



**US Army Corps
of Engineers**
HUNTSVILLE ENGINEERING
SUPPORT CENTER

**Defense Environmental Restoration Program
for
Formerly Used Defense Sites**

**Ordnance and Explosives
Chemical Warfare Materials**

SUPPLEMENT
TO THE MARCH 1994
ARCHIVES SEARCH REPORT
FOR
BENICIA ARSENAL
Benicia, Solano County, California

PROJECT NO. J09CA075600

APRIL 1997

**FINAL
MAY 1997**

**Prepared by
US ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT**

TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1.0	PURPOSE AND SCOPE	1-1
2.0	HISTORY	2-1
2.1	Summary of OE Activities	2-1
2.2	Summary of CW Activities	2-5
2.3	Review of Historical Records	2-6
3.0	SUMMARY OF INTERVIEWS	3-1
3.1	Mr. Phil Plant and Mr. Jim Campbell	3-1
3.2	Mr. Leonard Auger	3-1
3.3	Mr. Earl Manor	3-1
3.4	Mr. Joseph Moreira	3-3
3.5	Mr. Mike Tessier	3-3
3.6	Mr. James Milburn	3-4
3.7	Mr. M. J. Vincent	3-4
3.8	Mr. Elmer Banks	3-4
3.9	Mr. R. V. Allenwood	3-5
4.0	REAL ESTATE	4-1
5.0	SITE INSPECTION	5-1
5.1	General	5-1
5.2	Analysis of Ordnance Activities	5-1
5.3	Current Site Characterization	5-2
6.0	EVALUATION OF ORDNANCE PRESENCE	6-1
6.1	Chemical Warfare Materials	6-1
6.2	Landfills/dumps	6-2
6.3	Conventional Ordnance	6-3
7.0	CONCLUSIONS	7-1
7.1	Chemical Warfare Materials	7-1
7.2	Conventional Ordnance	7-1
7.3	Arsenal Boundary	7-1
7.4	General	7-2

APPENDICES

- A REFERENCES
- B INTERVIEWS
- C PRESENT SITE PHOTOGRAPHS
- D SITE SPECIFIC SAFETY AND HEALTH PLAN/
SITE INSPECTION REPORT
- E REPORT DISTRIBUTION LIST

REPORT PLATES

- PLATE 1 ORDNANCE ACTIVITIES-1991
GROUND FEATURES
- PLATE 2 ORDNANCE ACTIVITIES-1951
GROUND FEATURES
- PLATE 3 ORDNANCE ACTIVITIES
TOURTELOT PROPERTY

1.0 PURPOSE AND SCOPE

The Draft Archive Search Report (ASR) for the Benicia Arsenal was completed in March 1994.

During February 1997, Pacific Bay Homes began residential construction on a portion of the leased property known as the Tourtelot property. Live conventional ordnance was found during excavation activities. Construction activities were halted. Funds were obtained by the Sacramento Corps of Engineers District to perform additional research.

The primary focus of the additional research was to confirm storage areas and determine possible disposal areas for Chemical Warfare Materials (CWM). The research was also intended to verify the boundaries of the arsenal, specifically the leased property that was added to the northern portion of the arsenal.

The additional research was not limited to CWM. This supplement presents additional information regarding CWM and conventional ordnance.

2.0 HISTORY

2.1 Summary of OE Activities

By 1918 a 500 yard small arms range existed on the arsenal property. (Ordnance Office 1918).

In 1922 a fire both partially and completely destroyed several buildings and magazines on the original Benicia Arsenal property. Included in the destruction were the following pieces of ordnance: Mk. 1 50 pound bombs, hand grenades, phosphorus grenades, 15 pound high explosive bombs, and 25 pound fragmentation bombs (Fire 1922).

In 1926 an old cistem was reconditioned for use as a storage magazine. It was designated as Magazine #12 (Historical Record of Ordnance Buildings at Benicia Arsenal 1939). This is the cistem used for CWM storage as discussed in the history section of the ASR.

In May 1927 an Ordnance Reserve Officers' Training Camp at Benicia Arsenal conducted demonstration firings of automatic rifle, machine gun, 3-inch Stokes trench mortar and 37mm gun. The impact areas of these operations are unknown (Adams 1927).

The Army designated a Demolition Area by 1942 (Kennedy 1942). A 1956 map refers to this area as a Firing Range. The map is unclear if this is a proposed range (Griffin 1951; Office of the Post Engineer 1956).

A procedure for burning explosives was established at Benicia by 1946 (Deitrick 1946).

A demolition site was located in a deep valley between steep hills on the northwest edge of the arsenal. In 1945 the Army burned 129,950 pounds of TNT along with M21A1 boosters and M51 drop-testing fuzes. An additional burning included:

- Oil Slick Ignitor Comb
- Incendiary Pocket OSS
- Incendiary Oil Slick Comb
- Railroad Ignitor Device w/clamp
- Limpet Pin-up Gun for use on wood
- Limpet Pin-up Gun for use on steel
- Simulator Rifle Fire Pencil Delay
- Firing Device, Auto Weapons, Delay
- Firing Device, Pressure Type
- Sympathetic Fuzes and Boosters (Seres 1945).

The Army burned over 69 million rounds of .30, .50, and .45 caliber ammunition by 1949 at Benicia Arsenal (Goodell 1949). At least one method of burning the small arms ammunition at Benicia involved soaking the ammunition cases with kerosene (Benicia Arsenal Magazine 1951). In January 1946 the Army burned black powder, double base powder, magnesium powder, Metallic Grade A, B and C (Seres 1946A). In March 1946 the Army destroyed 110,000 M106 detonators at Benicia Arsenal.

Demilitarization (burning or blasting) activities at Benicia in August 1948 included scheduling of the following items:

- Shell, HE-T, MK-3, Navy for 20mm gun
- Fuze, Bomb, Tail, AN-M100A2
- Fuze, PD, M48A1 and M48A2
- Fuze, TSQ, M55A3
- Fuze, PD, M56
- Booster, M21A4
- Primer, perc, M28A2
- Primer, perc, M31
- Primer, perc, M38 and M38A1
- Proj. AP, 1400#, MK8, Mod 9A1 for 14 inch gun M1907
- Proj. AP, 1400#, MK7, Mod 6A1 for 14 inch gun M1907
- Charge, Cratering, 40#, M3
- Fuze, T&SQ, M54
- Cart, All Types, Cal. .30 Grade III
- Cart, All Types, Cal. .50 Grade III

From the same report the Army destroyed the following ammunition at Benicia Arsenal:

- 10,380 lbs. Smokeless Powder
- 31 155mm propelling charges
- 2,175 105mm propelling charges
- 30 81mm mortar shells
- 4 5" rockets
- 4 3" shells (Lore 1948A).

The Army destroyed the following ammunition at Benicia Arsenal in November 1948:

- 25 rounds, Cartridge, Ignition, M5
- 48 rounds, shell, HE, M56, 81mm
- 20 rounds, rockets, smoke, WP, 2.36 inches
- 2 rounds, shot, AP-T, M74, 37mm
- 5 rounds, shot, fixed, TP-T, M51A1, 37mm
- 7 each, charge, propelling, M4A1, 155mm Howitzer

These items could have been burned or blasted. In December 1948 the Army removed 628,709 rounds of small arms ammunition from stock and demilitarized them at the local burning pit. The Army also demilitarized 43,000 rocket kits at this time and started preparation on approximately 425 tons of ammunition for dumping at sea (Lore 1948B).

The Army demilitarized the following items at Benicia Arsenal:

- Grenade, Rifle, Smoke, WP, M19A1
- Grenade, Rifle, AT, M9 & M9A1
- Fuze, PD, M51 w/booster
- Fuze, PD, MK IV short delay
- 155mm Propelling Charges
- 1,061 pounds of dynamite
- 38 aircraft signals
- Cal., .30 Grade III small arms
- Rocket, kit, 4.5" aircraft fuze, bomb, nose, M149
- 43,000 rocket kits, AW0 215
- 43 Charge, Propelling, M19, 155mm Gun, M2 (Lore 1947).
- Railroad fuzes
- German Signals
- Combination Lock Primers, MK VI-1
- Shell, M54 for M4 gun
- Deprimed 20mm Cases
- 37mm Canister, M3, M5, & M6 Gun
- Foreign Powder
- Coast Guard Signals
- Cartridge, Rippling Link. Mk III
- Primacord
- Ignition Cartridges, M8 for rifle grenades
- Safety Fuzes
- Japanese Incendiary Bomb
- Primers
- Grenade, Hand, Mk II
- Small Arms ammunition, Cal. .22 and .50
- Small arms ammunition, Japanese
- Signal, M20
- Signal, M22
- Flares, signal, green
- Booby trap
- Siren w/report
- Super Siren Bomb
- English Signals, red
- Firing Device, Pull type

Primer, Igniting
Ground Bombs
Daytime Distress Signals
Electric Squibbs
Japanese Demolition Blocks
Propellent Powder, M1, MP Grain
Grenade, Rifle, AT, M9A1
Charge, Propelling M14A1
Charge, Propelling, M19
Fuze, Bomb, Tail, AN-M102A2 w/Primer Detonator M14
Shell DP 12 inch mortar
Demolition kit, M26
37mm cartridges
90mm cartridges
75mm cartridges
Dynamite (Seres 1946C).

Between 1946 and 1949 the Army dumped many tons of ammunition in the sea near Benicia (Monthly Report 1946; Seres 1946B; Monthly Report 1949). The Army began shipping all High Explosive ammunition from Benicia Arsenal to Navajo, Sierra, and Umatilla Depots in 1951. At the same time the Army discontinued the demolition ground site and began dumping unserviceable items at sea. By July 1952 there was only storage of small arms ammunition at Benicia Arsenal (Inspection 1951; Smith 1952).

Historic photos from 1954 display the outdoor storage conditions at Benicia Arsenal. In most cases it is impossible to tell the locations of the stack areas but the crates were completely exposed to the elements. The crates are sometimes shown setting in deep water (Post Request 1954).

A few small arms ranges existed at Benicia in 1955. The soldiers used an indoor pistol range at the Camel Barn and an outdoor bobbing target range just beyond Gate 12. Soldiers used a 1,000 inch Indoor target range in the Small Arms Shop basement (Sheetz 1955; White 1955).

In 1955 the Army inspected a surplus area consisting of 92 acres of steep rolling hills. An EOD team had previously cleared and restricted 15 acres of this area. This EOD cleared area had several large craters used for destruction of defective or obsolete ammunition. The area consisted of a draw and its tributaries for a distance of about

1/2 mile. The Army officer (Major Lynch) inspecting the 92 acres found 4 hand grenades, 2-37mm projectiles HE, 3-60mm mortars, and 1-75mm projectile HE during a brief period. He stated that a search and clearance would probably result in the recovery and destruction of many more missiles. He determined the area was not an impact area, and as such, a search and clearance would leave the area clear and would probably not require any subsurface restriction. Based on the results of the inspection by Major Lynch, the Corps of Engineers Real Estate Office recommended complete clearance of the leased area (Lynch 1955; Cupples 1955).]

A 1956 map indicates a rectangular area surrounding the artillery test tunnels (on the leased property) used as a demolition and demilitarization area (Office of the Post Engineer 1956).

2.2 Summary of CW Activities

Chemical Warfare Service depots throughout the country sent bombs, grenades, 4.2-inch shells and toxic containers to Benicia by rail. These chemical items were loaded directly on ships or barges, stored openly or in igloos, or sent out by rail (Hemlebem 1947).

The first few years immediately after WWII ships delivered various types of supplies and ordnance to Benicia Arsenal from the Pacific Theater of Operations. In January 1946 the Army discharged 82 long weight tons of 75mm gas filled howitzer shells and 218 long weight tons of 60mm gas filled mortar shells to Benicia Arsenal (Marriott 1946). Whenever necessary the Fire Department at Benicia Arsenal performed decontamination operations. A few mustard gas or phosphorous containers required decontamination. The Fire Department also stood by as ammunition was deactivated, exploded, or burned (Benicia Arsenal 1951).

2.3 Review of Historical Records

**Washington National Records Center
4205 Suttland Road
Suttland, MD 20409
POC: Velecia Chance
(301) 457-7010**

Record Group 77 (Records of the Chief of Engineers)

Accession A52-0259

Box 8 One folder on Benicia Arsenal. Copied a small list of ordnance items from 1946.

Accession A53-0325

Box 10 Belle Mead thru Big Springs. Several folders on Benicia Arsenal 1948-50. Copied document on existing facilities at Benicia Arsenal for February 1949.

Record Group 121 (Records of the Public Buildings Service)

Accession 75-0037

Boxes 2 - 4 Many folders on California sites. Nothing for Benicia Arsenal.

**National Archives - Archives I
8th & Pennsylvania
Washington, DC 20408
POC: Mitch Yockelson
(202) 501-5671**

Record Group 77 (Records of the Chief of Engineers)

Entry 391 Construction Completion Reports 1917-43.

Box 8 Copied documents on new magazine construction.

Box 34 Copied document on 1921 magazine construction.

Entry 393 Records of Equipment and Condition of Buildings of Active Army Posts 1905-42.

Box 14 Copied documents on magazines and maps of Benicia Arsenal.

Record Group 92 (Records of the Quartermaster General)

- Entry 1891 General Correspondence Geographic File 1922-35.
Box 134 Fort Belvoir thru Benicia.
Box 137 Benicia Arsenal. Copied document on Magazine #14.
- Entry 1974 Construction Division Completion Reports 1917-1919.
Box 25 Fort Belvoir thru Benicia Arsenal. Part of September 1916 map copied.
- Entry 1998 Real Estate Records 1917-22.
Box 16 Camp Beauregard thru Benicia Arsenal. One folder on Benicia Arsenal.
- Entry General Correspondence Geographic File 1922-35.
Box 136 Numerous folders on Benicia Arsenal. Completion report on magazine buildings, September 1930.

Record Group 153 (Records of the Office of the Judge Advocate)

- Entry 56 Records of Military Reservation Division 1809-1948.
Box 8 Alcatraz Island thru Fort Jones.

Record Group 156 (Records of the Chief of Ordnance)

- Entry 36A General Correspondence Decimal Files 1915-31.
Box 273 Benicia Arsenal.
Box 274 One document copied on roof repair for magazines 13 and 14.
- Entry 36B General Correspondence 1931-41.
Box 121 Augusta thru Benicia.
- Entry 36C General Correspondence 1931-1941.
Box 1438 Memorandum of Benicia Arsenal Activities, 1919.
- Entry 41 Correspondence Relating to Inspections 1917-1940.
Box 1 This box was charged out to another researcher and we were unable to view it.
Box 2 Fort Benning thru Chavez.
Box 3 Curtis Bay thru 8th Corps.
Boxes 4 - 10 General information.
- Entry 50 Ordnance Depot Planning and Administration during World War I.
Box 1 Map of Benicia Arsenal 1918 with small arms range.
- Entry 107 Statements of Ordnance Stock on Hand at Arsenals and Depots 1920-29.
Fifteen handwritten bound volumes.
- Entry 438 Administrative Division. Military Guard Section 1918-19.
Box 2 General information for Benicia Arsenal 1918.
Box 3 Reports of inspections of plants, depots, arsenals, and armories.
- Entry 524 Executive Section 1917-20, Historical Branch.
Boxes 1-24 Mostly GOCO Plants.

- Entry 527 Executive Section/ Historical Branch.
Box 2 Histories and studies relating to ordnance material used in trench warfare 1917-19. Not site specific.
Box 3 Specifications and development of numerous ordnance pieces.
No mention of sites.
- Entry General Correspondence 1931-41.
Box 122 Ammunition list and target material list 1934.

- Record Group 159 (Records of the Office of the Inspector General)
Entry 11 Annual Inspection Reports 1912-39.
Box 79 Copied several reports and one map.

- Record Group 175 (Records of the Chemical Warfare Service)
Entry 2 Index Briefs 1918-1942.
Box 32 Arsenals. This box was charged out to another researcher and we were unable to view it.
Box 38 Bay Company thru Bess, E.S.
- Entry 3 Special File 1922-43.
Box 588 Ninth Corps Area, but no information for Benicia.
Box 589 Ninth Corps Area, but no information for Benicia.

- Record Group 407 (Records of the Adjutant General's Office)
Central Decimal Files 1917-1925
Box 1104 Various schools.

National Archives - Archives II
8601 Adelphi Road
College Park, MD 20740
POC: Ken Schlessinger
(301) 713-7250

- Record Group 71 (Records of the Bureau of Yards and Docks)
Naval Property Case Files, 1941-58.
Boxes 145 - 150 San Francisco. But nothing specific for Benicia Arsenal.
- Record Group 77 (Records of the Chief of Engineers)
Entry 1011 Formerly Classified Subject Files 1940-45.
Box 180 Several folders on Benicia Arsenal. Large map of Benicia Arsenal January 1943.
Box 181 Lease information 1942.

Record Group 112 (Records of the Surgeon General of the Army)

Entry 31 Geographic Series 1938-40.

- Box 1 Alaska Air Base thru Boston Airport.
- Box 62 Bates Field thru Boca Raton Field.
- Box 388 Bedford AAF thru Big Spring AAF.
- Box 1290 Avon Park AAF thru Big Springs AB.

Entry 32 Geographic Series 1938-44.

- Box 2 Eighth AF thru Chanute Field.
- Box 76 2nd Air Force thru 1st Army.
- Box 77 5th Army Corps thru Austria.
- Box 78 Bermuda thru France.
- Box 79 France thru Germany.
- Box 80 Germany thru Great Britain.
- Box 81 Great Britain thru Ireland.
- Box 82 Italy thru Japan.
- Box 83 Japan.
- Box 84 Japan thru Panama.
- Box 85 Philippines thru 27th Division.
- Box 86 34th Division thru Crile General Hospital.
- Box 87 England General Hospital thru Louisville Medical Depot.
- Box 88 Richmond General Depot thru Edgewood Arsenal.
- Box 89 Hampton Roads Port of Embarkation thru University of Chicago.
- Box 90 University of Pittsburgh thru European Command.
- Box 91 Far East Command thru Cape Newenham.
- Box 92 Capiapo thru 18th Medical General Laboratory.
- Box 93 600th Motor Ambulance Co. thru Musk Ox.

Record Group 156 (Records of the Chief of Ordnance)

Entry 654H Histories of Ordnance Activities at Ports of Embarkation 1919-45.

- Box 2 San Francisco Port of Embarkation.

Entry 1049 General Correspondence 1949-54.

- Box A393
- Box A757
- Box A784
- Box A786
- Box A892
- Box A907
- Box A1167
- Box A1289
- Box A1295

- Entry 1314 Industrial Division Ammunition Branch, Field Service 1945-50.
Boxes I132 and I133 Various arsenals. Fiscal and budget reports.
Intelligence, Safety and Security Office, Safety Branch. General
Administration Files 1950-54.
Boxes E1 - E3 Various folders with specific ordnance but no connection
with Benicia Arsenal.
Box E4 Two documents on storage of class 10 material in igloos.
Boxes E5 thru E7 1954.
Boxes E8 - E10 General information.
Box E11 Acquisition of land, Benicia Arsenal, California 1954.
Boxes E12 - E13 General Information.
- Entry 1336 Field Service Division.
Box H1 Copied several documents for Benicia Arsenal.
- Entry 1337 Field Service Division. Installation Status Directive Files 1954-61.
Box 1 Aberdeen to Terre Haute. Several folders on various arsenals
but not Benicia.
- Entry 1339 Field Service Division Ammunition Task Force Files 1950-52.
Box H2 Reports on Ordnance Ammunition Program.
Boxes H3 - H4 Ordnance Ammunition Program Reports 1950-52.
Boxes H-5 - H-6 Ammunition procurement & supply.
Box H7 Artillery ammunition.
Box H8 Misc. memos.
Box H9 Pacific Theater operations.
- Entry 1341 Field Service Division 1942-51, General Supply Branch.
Box H10 Seacoast Defense Armament Board November 1946.
Box H11 One folder on Benicia general information.
Box H12
Box H13 1943-50. Raritan Arsenal thru Wingate.
- Entry 1346 Field Service Division, Organization Planning Files 1953-57.
Box 1 Operation Sledge Hammer logistics reports.
- Entry 1351 Field Service Division Management Administration and Project Files
1953-54.
Boxes H15 - H17 Management reports on various arsenals. Copied job
descriptions for Benicia Arsenal.
Box H18 Erie thru General 1954
Box H19 Management memos for various arsenals.
Box H20 - H25 Various arsenals.
- Histories of Ordnance Field Installations and Activities 1940-45.
Box 14 Aberdeen thru Dale Mabry Field.

Record Group 159 (Records of the Inspector General)

General Correspondence 1939-47.

Box 176 Bellows Field thru Budley Field. Construction contracts for magazine areas but not at Benicia.

Box 402 Report of Inspection.

Box 503 Annual inspection of Benicia Arsenal 1940.

Record Group 175 (Records of the Chemical Warfare Service)

General Correspondence, Station Series 1955-59.

Box 11 Alaska General Depot thru Fort Belvoir.

Records of the Office of the Chief Chemical Officer 1948-60.

Box 11 General information.

Boxes 12 and 13 Bids for contracts on supplies and services, but not for Benicia Arsenal.

Record Group 269 (Records of the General Services Administration)

Real Property Disposal Case Files 1945-53.

Box 60 Surplus documents for Turlock.

Record Group 291 (Records of the Federal Property Resources Service)

Real Property Disposal Case Files 1962.

Box 31 Appraisal of real estate for Federal Terrace Housing Project.

Record Group 334 (Records of the Interservice Agencies)

Entry Armed Services Explosives Safety Board.

Box 3 Explosion Reports 1939-48.

Record Group 336 (Records of the Chief of Transportation)

Historical Program Files 1940-50.

Box 77 Document on discharge of ammunition with list January 1946.

Box 79 No Benicia Information.

Box 97 No information for Benicia.

Box 105 San Francisco Port of Embarkation but nothing specific for Benicia Arsenal.

Box 131 Drawings of Ammunition Facilities but not Benicia.

Record Group 337 (Records of the Headquarters Army Ground Forces)

Entry 1 Combat Arms Advisory Group Inspection Reports 1948-50.

Box 1 One folder on Benicia Arsenal 1950. Document on Reserves Summer Camp June 1950 at Benicia.

Entry 79 Inspector General's Section Site Board Reports 1941-44.

Box 1 Alabama thru California but no Benicia.

Boxes 2 - 5 Georgia thru Virginia.

Record Group 338 (Records of the U.S. Army Commands, 1942 -)

Entry 1049 General Correspondence 1949-54.

Box A248 Monthly reports copied from Benicia 1949.

Entry Fifth Army

Bomb Disposal Reports

Boxes 1 - 4 European Theater of Operation.

Entry Sixth Army

Boxes 136 - 153 Radio Journals and Pacific Theater Operations.

Boxes 327 - 336 General information.

Box 151 General information.

Box 162 General information.

Entry Sixth Army Chemical Warfare Section, Decimal File 1943-46.

Box 136

Box 144

Box 147

Entry Sixth Army Engineer Section, maps and overlays 1943-46.

Boxes 431 - 436 Alamo Forces and other Pacific Theater
correspondence.

Entry Ninth Service Command Chemical Warfare Office Decimal
File 1927 - 45.

Box 24 General information for various sites including Benicia.

Box 27 Decimal File 1941-43.

Record Group 429 (Records of the Federal Property Council)

Central Real Property Surveys 1978-84.

Box 8 Mare Island Naval Shipyard.

Box 57 Mare Island Naval Shipyard, Vallejo, CA.

National Archives - Archives II
Cartographic & Architectural Research Room
8601 Adelphi Road
College Park, MD 20740
POC: Jennifer Nelson
(301) 713-7040

Record Group 30 (Records of the Bureau of Public Roads)
Benicia Arsenal & vicinity. Vallejo Defense Area map, 1940.

Record Group 156 (Records of the Chief of Ordnance)

Maps and Plans of Benicia Arsenal, California.

Map numbers 58, 83, 84.

**National Archives - Archives II
Still Picture Branch
8601 Adelphi Road
College Park, MD 20740
POC: Janita Dixon
(301) 713-6795**

**Record Group 156 (Records of the Chief of Ordnance)
Prints: Scenes of Benicia Arsenal 1899 - 1906.
Two photos of ammunition and weapons at Benicia Arsenal.**

**San Bruno Federal Records Center
1000 Commodore Drive
San Bruno, CA 94066
POC: Patty Bailey
(415) 876-9006**

**Record Group 77 (Records of the Chief of Engineers)
Accession 69-205
Box 2 Harbor soundings.
Accession 74A-1193
Map tubes 1 and 26 of 73 No copies made.
Accession 76A-1483
Box 127 of 374 1958 map of Benicia with disposal area.
Box 128 of 374 Many folders on Benicia.
Box 129 of 374 Copied two documents on clearance of ammunition
disposal area.
Accession 88-0017
Box 2 of 4 Construction projects at Benicia Arsenal.**

**Record Group 121 (Records of the Public Building Service)
Accession 76-0602
Box 1 of 7 No information for Benicia Arsenal.**

**National Archives - Pacific Sierra Region
1000 Commodore Drive
San Bruno, CA 94066
POC: Bill Green
(415) 876-9009**

Record Group 121 (Records of the Public Building Service)

Accession 85-001 Real Property Disposal Project Files 1945-51.

Box 8 Copied building list and disposal letters.

Box 9 Copied legal description and maps.

Box 10 Copied map and building list.

Box 11 Duplicates of box 10.

Record Group 156 (Records of the Chief of Engineers)

Entry 1156 General Correspondence 1903-15 for Benicia Arsenal. The following files included several boxes each and contained no pertinent information:

File 16 Supplies, acids, and chemical liquids.

File 17 Experimental.

File 102 Ordnance Detachment at Benicia.

File 110 Artillery firing, targets.

File 152 Ordnance stores.

Record Group 270 (Records of the War Assets Administration)

Accession 58-0342 Real Property Disposal Case Files 1946-49.

Box 134 Stockton Sub Depot of Benicia Arsenal.

Accession 62A-0979 Real Property Disposal Case Files 1946-49.

Box 16 Stockton Sub Depot.

Record Group 392 (Records of the US Coast Artillery Districts)

Entry 324 Correspondence, Reports and Blueprints relating to Batteries and Target Practice 1906-23.

Boxes 1 - 3 Several folders for Pacific Coast batteries but only general information.

**National Personnel Records Center
Military Personnel Records
9700 Page Avenue
St Louis, MO 63132-5100
POC: Wilson Sullivan
(314) 538-4085**

- Record Group 338 (Records of the US Army Commands)
- Accession 56B3039 Benicia Arsenal 1951
 - Box 1 Copies of Benicia Arsenal magazine 1951. Photos included.
 - Accession 56C3039
 - Boxes 1 - 4 General information.
 - Accession 56D3039 Benicia Arsenal Operation Prog. 1952.
 - Box 1 General information.
 - Accession 56E3039 Operations Planning 1952.
 - Boxes 1 - 3
 - Accession 57A3048 Administrative 1953.
 - Boxes 1 - 18 Documents on sending records to California Historical Society.
 - Accession 57B0753 Benicia Arsenal 1953.
 - Boxes 1 - 3 General information.
 - Accession 57C0753 Benicia Arsenal 1953.
 - Boxes 1 & 2 General information.
 - Accession 58A0969 Administrative 1954.
 - Box 1 Photos and descriptions of open area storage.
 - Boxes 2 & 3 General information.
 - Box 4 Management Seminar booklet 1954.
 - Boxes 5 - 16 General information.
 - Accession 59A0367 Administrative 1953-55.
 - Boxes 1 - 22 List of Proper Freight Classification Descriptions 1955 (Box 20). Document on indoor small arms range 1955 (Box 22).
 - Accession 59B0376 Publications 1953 - 55.
 - Box 1 Document on the indoor pistol range at Camel Barn. Benicia Arsenal Safety Regulation Index 1953. One document on fire hazard symbols (including chemical) for buildings at Benicia Arsenal.
 - Accession 59C0376 Operation Planning 1954 - 55.
 - Boxes 1 - 5 General information.
 - Accession 60A0543 Benicia Arsenal administrative 1954.
 - Boxes 1 - 15 Summary of Real Property Study at Benicia Arsenal May 1956 (Box 15).
 - Accession 60C0543 Benicia Arsenal Operation Planning 1956.
 - Boxes 1 - 6 General information.
 - Accession 61A5036 Benicia Arsenal Administrative 1957.
 - Boxes 1 - 3 General information.

Accession 61C5036 Benicia Arsenal Operation Planning 1957.
Boxes 1 - 5 General information.
Accession 61D5036 Benicia Arsenal Operation Progress 1957.
Box 1
Accession 62A4288 Administrative Files 1958.
Boxes 1 - 2
Accession 63A6091 Organizational Planning 1959.
Box 1 Civilian Employees Health Service Report 1959.

**U.S. Army Military History Institute
Reference Branch - Carlisle Barracks
22 Ashburn Drive
Carlisle, PA 17013
POC: Louise Arnold-Friend
(717) 245-3601**

Annual Historical Summaries. General information on Benicia Arsenal.

History of Benicia Arsenal 1851-1962. by Josephine W Cowell. Selected pages on temporary storage structures.

**Office of History
U.S. Army Corps of Engineers
7701 Telegraph Road
Alexandria, VA 22315
POC: Dr. Gordon
(703) 428-6558**

Installations Reservations 1937-45.

**Chemical Biological Defense Agency Historical Office
Aberdeen Proving Ground
Edgewood, MD 21010
POC: Dr. Jeffrey Smart
(410) 671-4430**

The research team reviewed several files. *History of CWS Activities at Ports of Embarkation* by Sylvester John Hemlebem dated June 27, 1947. A team member copied a portion of this report dealing with Benicia Arsenal. Two pertinent photographs are included.

Army Ordnance. An Ordnance Reserve Officers' Training Camp in California by Major Walter H. Adams. Mentions demonstrations firings of automatic rifle, machine gun, 3-inch Stokes trench mortar and 37mm gun at Benicia Arsenal.

**U.S. Army Environmental Center
Technical Library
Aberdeen Proving Ground, MD 21010
POC: Julie Tracey
(410) 671-1625**

The research team found general information about Benicia Army Cemetery 1990.

**Solano County Archives
1745 Enterprise Dr., Bldg. 2, Suite A
Fairfield, CA 94533
POC: Judy Nielsen**

The research team viewed several hundred air photos and made no copies.

3.0 SUMMARY OF INTERVIEWS

3.1 Mr. Phil Plant (President) and Mr. Jim Campbell (General Manager), Benicia Industries

Mr. Plant and Mr. Campbell only have experience with the arsenal since its closure. They are not aware of any landfills. They were involved in several environmental surveys of the Benicia Industries property, but they have never encountered evidence of landfills while performing soil borings.

They had no idea mustard was present at the arsenal during WWII. They do not know of any specific igloos or of a cistern used for CWM storage. They remember Methyl Ethyl Bromide being found in an igloo behind building W-10.

Mr. Plant had previously provided the names of Mr. Earl Manor and Mr. Leonard Auger as individuals with knowledge of activities at the arsenal.

3.2 Mr. Leonard Auger, former Commanding Officer, Benicia Arsenal

We were referred to Mr. Auger by Mr. Phil Plant of Benicia Industries.

Mr. Auger was not able to help us with the matter of storage or possible burial of CWM. He began his tour at the arsenal in 1958. He said no weapons firing occurred during the time he was there. He had no knowledge of events that occurred prior to his time as commander.

3.3 Mr. Earl Manor, former employee, Benicia Arsenal

We were referred to Mr. Manor by Mr. Phil Plant of Benicia Industries.

Mr. Manor was stationed at Benicia in 1944 to load ships. He began working at the arsenal as a civilian in 1947 and was there until it closed. He then went to work for Benicia Industries.

Mr. Manor is aware of the conventional ordnance found by Pacific Bay Homes in the northwest part of the former arsenal property. He said he is not surprised since there was weapons firing in the valley below this area.

When I asked about CWM storage and possible burial, his first reaction was there was no mustard at the arsenal. I told him we had pictures of mustard bombs in an igloo and mustard bombs and one ton containers on the dock. I also told him that two igloos had been designated for CWM storage and one cistern had been converted to a magazine for CWM storage. He said I was jogging his memory and that he could remember two igloos marked for CWM storage.

I asked if we could visit him while we are in San Francisco. He said yes. The following information was obtained during our visit with Mr. Manor at his home on 3/12/97.

Prior to our meeting, Mr. Manor spoke with Mr. Leonard Ramberg. Mr. Ramberg worked in the ammunition department at the arsenal during WWII. His phone number is

Mr. Manor corrected the time periods he was at the arsenal. He was there in 1943 to load ships. He was overseas for two years and then returned to the arsenal as a civilian from 1947 to 1965. He worked for Benicia Industries from 1971 to 1983.

Mr. Manor said he did his best to try to recall the location of the CWM storage igloos, but neither he nor Mr. Ramberg could remember which igloos were used. He does not remember any cistern modified for CWM storage.

He remembers the testing range (tunnel area) was used for ammunition disposal during 1949-1950.

There was a landfill near his bivouac area which was near the dock. He said the landfill was used for disposal of dunnage. He said there was another landfill, but he could not remember the location. He said the area around building W-6 was used for dumping of waste leather, but was not used as a landfill. While he worked for Benicia Industries, they found Methyl Ethyl Bromide in an igloo behind the warehouses.

He also remembered there were many temporary (tarpaulin) storage structures behind the warehouses.

I asked Mr. Manor if there was anyone else who might have information about the arsenal. He said Mr. Joseph Moreira was a truck driver at the arsenal during WWII, but he wasn't sure how much help Mr. Moreira could provide.

3.4 Mr. Joseph Moreira, former employee, Benicia Arsenal

We were referred to Mr. Moreira by Mr. Earl Manor

Mr. Moreira was employed at the arsenal from 1940 to 1956. He said he was a truck driver and hauled the gun barrels to the tunnel area for test firing.

I asked him if he had any knowledge of the mustard that was loaded on to ships at the arsenal. He said his job also included loading mustard onto the ships. He said they were required to wear special protective suits. He said the one ton mustard containers were loaded directly on to the ships. Mustard was never placed in the bombs. The bombs were placed on the ship empty for loading at their destination.

I asked him if there was a burial area for leaking containers. He was emphatic they never had a burial area because they never had any leaking containers.

We called Mr. Moreira again on 3/19/97 to see if he could remember which igloos had been designated for CWM storage and which cistern had been modified for CWM storage. He could not remember.

We also asked for other names of persons who worked at the arsenal. He said he would call us back if he could think of anyone that we hadn't already talked to.

3.5 Mr. Mike Tessier, Deputy Fire Chief, Benicia, CA

We contacted Mr. Tessier regarding controlled burns of the Exxon buffer property west of East 2nd Street. Mr. Tessier has been with the fire department since 1983.

Mr. Tessier indicated the grass has been burned on this 200 acre area either by controlled burns or accidental fires at least six times in the last 12 years. He never saw ordnance and there were no explosions indicating a detonating round.

He is not aware of any ordnance incidents on the former arsenal aside from the activities on the Tourtelot property.

He also mentioned that Mr. Jim Lamont does a lot of excavation on the arsenal property (including cutting fire breaks) and has never reported seeing ordnance.

3.6 Mr. James Milburn, former employee, Benicia Arsenal

Mr. Milburn was a civilian employee at the arsenal from 1941 to 1963. He worked primarily in the utilities function but has a good memory of a variety of ordnance related activities on the arsenal as well as the location of dump sites.

Specifically:

- 1) there was a small arms ammunition burn structure in the open storage area (rail area). He suggested calling Elmer Banks to get more detailed information.
 - 2) there was a converted cistern near Magazine #10 used to store pyrotechnics.
 - 3) there was an area used for destruction of primers. The area was a steep ravine. He was not sure if the primers were disposed of on the site or if it was just a destruction operation.
 - 4) there was a grenade found in the 1930's near the magazine that burned in 1922. The boy that found the grenade lost his hand when the grenade exploded.
 - 5) there was a dump site near the clock tower that was used during the early 1940's.
 - 6) after the clock tower dump site closed, a larger dump site was opened near the bay. It was used from the late 1940's until 1962.
 - 7) there was a pistol range on the Exxon property that was used from 1945 to 1955.
- He also provided the names of several other individuals who worked at the arsenal.

3.7 Mr. M. J. Vincent, former employee, Benicia Arsenal

Mr. Vincent left the arsenal in 1942 and did not feel that he could offer any helpful information.

3.8 Mr. Elmer Banks, former employee, Benicia Arsenal

Mr. Banks was a welder at the arsenal from 1941 to 1948. He remembers building a structure used for destruction of small arms ammunition (after the war). He could not remember the exact location but said it was in a draw past the open storage area (rail car storage).

When asked about other ordnance activities, he said his job was basically welding and that I should call the surveillance people.

3.9 Mr. R. V. Allenwood, former employee, Benicia Arsenal

Mr. Allenwood was a member of the Benicia Arsenal fire department from the 1940's thru the 1960's. He was the assistant fire chief.

He said that in addition to fire fighting duties, the fire department was responsible for inspecting ships and dealing with leaking mustard containers.

He remembers one leaking mustard container incident. There was a leaking one ton container on the dock. They pushed the container into the water and hosed off the dock.

He does not remember any mustard rounds being decontaminated after the war.

He also remembered HE bombs being accidentally dumped into the water while a ship was being loaded.

He does not believe mustard was buried anywhere on the arsenal.

4.0 REAL ESTATE

A 1951 drawing provides the most complete description of the arsenal boundary and the leased property boundary (see Plate 2). We found no evidence during the additional research indicating the arsenal was larger than the boundaries shown on Plate 2.

5.0 SITE INSPECTION

5.1 General

This site visit was performed on 3 April 1997.

Participants:

Ted Moore	Project Manager
Hank Counts	UXO Specialist and Safety Officer

5.2 Analysis of Ordnance Activities

We met with representatives of Pacific Bay Homes at the Tourtelot site. We visited the site to get some idea of where ordnance had been found, to talk with the on-site environmental coordinator about the types and condition of ordnance found, and to take pictures. We did not walk in areas that had been gridded and suspected to contain ordnance. There are no construction activities at the present time, but ordnance has been found on the site. We walked to the tunnel area. The tunnels and firing positions have been excavated and removed. Concrete filled 155mm rounds were found in the tunnels. There was a pile of inert ordnance that had been collected from two grids and the tunnel area. The pile included a 2.36" rocket motor, 75mm projectile, 40mm grenade, 81mm mortar, 37mm projectile, 155mm projectile, and miscellaneous HE fragments.

We met with Mr. Fred Newhouse of Exxon to begin our inspection of the suspected demolition area on Exxon's property west of East 2nd Street. Exxon was unaware that any ordnance activities had occurred on this portion of their property. We concentrated on the area shown on the map as the demolition area. The suspected demolition area is a paved circular area approximately 50' in diameter. There is a berm on the west side of the paved circle. We found .50 cal projectiles and trash in the berm. We used a Schonsted (model GA-72-CV) magnetometer to surface survey the area surrounding the suspected demolition area. We got several +10 readings on the south side of the paved circle.

5.3 Current Site Characterization

After encountering live ordnance during construction activities on the Tourtelot property, Pacific Bay Homes hired an environmental contractor to coordinate ordnance removal (EMCON). A UXO removal contractor (EDET) is also on the site. Records of ordnance found to date are available at the site office. The Tourtelot property is fenced and access is controlled by a guard. There is also an observation point on the high ground to insure only authorized personnel are on the site. There is a residential area immediately to the west of this area.

There is a residential area approximately 1/2 mile west of the suspected demolition area on the Exxon property. The perimeter of the property is partially fenced and Exxon tries to prevent public access to the area. In spite of Exxon's efforts, the public uses the area regularly for motorcycles and all terrain vehicles.

6.0 EVALUATION OF ORDNANCE PRESENCE

Map 2 from the ASR has been included in this supplement as Plate 1. The eleven areas described in this section have been added to Plate 1 beginning with Area 6. Plate 2 is a 1951 drawing that shows the arsenal features and boundaries. The eleven areas described in this section are also shown on Plate 2. Plate 3 shows features of the Tourtelot property. Details regarding Areas 1 thru 5 are contained in the original ASR.

6.1 Chemical Warfare Materials

6.1.1 Summary of the Original Research for the ASR

The original research found several documents indicating that CWM (mustard) was loaded on to ships at Benicia Arsenal. Two igloos were designated for CWM storage and a cistern had been converted for CWM storage. Historic photographs showed one ton mustard containers being loaded on to ships and mustard bombs in storage and also being loaded on to ships.

6.1.2 Results of the Additional Research

6.1.2.1 General Information

The additional research confirmed CWM presence at the arsenal.

An eye witness to the loading of mustard containers on to ships, Mr. Joseph Moreira, indicated that no disposal area for leaking mustard containers was required because there were no leakers. He participated in loading ships and said the bombs were loaded on to the ships empty with the intention they would be filled at their destination.

An eye witness to one incident of a leaking one ton mustard container, Mr. R. V. Allenwood, indicated that he pushed the container off the dock and into the bay. He then hosed the mustard off the dock. He was assistant chief of the Benicia Arsenal fire department. He is not aware of any other leaking mustard containers or of mustard filled rounds that required decontamination.

A 1955 document indicates the CWM igloos were marked with a sign containing black letters on a yellow background with a brown diagonal stripe. Of the few igloos remaining on the site, none have such a sign.

A 1946 document indicates CWM was returned to the arsenal after the end of the war. A 1946-1951 history of the arsenal indicates very little decontamination operations were necessary for a few returned mustard or phosphorus containers. The fire

department was responsible for decontamination activities. There was no mention of where decontamination occurred. Mr. Allenwood does not remember any mustard containers being decontaminated after the war.

6.1.2.2 Area 6 - Modified Cistern

Historic documents indicate the cistern modified in 1926 for CWM storage became Magazine #12. Mr. Milburn indicated there was a converted cistern near Magazine #10 used for pyrotechnic storage. He is probably referring to Magazine #12. This magazine was destroyed during construction of I-680. This area consists of about one acre.

6.1.2.3 Area 7 - CWM Storage Igloos

We were not able to confirm the location of the two CWM storage igloos, but historical documents indicate that several tarp covered wooden frame structures were constructed in 1943-44 for outdoor storage of CWM. A 1945 air photo shows what may be a cluster of these tarp covered structures between igloos D512 and D513. This area consists of about one acre.

Igloos D512 and D513 were demolished during industrial development of the arsenal property.

6.2 Landfills/dumps

6.2.1 Area 8 - Dunnage Burn Area

This is one of three landfills/dump sites indicated by former arsenal employees. It was for the specific purpose of burning dunnage (wooden shipping material). This information was provided by Mr. Earl Manor, an eye witness to the burning activities. This area consists of approximately 13 acres. This area is now a paved parking lot.

6.2.2 Area 9 - Dump Site

This is one of three landfills/dump sites indicated by former arsenal employees. Information on this dump site was provided by Mr. James Milburn. It is located near the clock tower and was used during the early 1940's. This area consists of approximately three acres and is now an undeveloped open area.

6.2.3 Area 10 - Dump Site

This is one of three landfills/dump sites indicated by former arsenal employees. Information for this dump site was provided by Mr. James Milburn. It is located near the bay and was used from the late 1940's until 1962. This area consists of

approximately 20 acres and is a paved area used for parking cars unloaded from ships. (We tried to contact Mr. Leroy Bailey (707) 745-3737 to determine the contents of this dump site, but did not find him at home).

6.3 Conventional Ordnance

6.3.1 Summary of the Original Research for the ASR

Historical documents indicated the full range of ammunition was stored at and shipped from the arsenal.

A portion of the leased property was used for testing 155mm howitzer barrels (Area 5). The test area consisted of concrete tunnels and firing butts.

An area adjacent to the leased property was used for artillery testing (Area 4).

There were more than 100 structures (igloos, magazines, and warehouses) used for ordnance storage.

6.3.2 Results of the Additional Research

6.3.2.1 General Information

The additional research confirms that large quantities of all types of ammunition were stored at and shipped from the arsenal.

Large quantities of ammunition were returned to the arsenal after WWII ended. Demolition and demilitarization of unserviceable ammunition occurred at the arsenal until 1952.

HE bombs were accidentally dropped into the bay while a ship was being loaded.

Sea dumping of unserviceable ammunition also occurred.

A 1955 document indicates an ordnance clearance of a 92 acre portion of the leased property was proposed prior to disposal of the property. This area later became known as the Tourtelot property and is being developed for residential use by Pacific Bay Homes. We did not find a copy of the clearance report.

6.3.2.2 Area 11 - Demolition area on the Tourtelot Property

This area is a portion of the Tourtelot property and consists of about 15 acres.

Historical documents indicate this area is a deep draw used for demolition of ammunition. Air photos show several craters in this area. Mr. Manor and Mr. Moreira verified the area was used for ammunition demolition. Pacific Bay Homes found live ordnance in this area during excavation activities (see Plate 3).

A 1955 document indicates this 15 acre area was cleared by an EOD unit. It was later inspected (in 1955) in anticipation of disposal of the 92 acre tract. The inspecting officer found four hand grenades, two 37mm projectiles, three 60mm mortars, and one 75mm HE projectile in a very short time. Based on the presence of craters, he determined the area had been used for demolition of ammunition and was not an impact area. Clearance of the 92 acre tract was recommended based on his inspection.

It is possible that even though this area was not specifically an impact area, rounds fired from the firing range located down the draw (Area 4) may have impacted in this area.

6.3.2.3 Area 12 - Demolition and Demilitarization Area on the Tourtelot Property

This area is also a portion of the Tourtelot property. It consists of approximately 23 acres.

A 1956 drawing indicates this area was used for demilitarization and demolition of ammunition. Other historical documents indicate this area was used for burning bulk explosives. It also contains the 155mm howitzer test tunnels and firing butts.

This area was partially excavated when Pacific Bay Homes construction activities were halted. The 155mm howitzer test tunnels and the firing points have been removed.

6.3.2.4 Area 13 - Demolition Area on Exxon's Property

This area appears on a 1942 drawing as a demolition area. It is located west of East 2nd Street in the buffer area now owned by Exxon. It also appears as a firing range on a 1956 land use drawing. Mr. James Milburn indicated this area had been used as a firing range. The .45 cal. projectiles found during the site visit confirm the area was used as a firing range.

Ground features consist of a paved circular area approximately 50' in diameter. There is an earth berm on the west edge of the paved area. There is a paved road leading to the paved circle from East 2nd Street.

We did not find evidence of demolition activities, but we surface surveyed the area using a Schonsted magnetometer (model # GA-72-CV) and got several +10 hits in the area south of the paved circle.

This area consists of approximately two acres.

According to Mike Tessier of the Benicia Fire Department, this area has been controlled burned at least six times during the last 12 years without any evidence of ordnance being found.

The land is currently undeveloped, but there is a residential area about 1/2 mile to the west.

6.3.2.5 Area 14 - Small Arms Range

This area appears as a small arms range (500 yds) on a 1918 drawing. The target berm was excavated for construction of I-780.

6.3.2.6 Area 15 - Small Arms Ammunition Disposal Structure

This area was a special structure constructed for the disposal of small arms ammunition. Information was provided by Mr. James Milburn and Mr. Elmer Banks. The location shown on Plates 1 and 2 is approximate. This area consists of approximately one acre.

6.3.2.7 Area 16 - Primer Destruction Area

This area was used for destruction of primers. Information was provided by Mr. James Milburn. He was eye witness to the destruction of primers and is suspicious that the primers were disposed of in the ravine. This area consists of approximately one acre.

7.0 CONCLUSIONS

7.1 Chemical Warfare Materials

Although CWM was clearly present at the arsenal during WWII and then returned to the arsenal after the war, it appears unlikely any of the mustard was disposed of on the arsenal property. According to Mr. Moreira there were no leakers. According to Mr. Allenwood, there was only one mustard incident and the leaking container was pushed off the dock and into the bay. According to a history of the arsenal, only a few chemical rounds required decontamination. Mr. Allenwood does not remember any mustard rounds requiring decontamination.

We do not suspect the dunnage burn pits were used for CWM disposal.

Nothing remains of the known or suspected CWM storage igloos and magazine.

Even though we do not suspect CWM remaining at the Benicia Arsenal, if any suspect items are found during ground disturbing activities, work should be stopped and local law enforcement should be contacted.

7.2 Conventional Ordnance

The Benicia Arsenal was used for the storage and shipment of virtually every type of conventional ordnance available. After the end of WWII, large quantities of conventional ordnance were returned to the arsenal and demolition activities occurred on arsenal property. Some sea dumping also occurred.

Ordnance presence on and near the Tourtelot property was suspected at the time the ASR was prepared. The firing range down the draw from the Tourtelot property and the artillery firing area on the high ground (tunnel area) on the Tourtelot property were suspected as sources of unexploded ordnance. The additional research revealed the demolition area in the draw on the Tourtelot property. Historical records and ordnance found by Pacific Bay Homes confirms ordnance presence on the Tourtelot property.

The suspected demolition area on Exxon's property was used as a small arms firing range, but we cannot confirm use as a demolition area.

7.3 Arsenal Boundary

We did not find evidence that the arsenal was larger than shown on Plates 1 and 2.

7.4 General

No change in the RAC score is recommended. The RAC score for the Benicia Arsenal is still 1.

Although the ASR and this supplement have identified specific areas where ordnance activities were known or suspected to have occurred, caution should be exercised during development of all former arsenal property.

HISTORICAL REFERENCES CITED

Adams, Major Walter H., Ord. Res., U.S.A.

1927 An Ordnance Reserve Officers' Training Camp in California.
Army Ordnance. January-February 1927. Pages 299 - 300.

Benicia Arsenal

1951 Benicia Arsenal Historical Summary September 2, 1945 - July 1, 1951.
Record Group 156, Box 29, Archives II, College Park, Maryland.

Benicia Arsenal Magazine

1951 Salvage With a Bang! *Benicia Arsenal Magazine*. Volume 1, May 1951,
page 5.

Cupples, William H.

1955 Report of Inspection, Benicia Ordnance Depot Ammunition Disposal
Area, San Francisco Engineer District. Record Group 77, Accession
76A1483, Box 129, San Bruno Federal Records Center, San Bruno,
California.

Deitrick, Carroll H.

1946 Burning Ground Procedure - Benicia Arsenal. Record Group 156,
Entry 685, Box F-11, Archives II, College Park, Maryland.

Fire

1922 Benicia Arsenal, California. Fire - August 12, 1922. Record Group 334,
Armed Services Explosives Safety Board, Box 3, National Archives,
College Park, Maryland.

Goodell, J.B.

1949 Weekly Report of Important Accomplishments. Record Group 156,
Entry 1336, Box H-1, Archives II, College Park, Maryland.

Griffin, George T.

1951 Inspection of Benicia Arsenal. Record Group 156, Entry 1049,
Box A907, Archives II, College Park, Maryland.

Hemlebem, Sylvester John

1947 *History of CWS Activities at Ports of Embarkation*. June 27, 1947.

Historical Record of Ordnance Buildings at Benicia Arsenal

1939 Magazine # 12 (Old Cistern). Record Group 77, Box 14, Entry 393.
National Archives, Archives I, Washington, D.C.

Inspection

- 1951 Inspection of Benicia Arsenal, September 12, 1951. Record Group 156, Archives II, College Park, Maryland.

Kennedy, Clyde C.

- 1942 Completion Report for Extension of Benicia Arsenal Magazine Area at Benicia, California. Record Group 77, Entry 391, Box 8, Archives I, Washington, D.C.

Lore, L.F.

- 1948A Monthly Report of Surveillance Activities. August 1948. Record Group 156, Archives II, College Park, Maryland.

- 1948B Monthly Report of Surveillance Activities. December 1948. Record Group 156, Entry 1049, Box A248, Archives II, College Park, Maryland.

Lynch, D.R.

- 1955 Report of Inspection, Benicia Ordnance Depot Ammunition Disposal Area, San Francisco Engineer District. Record Group 77, Accession 76A1483, Box 129, San Bruno Federal Records Center, San Bruno, California.

Marriott, Owen R.

- 1946 Discharge of Ammunition, Benicia. Record Group 336, Box 77, Archives II, College Park, Maryland.

Monthly Report

- 1946 Monthly Report of Surveillance Activities. Record Group 156, Archives II, College Park, Maryland.

- 1949 Monthly Report of Surveillance Activities. Record Group 156, Archives II, College Park, Maryland.

Office of the Post Engineer

- 1956 Land Utilization Map, Benicia Arsenal, dated May 4, 1956. Record Group 338, Accession 60A0543, Box 15, National Personnel Records Center, St. Louis, Missouri.

Ordnance Office, Supply Division

- 1918 General layout of Benicia Arsenal, dated August 12, 1918. Record Group 156, Entry 50, Box 1, National Archives - Archives I, Washington, D.C.

Post Request

1954 Several Post requests with photos. Record Group 338, Accession 58A0969, Box 1, National Personnel Records Center, St. Louis, Missouri.

Seres, G.

1945 Monthly Report of Surveillance Activities. Record Group 156, Entry 1049, Box A248, Archives II, College Park, Maryland.

1946A Monthly Report of Surveillance Activities. January 2, 1946. Record Group 156, Entry 1049, Box A248, Archives II, College Park, Maryland.

1946B Monthly Report of Surveillance Activities. Record Group 156, Archives II, College Park, Maryland.

1946C Monthly Report of Surveillance Activities. August 6, 1946. Record Group 156, Archives II, College Park, Maryland.

Sheetz, E. D.

1955 Arsenal Bulletin Number 37 dated August 18, 1955. Record Group 338, Accession 59B0371, Box 1, National Personnel Records Center, St. Louis, Missouri.

Smith, R. M. Captain

1952 Job Description Field Service, Record Group 156, Entry 1351, Box H-17, Archives II, College Park, Maryland.

White, Henry K.

1955 Targeting Ranges for Small Arms Rebuild Shops, dated June 24, 1955. Record Group 338, Accession 59A0376, Box 22, National Personnel Records Center, St. Louis, Missouri.

TELEPHONE OR VERBAL CONVERSATION RECORD

DATE 7 March 1997

For use of this form, see AR340-15; the proponent agency is the Adjutant General's Office.

SUBJECT OF CONVERSATION Benicia Arsenal		
OUTGOING CALL		
PERSON CALLING Ted Moore	ADDRESS CELMS-ED-P	PHONE NUMBER AND EXT. (314) 331-8849
PERSON CALLED Leonard Auger	OFFICE Retired Commander, Benicia Arsenal	PHONE NUMBER AND EXT. (707) 745-1010

SUMMARY OF CONVERSATION:

I was referred to Mr. Auger by Mr. Phil Plant of Benicia Industries.

Mr. Auger was not able to help us with the matter of storage or possible burial of CWM. He began his tour at the arsenal in 1958. He said no weapons firing occurred during the time he was there. He had no knowledge of events that occurred prior to his time as commander.

TELEPHONE OR VERBAL CONVERSATION RECORD

For use of this form, see AR340-15; the proponent agency is the Adjutant General's Office.

DATE 7 March 1997

SUBJECT OF CONVERSATION Benicia Arsenal		
OUTGOING CALL		
PERSON CALLING Ted Moore	ADDRESS CELMS-ED-P	PHONE NUMBER AND EXT. (314) 331-8849
PERSON CALLED Earl Manor	OFFICE Former employee, Benicia Arsenal	PHONE NUMBER AND EXT. (707) 745-3256

SUMMARY OF CONVERSATION:

I was referred to Mr. Manor by Mr. Phil Plant of Benicia Industries.

Mr. Manor was stationed at Benicia in 1944 to load ships. He began working at the arsenal as a civilian in 1947 and was there until it closed. He then went to work for Benicia Industries (industrial developer of the former arsenal property).

Mr. Manor is aware of the conventional ordnance found by Pacific Bay Homes in the northwest part of the former arsenal property. He said he is not surprised since there was weapons firing in the valley below this area.

When I asked about CWM storage and possible burial, his first reaction was there was no mustard at the arsenal. I told him we had pictures of mustard bombs in an igloo and mustard bombs and one ton containers on the dock. I also told him that two igloos had been designated for CWM storage and one cistern had been converted to an igloo for CWM storage. He said I was jogging his memory and that he could remember two igloos marked for CWM storage.

I asked if we could visit him while we are in San Francisco. He said yes. The visit is planned for 3/12/97 at 11:00 a.m. at his home.

The following information was obtained during our visit with Mr. Manor on 3/12/97.

Prior to our meeting, Mr. Manor spoke with Mr. Leonard Ramberg. Mr. Ramberg worked in the ammunition department at the arsenal during World War II. His phone number is (707) 745-2955.

Mr. Manor corrected the time periods he was at the arsenal. He was there in 1943 to load ships. He was overseas for two years and then returned to the arsenal as a civilian from 1947 to 1965. He worked for Benicia Industries from 1971 to 1983.

Mr. Manor said he did his best to try to recall the location of the CWM storage igloos, but neither he nor Mr. Ramberg could remember which igloos were used. He does not remember any cistern that was modified for CWM storage.

He remembers the testing range (tunnel area) was used for ammunition disposal during 1949-1950. There was a landfill near his bivouac area which was near the dock. He said the landfill was used for disposal of dunnage. He said there was another landfill, but he could not remember the location. He said the area around building W-6 was used for dumping of waste leather, but was not used as a landfill. While he worked for Benicia Industries, they found Methyl Ethyl Bromide in an igloo behind the warehouses. He also remembers there were many temporary (tarpaulin) storage structures behind the warehouses.

I asked Mr. Manor if there was anyone else who might have information about the arsenal. He said Mr. Joseph Moreira ((707) 745-1593) was a truck driver at the arsenal during WWII, but he wasn't sure how much help Mr. Moreira could provide.

TELEPHONE OR VERBAL CONVERSATION RECORD

DATE 12 and 19 March 1997

For use of this form, see AR340-15; the proponent agency is the Adjutant General's Office.

SUBJECT OF CONVERSATION Benicia Arsenal		
OUTGOING CALL		
PERSON CALLING Ted Moore	ADDRESS CELMS-ED-P	PHONE NUMBER AND EXT. (314) 331-8849
PERSON CALLED Joseph Moreira	OFFICE Former employee, Benicia Arsenal	PHONE NUMBER AND EXT. (707) 745-1593

SUMMARY OF CONVERSATION:

I was referred to Mr. Moreira by Mr. Earl Manor

Mr. Moreira was employed at the arsenal from 1940 to 1956. He said he was a truck driver and hauled the gun barrels to the tunnel area for test firing.

I asked him if he had any knowledge of the mustard that was loaded on to ships at the arsenal. He said his job also included loading mustard onto the ships. He said they were required to wear special protective suits. He said the one ton mustard containers were loaded directly on to the ships. Mustard was never placed in the bombs. The bombs were placed on the ship empty for loading at their destination.

I asked him if there was a burial area for leaking containers. He was emphatic that they never had a burial area because they never had any leaking containers.

We called Mr. Moreira again on 19 March to see if he could remember which igloos had been designated for CWM storage and which cistern had been used for CWM storage. He could not remember.

We also asked for other names of persons who worked at the arsenal. He said he would call us back if he could think of anyone that we hadn't already talked to.

TELEPHONE OR VERBAL CONVERSATION RECORD DATE 12 March and 7 April 1997

For use of this form, see AP340-15; the proponent agency is the Adjutant General's Office.

SUBJECT OF CONVERSATION Benicia Arsenal		
OUTGOING CALL		
PERSON CALLING Ted Moore	ADDRESS CELMS-ED-P	PHONE NUMBER AND EXT. (314) 331-8849
PERSON CALLED Phil Plant (President) Jim Campbell (General Mgr)	OFFICE Benicia Industries	PHONE NUMBER AND EXT. (707) 745-2394

SUMMARY OF CONVERSATION:

Mr. Plant and Mr. Campbell only have experience with the arsenal since it closed. They are not aware of any landfills. They were involved in several environmental surveys of the Benicia Industries property, but they have never encountered any evidence of landfills while performing soil borings.

They had no idea mustard was present at the arsenal during WWII. They do not know of any specific igloos used for CWM storage or of a cistern used for CWM storage. They remember Methyl Ethyl Bromide being found in an igloo behind building W-10.

Mr. Plant had previously provided the names of Mr. Earl Manor and Mr. Leonard Auger as individuals with knowledge of activities at the arsenal.

I called Jim Campbell on 7 April to confirm information he had provided in to us in 1993. He confirmed that the draw below the Tourtelot property had been used as a firing range.

TELEPHONE OR VERBAL CONVERSATION RECORD

DATE 27 March 97

For use of this form, see AF340-15; the proponent agency is the Adjutant General's Office.

SUBJECT OF CONVERSATION Benicia Arsenal		
OUTGOING CALL		
PERSON CALLING Ted Moore	ADDRESS CELMS-ED-P	PHONE NUMBER AND EXT. (314) 331-8849
PERSON CALLED Mike Tessier	OFFICE Deputy Fire Chief, Benicia	PHONE NUMBER AND EXT. (707) 746-4275

SUMMARY OF CONVERSATION:

I called Mr. Tessier regarding controlled burns of the Exxon buffer property west of East 2nd Street. Mr. Tessier has been with the fire department since 1983.

Mr. Tessier indicated the grass has been burned on this 200 acre area either by controlled burns or accidental fires at least six times in the last 12 years. He never saw ordnance and there were no explosions indicating a detonating round.

He is not aware of any ordnance incidents on the former arsenal aside from the activities on the Tourtelot property.

He also mentioned that Mr. Jim Lamont does a lot of excavation on the arsenal property (including cutting fire breaks) and has never reported seeing ordnance.

TELEPHONE OR VERBAL CONVERSATION RECORD

DATE 3 April 97

For use of this form, see AR340-18; the proponent agency is the Adjutant General's Office.

SUBJECT OF CONVERSATION Benicia Arsenal		
OUTGOING CALL		
PERSON CALLING Ted Moore	ADDRESS CELMS-ED-P	PHONE NUMBER AND EXT. (314) 331-8849
PERSON CALLED James Milburn	OFFICE Former employee, Benicia Arsenal	PHONE NUMBER AND EXT. (707) 745-3896

SUMMARY OF CONVERSATION:

This a record of our visit with Mr. Milburn at his home in Benicia on 3 April 1997.

Mr. Milburn was a civilian employee at the arsenal from 1941 to 1963. He worked primarily in the utilities function but has a good memory of a variety of ordnance related activities on the arsenal as well as the location of dump sites. Specifically:

- 1) there was a small arms ammunition burn area in the open storage area (rail area). He suggested calling Elmer Banks to get more detailed information.
- 2) there was a converted cistern near Magazine #10 used to store pyrotechnics.
- 3) there was an area used for destruction of primers. The area was a steep ravine. He was not sure if the primers were disposed of on the site or if it was just a destruction operation.
- 4) there was a grenade found in the 1930's near the magazine that burned in 1922. The boy that found the grenade lost his hand when the grenade exploded.
- 5) there was a dump site near the clocktower that was used during the early 1940's.
- 6) after the clocktower dump site closed, a larger dump site was opened near the bay. It was used from the late 1940's until 1962. He said Mr. Leroy Bailey ((707) 745-3737) might have some idea what was in this dump.
- 7) there was a pistol range on the Exxon property that was used from 1945 to 1955.

Mr. Milburn marked the above areas on our map.

He also provided the names of several other individuals who worked at the arsenal.

TELEPHONE OR VERBAL CONVERSATION RECORD

DATE 7 April 97

For use of this form, see AR340-15; the proponent agency is the Adjutant General's Office.

SUBJECT OF CONVERSATION Benicia Arsenal		
OUTGOING CALL		
PERSON CALLING Ted Moore	ADDRESS CELMS-ED-P	PHONE NUMBER AND EXT. (314) 331-8849
PERSON CALLED M. J. Vincent	OFFICE Former employee, Benicia Arsenal	PHONE NUMBER AND EXT. (707) 745-8684

SUMMARY OF CONVERSATION:

Mr. James Milburn suggested we call Mr. Vincent.

Mr. Vincent left the arsenal in 1942 and did not feel that he could offer any helpful information.

TELEPHONE OR VERBAL CONVERSATION RECORD

DATE 7 April 97

For use of this form, see AF340-15; the proponent agency is the Adjutant General's Office.

SUBJECT OF CONVERSATION Benicia Arsenal		
OUTGOING CALL		
PERSON CALLING Ted Moore	ADDRESS CELMS-ED-P	PHONE NUMBER AND EXT. (314) 331-8849
PERSON CALLED Elmer Banks	OFFICE Former employee, Benicia Arsenal	PHONE NUMBER AND EXT. (909) 658-1752

SUMMARY OF CONVERSATION:

Mr. James Milburn suggested we call Mr. Banks.

Mr. Banks was a welder at the arsenal from 1941 to 1948. He remembers building a structure used for destruction of small arms ammunition (after the war). He could not remember the exact location but said it was in a draw past the open storage area (rail car storage).

When asked about other ordnance activities, he said his job was basically welding and that I should call the surveillance people.

TELEPHONE OR VERBAL CONVERSATION RECORD

DATE 7 April 97

For use of this form, see AR340-15; the proponent agency is the Adjutant General's Office.

SUBJECT OF CONVERSATION Benicia Arsenal		
OUTGOING CALL		
PERSON CALLING Ted Moore	ADDRESS CELMS-ED-P	PHONE NUMBER AND EXT. (314) 331-8849
PERSON CALLED R.V. Allenwood	OFFICE Former employee, Benicia Arsenal	PHONE NUMBER AND EXT. (707) 745-0876

SUMMARY OF CONVERSATION:

Mr. James Milburn suggested we call Mr. Allenwood.

Mr. Allenwood was a member of the Benicia Arsenal fire department from the 1940's thru the 1960's. He was the assistant fire chief.

He said that in addition to fire fighting duties, the fire department was responsible for inspecting ships and dealing with leaking mustard containers.

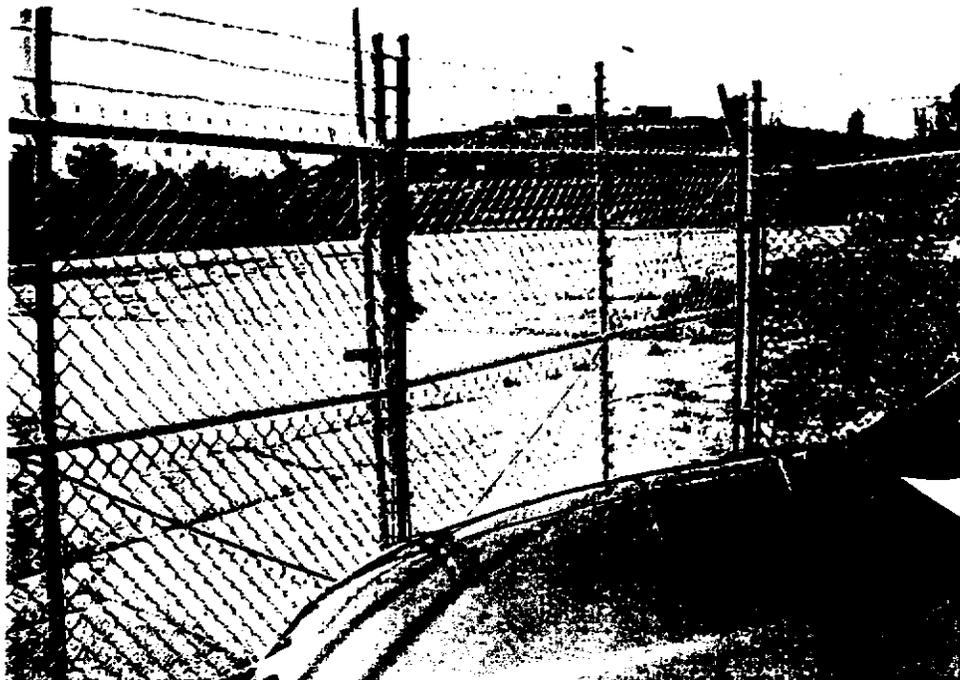
He remembers one leaking mustard container incident. There was one leaking one ton container on the dock. They pushed the container into the water and hosed off the dock.

He does not remember any mustard rounds being decontaminated after the war.

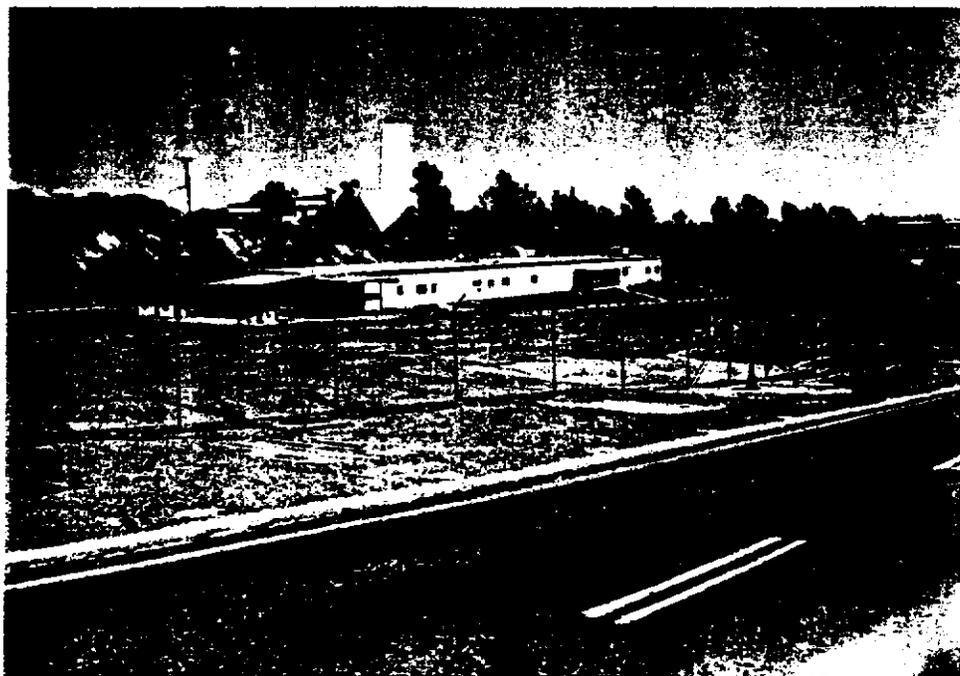
He also remembered HE bombs being accidentally dumped into the water while a ship was being loaded.

He does not believe mustard was buried anywhere on the arsenal.

**APPENDIX C
PRESENT SITE PHOTOGRAPHS**



**PHOTO # 1
DUNNAGE BURN AREA**



**PHOTO # 2
ARROW IS POINTING TO THE 1918 SMALL ARMS RANGE BERM AREA**

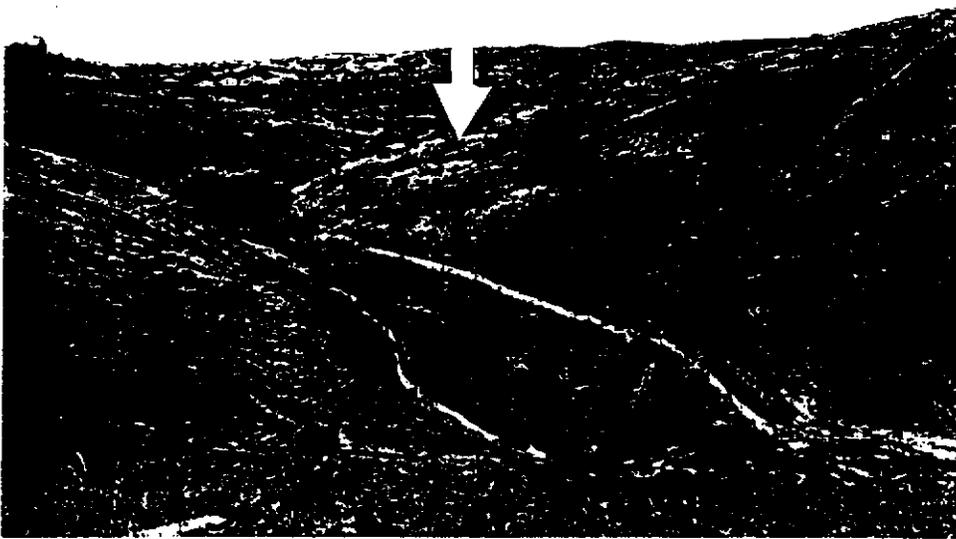


PHOTO # 3
VIEW TO WEST FROM THE MCALLISTER BRIDGE
(ARROW POINTS TO DEMOLITION PITS)



PHOTO # 4
VIEW TO EAST FROM THE MCALLISTER BRIDGE



PHOTO # 5
VIEW TO NORTH - TUNNEL AREA



PHOTO # 6
RECOVERED ORDNANCE SCRAP



PHOTO # 7
VIEW TO WEST - DEMOLITION AREA AND BERM



PHOTO # 8
VIEW TO EAST FROM THE DEMOLITION AREA TOWARD EAST 2ND STREET

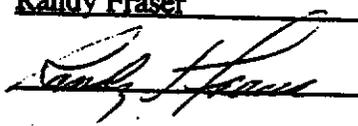
APPENDIX D

**SITE SPECIFIC SAFETY AND HEALTH PLAN /
SITE INSPECTION REPORT**

SITE SAFETY AND HEALTH PLAN (SSHP)
for
BENICIA ARSENAL
Benicia, Solano County, California
Site # J09CA075600

The purpose of this site visit is to reconnoiter, document, and photograph areas on the former Benicia Arsenal, Benicia, Solano County, California suspected to be contaminated with unexploded ordnance and/or toxic chemical munitions.

SSHP PREPARED BY: Hank Counts
OFFICE USACE, CELMS-ED-P
ADDRESS 1222 Spruce St. St. Louis, Mo
PHONE (314) 331-8762
DATE PREPARED 4-02-97

SSHP REVIEWED/APPROVED BY: Randy Fraser


NOTE: This SSHP is to be used only for non-intrusive site visits and must be approved by safety prior to the start of the field visit. All team members must read, and comply with the SSHP, and attend the safety briefings. The Site Safety and Health Officer (SSHO) shall ensure the Safety Briefing Checklist and the SSHP acceptance form (Appendix C) is filled out prior to the start of the site visit.

A. SITE DESCRIPTION AND PREVIOUS INVESTIGATIONS

1. Site Description

a. Size: Approximately 4.9 square miles

b. Present Usage

(check all that apply)

- | | | |
|--|--|--|
| <input type="checkbox"/> Military | <input type="checkbox"/> Recreational | <input type="checkbox"/> Other (specify) |
| <input checked="" type="checkbox"/> Residential | <input type="checkbox"/> Commercial | <input type="checkbox"/> _____ |
| <input checked="" type="checkbox"/> Natural Area | <input checked="" type="checkbox"/> Industrial | <input type="checkbox"/> _____ |
| <input type="checkbox"/> Agricultural | <input type="checkbox"/> Landfill | <input type="checkbox"/> _____ |
| <input checked="" type="checkbox"/> Secured | <input type="checkbox"/> Active | <input type="checkbox"/> Unknown |
| <input checked="" type="checkbox"/> Unsecured | <input type="checkbox"/> Inactive | |

2. Past Uses: Between 1851 and 1962, the United States utilized the Benicia Arsenal as a principal depot for the Division of the Pacific; manufactured small arms, mobile and seacoast targets; repaired and stored ordnance and ordnance stores; and served as a transshipment depot for chemical warfare material. It was also a proving ground

3. Surrounding Population (check all that apply)

- | | | |
|---|---|--|
| <input checked="" type="checkbox"/> Rural | <input checked="" type="checkbox"/> Residential | <input type="checkbox"/> Other (specify) |
| <input type="checkbox"/> Urban | <input checked="" type="checkbox"/> Industrial | _____ |
| <input type="checkbox"/> Commercial | | _____ |

4. Previous Sampling/Investigation Results

a. Ordnance/Explosives (OE) Encountered: Information obtained through archival research indicates the following ordnance and explosives may be present on this site.

- Bombs, H.E. - Artillery projectiles upto and including 155MM
- Bombs, Practice - Grenades Hand and Rifle
- .30 & .50 Cal

b. Samples (Air, Water, Soil, Vegetation)

- No samples are available.
- Samples available

Chemical	Concentration	Media	Location
----------	---------------	-------	----------

B. DESCRIPTION OF ON-SITE ACTIVITIES

ARCHIVES SEARCH REPORT - SUPPLEMENT

(check all that apply)

- Walk-through Drive-through Other (specify)
 On-Road Off road _____
 On Path Off path _____

C. SITE PERSONNEL AND RESPONSIBILITIES

1. Responsibilities

a. Project Manager: The Corps of Engineers Project Manager (PM) is overall responsible for the site visit. He will assign a Team Leader, (most situation will be the PM). The PM will ensure that the SSHP is completed. Coordinates and executes the site visit.

b. Site Safety and Health Officer: Individual designated to conduct safety, enforce the SSHP, conduct safety briefings, and ensure that the team leader can safely fulfill his objectives. The SSHO will maintain the safety gear, and monitor on-site operations. The SSHO is responsible for identifying, marking, and reporting any unexploded ordnance and explosives.

2. Team Members

Name	Position	Address	Phone
Ted Moore	<u>PM/Team Leader</u>	<u>USACE, St. Louis, Mo</u>	<u>(314) 331-8849</u>
<u>Hank Counts</u>	<u>SSHO, UXO Spec</u>	<u>USACE, St. Louis, Mo</u>	<u>(314) 331-8762</u>

D. OVERALL HAZARD EVALUATION:

High Moderate Low Unknown

This assessment was developed using the Site Investigation Hazard Analysis and Risk Assessment Code Matrix.

E. GENERAL PRECAUTIONS: Prior to the on-site visit, all team members are required to read this SSHP and sign the form acknowledging that they have read and will comply with it. In addition, the SSHO shall hold a brief tailgate meeting in which site specific topics regarding the days activities will be discussed. If unanticipated hazardous conditions arise, team members are to stop work, leave the immediate area and notify the SSHO. The buddy system will be enforced at all times.

F. STANDARD OPERATION SAFETY PROCEDURES, ENGINEERING CONTROLS AND WORK PRACTICES

1. **Site Rules/Prohibitions:** At any sign of unanticipated hazardous conditions, stop tasks, leave the immediate area and notify the SSHO. Smoking, eating and drinking allowed in designated areas only.
2. **Material Handling Procedures:** Do not handle.
3. **Drum Handling Procedures:** Do not handle.
4. **Confined Space Entry:** A area identified as a Permit Required Confined space will not be entered. All confined spaces shall be considered permit required confined spaces until the pre-entry procedures demonstrate otherwise. Confined spaces may be entered without a written permit or attendant provided the space is determined not to be a permit required confined space as specified in 29 CFR 1910.146.
5. **Electrical Protection:** Overhead power lines, downed electrical wires and buried cables pose a danger of shock and electrocution. In addition, buildings may contain exposed wiring that may hold a potential load. Workers should avoid contact with any and all exposed wire and cables
6. **Spill Containment:** N/A
7. **Excavation Safety:** Do not enter trenches/excavations.
8. **Illumination:** Site visits will be conducted during daylight hours only.
9. **Sanitation:** Use existing sanitary facilities.
10. **Buddy System:** Individuals will maintain constant contact with other personnel at all times. No one will work alone at any time during the site visit.
11. **Engineering Controls:** N/A
12. **Insects:** Wearing light colored clothing and tucking in the pant legs can reduce contact. In severely infested area it may be necessary to tape all openings. Apply repellents to both clothing and bare skin. Diethyltoluamide (DEET) is an active ingredient in many repellents, which are effective against ticks and other insects. Repellents containing DEET can be applied on exposed areas of skin and clothing. However, repellents containing permethrin should be used on only clothing. For more information on insect bites, refer to Appendix B.
13. **Poisonous Vegetation:** Recognition and avoidance is the best protection. Cover all exposed skin. If it is known or suspected that an individual has been exposed, wash the effected area with soapy water.

14. Inclement Weather: When there are warnings or indications of impending severe weather (heavy rains, strong winds, lightning, tornados, etc.), weather conditions shall be monitored and appropriate precautions taken to protect personnel and property from the effects of the severe weather.

15. Hot Weather: In hot environments, cool drinking water shall be made available and workers shall be encouraged to frequently drink small amounts, e.g., one cup every 15 - 20 minutes: the water shall be kept reasonably cool. In those situations where heat stress may impact worker safety and health, work regimens shall be established. Environmental monitoring of the Wet Bulb Globe Temperature Index shall be conducted and work loads and work regimens categorized as specified in the American Conference of Governmental Industrial Hygienist (ACGIH) publication "Threshold Limit Values and Biological Exposure Indices". For more information on Heat Stress refer to Appendix A of this SSHP.

16. Cold Weather: Cold injury (frost bite and hypothermia) and impaired ability to work are dangers at low temperatures and when the wind-chill factor is low. To guard against them: wear appropriate clothing; have warm shelter readily available; carefully schedule work and rest periods, and monitor workers' physical conditions.

17. Off-Road Driving: Ensure all emergency equipment is available with the vehicle i.e. tire changing equipment. Drivers shall familiarize themselves with the procedures for engaging four-wheel drive systems before the need for added traction arises. Vehicles will not be driven into an environment that is unknown, such as deep water, or an unstable surface. Vehicles will not be driven into a suspected ordnance impact area.

18. Ordnance:

a. General Information

(1) The cardinal principle to be observed involving explosives, ammunition, severe fire hazards or toxic materials is to limit the exposure to a minimum number of personnel, for the minimum amount of time, to a minimum amount of hazardous material consistent with a safe and efficient operation.

(2) The age or condition of an ordnance item does not decrease the effectiveness. Ordnance that has been exposed to the elements for extended periods of time become more sensitive to shock, movement, and friction, because the stability agent in the explosives may be degraded.

(3) When chemical agents may be present, further precautions are necessary. If the munitions item has green markings leave the area immediately, since it may contain a chemical filler.

(4) Consider ordnance that has been exposed to fire as extremely hazardous. Chemical and physical changes may have occurred to the contents which render it more sensitive than it was in its original state.

b. On-Site Instructions

(1) DO NOT TOUCH or MOVE any ordnance items regardless of the markings or apparent condition.

(2) DO NOT conduct a site visit during an electrical storm or an approaching electrical storm. If a storm approaches during the site visit leave the site immediately and seek shelter.

(3) DO NOT use a radio or cellular phone in the vicinity of a suspect ordnance item.

(4) DO NOT walk across an area where the ground cannot be seen.

(5) DO NOT drive a vehicle into a suspected OE area; use clearly marked lanes.

(6) DO NOT carry matches, cigarettes, lighters or other flame producing devices into a OE site.

(7) DO NOT rely on color code for positive identification of ordnance items or their contents.

(8) Approach ordnance items from the side; avoid approaching from the front or rear.

(9) Always assume ordnance items contain a live charge until it can be determined otherwise.

(10) Dead vegetation and animals may indicate potential chemical contamination. If a suspect area is encountered, personnel should leave the immediate area and evaluate the situation before continuing the site visit.

c. Specific Action Upon Locating Ordnance

(1) DO NOT touch, move or jar any ordnance item, regardless of its apparent condition.

(2) DO NOT be misled by markings on the ordnance item stating "practice", "dummy", or "inert". Practice munitions may contain an explosive charge used for spotting the point of impact. The item may also be mismarked.

(3) DO NOT roll the item over or scrape the item to read the markings.

(4) The location of any ordnance items found during site investigations should be clearly marked so it can be easily located and avoided.

(5) Reporting will be conducted in accordance with CELMS-PM-M, Standard Operating procedure for Reporting Ordnance and Unexploded Ordnance (UXO), dated 19 January 1995.

19. Other: (specify)

G. SITE CONTROL AND COMMUNICATIONS

1. Site Map: Refer to Appendix A

2. Site Work Zones: N/A

3. Buddy System: Individuals will maintain constant contact with other personnel at all times. No one will work alone at any time during the site visit.

4. Communications

a. On-Site: Verbal communications will be used among team members.

b. Off-Site: Communications shall be established on every site. Communications may be established by using an cellular phone or by public or private phone which may be readily accessible. (specify below)

Cellular phone

Public/private phone (location _____)

Other _____

c. Emergency Signals: In the case of small groups, a verbal signal for emergencies will suffice. An emergency signal for large groups (i.e. air horn, whistle) should be incorporated at the discretion of the SSHO.

Verbal

Nonverbal (specify) _____

H. EMERGENCY RESPONSE: Team members are to be alert to the dangers associated with the site at all times. If an unanticipated hazardous condition arises, stop work, evacuate the immediate area and notify the SSHO. A First Aid Kit and emergency eye wash (if applicable) will be located in the SSHO's field vehicle. If qualified persons (i.e. fire department, medical facility or physician) are not accessible within five minutes of the site at least two team members shall be qualified to administer first aid and CPR.

1. Emergency/Important Telephone Numbers

Benicia Police Department: (707) 745-3412
Hospital: (707) 648-6200
Poison Control Center, NJ (800) 962-1253
3d Ord BN (EOD) (206) 967-1972
787th Ord Co (EOD) (415) 603-8301
Huntsville Safety Office: (205) 895-1582/1579
Huntsville's 24 hour number: (800) 627-3532, PIN 777-2534
On-site cellular phone (314) 606-4955
St Louis Corps of Engineers (314) 331-8036

2. Hospital/Medical Facility Information

Name: Vallejo Kaiser Hospital
Address: 975 Sereno Dr
Vallejo, CA
Phone: (707) 648-6200
Distance to hospital 11 miles
Route to Hospital refer to the site map

I. MONITORING EQUIPMENT AND PROCEDURES

1. **Exposure Monitoring:** For non-intrusive on-site activities such as site visits, air monitoring is typically not required. However, if the site situation dictates the need for monitoring, complete the following information on a separate page and attach the page to the SSHP.

a. **Monitoring Equipment To Be Utilized:** N/A

b. **Equipment Calibration Results:** N/A

c. **Action Levels:** N/A

2. Heat/ Cold Stress Monitoring

a. Heat Stress monitoring criteria published in Chapter 8 of the NIOSH/OSHA/USCG/EPA "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities" shall be followed.

b. Cold Stress monitoring shall be conducted in accordance with the most current published American Conference of Governmental Industrial Hygienists (ACGIH) cold stress standard..

J. PERSONAL PROTECTIVE EQUIPMENT: Typically, for non-intrusive site visits, Level D is required. If a higher level of protection is to be used initially or as contingency, a brief discussion will be attached. At a minimum personnel shall wear clothing suitable for the weather and work condition. The minimum for field work shall be short sleeve shirt, long trousers, and leather or other protective work shoes or boots. If a higher level of protection is to be used initially or as contingency, a brief discussion will be attached.

1. **Footwear:** Footwear providing protection against puncture shall meet the applicable requirements as stated in EM 385-1-1, paragraph 05.A.07. All activities which personnel are potentially exposed to foot hazards will be identified and documented in a hazard analysis.

2. **Hand Protection:** Persons involved in activities which subject the hands to injury (e.g., cuts, abrasions, punctures, burns) shall use leather gloves.

3. **Head Protection:** Hardhats shall be worn when personnel are subject to potential head injury. The identification and analysis of head hazards will be documented in a hazard analysis.

4. **Eye Protection:** Personnel will wear eye protection when activities present potential injuries to the eyes. All eye protection equipment shall meet the requirements as stated in EM 385-1-1, paragraph 05.B.

K. DECONTAMINATION PROCEDURES: Decontamination procedures are not anticipated for this site investigation. Team members are cautioned not to walk, kneel or sit on any surface with potential leaks, spills or contamination.

L. TRAINING: All site personnel shall have completed the training required by EM 385-1-1 and 29 CFR 1910.120 (e). The U.S. Army Corps of Engineer (USACE) Project Manager shall ensure, and the SSHO shall verify, that all on-site personnel have completed appropriate training. Additionally, the SSHO shall inform personnel before entering, of any potential site-specific hazards and procedures.

M. MEDICAL SURVEILLANCE PROGRAM: The USACE Project Manager shall ensure, and the SSHO shall verify, that all on-site personnel are on the Medical Surveillance Program meeting the requirements of 29 CFR 1910.120, and ANZI Z-88.2, as appropriate, depending on the PPE and site specific tasks.

Provide the following information on Training and Medical

NAME	HAZWOPER DATE	PROVIDER	MEDICAL DATE
<u>Ted Moore</u>	<u>12-17-96</u>	<u>Corps of Engineers</u>	<u>4-96</u>
<u>Hank Counts</u>	<u>1-6-97</u>	<u>Corps of Engineers</u>	<u>9-96</u>
_____	_____	_____	_____
_____	_____	_____	_____

N. LOGS, REPORTS AND RECORDKEEPING: Site logs are maintained by the Project Manager and SSHO. This is to include historical data, personnel authorized to visit the site, all records, standard operating procedures, air monitoring logs and the SSHP.

O. GENERAL: The number of personnel visiting the site shall be a limited to a minimum of two, maximum of eight. The more personnel on-site, the greater potential for an accident. The SSHO may modify this SSHP if site conditions warrant it and without risking the safety and health of the team members. This modification will be coordinated with the team members. The SSHO shall notify Corps of Engineers Safety Office in Huntsville, AL. of the change as the situation allows.

APPENDIX A

HEAT- RELATED INJURIES

Once the signals of a heat-related illness begin to appear, the victim's condition can quickly get worse. A heat related illness can result in death. If you see any of the signals of sudden illness, and the victim has been exposed to extremes of heat, suspect a heat-related illness.

People at risk for heat-related illness include those who work or exercise outdoors, elderly people, young children, and people with health problems. Also at risk are those who have had a heat-related illness in the past, those with medical conditions that cause poor blood circulation, and those who take medications to get rid of water from the body (diuretics).

People usually try to get out of extreme heat before they begin to feel ill. However, some people do not or can not. Those that work outdoors often keep working even after they begin to feel ill. Many times, they might not even recognize that they are in danger of becoming ill.

Heat cramps, heat exhaustion, and heat stroke are conditions caused by overexposure to heat. You can help prevent heat-stress emergencies by recognizing and properly treating symptoms. Below is a quick reference guide to heat-related emergencies:

HEAT CRAMPS: Heat cramps are the least severe, and often are the first signals that the body is having trouble with the heat. *Symptoms* include: Muscle twitching; painful spasms in the legs, arms or abdomen.

WHAT TO DO:

- Have the individual rest in a cool place.
- Give cool water or a commercial sports drink.
- lightly stretch the muscle and gently massage the area.

HEAT EXHAUSTION: Heat exhaustion is a more severe condition than heat cramps. *Symptoms* include: cool, moist, pale, or flushed skin, headache, nausea, dizziness, weakness, and exhaustion.

HEAT STROKE: Heat stroke is the least common but most severe heat emergency. It most often occurs when people ignore the signals of heat exhaustion. Heat stroke develops when the body systems are overwhelmed by heat and begin to stop functioning. Heat stroke is a serious medical emergency. *Symptoms* include: red, hot, dry skin; changes in consciousness; rapid, weak pulse; and rapid, shallow breathing.

WHAT TO DO: When you recognize a heat-related illness in its early stages, you can usually reverse it.

- Get the victim out of the heat.
- Loosen any tight clothing and apply cool, wet cloths, such as towels or sheets.
- If the victim is conscious, give cool water to drink. Do not let the conscious victim drink too quickly. Give about 1 glass (4 ounces) of water every 15 minutes.
- Let the victim rest in a comfortable position, and watch carefully for changes in his or her condition. The victim should not resume normal activities the same day.
- Refusing water, vomiting, and changes in consciousness mean that the victim's condition is getting worse. Call for an ambulance immediately if you have not already done so.
- If the victim vomits, stop giving fluids and position them on their side.
- Watch for signals of breathing problems.
- Keep the victim lying down and continue to cool the body any way you can. If you have ice packs or cold packs, place them on each of the victim's wrists and ankles, on the groin, in each armpit, and on the neck to cool the large blood vessels.

APPENDIX B

BITES AND STINGS

Scorpions, Bees and Spiders

Bee stings are painful, but rarely fatal. Some people, however have a severe allergic reaction to an insect sting. This allergic reaction may result in a breathing emergency. If someone is stung by an insect, remove the stinger. Scrape it away with from the skin with your fingernail or plastic car, such as a credit card, or use tweezers. If you use the tweezers, grasp the stinger, not the venom sac. Wash the site with soap and water. Cover it to keep it clean. Apply a cold pack to the area to reduce the pain and swelling. Watch the victim for signals of an allergic reaction.

Scorpions live in dry regions of the southwestern United States and Mexico. They live under rocks, logs, and the bark of certain trees and are most active at night. Only a few species of scorpions have a sting that can cause death.

Spiders; there are also only two spiders in the United States whose bite can make you seriously sick or be fatal. These are the black widow spider and the brown recluse. The black widow is black with a reddish hourglass shape on the underside of its body. The brown recluse is light brown with a darker brown, violin-shaped marking on the top of its body. Both spiders prefer dark, out of the way places. Often, the victim will not know that he or she has been bitten until he or she starts to feel ill or notices a bite mark or swelling.

Symptoms include nausea and vomiting, difficulty breathing or swallowing, sweating and salivating much more than normal, severe pain in the sting or bite area, a mark indicating a possible bite or sting, and swelling of the area.

First Aid: If someone has been stung by a scorpion or bitten by a spider he or she thinks is a black widow or brown recluse, wash the wound, apply a cold pack to the site, and get medical help immediately.

Lyme Disease

Lyme Disease is an illness that people get from the bite of an infected tick. Lyme disease is affecting a growing number of people in the United States. Everyone should take precautions against it. Not all ticks carry lyme disease. Lyme disease is spread mainly by a type of tick that commonly attaches itself to field mice and deer. It is sometimes called a deer tick. This tick is found around beaches and in wooded and grassy areas. like all ticks, it attaches itself to any warm-blooded animal that brushes by. Deer ticks are very tiny and difficult to see. They are much smaller than the common dog tick or wood tick. They can be as small as a poppy seed or the head of a pin. Adult deer ticks are only as large as a grape seed.

Symptoms: The first signal of infection may appear a few days or a few weeks after a tick bite. Typically, a rash starts as a small red area at the site of the bite. It may spread up to 7 inches across. In fair-skinned people the center is lighter in color and the outer edges are red and raised. This sometimes gives the rash a bull's-eye appearance. In dark skinned people the area may look black and blue, like a bruise.

Other symptoms include fever, headache, weakness, and joint and muscle pain similar to the pain of "flu". These symptoms might develop slowly and might not occur at the same time as a rash. In fact you can have lyme disease without developing a rash.

First Aid: If you find a tick, remove it by pulling steadily and firmly. Grasp the tick with fine-tipped tweezers, as close to the skin as possible, and pull slowly. If you do not have tweezers, use glove, plastic wrap, or a piece of paper to protect you finger. If you use your bare fingers, wash your hands immediately. Do not try to burn a tick or use other home remedies, like coating the tick with Vaseline or nail polish or picking it with a pin. Once the tick is removed, wash the area with soap and water. If available, apply antiseptic or antibiotic ointment. If you can not remove the tick or parts of the tick stay in your skin, obtain medical care. If a rash or flu like symptoms develop, seek medical attention.

APPENDIX C

SSHP ACCEPTANCE FORM
ABBREVIATED SITE SAFETY AND HEALTH PLAN
FOR
Benicia Arsenal
Benicia, Solano County, California

I have read and agree to abide by the contents of the Site Safety and Health Plan.

NAME	OFFICE	SIGNATURE	DATE
<u>Don Counts</u>	<u>CELMS-ED-P</u>	<u>Don Counts</u>	<u>4/3/97</u>
<u>Ed Moore</u>	<u>CELMS-ED-P</u>	<u>Ed Moore</u>	<u>4/3/97</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

SITE SURVEY SAFETY BRIEFING

(Check subjects discussed)

Date 4-3-97

GENERAL INFORMATION

- Purpose of Visit
- Identify Key Site Personnel

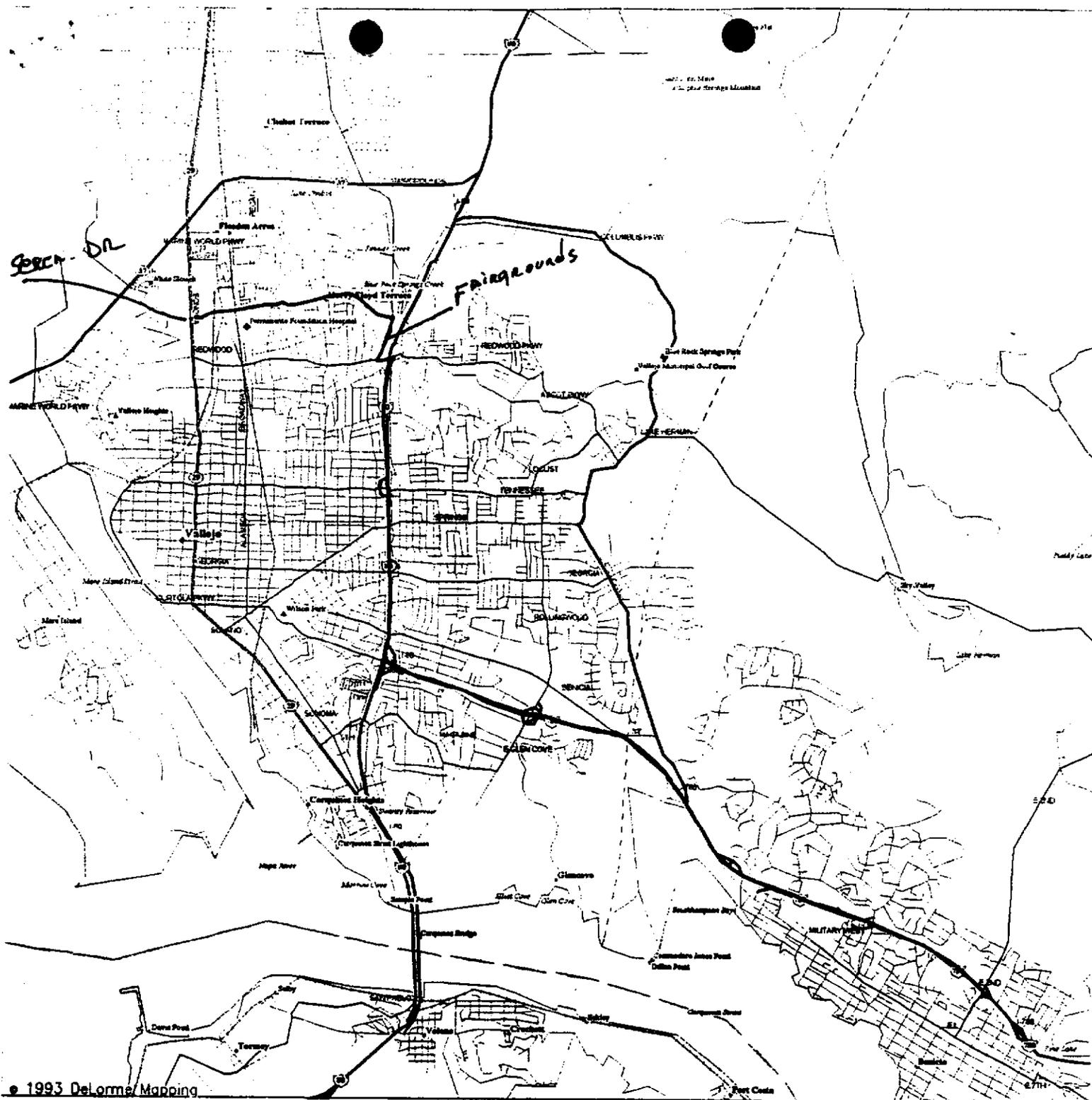
SITE SPECIFIC INFORMATION

- Site Description/Past Use
- Results of Previous studies
- Potential Site Hazards
- OE Safety Procedures
- Site SOP
- Site Control and Communications
- Emergency Response
- Location of First aid Kit
- Emergency Phone Numbers
- Map to Facility
- PPE
- Weather Precautions
- Cold/Heat
- Severe Weather

Safety Briefing Attendance

All team members and any accompanying personnel will be briefed and sign this form:

NAME (Print)	ORGANIZATION	SIGNATURE
<u>Ted Moore</u>	<u>USACE-STL, Project Manager</u>	<u><i>Ted Moore</i></u>
<u>Hank Counts</u>	<u>USACE-STL, Safety Specialist</u>	<u><i>Hank Counts</i></u>
<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>



© 1993 DeLorme Mapping

- LEGEND**
- State Route
 - Geo Feature
 - Town, Small City
 - Hill
 - Hospital
 - Interstate, Turnpike
 - Population Center
 - Street, Road
 - Hwy Ramp

- Major Street/Road
- Interstate Highway
- State Route
- Railroad
- River
- Open Water

Scale 1:62,500 (at center)
 1 Miles
 2 KM

Hospital location
 Mag 14.00
 Wed Apr 02 08:51:29 1997

975 SERENNO DR.

From Benicia take 780 to I80 toward Sacramento to Redwood exit Turn left 2nd left (west) Turn Right (North) at Fairgrounds to Serenno on left. go about 2 miles to Hosp

MEMORANDUM FOR: Mike Dace

SUBJECT: Benicia Arsenal - Site Visit

Participants:

Ted Moore	Project Manager
Hank Counts	UXO Specialist and Safety Officer

Thursday, 3 April 1997

1300 - We met with representatives of Pacific Bay Homes at the Tourtelot site. We visited the site was to get some idea of where ordnance had been found, to talk with the on-site environmental coordinator about the types and condition of ordnance found, and to take pictures. We did not walk in areas that had been gridded and suspected to contain ordnance.

The area is fenced and access is controlled by a guard. There is also an observation point on the high ground to insure only authorized personnel are on the site. There is a residential area immediately to the west of the Tourtelot site.

There are no construction activities at the present time, but ordnance has been found on the site. We walked to the tunnel area. The tunnels and firing positions have been excavated and removed. Concrete filled 155mm rounds were found in the tunnels.

There was a pile of inert ordnance that had been collected from two grids and the tunnel area. The pile included a 2.36" rocket motor, 75mm projectile, 40mm grenade, 81mm mortar, 37mm projectile, 155mm projectile, and miscellaneous HE fragments.

1530 - We met with Mr. Fred Newhouse of Exxon to begin our inspection of the suspected demolition area on Exxon's property west of East 2nd Street. Exxon was unaware that any ordnance activities had occurred on this portion of their property.

We concentrated on the area shown on the map as the demolition area. The suspected demolition area is a paved circular area approximately 50' in diameter. There is a berm on the west side of the paved circle. We found .50 cal projectiles and trash in the berm. We used a Schonsted (model GA-72-CV) magnetometer to surface survey the area surrounding the suspected demolition area. We got several +10 readings on the south side of the paved circle.

There is a residential area approximately 1/2 mile west of the suspected demolition area. The perimeter of Exxon's property is partially fenced and Exxon tries to prevent public access to the area. In spite of Exxon's efforts, the public uses the area regularly for motorcycles and all terrain vehicles.

1730 - We interviewed Mr. James Milburn at his home.

**APPENDIX E
REPORT DISTRIBUTION LIST**

<u>Addressee</u>	<u>No. Copies</u>
Commander, U.S. Army Engineering Support Center Huntsville, ATTN: CEHNC-ED-SY P.O. Box 1600 Huntsville, AL 35807-4301	2
Project Manager Chemical Demilitarization, Non-Stockpile ATTN: SFAE-CD-N, Bldg 4585 Aberdeen Proving Ground, MD 21010-5401	1
Commander, U.S. Army Chemical & Biological Defense Command ATTN: AMSCB-CIH, Bldg E5183 Aberdeen Proving Ground, MD 21010-5423	1
U.S. Army Technical Center for Explosives Safety ATTN: SMCAC-ESM Savanna, IL 61074-9639	1
Commander, U.S. Army Corps of Engineers Sacramento District 1325 "J" Street Sacramento, CA 95814-7859	1

ARCHIVES SEARCH REPORT - SUPPLEMENT

- PLATE 1 ORDNANCE ACTIVITIES-1991
 GROUND FEATURES
- PLATE 2 ORDNANCE ACTIVITIES-1951
 GROUND FEATURES
- PLATE 3 ORDNANCE ACTIVITIES
 TOURTELOT PROPERTY

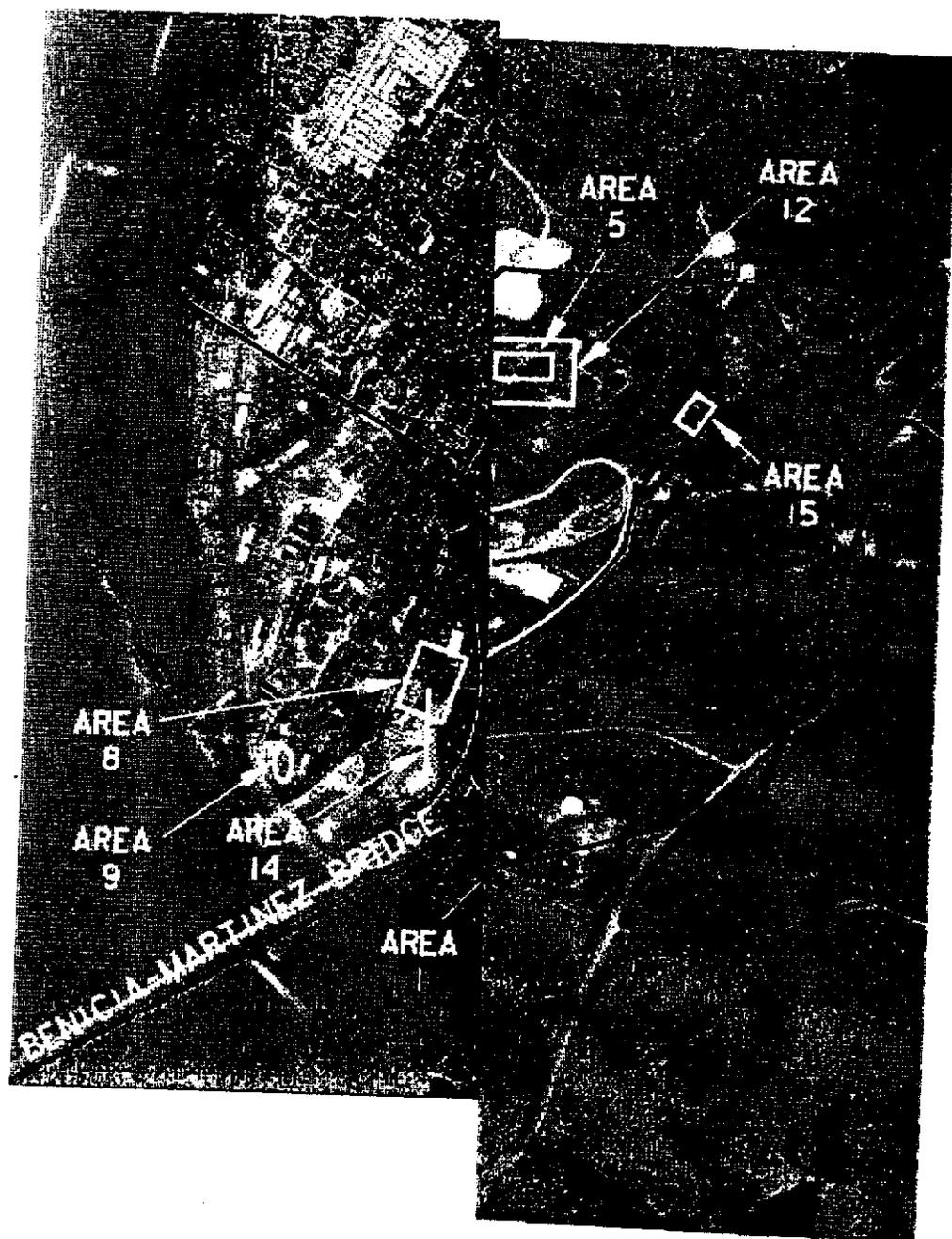


PLATE I

BENICIA ARSENAL
SOLANO COUNTY
BENICIA, CALIFORNIA
DERP-FUDS *J09CA075600
ORDNANCE ACTIVITIES-1991
GROUND FEATURES

E: APRIL 1997 | DATE OF PHOTO: 1991

1997 15:49 | N/OEW94AM/SITEISM/MAP/BENI.DGN

T PROPERTY

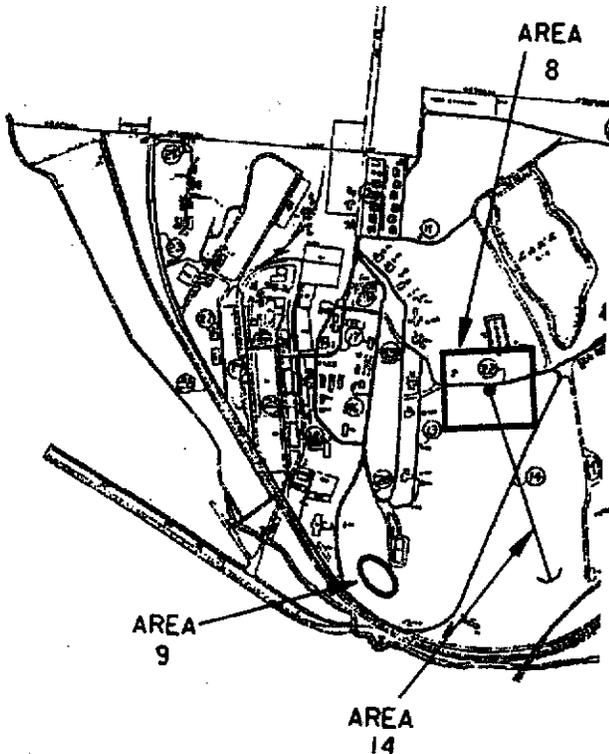
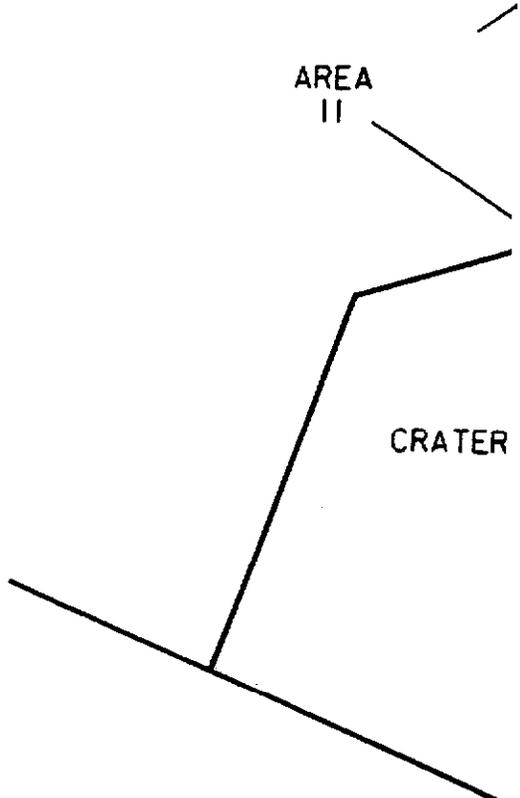


PLATE 2

BENICIA ARSENAL
SOLANO COUNTY
BENICIA, CALIFORNIA
DERP-FUDS • J09CA075600
ORDNANCE ACTIVITIES-1951
GROUND FEATURES

DATE:	APRIL 1997	DATE OF MAP:	1951
R-1997 08:50	N/DEW94AM/SITE/IGM/MAP/BENZ.DGN		



AREA
II

CRATER

LEGEND

- ARSENAL BOUNDARY
- - - - LEASED PROPERTY BOUNDARY
- LIVE ORDNANCE FOUND BY PACIFIC BAY HOMES

PLATE 3

**BENICIA ARSENAL
SOLANO COUNTY
BENICIA, CALIFORNIA
DERP-FUDS *J09CA075600
ORDNANCE ACTIVITIES
TOURTELOT PROPERTY**

PROJ. DATE:	APRIL 1997	DATE OF MAP:	1997
23-APR-1997 10:37	N/OEW94AM/SITE16/PHOTO/BEN3.DGN		