The section was expanded to include more details on the housing area at the installation. The text in the report now reads "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." Pets would only be potentially exposed to potential MEC and MC at the Salvage Yard Landfill Site, which is the only site in the proximity of the installation housing. They are covered as receptors under the domestic animals category.</p>

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CA RWQCB	10	Page 3-7, Subsection 3.7 Hydrology, Watersheds, and Water Resources	Expand Subsection 3.7 to include a discussion that the City of Oceanside (San Luis Rey Watershed) and Marine Corps Base Camp Pendleton (Santa Margarita Watershed), both located hydraulically down gradient of NWS Fallbrook, extract and use ground water as a potable water supply. Additionally, expand the discussion to include the fact that Marine Corps Base Camp Pendleton currently uses water from the Santa Margarita River to recharge the ground water aquifer that is used for municipal/domestic purposes (Stetson Engineers Inc., 2001). These sensitive receptors need to be taken into consideration in the PA Conceptual Site Models and Exposure Pathway Analyses for sites involving potential surface and/or ground water impact (s).	Concur. Information was added to Section 3.7 to clarify the connection between the NWS Fallbrook hydrology and the City of Oceanside and Marine Corps Base Camp Pendleton. The following text was added to Section 3.7: "MCB Camp Pendleton, located in 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'Neil, which is used to supplement its water supply and for recreational purposes. At Lake O'Neil, no swimming is permitted. Fishing is permitted all year round. The fishing program includes a partial catch and release program based on posted signage."
CA RWQCB	11	Site Specific Comments	<b>Page 5-1, Subsection 5.1.1 History and Site Description</b>	The firing line is of environmental significance. The following text has been

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		Fallbrook SF Small Arms Range	Discussions of the Site are focused primarily on the target area and the natural soil berm, located behind the target area. Please provide a discussion as to why the area in the vicinity of the firing line is not of environmental significance.	added to Section 5.1.1: "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."
CA RWQCB	12	Site Specific Comments Fallbrook SF Small Arms Range	<b>Page 5-16, Subsection 5.1.11, Plant/Animal Uptake</b> Based on the discussion, it seems that there is a potentially complete exposure pathway for the biota receptor via the domestic animal exposure route, which is not illustrated in Figure 5.1-5.	The grazing program involving dairy cows was discontinued towards the end of 2004. Therefore, cattle are no longer considered an ecological receptor.
CA RWQCB	13	Site Specific Comments Fallbrook SF Small Arms Range	<b>Page 5-17, Subsection 5.1.11, Ground water</b> The discussion of the incomplete pathway for all receptors regarding vapor inhalation contradicts the information presented in Figure 5.1-5, which illustrates a potential exposure pathway for biota. Please review, and either rectify the discrepancy or provide clarification, whichever is appropriate.	Figure 5.1-5 was modified to reflect the incomplete pathway as described in Section 5.1.11.
CA RWQCB	14	Site Specific Comments	<b>Page 5-19, Subsection 5.1.13 Recommendations</b>	As discussed in Section 5.1.13, samples will be analyzed for the full metal

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		Fallbrook SF Small Arms Range	The recommendation for future environmental activities includes an assessment of lead. Based on the discussion presented in Subsection 5.1.6 and Appendix D (Ordnance Technical Data Sheets), it seems a screening of several other munitions constituents; such as antimony, arsenic, copper, nickel, zinc, and constituents associated with black and smokeless powder; also is warranted at this Site.	spectrum. The presence or absence of potential chemicals of concern will be evaluated in future investigations.
CA RWQCB	15	Site Specific Comments Fallbrook SF Small Arms Range	<b>Page 5-20, Figure 5.1-5</b> According to the MC Exposure Pathway Analysis, a potentially complete pathway for biota inhaling impacted ground water vapors. Such a pathway seems unlikely; please provide a discussion supporting this conclusion. Based on site conditions it seems that the food chain exposure routes should be expanded to include fish and game.	Figure 5.1-5 was modified to reflect the incomplete pathway as described in Section 5.1.11. Hunting is not supported at NWS Fallbrook. At this time, fishing at the lakes has been suspended until further investigation by IRP and MRP. Therefore, game and fish are not considered potentially complete pathways.
CA RWQCB	16	Fallbrook QE Test Area	<b>Page 5-24, Figure 5.2-1</b> Figure 5.2-1 is a photograph that illustrates the presence of several white objects of various sizes at the Site. If possible, identify what the objects are in the figure description.	Concur. The following information was added to the caption for the photograph. "The white objects are concrete huts that were used for shelter, viewing platforms, and storage of the targets on the site."
CA RWQCB	17	Fallbrook QE Test Area	<b>Page 5-26, Subsection 5.2.2 Visual Survey Observations and Results</b>	No schematics were found for the construction of the burn/slit trenches.

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			<p>If possible, include relevant construction details of the burn/slit trenches. Details of particular concern involve containment of waste and waste byproducts. The discussion of site observations mentions the presence of two small round metal burn pits. Are these objects the metal barrels mentioned in Subsection 5.2.1?</p>	<p>The round metal burn pits are the metal barrels identified in Section 5.2.1. Identification of the two metal barrels was added to Figure 5.2-4.</p>
CA RWQCB	18	Salvage Yard Landfill	<p><b>Page 5-52, Subsection 5.3.7 Contaminant Migration Routes</b> Based on the proximity of an ephemeral stream and site topography, it seems that a potential contaminate migration route at the Site is surface water, which is not presented. Please provide a discussion as to why the surface water route is not a concern.</p>	<p>The potential for surface water to serve as a migration route was added to Section 5.3.7. Section 5.3.7 now reads: "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."</p>
CA RWQCB	19	Salvage Yard Landfill	<p><b>Page 5-53, Subsection 5.3.8.2 Building Near/Within Site</b> If possible, please provide the years Buildings 307 and 365 were constructed. This information will assist establishing Site boundaries.</p>	<p>The construction dates for the buildings were unavailable. Available information on buildings 307 and 365 was added to subsection 5.3.8.2. The text now reads "Building 307 is located to the west and Building 365 is located to the east of the Salvage Yard Landfill. Both buildings</p>

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				are used by the Naval Surface Warfare Center (NSWC) Crane for their engineering offices, and have 10 to 15 personnel at any given time."
CA RWQCB	20	Salvage Yard Landfill	<b>Page 5-61, Subsection 5.3.11 Surface Soil</b> Based on the discussion regarding the surface soil exposure media, it seems that there is a potentially complete pathway for domestic animals, which is not illustrated in Figure 5.3-5. Please review and provide clarification.	Figure 5.3-5 was modified to reflect the pathways for domestic animals discussed in the text. The domestic animal category only applies to pets at the housing complex since cattle no longer graze at the installation.
CA RWQCB	21	Salvage Yard Landfill	<b>Page 5-61, Subsection 5.3.11 Ground Water</b> The discussion of the ground water vapor inhalation exposure route seems to contradict the information presented in Figure 5.3-5. The exposure route is described as incomplete in subsection 5.3.11 and potentially complete in Figure 5.3-5. Please review, and either rectify the discrepancy or provide clarification, whichever is appropriate.	Figure 5.3-5 was modified to reflect the incomplete pathway as described in Section 5.3.11.
CA RWQCB	22	Dunnage Disposal Site #1	<b>Page 5-69, Subsection 5.4.1.1 Topography</b> According to this Subsection there are some burial pits within the boundaries of Dunnage	The Dunnage Disposal Site #1 description was clarified to specify there are no visible burial pits, but suspected

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			Disposal Site #1. To the extent practicable, indicate the location of the pits on a map and provide information regarding the number and approximate dimensions of the pits.	ground disturbances/ burials. The text was referring to the moderately deep ravines created by runoff and ephemeral streams at the site. Further investigation of possible burial pits will be investigated during the Site Inspection. The text now reads "The Dunnage Disposal Site #1 contains low hills with some moderately deep ravines created by runoff and ephemeral streams."
CA RWQCB	23	Dunnage Disposal Site #1	<b>Page 5-72, Subsection 5.4.4 MEC Presence</b> In the second sentence of Subsection 5.4.4, there is a discussion of a "Bombing Crater Site". Please provide additional information regarding the location, dimensions, and nature of this apparent Dunnage Disposal Site #1 Subsite.	The discussion of a "Bombing Crater Site" is in error. The discrepancy was corrected. There is no "Bombing Crater Site" at the Dunnage Disposal Site #1 or anywhere else on Detachment Fallbrook. The discussion was unintentionally included from the NAWS China Lake PA.
CA RWQCB	24	Dunnage Disposal Site #2	<b>Page 5-93, Subsection 5.5.6, 5.5.7, and 5.5.8</b> Please note that there is a discrepancy in the PA regarding the presence of MC at the Dunnage Disposal Site #2. According to Subsection 5.5.6 and 5.5.7, MC are not expected to be present at Dunnage Disposal Site #2, yet according to Subsection 5.5.8, there is a potential for receptors to come into contact with MC. This discrepancy also is	MC are not suspected at the Dunnage Disposal Site #2. Section 5.5.8 and Table 5.5-1 have been modified to correct this discrepancy. Section 5.5.8 now reads "MEC and MC are not expected to be present at the site; potential receptors and pathways are not of concern."

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			an issue in Table 5.5-1. Please review, and either rectify the discrepancy or provide clarification, whichever is appropriate.	
CA RWQCB	25	Dunnage Disposal Site #2	<b>Page 5-94, Subsection 5.5.8.2</b> The information presented in this Subsection regarding the presence of buildings in the vicinity of Dunnage Disposal Site #2 conflicts with information presented in Map 5.5-2. According to the Subsection 5.5.8.2, there are no buildings within a 0.5 miles radius of the Site, yet Map 5.5-2 illustrates the presence of Building 701 approximately 100 meters to the north of the Site. Please review, and either rectify the discrepancy or provide clarification, whichever is appropriate.	Section 5.5.8.2 has been modified to identify the presence of buildings 701 and 679. Section 5.5.8.2 now reads "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."
CA RWQCB	26	Dunnage Disposal Site #2	<b>Page 5-100, Subsection 5.5.13</b> The proposed recommendation for the Dunnage Disposal Site #2 is no further action for MEC and MC. Based on the limited extent of the site reconnaissance performed and the approximate size of the Dunnage Disposal Site #2, refer to Map 5.5-1, it is Regional Board's position that a more extensive and thorough site reconnaissance is warranted to support the proposed.	Dunnage Disposal Site #2 is not suspected to contain MEC or MC. It is currently identified as IRP Site 34b. Further investigation at this site will be conducted under the IRP.
CA	27	Dunnage	<b>Page 5-110, Table 5.6-1</b>	Terrier and Sidewinder Roads were

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RWQCB		Disposal Site #3	Please provide the years that Terrier and Sidwinder Roads were constructed. This information will assist establishing site boundaries.	constructed in 1945. This information has been added to Table 5.6-1.
CA RWQCB	28	Dunnage Disposal Site #3	<b>Page 5-117, Subsection 5.6.11 Ground Water</b> The discussion of the ground water vapor inhalation exposure route for the biota receptor contradicts the information presented in Figure 5.6-4. The exposure route is described as incomplete in Subsection 5.6.11 and potentially complete in Figure 5.6-4. Please review, and either rectify the discrepancy or provide clarification, whichever is appropriate.	Figure 5.6-4 was modified to reflect the incomplete pathway as described in Section 5.6.11.
CA RWQCB	29	Dunnage Disposal Site #3	<b>Page 5-120, Subsection 5.6.13 Recommendations</b> Regarding the proposed ground water monitoring network, it is the Regional Board's position that currently there is a insufficient data available at the site to propose a network that is in compliance with Applicable or Relevant and Appropriate Requirements (ARARs). Typically these networks are designed and installed during Remedial Investigation (RI) phase based on site-specific data.	Dunnage Disposal Site #3 could potentially contain MEC or MC. It is currently identified as IRP Site 34c. An SI under the MMRP is being recommended to further investigate the possibility of MEC and/or MC at the site.
CA	30	Dunnage	<b>Page 5-134, Subsection 5.7.13</b>	Dunnage Disposal Site #5 is not

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RWQCB		Disposal Site #4	<p><b>Recommendations</b></p> <p>The proposed recommendation for the Dunnage Disposal Site #4 is no further action for MEC and MC. Based on the limited extent of the site reconnaissance performed and the approximate size of the Dunnage Disposal Site #4, refer to Map 5.7-1, it is the Regional Board's position that additional site reconnaissance activities is warranted in the southern portion of the site to support the proposed recommendation.</p>	suspected to contain MEC or MC. It is currently identified as IRP Site 34d. Further investigation at this site will be conducted under the IRP.
CA RWQCB	31	Fallbrook Skeet/Trap Range	<p><b>Page 5-165, Subsection 5.9.11 Ground Water</b></p> <p>The discussion on the ground water vapor inhalation exposure route seems to contradict the information presented in Figure 5.9-4. The exposure route is described as incomplete in Subsection 5.9.11 and potentially complete in Figure 5.9-4. Please review, and either rectify the discrepancy or provide clarification, whichever is appropriate.</p>	Figure 5.9-4 was modified to reflect the incomplete pathway as described in Section 5.9.11.
DTSC	32		Upon review, DTSC found that the subject PA is well organized and provided adequate information to support the recommendations: Site Inspection (SI) for Munitions Constituents (MC) at the SF Small Arms Range and the Fallbrook	Comment noted. No response is required.

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			<p>Skeet/Trap Range; SI for both Munitions and Explosives of Concern (MEC) and MC at the QE Test Area, the Salvage Yard Landfill, and the Dunnage Disposal Sites #1 and #3; No Further Action (NFA) at Dunnage Sites #2, #4, and #5. Navy informed DTSC during the November 29, 2005 Site visit, that the proposed "no further action" recommendations for Dunnage Sites #2, #4, and #5 are for the Munitions Response Program. Site Inspections will be conducted at these sites under the Installation Restoration (IR) Program as funding is available.</p> <p>DTSC concurs with the PA recommendations. However, if additional data becomes available, the recommendations will be re-evaluated accordingly.</p>	

Naval Weapons Station Seal Beach, Detachment Fallbrook  
 Draft Final Preliminary Assessment for the Munitions Response Program Depot Lake and Lower Lake, February 2006  
 Comments (received from DTSC and CA RWQCB) and Responses (Malcolm Pirnie)  
 May 2006

Document: Draft Final Preliminary Assessment for the Munitions Response Program, Depot Lake and Lower Lake - Naval Weapons Station Seal Beach, Detachment Fallbrook

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CA RWQCB	1	Subsection 3.6 Hydrology	The current description of the hydrology at the Sites includes the number and location of tributaries to the Sites, and the location of surface water discharge points for the Sites, dam and spillway. The Subsection should be expanded to identify all downgradient receiving surface water body(s) for the Sites.	Concur. Downgradient receiving surface water bodies for the sites have been identified and included. Parts of Section 3.6 now read: <ul style="list-style-type: none"> <li>• For Depot Lake: "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."</li> <li>• For Lower Lake: "The dam releases the lake water into an intermittent stream that feeds Lake O'Neill on MCB Pendleton."</li> </ul>
CA RWQCB	2	Subsections 5.1.1 and 5.2.1 History and	The uses of the Sites identified in these Subsections include water storage for stock water and fire protection, fish and wildlife	As discussed in Sections 5.1.11 and 5.2.11, inhalation and dermal contact of surface water is considered a potentially

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		Site Description	enhancement, and recreational boating and fishing. Please expand the discussion to indicate whether or not humans use the Sites for activities involving body contact and ingestion of water. This information can be used in the future to develop a comprehensive risk assessment for the Sites.	complete pathway. As of 2004, recreational boating and fishing were discontinued at Depot and Lower Lakes. No swimming is allowed at the lakes. At this time, all recreational activities, including fishing and swimming, at the lakes have been suspended until further investigation by IRP and MRP.
CA RWQCB	3	Subsections 5.1.7 and 5.2.7 Contaminant Migration Routes	The PA includes the following contaminant migration routes: sediment transport and deposition; construction, excavation, and maintenance activities; off Base surface water flow; and surface water infiltration to ground water. Since the Sites are used to store water for wildfire suppression activities, it seems the Subsections need to be augmented to include these activities. Note that Table 5.1-1 (Munitions/Release Profile, Migration Routes/Release Mechanisms) requires revision to address this issue and to include surface water infiltration to ground water.	Concur, the use of lake water for wildfire suppression will be added as a migration route. Subsections 5.1.7 and 5.2.7 now include the following text: "Potentially contaminated lake water could also migrate during its use for fire suppression. Lake water contaminated with MC might infiltrate into the groundwater." Tables 5.1-1 and 5.1-2 also reflect this change.
CA RWQCB	4	Subsections 5.1.8 and 5.2.8 Receptors and Pathways	The PA includes the following receptors: human at the Sites, humans downgradient of the Sites and off Base that come into contact with site related MC discharging through the surface water system, and ecological receptors that come into contact	Benthic aquatic life was considered as part of the ecological receptors. Civilian and military personnel were considered as part of the human receptors off-base receiving surface water. The discussions of receptors will be clarified to show

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			with contaminated surface water or ingest MC incorporated into the food chain. Additional receptors that need to be discussed are benthic aquatic life at the Sites and in downgradient receiving surface waters, and civilians and military personnel at Marine Corps Base Camp Pendleton using surface and ground waters for municipal and domestic purposes.	inclusion of the receptors identified in the comment. Subsections 5.1.8 and 5.2.8 now read: "Human receptors ... include Navy personnel and Navy-permitted visitors (including contractors). Ecological receptors (including benthic aquatic life) may come into direct contact with MC in the sediment and/or water. Ecological receptors may also come into contact with MC that has been incorporated into the food chain (bioaccumulated in plants and prey). The general public (including MCB Camp Pendleton military personnel and civilians) could also come into contact with MC flowing out of the lake and off of the installation through the surface water system."
CA RWQCB	5	Tables 5.1-1 and 5.2-1 Ecological Profile, Degree of Disturbance	According to Tables 5.1-1 and 5.2-1, the disturbance at each of the Sites is expected to be low and the disturbance below the water level is expected to be minimal. Whereas these expectations maybe correct the majority of the time, they are most probably incorrect during the removal of surface waters for wildfire suppression. Either revise the finding, or provide in the	The fire department (Station 9) uses a helicopter and bucket method to remove water from Depot Lake and Lower Lake. The bucket holds 300 gallons of water and only goes down 4 feet into the water. This action is performed on average twice a year during fire season. From this description, it would not appear that the bucket method would significantly

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			response to comments (RTC) an explanation as to why the Sites will not be significantly disturbed during these activities.	disturb the sediments in the lakes.
CA RWQCB	6	Pages 5-13, 5-32, and 5-33 MEC and MC Interactions and Pathway Analysis	Since surface water from the Sites are used for wildfire suppression, it seems the discussions should include the possibility of MEC and MC (sediment and surface water exposure media) removal and offsite disposal during these activities. PA Figures 5.1-2 and 5.2-2 need to be augmented to include the use of surface water from the Sites for wildfire suppression.	Water usage to fight wildfires is not considered a disposal activity. The figures have been updated to include wildfire suppression activities. The MEC Interactions Pathway Analysis would not be affected because the technique used to remove water from the lakes is not expected to disturb the sediments, which is where any MEC in the lakes would be encountered. The MC Interactions and Pathway Analysis for both lakes now includes the following text: "Water removed during wildfire suppression actions could potentially transfer MCs in the surface water from the lake onto the wildfire area."
CA RWQCB	7	Pages 5-13, 5-14, and 5-33 MC Interactions and Pathway Analysis, Surface and Ground	The discussion should be expanded to include the fact that civilians and military personnel at Marine Corps Base Camp Pendleton use surface and ground waters from the Santa Margarita Hydrologic Unit for municipal and domestic purposes.	Concur; the discussion will be expanded to include uses of water downstream. <ul style="list-style-type: none"> <li>• The MC Interactions and Pathway Analysis for Surface Waters for Depot and Lower Lake now includes the following text: "As mentioned in Section 3.7, MCB Camp Pendleton uses surface water from the Santa</li> </ul>

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		Waters		<p>Margarita River Watershed for municipal and domestic purposes. This could potentially affect both civilians and military personnel at MCB Camp Pendleton."</p> <ul style="list-style-type: none"> <li>• The MC Interactions and Pathway Analysis for Groundwaters for Depot and Lower Lake now includes the following text: "As mentioned in Section 3.7, MCB Camp Pendleton extracts and uses groundwater from the Santa Margarita Watershed; this could potentially affect both civilians and military personnel at MCB Camp Pendleton."</li> </ul>
CA RWQCB	8	Subsections 5.2.1 and 5.2.1.4, Table 5.2-1, and Map 5.2-2	The descriptions of the Site presented in the above noted Subsections and Table differs significantly from that illustrated Map 5.2-2. As an example, the Site description in Subsection 5.2.1 identifies the location of the Lower Lake dam to be at the southern end of the Lake. Yet Map 5.2-2 illustrates the dam as being located at the western end of the Lower Lake.	Concur; the description of the Lower Lake dam will be corrected to say that the dam is located on the western end.
CA RWQCB	9	Page IV	Include a definition of "magazine".	Concur. Definition added.
CA	10	Page 5-4,	Typographical error – "...7.2-inch-inch	Concur. Text corrected.

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RWQCB		Subsection 5.1.3, 2 <sup>nd</sup> Paragraph	projector charges....”	
CA RWQCB	11	Appendix A References	Include the USACE, 2003 and EPA/540/G-89/004 references noted on Page 5-7.	Concur. References added to Appendix A.
CA RWQCB	12	Tables 5.1-1 and 5.2-1, and Subsections 5.1.6 and 5.2.6 Associated Munitions Constituents Columns, 1 <sup>st</sup> Bullets	Typographical error “...lead chromate(VI)....”	Concur. Text corrected.
CA RWQCB	13	Tables 5.1-1 and 5.2-1 Associated Munitions Constituents Columns, 2 <sup>nd</sup> Bullets	Based on the information presented in Appendix D regarding the 7.2-inch projector charges, it seems “Torpex” should be included.	Torpex is composed of the MC reported in the tables: 42% RDX, 40% TNT, and 18% aluminum.
CA RWQCB	14	Table 5.2-1 Associated Munitions Constituents Column, 1 <sup>st</sup>	Typographical error “...cumene hydroperoxide, , methyl....”	Concur. Text corrected.

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CA RWQCB	15	Page 5-22, 2 <sup>nd</sup> Paragraph, 1 <sup>st</sup> Sentence	"...south and east and costal sage...."	Concur. Text corrected.
DTSC	16	Characteristics of the Lakes	There is no mention of the depth of the two lakes. Please include this information in the final PA.	Concur. Approximate depths have been added to the description of the two lakes. Section 5.10.1.4 now reads: "The lake is approximately 4 to 10 feet deep in the summer months and 6 to 18 feet deep in the winter months." and Section 5.11.1.4 now reads: "The lake is approximately 8 to 16 feet deep during the summer months and 12 to 25 feet during the winter months."