

# **Chemical Warfare Materials (CWM) used at Fort Ord**

Compiled from Fort Ord cleanup documents

**Summary:** The Fort Ord cleanup has downplayed the use of CWM at Fort Ord. There is a conclusive body of evidence that CWM was used for experiments and field training of troops at Fort Ord from the 1930s to 1974. Shortly after cleanup operations began, physical evidence of CWM use at Fort Ord emerged. Suspected and known CWM training areas and their potential residual contamination have virtually been ignored. Despite the potential CWM hazard, thousands of acres of former training areas are being transferred for residential, commercial, and other public uses. Despite the body of evidence, the CWM issue is being whitewashed. The FORA officials and regulatory agencies have turned a blind eye to this significant hazard. Failure to yield to the evidence and red flags of CWM use in training areas is an accident waiting to happen.

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## **Record of CWM Sites**

### **Identified CWM training areas:**

- Site 2 / OE-2, Chemical Training Area; Area between intersection of Fifth and Eighth Streets and intersection of Imjin and Eighth Street.<sup>1</sup>
- Chemical, Biological, Radiological (CBR) 4 field training sites.<sup>2</sup>
  - OE-4A - CBR #1, Parker Flats
  - OE-4B - CBR #2, Parker Flats, CS Gas Chamber
  - OE-4C - CBR #3, OE-31, CSU footprint
  - OE-4D - CBR #4, OE-40, Parker Flats Gas House

### **Discovery of buried CWM**

#### **HD Mustard container found:**

- In 1993 in the vicinity of Site 2 (offsite), a suspected Chemical Training Area, a 55 gal drum was unearthed during ditching operations which was suspected to be a chemical agent container. Soil samples confirmed traces of HD Mustard.<sup>3</sup>

#### **Chemical Agent Identification Sets found:**

- In 1997 Chemical Agent Identification Sets (CAIS). 24 ampoules (glass vials) were found 12 and 18 inches deep during a Ordnance and Explosive (OE) removal action at Site 13B.<sup>4</sup>

### **An apparent CWM incident**

#### **Hazardous Material incident:**

- In 1994 in the vicinity of Site 4C, a known CBR training site within CSU property, 2 EOD specialists were overcome by fumes. One of the men vomits and the other became dizzy. They retreated up wind, called for help, and are taken to the hospital. The incident was serious enough that all operations in the area were halted, their vehicle was confiscated, the area was fenced off, and a Army team from 87<sup>th</sup> Ord Det (EOD) was called in. The incident remains unresolved.<sup>5</sup>

### **Significant Documents state CWM use**

#### **Chemical training and experiments were conducted at Fort Ord**

- “During World War II, troops assigned to Edgewood Arsenal, Maryland, trained and conducted experiments at Fort Ord. CAIS were used at Fort Ord prior to 1974 for field training of troops.”<sup>6</sup>

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<sup>1</sup> Map 2,3,4,5: Site 2 / OE-2 location; vicinity of Marina horse stables; Archive Search Report OE-0005A Sec. 6.2

<sup>2</sup> Map 1 & 2: OE / CBR Site locations, Archive Search Report OE-0022 Plate B2, BW-0540 Plate 1

<sup>3</sup> Map 3: Site 2 / OE-2 location, vicinity of Marina Horse Stables adjacent to CSUMB, Archive Search Report OE-0005A Sec. 6.2

<sup>4</sup> Map 5: Site 13B, adjacent to CSUMB and Monterey County. MST Parcel; OE-0265E

<sup>5</sup> Map 5: OE-4C; incident within CSUMB Parcel, excerpts OE-0011, Substances unknown-Removal Action Report BW-0841

<sup>6</sup> Quote: Non-Stockpile Chemical Material; Former Fort Ord 1997, OE-0202

### **Chemical training was conducted at Fort Ord**

- “During the World War II years the installation was a staging and training area for other divisions and units. Chemical training was conducted at Fort Ord starting in 1940. Training consisted of defense against chemical attack, gun drills wearing masks, passing through smoke and gas, chemical agent identification, weapons and tactics, and treatment of gas casualties. However, no conclusive evidence was found of toxic chemical use. During WWII troops assigned to Edgewood Arsenal, Maryland trained and conducted experiments at Camp Roberts and Fort Hunter Liggett. Chemical Agent Identification Sets (CAIS) were used at Fort Ord.”<sup>7</sup>

### **Ordnance used or fired at Fort Ord**

- “Chemicals: Riot Control tear gases such as CN and CS were dispensed in capsules, candles, and M79 grenade launchers. No other delivery means are known. CAIS were used at Fort Ord.”
- “Projectiles: 20mm; 37mm gun and anti-aircraft; 40mm grenade (linked and single) and anti-aircraft; 57mm, 75mm, 90mm, 106mm recoilless rifle; rifle grenades; 75mm, 105mm, 155mm Howitzer; 7” and 8” naval gun; 60mm, 81mm, 4.2” and 4” stokes mortars. Types identified have been HE, HEAT, APEH, illumination, and smoke, FS, HC, WP.”<sup>8</sup>

### **Chemical Agents buried in WWII training areas**

- “K951 ampoules (glass vials) containing chemical agents are frequently found in burial sites at old WWII training areas. They are sometimes found loose, sometimes found in their original steel cylinders (also called “pigs”), and are sometimes found in drums, cans, or other disposal containers. When found loose, the agent type cannot be readily identified without sophisticated spectrographic equipments, and a worse case assumption of phosgene should be made by field personnel.”<sup>9</sup>

### **Mustard Agent: Addendum to Health And Safety Plan (HASP)**

- “...the addendum was initiated as a result of further information obtained from both historical data and recent site investigation observations which indicate an increased probability that chemical agents will be encountered during subsurface investigations. Specifically, blister (a.k.a. mustard) agents are the chemical hazards addressed in the addendum.”<sup>10</sup>

### **Summary of Events:**

- 1993 Mr. Macbride, a military dependent, stated he saw soldiers with masks training 1930s. (Site 2)?

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<sup>7</sup> Quote: Contradictory statement, Archives Search Report; Sec. 6.0 site analysis 1993, OE-0005A

<sup>8</sup> Chemical Agents, chemical munitions, and toxic smokes, were used at Fort Ord; 1993 OE-0005A Fig. 6-1

<sup>9</sup> Quote: CAIS consist of Mustard (H), Lewisite (L), Chloropicrin (PS), Phosgene (CG); 1995 OE-0265E

<sup>10</sup> Quote: OE-0522; 4/22/1994 DTSC Memorandum issued eight days after Haz Mat incident. CSU footprint; Haz Mat incident occurred on 4/14/1994 in the vicinity of CBR Site 4C, aka Inter-Garrison response site

- 1993 Staff Sergeant Davis, stationed at Fort Ord, stated CAIS are buried along Imjin Rd. (outside Site 2)?
- 1993 Site 16 Characterization; vicinity of Site 2, physical evidence emerges, empty 55 gal drum mustard agent is dug up. (confirms Mr. Macbrides recollection)
- 2-17-1994; Mustard Agent Addendum is added to Health And Safety Plan, procedures for work involving potential exposure to Chemical Warfare Agents. BW-0496
- 4-14-1994; 2 cleanup specialists, while digging, are overcome by fumes next to a known chemical training site.<sup>11</sup> (CWM incident)? (Site 4C-experimental CWM site)? (no accounting of TCRA removal, chemical containers or their contents)?
- 4-22-1994; DTSC issues Fort Ord RI/FS Mustard Agent Memorandum stating specific sites are not identified in the addendum due to uncertainty of location(s) of historical use and disposal of blister agents(mustard).(could be anywhere)? BW-0522
- 1997 CAIS CWM glass vials are dug up at site 13B.(unknown CWM training site)?
- Army documents state CWM experiments and field training occurred at Fort Ord for decades.<sup>12 13</sup> Picture of CWM field training. Does not appear to be a classroom.
- Remediation documents omit empty 55 gal HD mustard drum (a), the CSU site Haz Mat incident (b), and Site 13B CAIS discovery (c).<sup>14</sup> (CWM whitewash)

### **Failure to Comply with CERCLA**

- According to the NCP, 40 C.F.R. 300.430(d)(4) an RI/FS must include a site-specific baseline risk assessment. “to characterize the current and potential threats to human health and the environment.” The baseline risk assessment is a vital component of the RI/FS, and the results of the risk assessment is used to “ establish acceptable exposure levels for use in developing remedial alternatives in the FS.” Remedial goals are established based on the acceptable exposure levels derived in accordance with the factors set in 40 C.F.R. 300.430(e)(2)(i). A OE baseline risk assessment has not been performed for any Training Areas outside of Site 39; nor have acceptable exposure levels or remediation goals been derived in a manner required by the NCP. The Army, FORA ESCA Privatized RP, and the regulatory agencies have turned a blind eye to this vital RI/FS requirement.

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<sup>11</sup> Haz Mat incident triggers Time Critical Removal Action (TCRA) BW-0647

<sup>12</sup> Reference documents / section: BW-0013 2.1.6, OE-0202 ES, OE-0265E pg 6, OE-0005A 6.2, OE-0002 4.4.3.2,

<sup>13</sup> Attachments: Excerpts OE-0011; (5) Maps - 4 CBR sites BW-0540, OE sites OE-0245H, Site 2 “no further action” OE-0029, Site 2 OE-0001, Site 2 OE-0002; Picture of CWM training at Fort Ord; baseline risk assessment CERCLA CFR §300.430(d)(4)

<sup>14</sup> (a) Site 16 Post Remediation BW-2021A - BRA BW-2300J HA-91, (b) CSUMB RI/FS WP1 ESCA-0139 - CBR #3 Site and Haz Mat incident have disappeared BRA BW-2300J HA-161, (c) Site 13B CAIS has disappeared BRA BW-2300J HA-103

**Question:**

- In light of the above events and supporting documentation, how can areas where CWM use is suspected or has been found be rendered as safe (no further action)?

**Conclusion:**

- Chemical Warfare Materials were used at Fort Ord for experiments and for field training of troops. Of particular concern, some of the agents found were housed in glass vials and cannot be detected with the magnetometers used for the cleanup of ordnance and explosives. To date, technology either does not exist or has not been deployed to address the significant threat from CWM. Because of the outlined events and Army's poor record keeping of what, when, and where CWM was used and disposed of, the precautionary approach should be taken. It would be reasonable to triangulate the known CBR and CWM discovery sites and consider the entire area a high risk CWM site.

**Acronyms:**

BRA	Basewide Range Assessment 2009
CAIS	Chemical Agent Identification Sets
CBR	Chemical, Biological, Radiological
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CN	chloroacetophenone (riot control gas)
CS	2-chlorobenzalmalononitrile (riot control gas)
CSU	California State University
CSUMB	California State University Monterey Bay
CWM	Chemical Warfare Material
EOD	Explosive Ordnance Disposal
ESCA	Environmental Services and Cooperative Agreement
FORA	Fort Ord Reuse Authority
FS	Sulfur trioxide
HC	Mixture of hexachloroethane, zinc oxide, and approximately 7% aluminum
HD	Mustard agent
NCP	National Contingency Plan
OE	Ordnance and Explosives
RI/FS	Remedial Investigation / Feasibility Study
RP	Remediation Program
WP	White Phosphorous
WP <sub>1</sub>	Work Plan

**Note:** Footnotes with references such as BW-0013, OE-0029, etc., are Administrative Record numbers that the information was compiled from. These documents are available at the Fort Ord cleanup web site at: <http://fortordcleanup.com/adminrec/arsearch.asp>

**OE-0011:**

Journal excerpts of HAZ MAT incident CSU Footprint aka CSUMB

**OE-0011: Delivery Order 015A Entry 27; CSU Footprint 4-14-1994**

Grid 37-D EOD specialists became ill, vomiting. **HAZ MAT** team called in...  
**all intrusive work stopped**

COMMENTS/CONCERNS: AT APPROXAMATLY 0845 THIS MORNING TM6 CALLED ON THE RADIO FROM GRID 37-D STATING THAT WHILE DIGGING UP A TRASH PIT TWO EOD SPECIALISTS BECAME ILL, ONE VOMITED AND THE OTHER BECAME DIZZY. THE TEAM HAD RETREATED UP WIND TO A SAFE AREA AND REQUESTED ASSISTANCE. THE TEAM SAFETY AND COE REP RESPONDED. SUXOS CALLED BILL COLLINS AND REQUESTED ASSISTANCE. THE TWO MEN WERE TAKEN TO THE BASE HOSPITAL BY HFA SAFETY, COE REMAINED ON SITE WITH THE REMAINDER OF TM6 AWAITING BASE HAZ MAT RESPONSE TEAM. BASE HAZ MAT ARRIVED AND DECONTAMINATED ALL EOD PERSONELL AND SECURED THE AREA. ALL INTRUSIVE WORK WAS STOPPED AT 1130 HOURS. CLEARANCE TEAMS WERE SENT BACK INTO THE FIELD TO PICK UP UXO RELATED SCRAP ON THE SURFACE REMAINING WELL CLEAR OF THE CONTAMINATED AREA.

**OE-0011: Delivery Order 015A Entry 28; CSU Footprint vehicles and equipment impounded due to possible HAZ MAT contamination**

COMMENTS/CONCERNS: DUE TO THE POSSIBLE HAZ MAT CONTAMINATION ALL BRUSH CREW LABORS TEMINATED AT NOON UNTIL FURTHER NOTICE. CONCERNED ABOUT CONTINUING WORK FOR ENTIRE JOB. HAZ MAT PERS HAVE SSO VEHICLE AND TM 6 VEHICLE IMPOUNDED DUE TO POSSIBLE CONTAMINATION. ALSO ALL OF TM 6'S EQUIPMEMT AND MOST PERSONAL ITEMS HAVE BEEN IMPOUNDED.

**OE-0011: Delivery Order 015A Entry 29; CSU Footprint fence placed around HAZ MAT pit**

COMMENTS/CONCERNS: CONTINUE TO BRUSH GRIDS, TM 6 STILL WITHOUT EQUIPMENT DUE TO POSSIBLE CONTAMINATION. SSO VEHICLE REMAINS IMPOUNDED??  
BASE PLACED HURRICANE FENCE AROUND ACTUAL PIT.

A couple of notable sections from cleanup documents:

**OE-0002 TCRA**

**4.4.3.2 Site 2, Chemical Training Area**

**4.4.3.2.1** Site 2 is also located in an area which is heavily traveled and populated. Site 2 was identified as a site which may contain CWM in the form of vials of a 10% solution of mustard and lewisite. The vials are said to have been components of Chemical Agent Identification Sets (CAIS). With this in mind, special requirements for conducting operations in this area will be placed in effect. Appendix F contains health and safety plans for this area and PPE necessary to protect personnel.

## OE-0005A 1993 Archives Search Report

6.2.2. Site 2. Chemical training area. (vicinity FR 075575 to 078577; area between intersection of Fifth and Eighth Streets and intersection of Imjin and Eighth).

Discussion: The area between Imjin Road and the stockade has been described as a chemical training area by Mr. Maurice Macbride, who was a military dependent during 1933-37. He remembers watching soldiers training with protective masks on. He said later the area was used for landmine warfare training. During a terrain walk, no evidence of OEW contamination was found, except for one unidentified item protruding from the ground at FR 07805772. It is not suspected to be ordnance-related.

A Mr. Lee Stickler, who was in the Field Artillery in 1940-41 at Fort Ord, and much later served as Range Control Officer from 1971-89, stated that the area was a horse corral when he was there. This is confirmed by a map from 1943-44. At some point, the area was a 2.36" bazooka range, since these rockets have recently been found just east of Pete's Pond. The remains of what appear to be concrete target bunkers can still be seen.

Recently, a 55-gallon drum was unearthed (vicinity FR 074575) during ditching operations which was suspected to be a chemical agent container. It was tentatively identified as such by UXB International (subcontractor to Harding Lawson Associates) personnel who were working in the area. The drum apparently had reinforcing ribs of the kind used on chemical containers. An explosive ordnance disposal team from the 87th Ord Det (EOD), Presidio of San Francisco, was called out. The team responded as if it were a full-blown chemical incident.

The drum turned out to be empty. The Directorate of Engineering and Housing had the firm of Harding Lawson run soil sample tests. Traces of HD mustard were found. The consensus of opinion was that at one time the drum may have contained agent, but was empty when buried. This drum is the only evidence that toxic chemicals may have been used or stored on Fort Ord.

The EOD team leader, Staff Sergeant Davis, further stated that chemical agent training kits (containing 10% solutions HD) were buried along Imjin Road between the roadway and old stockade.

Recommendations: This area requires further investigation to determine the extent of the hazards present. The soil surrounding the ditching area where the drum was unearthed should have further analysis done. Any further excavation should proceed with caution due to the likelihood of uncovering 2.36" rockets.

Further investigation should be made along Imjin Road (southeast and south-southeast of stockade), to ascertain whether any of the buried training kits might be uncovered.

# Maps

- Map1: Chemical training areas: Pete's Pond / Site 2 / OE-2  
CBR #1  
CBR #2  
CBR #3  
CBR #4
- Map 2: Chemical training areas OE-2 - Pete's Pond  
OE-4A - CBR #1  
OE-4B - CBR #2  
OE-4C - CBR #3  
OE-40 - CBR #4
- Map 3: Chemical training area OE-2 next to horse stables at 9<sup>th</sup> Street
- Map 4 : Chemical training area Site 2 grid location and site boundary
- Map 5 : CSUMB OE cleanup Site 13B location of CWM CAIS found, location of Haz Mat incident 4-14-94 in vicinity of CBR site 4C

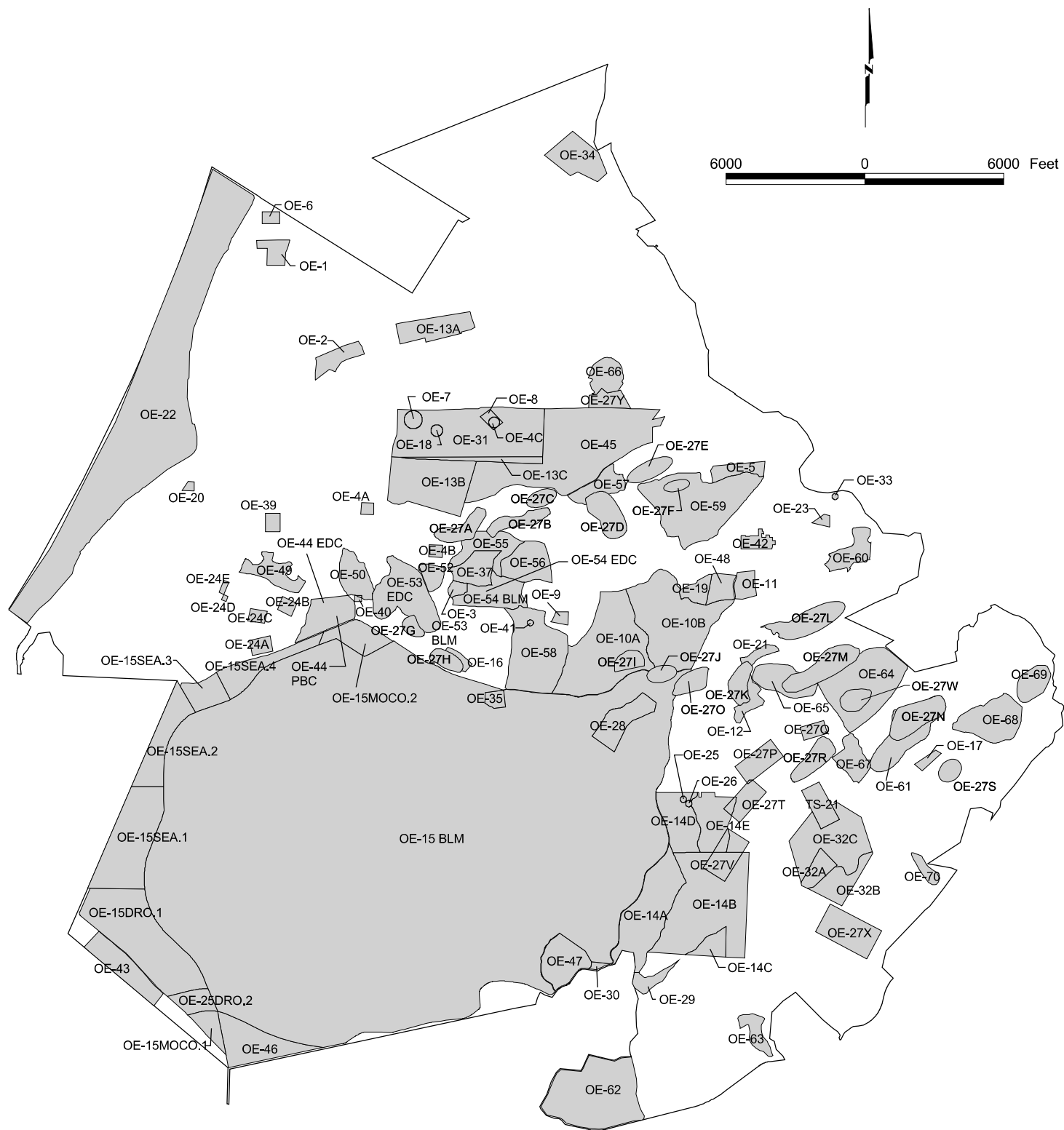
Note: During the Fort Ord cleanup, the names of sites have changed several times, or been subsumed into other sites (disappeared from the record).

## Acronyms

CBR Chemical, Biological, Radiological Sites

OE Ordnance and Explosives Sites





EXPLANATION

OE-30 OE Site Location and Number



**Harding Lawson Associates**  
Engineering and Environmental Services

**Previously Identified Known or Suspected OE Sites**  
OE RI/FS Work Plan  
Former Fort Ord  
Monterey, California

PLATE  
**2**

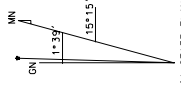
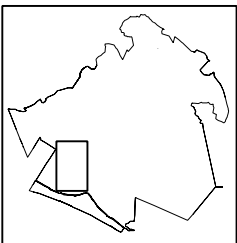
DRAWN TJH	JOB NUMBER 46310 001133	APPROVED	DATE 2/00	REVISED DATE
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ECCA.apr - layout 1-2/25/00

A B C D E F G H

6 5 4 3 2 1

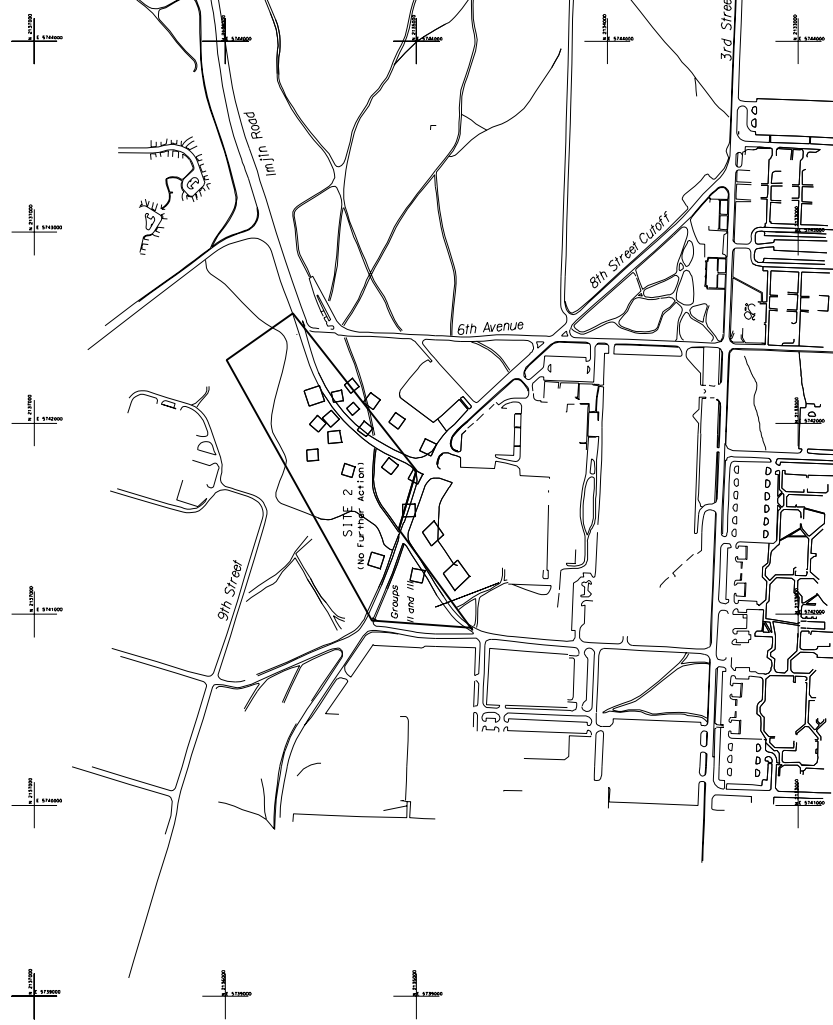
INDEX MAP



CALIFORNIA STATE PLANE GRID  
AND 1996 MAGNETIC NORTH

**LEGEND**

- OE Site Boundary
- Existing Infrastructure
- Land Use Group Designation
- Sampling Grid



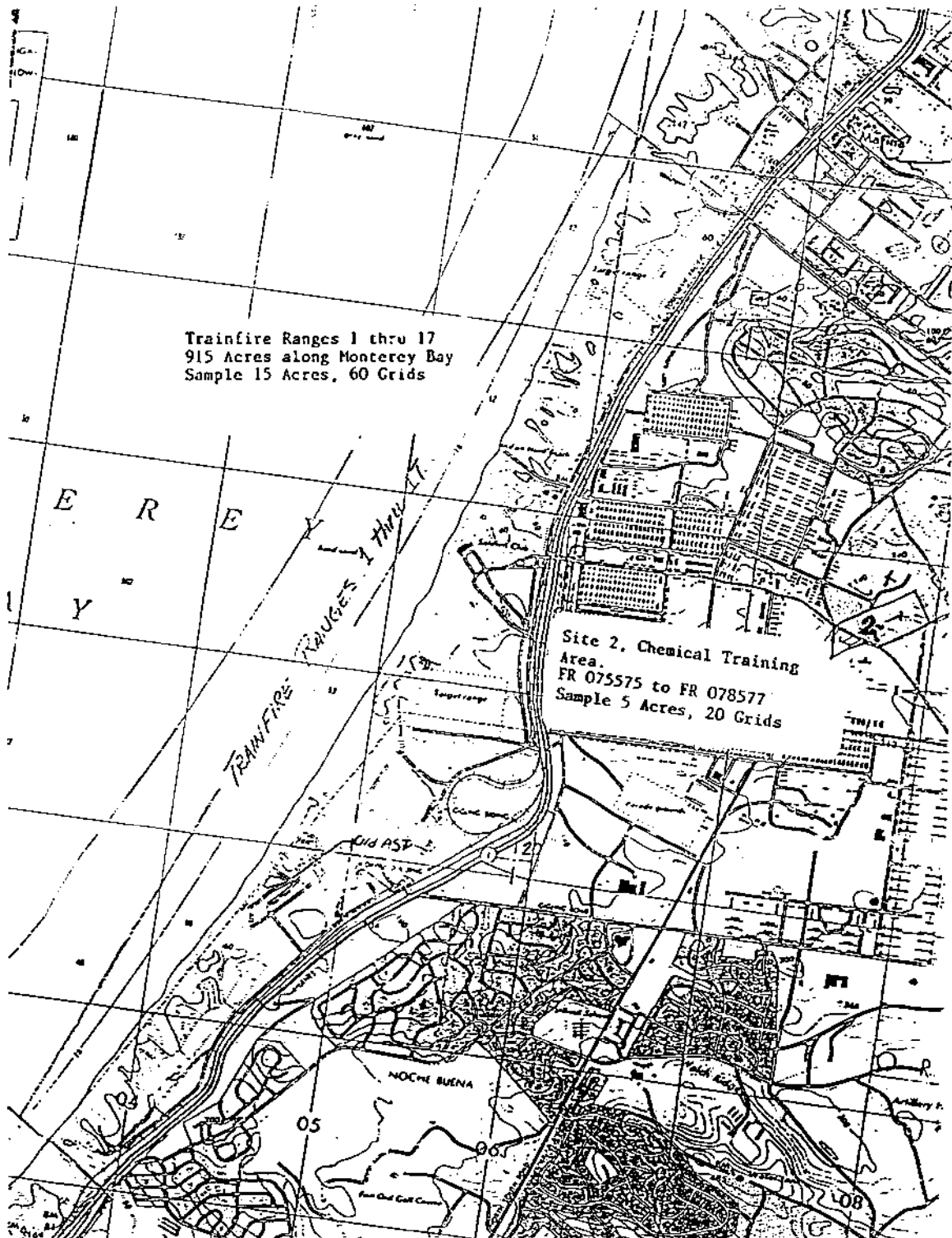
Former Fort Ord EE/CA  
Presidio of Monterey Annex, CA

Site 2  
Sample Grids, Site Boundary

Scale: 1" = 650'

Figure  
2.3-2

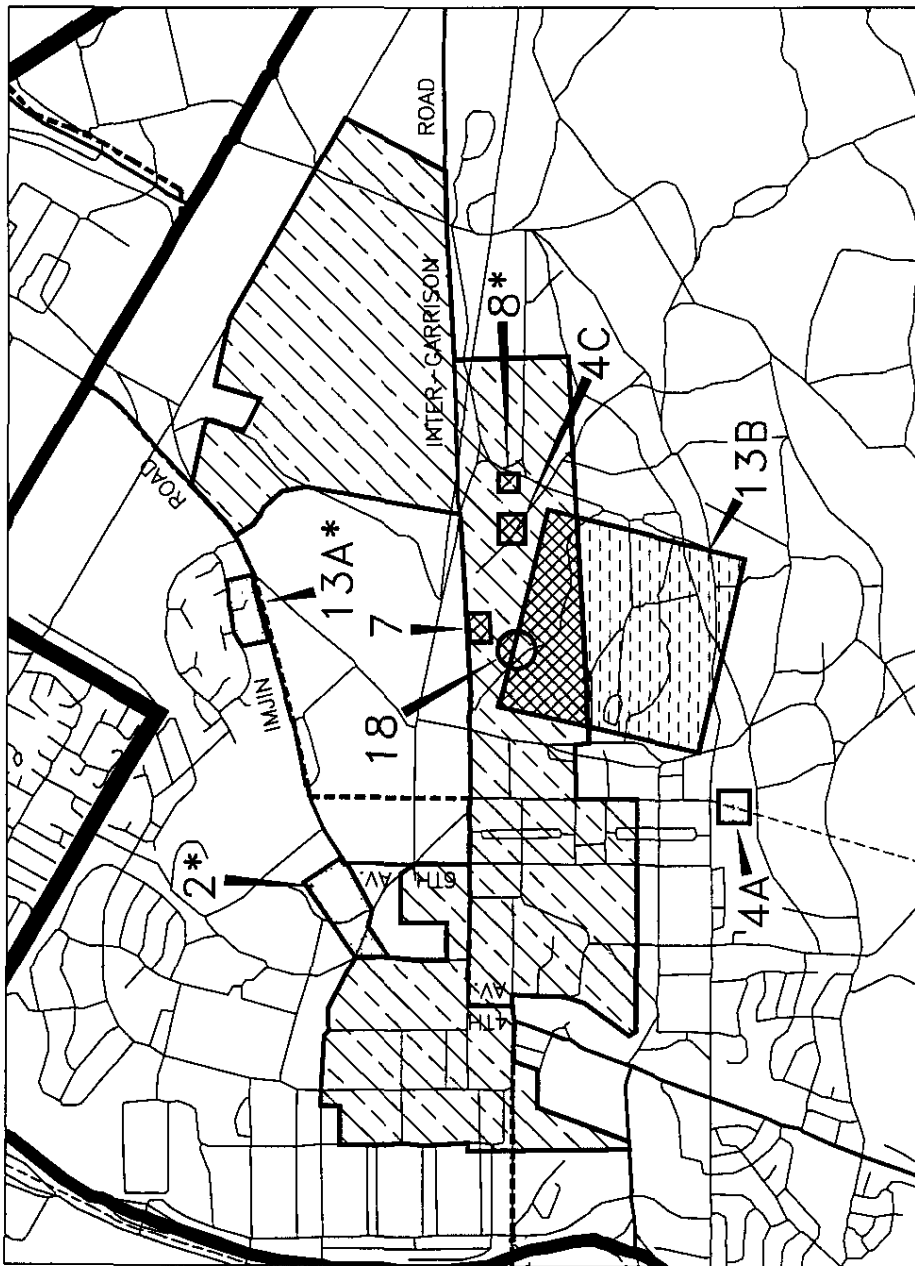
Figure 3



# UXO SITE LEGEND

SITE	DESCRIPTION
1*	FLAME THROWER RANGE
2*	NON-TOXIC CHEMICAL TRAINING AREA
3*	DEMOLITION TRAINING AREA
4A*	CBR TRAINING
4B*	CBR TRAINING
4C	3.5" ROCKET TRAINING AREA
5	MINE & BOOBY TRAP AREA
6*	MINE & BOOBY TRAP AREA
7	MINE & BOOBY TRAP AREA
8*	MINE & BOOBY TRAP AREA
9*	MINE & BOOBY TRAP AREA
10	81 & 60MM MORTAR ROUNDS
11	DEMOLITION TRAINING AREA
12	HAND GRENADE / 37MM GUN / 40MM AA (PRACTICE ROUNDS ONLY)
13A*	MORTAR RANGE (PRACTICE ROUNDS ONLY)
13B	MORTAR RANGE (PRACTICE ROUNDS ONLY)
14	7 & 8" NAVAL GUN IMPACT AREA
15	CONVENTIONAL ORDNANCE (IMPACT AREA)
16	2.36" ROCKET MOVING TARGET RANGE
17	ANTI-TANK (AT) PRACTICE MINE AREA
18	LANDMINE TRAINING AREA
19	RIFLE GRENADE RANGE
20*	RECILLISS RIFLE TRAINING AREA
21	MUDHEN LAKE
22*	BEACH RIFLE RANGES

AS OF 20 MAY 1994, THESE SITES HAVE BEEN DETERMINED TO BE UXO FREE



# CURRENT OEW TIME-CRITICAL REMOVAL ACTIONS

- REMOVAL ACTIONS IN PROGRESS
- SITE SAMPLED, ADDITIONAL REMOVAL ACTIONS REQUIRED
- NO REMOVAL ACTIONS REQUIRED
- CSUMB CAMPUS SITE
- FORT ORD BASE BOUNDARY

M-2

Scale of Map  
10/20/94



SCALE IN FEET  
0 300 600

Map of Fort Ord  
Base of Ordnance and Chemical  
Training Areas  
October 1994

## FORT ORD, CALIFORNIA



### FIELD TRAINING

Training during the early forties was still based on tactics used during World War I. The equipment used at that time was just as outdated.

## **CERCLA Requirement**

### **Baseline Risk Assessment**

CFR §300.430(d)(4)

(d) Remedial investigation. (1) The purpose of the remedial investigation (RI) is to collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives. To characterize the site, the lead agency shall, as appropriate, conduct field investigations, including treatability studies, and conduct a base line risk assessment. The RI provides information to assess the risks to human health and the environment and to support the development, evaluation, and selection of appropriate response alternatives. Site characterization may be conducted in one or more phases to focus sampling efforts and increase the efficiency of the investigation. Because estimates of actual or potential exposures and associated impacts on human and environmental receptors may be refined throughout the phases the RI as new information is obtained, site characterization activities should be fully integrated with the development and evaluation of alternatives in the feasibility study. Bench-or pilot-scale treatability studies shall be conducted, when appropriate and practicable, to provide additional data for the detailed analysis and to support engineering design of remedial alternatives.

(4) Using the data developed under paragraphs (d)(1) and (2) of this section, the lead agency shall conduct a site specific base line risk assessment to characterize the current and potential threats to human health and the environment that may be posed by contaminates migrating to ground water or surface water, releasing to air, leaching through soil, remaining in the soil, and bio accumulating in the food chain. The results of the base line risk assessment will help establish acceptable exposure levels for use in developing remedial alternatives in the FS, as described in paragraph (e) of this section

# Mustard Agent HD

## Physiological effects

Mustard gas has extremely powerful vesicant effects on its victims. Additionally, it is strongly mutagenic and carcinogenic, due to its alkylating properties. It is also lipophilic. Because people exposed to mustard gas rarely suffer immediate symptoms, and mustard-contaminated areas may appear completely normal, victims can unknowingly receive high dosages. However, within 6 to 24 hours of exposure to mustard agent, victims experience intense itching and skin irritation which gradually turns into large blisters filled with yellow fluid wherever the mustard agent contacted the skin. These are chemical burns and they are very debilitating. If the victim's eyes were exposed then they become sore, starting with conjunctivitis, after which the eyelids swell, resulting in temporary blindness. According to the Medical Management of Chemical Casualties handbook, there have been experimental cases in humans where the patient has suffered miosis, or pinpointing of pupils, as a result of the cholinomimetic activity of mustard. At very high concentrations, if inhaled, mustard agent causes bleeding and blistering within the respiratory system, damaging mucous membranes and causing pulmonary edema. Depending on the level of contamination, mustard gas burns can vary between first and second degree burns, though they can also be every bit as severe, disfiguring and dangerous as third degree burns. Severe mustard gas burns (i.e. where more than 50% of the victim's skin has been burned) are often fatal, with death occurring after some days or even weeks have passed. Mild or moderate exposure to mustard agent is unlikely to kill, though victims invariably require lengthy periods of medical treatment and convalescence before recovery is complete. The mutagenic and carcinogenic effects of mustard agent mean that victims who recover from mustard gas burns have an increased risk of developing cancer in later life.

Source:

[http://en.wikipedia.org/wiki/Sulfur\\_mustard](http://en.wikipedia.org/wiki/Sulfur_mustard)

Additional information:

<http://emedicine.medscape.com/article/832060-overview>