Calderon, Vanessa A. x5186

From: Gardenjewelltg@aol.com
Sent: Monday, February 02, 2009 4:21 PM
To: ceqacomments
Cc: michaelrweaver@att.net
Subject: Comments for DEIR Monterey County General Plan

RMA Planning, Monterey County

February 2, 2009

Comments for DEIR Monterey County General Plan

Dear Mr. Holm,

Please make all issues raised part of the E.I.R. for the General Plan.

In addition to the letter and documentation forwarded on my behalf by Mike Weaver,
please address the following issues and concerns outlined in the attached letters and documentation
regarding the Monterey Counties Plans to develop former military training ranges within the Federal Superfund
Site of Fort Ord. 1

Thank You
Lance Houston
899-5716

Great Deals on Dell Laptops. Starting at $499.

Calderon, Vanessa A. x5186

From: michaelrweaver@att.net
Sent: Monday, February 02, 2009 10:27 AM
To: ceqacomments
Subject: FW: FOCAG position paper and attachments

Monterey County
Planning and Building
Inspection Administration

FEB 0 2 2009

RECEIVED

rec'd as CEQA
Comments 2/2/09
10:27 am

RMA Planning, Monterey County

February 2, 2009

Comments for DEIR Monterey County General Plan

Dear Mr. Holm,
Attached please find a letter and documentation regarding the chemical contamination, residual effects, and some of the unexploded ordnance issues within and surrounding the Federal Superfund Site of former Fort Ord.
The primary author, Mr. Lance Huston, asked that I please forward this to you for inclusion into and consideration of this in the E.I.R. for the General Plan of Monterey County. He has some computer issues and is unable to send it along himself by the close of comment period today. However he can be reached at 915-5574 should you have any questions. The attachment addresses serious environmental issues that need consideration in land use matters in Monterey County. 1

Thank you,
Mike Weaver
484-6659

Fort Ord Community Advisory Group (FOCAG)
PO Box 2173
Monterey, CA 93942
Email: focag@fortordcag.org
Website: www.fortordcag.org

August 12, 2008

Fort Ord Reuse Authority (FORA)
100 12th St., Building 2880
Marina, CA 93933
c/o FORA Board Members

FINAL
FOR THE ADMINISTRATIVE RECORD
Please distribute to all FORA Board Members
Position Paper 6 pp. Attachments 75 pp.

RE: FOCAG Position Paper; Environmental Contamination; Remediation and Development of Military Munitions Training Areas at Former Fort Ord: Request for a revised Base Wide EIR

To whom it may concern;

> *The "Fort Ord Community Advisory Group is a public interest group formed to review, comment and advise on the remediation (cleanup) of the Fort Ord Army Base, Superfund Site, to ensure that human health, safety and the environment are protected to the greatest extent possible." - Mission Statement.*

The intent of this document is to inform the public and the decision makers of the potential danger of hazardous waste to human health. The FOCAG simply does not what to see anyone harmed. FORA has approved plans to allow local jurisdictions to develop residential housing and commercial space on many former military munitions training areas including Site 39 despite the clear history of people being harmed by such activities. Allowing people to live on top of former Military Munitions Training Areas is a recipe for disaster. There is new and significant information that justify a new EIR.

Many environmental contaminates at levels of a few parts per billion can have lifelong adverse human health effects. Most military munitions constituents are known to be endocrine disruptors, carcinogens, mutagens, toxicants, ect.. Attached is a list of military munitions constituents found in the types of munitions used at Fort Ord and Site 39. The list includes the potential negative human health impacts that may result from exposure to each of the constituents. Former Military Training Areas are highly contaminated with hazardous chemicals.(1) If you knew of the potential risk, would you allow your children to live on and play in soil contaminated with the Table 1 constituents?

The extent of contamination at former Fort Ord from military munitions training and disposal is unknown. Fort Ord was used by the U.S. Army for weapons testing. Site 39 has been described as the grand dad of all U.S. Military Munitions Training Sites. Contamination is likely worse that suspected. Historically, dangerous military munitions and constituents show up in the most unlikely places. No square inch of Fort Ord can be assumed to be free or safe from dangerous ordnance and chemicals. The Seaside, Del Rey Oaks, and Monterey County parcels within Historical Site 39 have been designated for

residential and commercial development despite the clear threat to human health. Tens of thousands of pounds of OEW/UXO have been removed from these parcels yet the Army and FORA still refuse to acknowledge the fact that these Parcels were used for ordnance training. In the 1995 RI/FS Site 39, onsite receptor analysis for residential and commercial use was not included because these uses were not expected. "Available future land use plans indicate that the site is not expected to be developed for residential, industrial, or commercial use." (1995 RI/FS Vol. III Baseline Risk Assessment For Site 39) Site 39 was expected to be off limits to development because of the known threats to human health and safety from military munitions. Site 39 should have been categorized as one Range due to the clear evidence of military munitions being used thorough the entire Historical Site 39, wall to wall.

Historical Range maps indicate that over the years as ranges were decommissioned, new ranges were opened. It appears that over time there are literally layers and overlaps of ranges the extent of which is unknown.(2)

"Site 39 was used Since the early 1900s for ordinance training activities. As a result, OEW, including UXO, is present at the site. OEW is defined as bombs and war heads; guided and unguided ballistic missiles; artillery, mortar, and rocket ammunition; small arms ammunition; anti-personnel and anti-tank mines; demolition charges; pyrotechnics; grenades; torpedoes and depth charges; containerized or uncontainerized high explosives and propellants; nuclear materials; chemicals and radiological agents; and all similar or related items designed to cause damage to personnel or materials. Oil in which explosive compounds are detected will be considered OEW if the concentration is sufficient to present an imminent hazard. UXO is a subset of OEW and consists of unexploded bombs, warheads, artillery shells, mortar rounds, and chemical weapons. Components or ordnance items (e.g., boosters, bursters, fuzes, igniter tubes) are also included in the UXO definition. Nonuclear materials, chemical agents, or biological agents have been found or reported to have been used at the site." (1995 RI/FS Site 39)(3)

A partial list of military munitions, live and inert, found within the Seaside1-4, Del Rey Oaks, and Monterey County parcels include but is not limited to the following; "fragment hand grenades MKII , smoke hand grenades M18, hand grenade M10, 4inch trench mortars MK1, 4.2 inch mortars, 4inch trench mortars FM, 4inch trench ordnance components, blasting caps M6, blasting caps M7, hand grenade fuzes M228, 75mm Shrapnel MK1, 37mm LE MK1 , 75mm HE MK1, Livens projector FM, surface trip flare M49, 3.5inch rocket M29, 35mm Rockets M73, 3inch Hotchkiss projector, activator mine AT M1, mine AT M1, primer igniter tube M57, cartridge ignition M2, signal illumination M125, mine fuze M6A1, rifle grenade M22, 57mm projector HE M306, flash artillery M110, projectile PD M503ch mortars HC, 3inch trench mortars MK1, 81mm mortar HE M43, 4.2 inch mortars, 40mmprojector M781." (USACE documents)

Seaside Parcels; "The teams dug up and removed 43,695 specific anomalies, weighing nearly 50,000 pounds, and consisting of debris and munitions from the areas. Most of the material was range debris, totaling 46,745 lbs; 2963 lbs were munitions debris, and 292 items were identified as munitions. 52 of these munitions and explosives were too deteriorated and unsafe to remove from the site. These unsafe items were blown in place. These items included Stokes mortars and 4.2 inch mortars, plus Livens projectiles. These

items were scrutinized carefully, and when the contents could not be confirmed, the contractors called in the Army special unit that deals with chemical warfare materials (CWM). This unit examined the three types of Munitions and Explosives of Concern for chemical weapons materials and found titanium tetrachloride in all of them. Titanium tetrachloride was used during WW I as a smoke agent in projectiles that were fired at enemy lines to obscure sight lines and decrease visibility." (Dr. Peter L. Defer Comments Draft MRS-SEA 1-4 Time Critical Removal Action 2004)(4)

Environmental contamination is now directly linked to adverse human health effects. Illness in the U.S. has reached epidemic levels likely due to lax regulation, oversight, and enforcement of environmental laws in place to protect human health, safety and the environment. Nationally, conservatively, 1 in 150 children has Autism. Asthma, Alzheimer's Disease, Diabetes, Immune System Disorders, Dementia, Cancers, Organ Diseases to list a few are at epidemic levels. Today, the U.S. public is sicker than ever before. It is time to seriously consider the cause of illness rather than treating the symptoms. What part is environmental contamination playing in this unprecedented epidemic?

Studies now show the unborn fetus, nursing mothers, infants, and children are especially vulnerable to extremely low levels of environmental contamination.
"The periods of embryonic, foetal and infant development are remarkably susceptible to environmental hazards. Toxic exposures to chemical pollutants during these windows of increased susceptibility can cause disease and disability in infants, children and across the entire span of human life. Among the effects of toxic exposures recognized in the past have been spontaneous abortion, congenital malformations, lowered birthweight and other adverse effects. These outcomes may be readily apparent. However, even subtle changes caused by chemical exposures during early development may lead to important functional deficits and increased risks of disease later in life. The timing of exposure during early life has therefore become a crucial factor to be considered in toxicological assessments." (2007 Faroes Statement)(5)(6)

In addition to munitions constituents, it is understood pesticide use was wide spread throughout military bases and in training areas. Did the Base Wide RI/FS address this serious contaminate?

The FOCAG has regularly raised questions, concerns, and objections to Army's and FORA's Remediation Plans to no avail. The FOCAG's concerns have been ignored by Army, FORA and the Regulatory Agencies. To date, there has been no meaningful change of course or willingness to adopt the FOCAG's recommendations. FORA, EPA, and DTSC failed to respond to the FOCAG 3-11-08 FORA ESCA RP Letter.(7) Officials have allowed CERCLA to be waived and are responsible for the abomination of law.

There is a history of slicing up OEW/UXO Site Remediation into pie pieces and placing the pieces of information into multiple documents. Anyone looking at a single document is only given a partial picture of the extent of the potential contamination within a Site or Parcel. This makes it virtually impossible for the decision makers and the public to be fully informed. In order to make sound decisions, full disclosure of all aspects of remediation and potential contamination should be compiled in a single document for each Site or Parcel.

For Example; the Seaside Parcels 1-4 are now referred to as former small arms ranges. Soil sampling for residual contaminates has been limited to Lead, Antimony, and Copper. According to the 1995 RI/FS Ranges 22, 23, 24 are shown to have included the use of 40mm grenades, hand grenades, rifle launched smoke grenades, and other ordnance.(8) It is understood Old Range 22 which runs parallel with Gen. Jim Moore Rd. was a Ordnance Range. Ordnance with an array of constituents has been discovered and removed throughout these parcels yet testing for their constituents is not part of the soil analysis. This is a major omission of critical information. This information would have been a significant factor in the selection of the Site remedy and remedial action chosen for the Sites. The City of Seaside plans to build 4500 homes and commercial space on these Sites. Historical maps indicate these areas within historical Site 39, were military ordnance training areas prior to small arms ranges. The extensive discovery of OEW/UXO on the Seaside parcels right down to General Jim Moore Rd. supports the 1995 RI/FS suspected uses as military ordnance training areas. The fact is Seaside Parcels 1-4 are former military ordnance and small arms ranges. The unwillingness to acknowledge military ordnance training occurred within the Seaside Parcels is a significant omission. The argument has been "there's no evidence this area was used for ordnance training". The fact is the entire Site 39, boundary to boundary is one big enmeshment of Training Areas and Ranges.

Additionally, it appears when a new cleanup document is released, often, previously discovered and removed OEW/UXO items have been omitted. It concerns the public that the breadth of contamination may be diminished thru data manipulation. By omitting critical information the reader could get the impression the land is cleaner and safer than it really is. If the reader is given the full extent of discovered munitions, the potential contamination from their use, and the potential health risks resulting from exposure to the contamination, the wisdom of residential and commercial use would be questionable.

There should be a maintained file with a set of data that compiles all the Site specific remedial actions and findings and is updated regularly upon receipt of new information. All documents should have a running tally of all the previously discovered and removed OEW/UXO items including their constituents. It would be helpful for A reader to be able to know the total number and poundage of OEW/UXO items found to date.

There are very serious unanswered questions with the remediation and development of former Fort Ord military training areas.

1) Millions of troops trained at Fort Ord. How many millions or billions of pounds of military munitions were used in the training of troops? Any estimates? If not, why not?

2) Of the millions or billions of pounds of military munitions used, how many pounds of their constituents were released into the environment? Any estimates? If not, why not?

3) Were did the residual contaminates go?

4) Could all the contaminates simply disappear?

5) How many gallons of pesticides are suspected to have been used at Fort Ord?

6) Was the use of pesticides in training areas a common practice?

7) What types/names of pesticides were used at Fort Ord?

8) Is there testing for pesticides? If not, why not?

9) Does Soil analysis of ranges include every known or suspected OEW/UXO constituent used at Fort Ord? If not, why not?

10) Babies and toddlers commonly eat soil and other substances off the ground. Has this phenomena been analyzed? If not, why not?

11) Have Maximum Residual Levels (MRL's) been established for the constituents in the attached Military Munitions Chemicals Of Concern Table 1? If not, why not?

12) If the extent of residual contamination and MRL's have not been established, how can an acceptable level of cleanup be know for residential or commercial use?

13) Is there a screening program in place to monitor for hazardous substances at Fort Ord? If not, why not? Will there be a program to monitor potential negative health impacts of residents living in homes built on former training areas and ranges? If not, why not?

14) Perchlorate is known to be a widely used constituent in military munitions used at Fort Ord . Is there testing being conducted to identify the extent of Perchlorate contamination in former training areas and ranges? If not, why not? If yes, the remediation documents don't appear to include any discussion or analysis.(9)

15) Synergism and synergistic effects of chemicals are a very important part of Risk Assessment.(10) I don't recall seeing any analysis in the Fort Ord Base Wide RI/FS addressing synergism. Is synergism covered in any Fort Ord Human Health Risk or Environmental Assessments? If not, why not?

16) Is there endocrine disruption screening being conducted at former Fort Ord? If not, why not?(11)

If a single person becomes ill or dies, as a result of ambitious economic development interests, the publics trust will have been breached. Under no circumstance should peoples health be compromised for a profit. Nothing is more important than a persons well being.

With so many unanswered questions, and in light of new and significant information on health hazards of environmental contamination, former military munitions training areas and ranges should be prohibited from being developed. Residential housing, commercial and other public uses should not be allowed due to the high probability of adverse health effects from exposure to military munitions OEW/UXO and residual contamination.

The Fort Ord Base Wide EIR is outdated. It is in the publics best interest to begin the new EIR process. Again we ask, when will the Scoping Session for a revised Base Wide EIR be held?

Please Provide a detailed written response to this paper and the 3-11-08 paper within 15 working days and send a copy to all FOCAG Members and the Regulators.

Sincerely,

Lance Houston
Fort Ord Community Advisory Group

Attachments;

1) Table1: Military Munitions OEW/UXO, 103 Contaminates of Concern (COC's)
2) Archive Search Report ASR; Site 39: 12 Range Maps
3) Site 39 Military Munitions; Types and Functions
4) Dr. Peter L. Defer comments; TCRA MRA SEA.1-4 Sept. 21, 2004
5) The Faroes Statement 2007
   www.ncrlc.com/1-pfd-files/faroes_statement.pdf
6) Neurodevelopmental Disorders in Children
   http://environmentalchemistry.com/yogi/environmental/200804childrenautismadhd.html
7) FOCAG Position Letter 3-11-08; FORA ESCA Remediation Program
   www.fortordcag.org/PrivateCleanup/3_13_08_FORA_ESCA_RP_Letter_final.pdf
8) Fort Ord; Site 39 Training Ranges
9) GAO 2005 Report; Perchlorate A System to Track Sampling and Cleanup / Fort Ord
   www.gao.gov/cgi-bin/getrpt?GAO-05-462
10) Synergism; Potential Synergistic effects of chemicals
    www.ccohs.ca/oshanswers/chemicals/synergism.html
11) Endocrine-Disrupting Chemicals Threaten Animal--and Human Reproduction
    www.checnet.org/HealtheHouse/education/articles-detail.asp?Main_ID=489
12) Civil War cannonball kills Virginia relic collector / ordnance can kill 150 years later
    http://www.newsweek.com/id/135153?tid=relatedcl
13) 1999 EPA Position Paper Range Rule - FOCAG Position Letter 3-13-08 attachments
    www.epa.gov/fedfac/documents/uxomemo.htm
14) 1998 Wingspread statement - FOCAG Position Letter 3-13-08 attachments
    www.rachel.org/library/getfile.cfm?ID=189

Cc. Roman Rocca, Cal DTSC
Viola Cooper, U.S. EPA, Region 9
Michael Weaver, FOCAG
Bruce Becker, FOCAG Web Smith
Debra Michelson, FORA Founder
David Dilworth, HOPE, FOCAG
Vienna Merrit Moore, FOCAG

Compound	CAS No.	Recognized/Suspected Human Health Hazards
1) Bis(2-chloroethyl)ether	111-44-4	Recognized: Carcinogen P65 Suspected: Neurotoxicant HAZMAP,Respiratory Toxicant EPA-HEN,Skin or Sense Organ Toxicant EPA-HEN
2) 4-Chlorophenyl phenyl ether	7005-72-3	Listed: Hazardous Substances (Superfund) Priority Pollutants (Clean Water Act)
3) 2-Nitrophenol	88-75-5	Suspected: Cardiovascular or Blood Toxicant HAZMAP, Neurotoxicant EPA-SARA
4) 1,3-Dichlorobenzene	541-73-1	Suspected: Cardiovascular or Blood Toxicant NJ-FS, Gastrointestinal or Liver Toxicant NJ-FS, Kidney Toxicant NJ-FS, Respiratory Toxicant NJ-FS
5) Fluorene	86-73-7	Suspected: Gastrointestinal or Liver Toxicant ATSDR
6) 2,4-Dimethylphenol	105-67-9	Suspected: Cardiovascular or Blood Toxicant IRIS, Kidney Toxicant NJ-FS , Gastrointestinal or Liver Toxicant NJ-FS, Skin or Sense Organ Toxicant NJ-FS
7) 1,2-Dichlorobenzene	95-50-1	Suspected: Endocrine Toxicant RTECS, Gastrointestinal or Liver Toxicant RTECS, Immunotoxicant HAZMAP,Neurotoxicant DAN HAZMAP, Skin or Sense Organ Toxicant HAZMAP
8) Azobenzene	103-33-3	Recognized: Carcinogen P65
9) 2,4-Dichlorophenol	120-83-2	Suspected: Cardiovascular or Blood Toxicant LADO RTECS, Endocrine Toxicant JNIHS KEIT, Immunotoxicant ATSDR
10) 1,4-Dichlorobenzene	106-46-7	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant LADO RTECS, Developmental Toxicant ATSDR JANK, Gastrointestinal or Liver Toxicant ATSDR EPA-HEN OEHHA-CREL RTECS,Kidney Toxicant KLAA OEHHA-CREL RTECS,Neurotoxicant DAN EPA-HEN OEHHA-CREL RTECS,Respiratory Toxicant OEHHA-CREL RTECS, Skin or Sense Organ Toxicant EPA-HEN LU RTECS
11) Hexachlorobenzene	118-74-1	Recognized: Carcinogen P65, Developmental Toxicant P65, Suspected: Cardiovascular or Blood Toxicant LADO RTECS, Endocrine Toxicant BKH BRUC IL-EPA JNIHS KEIT RTECS, Gastrointestinal or Liver Toxicant EPA-HEN OEHHA-CREL RTECS ZIMM, Immunotoxicant IPCS,Kidney Toxicant RTECS, Neurotoxicant EPA-SARA, Reproductive Toxicant ATSDR EPA-SARA FRAZIER,Skin or Sense Organ Toxicant EPA-HEN
12) 4-Chloro-3-Methylphenol	59-50-7	Suspected: Immunotoxicant NAP

13) Bis(2-chloroisopropyl)ether	39638-32-9	Suspected: Carcinogen SCDM
14) Phenanthrene	85-01-8	Suspected: Respiratory Toxicant NTP-HS, Skin or Sense Organ Toxicant NTP-HS
15) 2,4,6-Trichlorophenol	88-06-2	Recognized: Carcinogen P65, Suspected: Gastrointestinal or Liver Toxicant RTECS, Respiratory Toxicant EPA-HEN
16) Uranium	7440-61-1	Recognized: Carcinogen P65-MC, Suspected: Cardiovascular or Blood Toxicant EPA-HEN Kidney Toxicant ATSDR HAZMAP LAND MERCK, Neurotoxicant DAN, Reproductive Toxicant FRAZIER, Respiratory Toxicant EPA-HEN NEME
17) Anthracene	120-12-7	Suspected: Endocrine Toxicant KEIT, Gastrointestinal or Liver Toxicant ATSDR RTECS, Skin or Sense Organ Toxicant KLAA TIMB
18) 2,4-Dinitrophenol	51-28-5	Suspected: Cardiovascular or Blood Toxicant EPA-HEN RTECS, Developmental Toxicant EPA-SARA, Gastrointestinal or Liver Toxicant EPA-HEN, Neurotoxicant EPA-HEN RTECS, Reproductive Toxicant EPA-SARA, Skin or Sense Organ Toxicant EPA-HEN LU
19) Hexachloroethane	67-72-1	Recognized: Carcinogen P65, Suspected: Developmental Toxicant EPA-SARA, Gastrointestinal or Liver Toxicant ATSDR EPA-HEN OEHHA-CREL RTECS, Kidney Toxicant OEHHA-CREL RTECS, Neurotoxicant ATSDR EPA-HEN OEHHA-CREL,
20) Dibutyl phthalate	84-74-2	Suspected: Developmental Toxicant ATSDR CERHR EPA-SARA JANK NTP-R P65-CAND, Endocrine Toxicant BKH JNIHS KEIT WWF,Gastrointestinal or Liver Toxicant RTECS,Immunotoxicant HAZMAP, Kidney Toxicant RTECS, Neurotoxicant DAN RTECS, Reproductive Toxicant EPA-SARA NTP-R P65-CAND,Skin or Sense Organ Toxicant HAZMAP
21) 4-Nitrophenol	100-02-7	Suspected: Cardiovascular or Blood Toxicant HAZMAP, Neurotoxicant EPA-HEN EPA-SARA RTECS, Skin or Sense Organ Toxicant EPA-HEN RTECS
22) Nitrobenzene	98-95-3	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant EPA-HEN HAZMAP MALA RTECS, Kidney Toxicant MERCK, Neurotoxicant EPA-HEN RTECS, Reproductive Toxicant EPA-SARA, Respiratory Toxicant OEHHA-CREL RTECS, Skin or Sense Organ Toxicant HAZMAP
23) Fluoranthene	206-44-0	Suspected: Gastrointestinal or Liver Toxicant ATSDR
24) 2-Methyl-4,6-Dinitrophenol	534-52-1	Suspected: Cardiovascular or Blood Toxicant EPA-HEN HAZMAP RTECS, Gastrointestinal or Liver Toxicant EPA-HEN RTECS,Kidney Toxicant HAZMAP,Neurotoxicant ATSDR DAN EPA-HEN RTECS,Respiratory Toxicant EPA-HEN, Skin or Sense Organ Toxicant EPA-HEN

25) Isophorone	78-59-1	Suspected: Carcinogen EPA-HEN IRIS OPP-CAN SCDM, Developmental Toxicant OEHHA-CREL Gastrointestinal or Liver Toxicant ATSDR OEHHA-CREL, Kidney Toxicant RTECS, Neurotoxicant EPA-HEN HAZMAP, Respiratory Toxicant EPA-HEN RTECS, Skin or Sense Organ Toxicant EPA-HEN HAZMAP RTECS
26) Pyrene	129-00-0	Suspected: Neurotoxicant RTECS, Skin or Sense Organ Toxicant RTECS
27) Pentachlorophenol	87-86-5	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant EPA-HEN LADO RTECS, Developmental Toxicant ATSDR EPA-SARA OEHHA-CREL, Endocrine Toxicant ATSDR BRUC IL-EPA JNIHS KEIT RTECS WWF, Gastrointestinal or Liver Toxicant EPA-HEN OEHHA-CREL RTECS, Immunotoxicant EPA-HEN, Kidney Toxicant EPA-HEN OEHHA-CREL, Neurotoxicant DAN EPA-HEN RTECS, Reproductive Toxicant ATSDR EPA-SARA, Respiratory Toxicant RTECS, Skin or Sense Organ Toxicant EPA-HEN HAZMAP RTECS
28) Bis(2-chloroethoxy)methane	111-91-1	Suspected: Skin or Sense Organ Toxicant NTP-HS
29) Butylbenzyl phthalate	85-68-7	Suspected: Carcinogen IRIS, Developmental Toxicant CERHR P65-CAND, Endocrine Toxicant BKH JNIHS KEIT WWF, Neurotoxicant RTECS, Reproductive Toxicant CERHR
30) 1,2,4-Trichlorobenzene	120-82-1	Suspected: Carcinogen OEHHA-TCD P65-CAND, Developmental Toxicant EPA-SARA, Neurotoxicant DAN HAZMAP RTECS
31) 3,3'-D Dichlorobenzidine	91-94-1	Recognized: Carcinogen P65, Suspected: Gastrointestinal or Liver Toxicant EPA-HEN RTECS Immunotoxicant EEC HAZMAP, Kidney Toxicant RTECS, Neurotoxicant EPA-HEN, Respiratory Toxicant EPA-HEN, Skin or Sense Organ Toxicant EEC HAZMAP
32) Naphthalene	91-20-3	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant EPA-HEN HAZMAP LADO MALA, Developmental Toxicant EPA-HEN EPA-SARA, Gastrointestinal or Liver Toxicant EPA-HEN, Neurotoxicant ATSDR DAN EPA-HEN RTECS, Respiratory Toxicant ATSDR FOTH OEHHA-CREL, Skin or Sense Organ Toxicant EPA-HEN LU RTECS
33) Benzo(a)anthracene	56-55-3	Recognized: Carcinogen P65
34) Hexachlorobutadiene	87-68-3	Suspected: Carcinogen EPA-HEN IRIS P65-CAND SCDM, Cardiovascular or Blood Toxicant RTECS, Developmental Toxicant EPA-SARA JANK, Endocrine Toxicant RTECS,Gastrointestinal or Liver Toxicant OEHHA-CREL RTECS, Kidney Toxicant ATSDR HAZMAP KLAA OEHHA-CREL RTECS STAC, Neurotoxicant DAN, Reproductive Toxicant EPA-SARA
35) Chrysene	218-01-9	Recognized: Carcinogen P65

36) 2-Chloronaphthalene	91-58-7	Listed: Hazardous Constituents (Resource Conservation and Recovery Act), Hazardous Substances (Superfund), Priority Pollutants (Clean Water Act), Lacks at least some of the data required for safety assessment
37) Bis(2-ethylhexyl)phthalate	117-81-7	Recognized: Carcinogen P65, Developmental Toxicant P65, Reproductive Toxicant P65 Suspected: Endocrine Toxicant BKH BRUC IL-EPA JNIHS KEIT WWF,Gastrointestinal or Liver Toxicant EPA-HEN OEHHA-CREL RTECS,Respiratory Toxicant OEHHA-CREL RTECS Skin or Sense Organ Toxicant RTECS
38) Dimethyl phthalate	131-11-3	Suspected: Immunotoxicant HAZMAP, Neurotoxicant DAN RTECS, Respiratory Toxicant EPA-HEN,Skin or Sense Organ Toxicant EPA-HEN HAZMAP
39) Di-n-octyl phthalate	117-84-0	Suspected: Endocrine Toxicant BRUC JNIHS, Gastrointestinal or Liver Toxicant ATSDR
40) 2,6-Dinitrotoluene	606-20-2	Recognized: Carcinogen P65, Reproductive Toxicant P65, Suspected: Cardiovascular or Blood Toxicant ATSDR RTECS, Neurotoxicant EPA-SARA
41) Benzo(b)fluoroanthene	205-99-2	Recognized: Carcinogen P65
42) Acenaphthylene	208-96-8	Suspected: Respiratory Toxicant RTECS
43) Benzo(k)fluoroanthene	207-08-9	Recognized: Carcinogen P65
44) Acenaptheme	83-32-9	Suspected: Gastrointestinal or Liver Toxicant ATSDR
45) Benzo(a)pyrene	50-32-8	Recognized: Carcinogen P65, Suspected: Developmental Toxicant JANK P65-PEND, Endocrine Toxicant KEIT WWF, Gastrointestinal or Liver Toxicant RTECS, Immunotoxicant IPCS, Respiratory Toxicant EPA-HEN FOTH RTECS, Skin or Sense Organ Toxicant LADO RTECS
46) 2,4-Dinitrotoluene	121-14-2	Recognized: Carcinogen P65, Reproductive Toxicant P65, Suspected: Cardiovascular or Blood Toxicant ATSDR EPA-HEN RTECS,Gastrointestinal or Liver Toxicant OEHHA-CREL , Neurotoxicant ATSDR EPA-HEN EPA-SARA OEHHA-CREL RTECS
47) Ideno(1,2,3-cd)pyrene	193-39-5	Suspected: Carcinogen EPA-IRIS, Developmental, Reproductive, Endocrine, Genotoxicity,
48) Diethyl phthalate	84-66-2	Suspected: Endocrine Toxicant JNIHS WWF, Gastrointestinal or Liver Toxicant ATSDR RTECS, Immunotoxicant HAZMAP,Neurotoxicant RTECS,Reproductive Toxicant ATSDR,Respiratory Toxicant RTECS, Skin or Sense Organ Toxicant HAZMAP RTECS

49) Dibenzo(a,h)anthracene	53-70-3	Recognized: Carcinogen P65, Suspected: Skin or Sense Organ Toxicant LADO
50) Benzidine	92-87-5	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant HAZMAP, Gastrointestinal or Liver Toxicant OEHHA-CREL RTECS, Immunotoxicant IPCS, Kidney Toxicant EPA-HEN KLAA RTECS, Neurotoxicant OEHHA-CREL
51) Benzo(g,h,l)perylene	191-24-2	Listed: Hazardous Constituents (Resource Conservation and Recovery Act), Hazardous Substances (Superfund), Priority Pollutants (Clean Water Act), Lacks at least some of the data required for safety assessment
52) 4-Bromophenyl phenyl ether	101-55-3	Listed: Hazardous Constituents (Resource Conservation and Recovery Act), Hazardous Substances (Superfund), Priority Pollutants (Clean Water Act), Lacks at least some of the data required for safety assessment
53) N-Nitrosodiphenylamine	86-30-6	Recognized: Carcinogen P65, Suspected: Kidney Toxicant RTECS, Respiratory Toxicant RTECS
54) N-Nitrosodimethylamine	62-75-9	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant EPA-HEN KLAA RTECS, Developmental Toxicant JANK, Gastrointestinal or Liver Toxicant DOSS EPA-HEN HAZMAP LADO MALA RTECS ZIMM, Immunotoxicant IPCS, Neurotoxicant RTECS, Respiratory Toxicant RTECS, Skin or Sense Organ Toxicant RTECS
55) Phenol	108-95-2	Suspected: Cardiovascular or Blood Toxicant EPA-HEN HAZMAP OEHHA-CREL RTECS, Developmental Toxicant EPA-SARA JANK,Gastrointestinal or Liver Toxicant EPA-HEN OEHHA-CREL,Kidney Toxicant OEHHA-CREL,Neurotoxicant DAN EPA-HEN OEHHA-CREL, RTECS,Reproductive Toxicant FRAZIER P65-CAND,Respiratory Toxicant EPA-HEN OEHHA-AREL RTECS,Skin or Sense Organ Toxicant EPA-HEN HAZMAP KLAA OEHHA-AREL RTECS
56) Hexachlorocyclopentadiene	77-47-4	Suspected: Developmental Toxicant EPA-SARA, Gastrointestinal or Liver Toxicant RTECS, Kidney Toxicant ATSDR RTECS,Neurotoxicant EPA-SARA ,Reproductive Toxicant EPA-SARA, Respiratory Toxicant ATSDR EPA-HEN HAZMAP OEHHA-CREL RTECS,Skin or Sense Organ Toxicant EPA-HEN HAZMAP
57) 2-Chlorophenol	95-57-8	Suspected: Neurotoxicant RTECS, Skin or Sense Organ Toxicant RTECS
58) 1-Methylnaphthalene	90-12-0	Suspected: Respiratory Toxicant ATSDR
59) Acetophenone	98-86-2	Suspected: Skin or Sense Organ Toxicant EPA-HEN

60) Diphenylamine	122-39-4	Suspected: Cardiovascular or Blood Toxicant HAZMAP, Gastrointestinal or Liver Toxicant EPA-TRI, Immunotoxicant HAZMAP, Kidney Toxicant EPA-TRI, Neurotoxicant DAN RTECS, Respiratory Toxicant RTECS,
61) 2-Aminonaphthalene	91-59-8	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant HAZMAP, Gastrointestinal or Liver Toxicant RTECS, Kidney Toxicant RTECS
62) 1-Nitropyrene	5522-43-0	Recognized: Carcinogen P65
63) 2,5-Diphenyloxazole (Biphenyl)	92-52-4	Suspected: Cardiovascular or Blood Toxicant RTECS, Developmental Toxicant EPA-SARA, Gastrointestinal or Liver Toxicant EPA-HEN HAZMAP RTECS, Kidney Toxicant EPA-HEN MERCK, Neurotoxicant EPA-HEN HAZMAP RTECS, Respiratory Toxicant RTECS, Skin or Sense Organ Toxicant EPA-HEN
64) 2-Nitronaphthalene	581-89-5	Suspected: Cardiovascular or Blood Toxicant HAZMAP, Gastrointestinal or Liver Toxicant RTECS, Kidney Toxicant RTECS
65) Triethylaluminum	97-93-8	6 of 8 basic tests to identify chemical hazards have not been conducted on this chemical or are not publicly available according to US EPA's 1998 hazard data availability study.
66) 2 Methylnaphthalene	91-57-6	Suspected: Respiratory Toxicant ATSDR FOTH
67) 2-Methylphenol (o-Crestol)	95-48-7	Suspected: Carcinogen IRIS, Cardiovascular or Blood Toxicant OEHHA-CREL, Endocrine Toxicant RTECS, Gastrointestinal or Liver Toxicant RTECS, Neurotoxicant ATSDR DAN EPA-SARA RTECS, Respiratory Toxicant EPA-HEN, Skin or Sense Organ Toxicant EPA-HEN RTECS
68) 3-Methylphenol (m-Crestol)	108-39-4	Suspected: Carcinogen IRIS OPP-CAN, Cardiovascular or Blood Toxicant OEHHA-CREL, Gastrointestinal or Liver Toxicant RTECS, Kidney Toxicant RTECS, Neurotoxicant DAN RTECS, Respiratory Toxicant ATSDR EPA-HEN, Skin or Sense Organ Toxicant EPA-HEN RTECS
69) 4-Methylphenol (p-Crestol)	106-44-5	Suspected: Carcinogen IRIS, Cardiovascular or Blood Toxicant OEHHA-CREL, Gastrointestinal or Liver Toxicant RTECS, Kidney Toxicant RTECS, Neurotoxicant ATSDR DAN RTECS, Respiratory Toxicant EPA-HEN, Skin or Sense Organ Toxicant EPA-HEN LADO RTECS
70) 2,4,5-Trichlorophenol	95-95-4	Suspected: Cardiovascular or Blood Toxicant LADO, Respiratory Toxicant EPA-HEN, Skin or Sense Organ Toxicant EPA-HEN
71) HMX	2691-41-0	Suspected: Gastrointestinal or Liver Toxicant ATSDR, Neurotoxicant ATSDR RTECS

72) RDX	121-82-4	Suspected: Carcinogen IRIS SCDM, Gastrointestinal or Liver Toxicant RTECS, Neurotoxicant ATSDR HAZMAP RTECS, Reproductive Toxicant ATSDR
73) 2,4,6-Trinitrotoluene (TNT)	118-96-7	Suspected: Carcinogen IRIS SCDM, Cardiovascular or Blood Toxicant HAZMAP LADO MALA RTECS STAC, Gastrointestinal or Liver Toxicant ATSDR DIPA HAZMAP LADO RTECS ZIMM,Neurotoxicant RTECS,Respiratory Toxicant RTECS,Skin or Sense Organ Toxicant LU
74) 1,3,5-Trinitrobenzine	99-35-4	Suspected: Cardiovascular or Blood Toxicant RTECS, Neurotoxicant RTECS, Respiratory Toxicant RTECS
75) 2-Amino-4,6-Dinitrotoluene (2ADNT)	35572-78-2	Recognized: Carcinogens
76) 4-Amino-2,6-Dinitrotoluene (4ADNT)	19406-51-0	Recognized: Carcinogens
77) 1,3- Dinitrobenzine	99-65-0	Recognized: Reproductive Toxicant P65, Suspected: Cardiovascular or Blood Toxicant ATSDR HAZMAP RTECS, Gastrointestinal or Liver Toxicant DIPA MALA, Neurotoxicant DAN RTECS,Respiratory Toxicant RTECS
78) Nitroglycerin	55-63-0	Suspected: Carcinogen ORD-SF, Cardiovascular or Blood Toxicant HAZMAP KRIS LADO RTECS Gastrointestinal or Liver Toxicant RTECS, Immunotoxicant HAZMAP,Kidney Toxicant MERCK, Neurotoxicant DAN RTECS, Respiratory Toxicant RTECS,Skin or Sense Organ Toxicant HAZMAP
79) Dioxin (TCDD)	1746-01-6	Recognized: Carcinogen P65, Developmental Toxicant P65, Suspected: Cardiovascular or Blood Toxicant ATSDR EPA-HEN LADO OEHHA-CREL RTECS,Endocrine Toxicant BKH BRUC IL-EPA JNIHS KEIT OEHHA-CREL RTECS WWF,Gastrointestinal or Liver Toxicant EPA-HEN LADO OEHHA-CREL RTECS ZIMM ,Immunotoxicant ATSDR NAP,Kidney Toxicant MERCK RTECS,Neurotoxicant STAC,Reproductive Toxicant OEHHA-CREL,Respiratory Toxicant OEHHA-CREL RTECS,Skin or Sense Organ Toxicant EPA-HEN HAZMAP KLAA RTECS
80) Furan	110-00-9	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant RTECS, Gastrointestinal or Liver Toxicant RTECS,Kidney Toxicant RTECS,Respiratory Toxicant RTECS
Other Constituents, Flash Composition, Smoke Charge, Pyrotechnics		
81) Potassium Perchlorate	7778-74-7	Suspected: Cardiovascular or Blood Toxicant MALA
82) Flaked Aluminum (Aluminum)	7429-90-5	Suspected: Cardiovascular or Blood Toxicant LADO, Neurotoxicant ATSDR DAN KLAA LU, Reproductive Toxicant FRAZIER, Respiratory Toxicant KLAA LU NEME

83) Sulfur	7704-34-9	Listed: Registered Pesticides (Federal Insecticide, Fungicide, and Rodenticide Act) Air Contaminants (California Occupational and Safety Health Act) Lacks at least some of the data required for safety assessment
84) Pentaerythritol tetranitrate (PETN)	78-11-5	Suspected: Cardiovascular or Blood Toxicant HAZMAP, Skin or Sense Organ Toxicant RTECS
85) Magnesium Powder (Magnesium)	7439-95-4	Suspected: Respiratory Toxicant NEME
86) Sodium Nitrate	7631-99-4	Suspected: Cardiovascular or Blood Toxicant RTECS, Respiratory Toxicant RTECS
87) Barium Nitrate	10022-31-8	Suspected: Carcinogen, A poison via ingestion subcutaneous, parenteral, and intravenous routes (Toxnet)
88) Phosphorus, white	7723-14-0	Suspected: Cardiovascular or Blood Toxicant EPA-HEN RTECS, Gastrointestinal or Liver Toxicant DIPA DOSS EPA-HEN LADO MALA RTECS ZIMM,Kidney Toxicant EPA-HEN HAZMAP, Musculoskeletal Toxicant EPA-HEN, Neurotoxicant EPA-HEN RTECS,Reproductive Toxicant ATSDR EPA-SARA OEHHA-CREL,Respiratory Toxicant ATSDR EPA-HEN HAZMAP RTECS,Skin or Sense Organ Toxicant HAZMAP KLAA RTECS
89) Polyvinal Chloride	9002-86-2	Suspected: Gastrointestinal or Liver Toxicant DIPA, Respiratory Toxicant HAZMAP
90) Titanium Tetrachloride	7550-45-0	Suspected: Respiratory Toxicant ATSDR EPA-HEN HAZMAP, Skin or Sense Organ Toxicant EPA-HEN HAZMAP
Metals:		
91) Copper	7440-50-8	Suspected: Cardiovascular or Blood Toxicant HAZMAP KLAA, Developmental Toxicant EPA-SARA, Gastrointestinal or Liver Toxicant ATSDR DOSS KLAA RTECS ZIMM, Kidney Toxicant MERCK, Reproductive Toxicant EPA-SARA FRAZIER,Respiratory Toxicant NEME OEHHA-AREL OEHHA-CREL
92) Barium	7440-39-3	Suspected: Developmental Toxicant EPA-SARA, Neurotoxicant DAN, Reproductive Toxicant FRAZIER, Respiratory Toxicant NEME

93) Cadmium	7440-43-9	Recognized: Carcinogen P65, Developmental Toxicant P65, Reproductive Toxicant P65, Suspected: Cardiovascular or Blood Toxicant BENO KLAA LADO RTECS, Endocrine Toxicant IL-EPA KEIT WWF, Immunotoxicant IPCSKidney Toxicant ATSDR EPA-HEN HAZMAP KLAA LAND MERCK OEHHA-CREL RTECS STAC, Neurotoxicant DAN ,Respiratory Toxicant EPA-HEN HAZMAP NEME OEHHA-CREL RTECS
94) Lead	7439-92-1	Recognized: Carcinogen P65, Developmental Toxicant P65, Reproductive Toxicant P65, Suspected: Cardiovascular or Blood Toxicant BENO EPA-HEN HAZMAP KLAA KRIS LADO MALA STAC, Endocrine Toxicant BRUC IL-EPA KEIT WWF,Gastrointestinal or Liver Toxicant EPA-HEN RTECS STAC, Immunotoxicant IPCS,Kidney Toxicant EPA-HEN HAZMAP KLAA LAND MERCK STAC,Neurotoxicant DAN EPA-HEN EPA-SARA FELD HAZMAP KLAA LU RTECS STAC, Respiratory Toxicant NEME,Skin or Sense Organ Toxicant KLAA
95) Nickel	7440-02-0	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant OEHHA-CREL, Developmental Toxicant EPA-SARA, Immunotoxicant EEC HAZMAP OEHHA-AREL SNCI, Kidney Toxicant KLAA, Neurotoxicant FELD, Reproductive Toxicant EPA-SARA FRAZIER JANK, Respiratory Toxicant ATSDR EPA-HEN HAZMAP KLAA LU NEME OEHHA-AREL OEHHA-CREL RTECS, Skin or Sense Organ Toxicant EEC EPA-HEN HARV HAZMAP KLAA LADO TIMB
96) Aluminum	7429-90-5	Suspected: Cardiovascular or Blood Toxicant LADO, Neurotoxicant ATSDR DAN KLAA LU, Reproductive Toxicant FRAZIER, Respiratory Toxicant KLAA LU NEME
97) Chromium	7440-47-3	Suspected: Carcinogen HAZMAP SCDM, Gastrointestinal or Liver Toxicant CARB TAC, Immunotoxicant HAZMAP, Kidney Toxicant HAZMAP KLAA MERCK, Reproductive Toxicant FRAZIER, Respiratory Toxicant HAZMAP NEME, Skin or Sense Organ Toxicant HAZMAP KLAA LADO TIMB
98) Potassium	7440-09-7	Lacks at least some of the data required for safety assessment
99) Calcium	7440-70-2	Air Contaminants (California Occupational and Safety Health Act) Lacks at least some of the data required for safety assessment
100) Mercury	7439-97-6	Recognized: Developmental Toxicant P65, Suspected: Cardiovascular or Blood Toxicant KLAA, Endocrine Toxicant IL-EPA KEIT WWF, Gastrointestinal or Liver Toxicant RTECS STAC, Immunotoxicant HAZMAP SNCI, Kidney Toxicant HAZMAP KLAA LAND MERCK STAC, Neurotoxicant ATSDR DAN EPA-HEN EPA-SARA FELD HAZMAP KLAA OEHHA-CREL RTECS STAC, Reproductive Toxicant EPA-SARA FRAZIER HAZMAP OEHHA-AREL, Respiratory Toxicant HAZMAP NEME, Skin or Sense Organ Toxicant HAZMAP KLAA RTECS
101) Zinc	7440-66-6	Suspected: Cardiovascular or Blood Toxicant ATSDR, Developmental Toxicant EPA-SARA, Immunotoxicant OEHHA-CREL, Reproductive Toxicant EPA-SARA, Respiratory Toxicant NEME OEHHA-CREL RTECS, Skin or Sense Organ Toxicant RTECS

102) Titanium Metal Powder	7440-32-6	Suspected: Respiratory Toxicant NEME
103) Antimony	7440-36-0	Suspected: Cardiovascular or Blood Toxicant BENO LADO, Neurotoxicant DAN, Reproductive Toxicant EPA-SARA FRAZIER, Respiratory Toxicant EPA-HEN NEME, Skin or Sense Organ Toxicant EPA-HEN
104) Beryllium	7440-41-7	Recognized: Carcinogen P65, Suspected: Cardiovascular or Blood Toxicant KLAA, Gastrointestinal or Liver Toxicant ATSDR DOSS LADO MALA, Immunotoxicant EEC OEHHA-CREL,Kidney Toxicant LAND, Reproductive Toxicant FRAZIER, Respiratory Toxicant EPA-HEN HAZMAP KLAA LU NEME OEHHA-CREL, Skin or Sense Organ Toxicant EEC
105) Cadium	7440-43-9	Recognized: Carcinogen P65, Developmental Toxicant P65, Reproductive Toxicant P65, Suspected: Cardiovascular or Blood Toxicant BENO KLAA LADO RTECS,Endocrine Toxicant IL-EPA KEIT WWF,Immunotoxicant IPCS,Kidney Toxicant ATSDR EPA-HEN HAZMAP KLAA LAND MERCK OEHHA CREL RTECS STAC,Neurotoxicant DAN,Respiratory Toxicant EPA-HEN HAZMAP NEME OEHHA-CREL RTECS

Most Table 1 Constituents compiled from 1994 Basewide RI/FS Vol. II Table 12

Human Health Hazard Information source: Scorecard Database http://www.scorecard.org/chemical-profiles/index.tcl

Cancer References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=cancer

Developmental Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=endo

Endocrine Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=endo

Gastrointestinal or Liver Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=liver

Immunotoxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=immun

Kidney Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=kidn

Neurotoxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=neuro

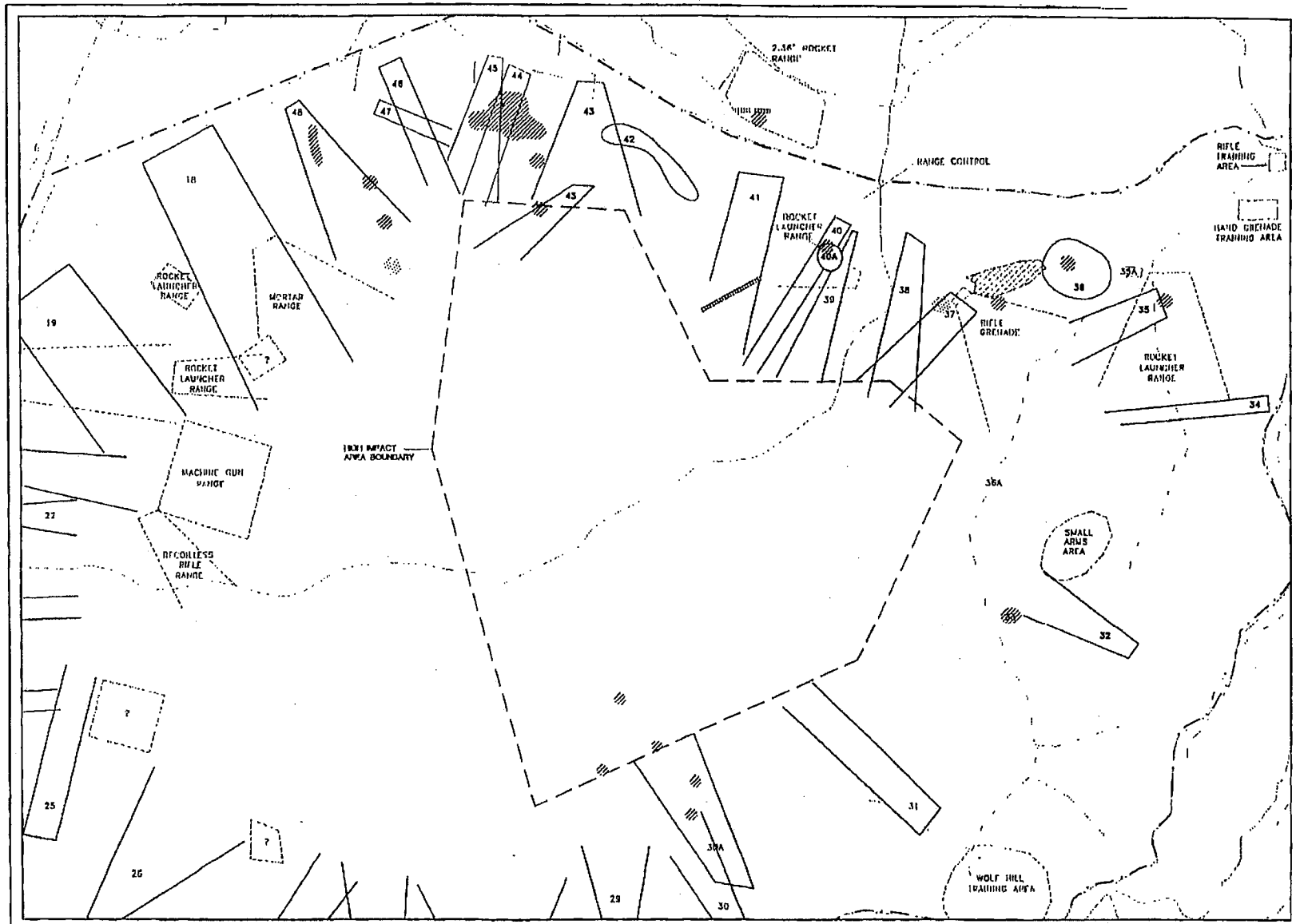
Reproductive Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=repro

Skin or Sense Organ Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=skin

Respiratory Toxicants: www.scorecard.org/health-effects/explanation.tcl?short_hazard_name=resp

Cardiovascular or Blood Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=cardio

Musculoskeletal Toxicity References: www.scorecard.org/health-effects/references.tcl?short_hazard_name=musc



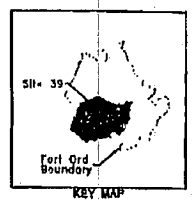
EXPLANATION

- SOIL BORING (HEA)
- INLAND RANGES BOUNDARY
- IMPACT AREA BOUNDARY
- MOVING TARGET TRACK
- INTERMITTENT STREAM
- POND/PERMANENT CATCHMENT BASIN
- 30 RANGE FAN AND NUMBER
- DECOMMISSIONED RANGE ? = DISTURBED AREA OF UNKNOWN USE
- ROADS AND TRAILS
- DEPRESSION
- APPROXIMATE LOCATION OF SOIL REMEDIAL UNIT 1 AREAS CONTAINING EXPLOSIVE COMPOUNDS AND TPH (NOT TO SCALE)
- APPROXIMATE LOCATION OF SOIL REMEDIAL UNIT 2 AREAS CONTAINING LEAD (NOT TO SCALE)
- APPROXIMATE LOCATION OF SOIL REMEDIAL UNIT 2 AREA CONTAINING DIOXIN (RANGE 44) (NOT TO SCALE)

N

800 0 800 1600

SCALE IN FEET



KEY MAP

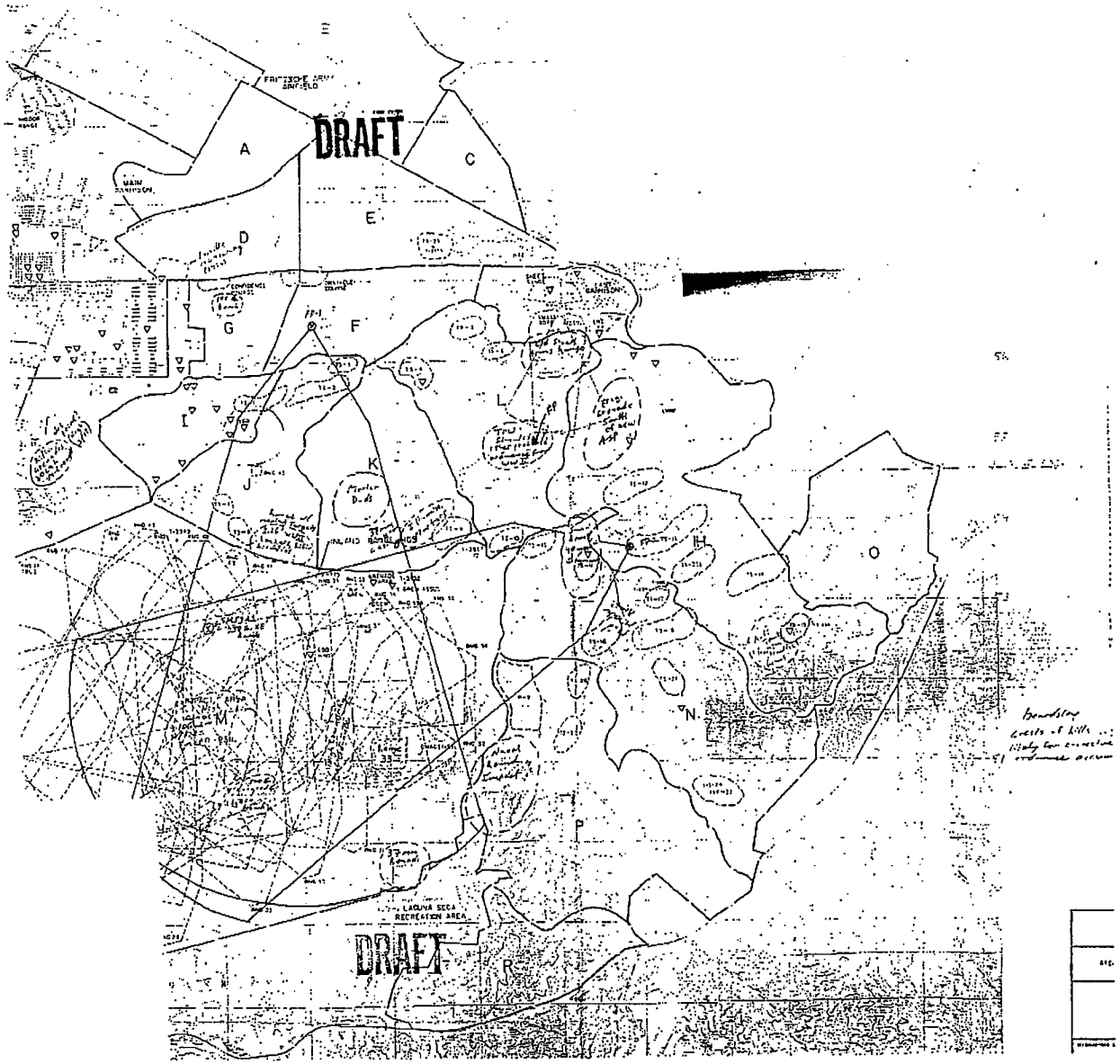
NO.	DATE	REVISIONS	HEA FILE NO.	PROJECT NO.	APPROVED	APPROVAL DATE	DRAWN BY
1	12/91	DRAFT FINAL	23388027	23388.02178			JK
2	10/92	FINAL	23388637	23388.04137	[illegible]	10/7/92	JK

Harding Lawson Associates
Engineering and Environmental Services

Volume V – Feasibility Study
Basewide RI/FS
Fort Ord, California

Locations of Soil Remedial Units 1 and 2 – Site 39

PLATE 6.2


DRAFT
A
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J
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L
H
O
M
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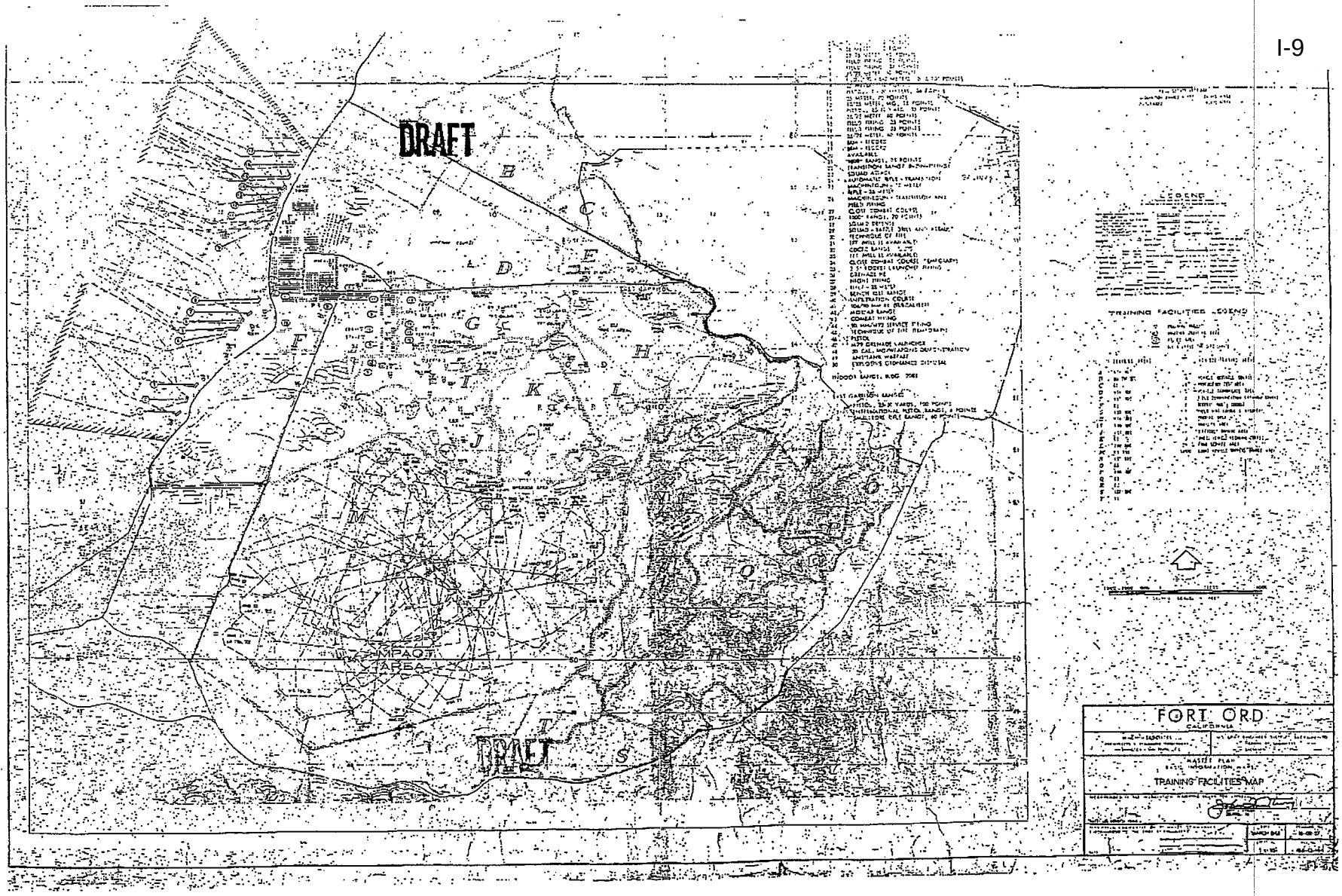
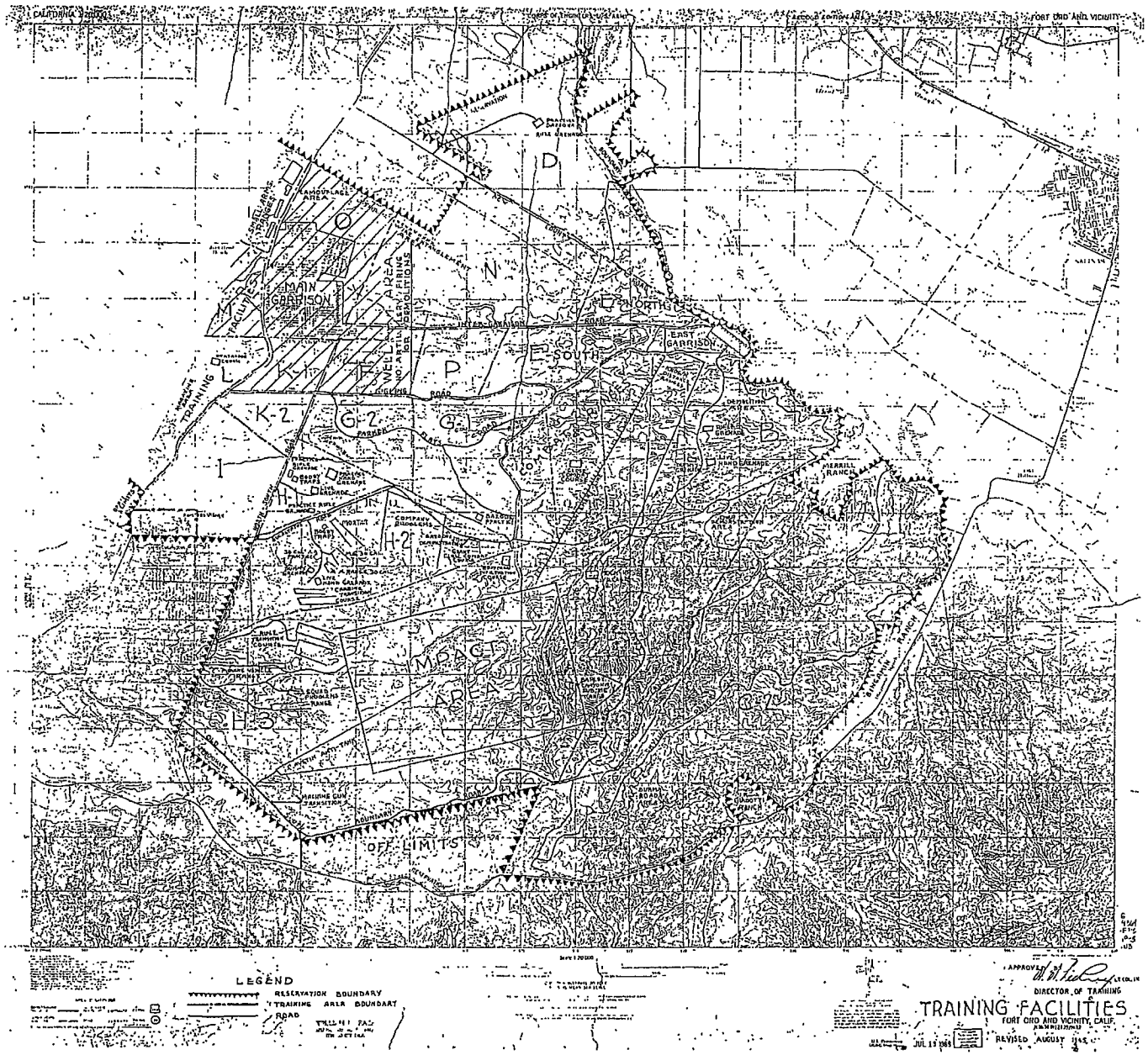
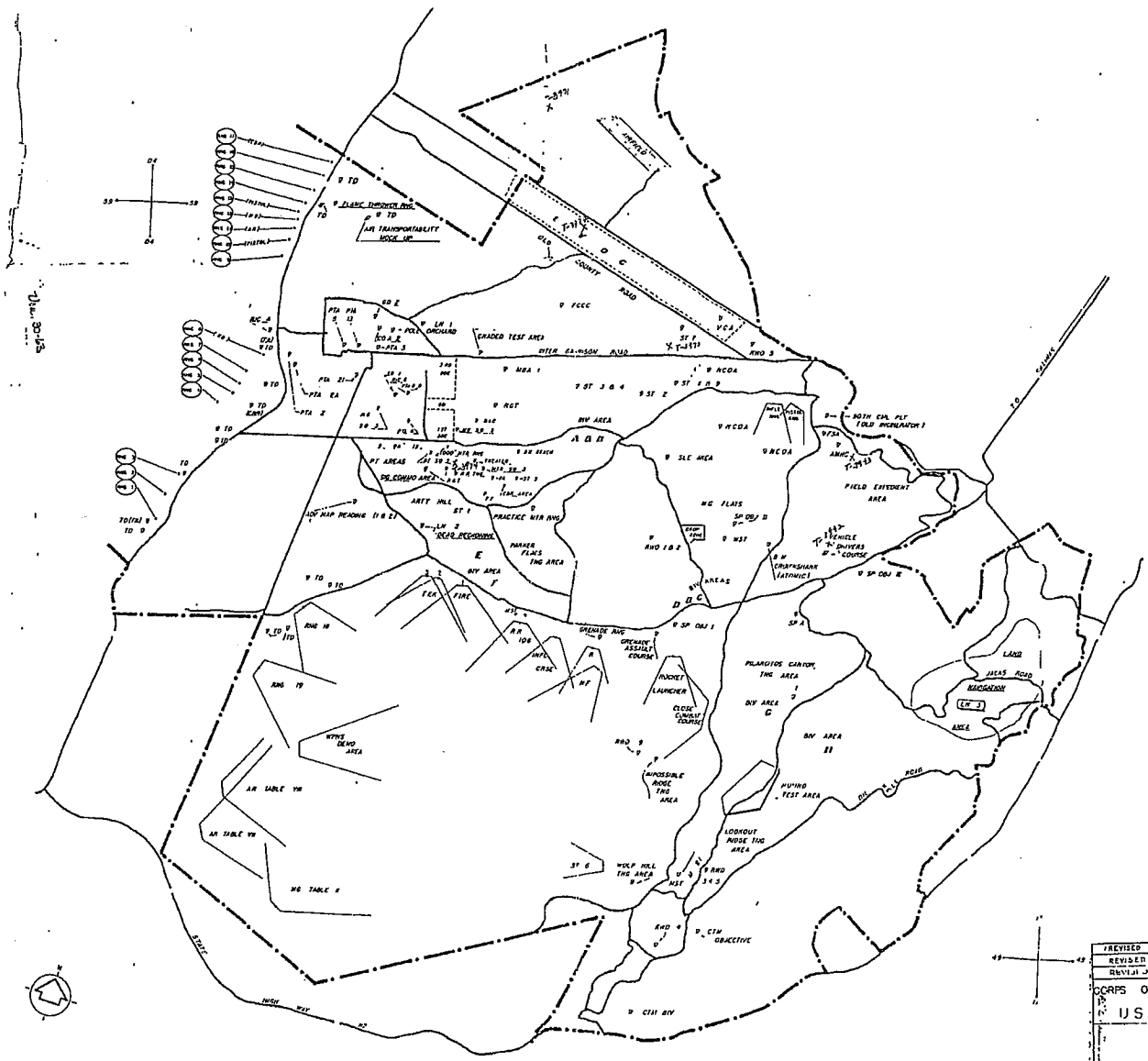
P
R
DRAFT

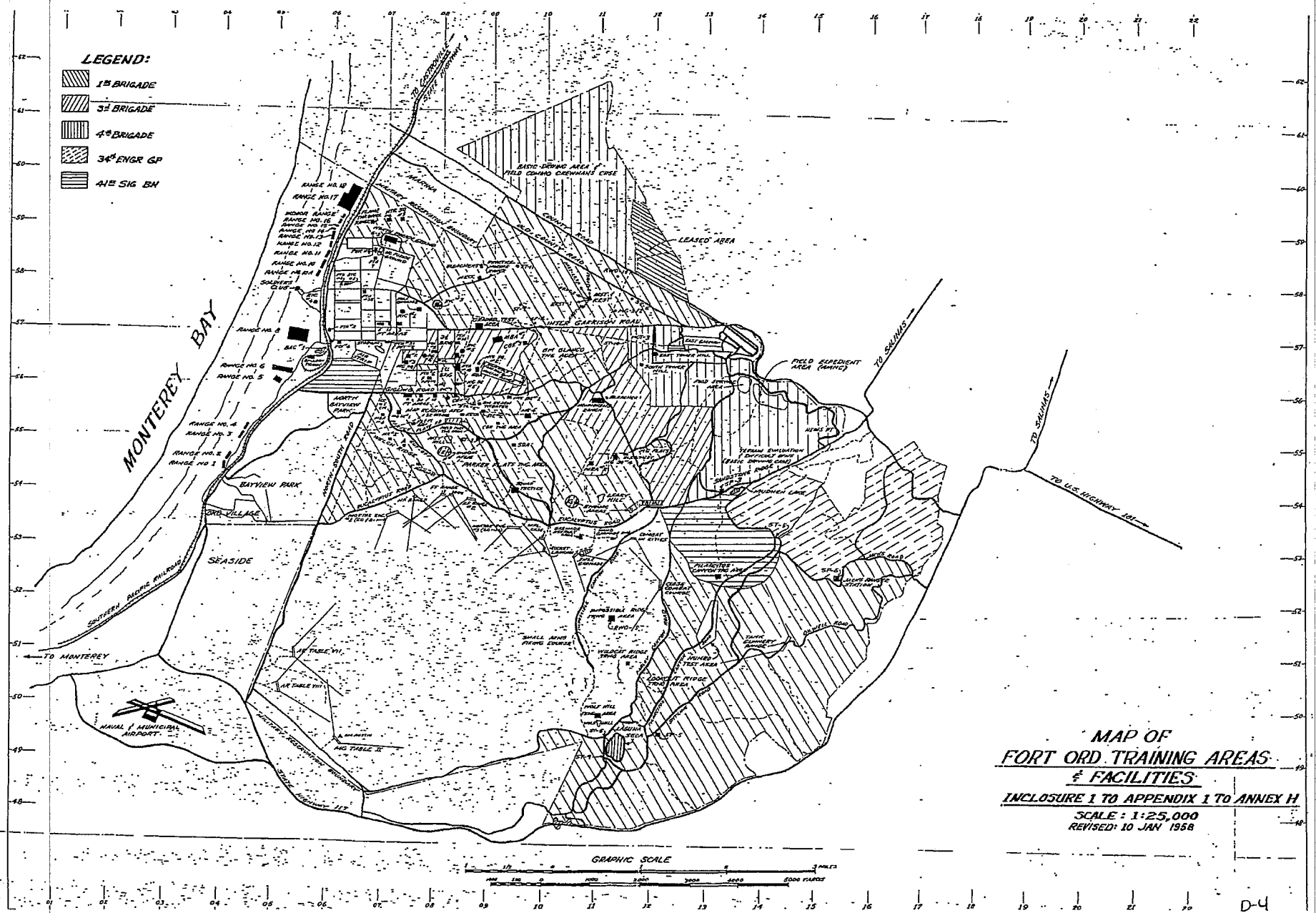

DRAFT
DRAFT
IMPACT AREA
TRAINING FACILITIES LEGEND
FORT ORD
CALIFORNIA
TRAINING FACILITIES MAP

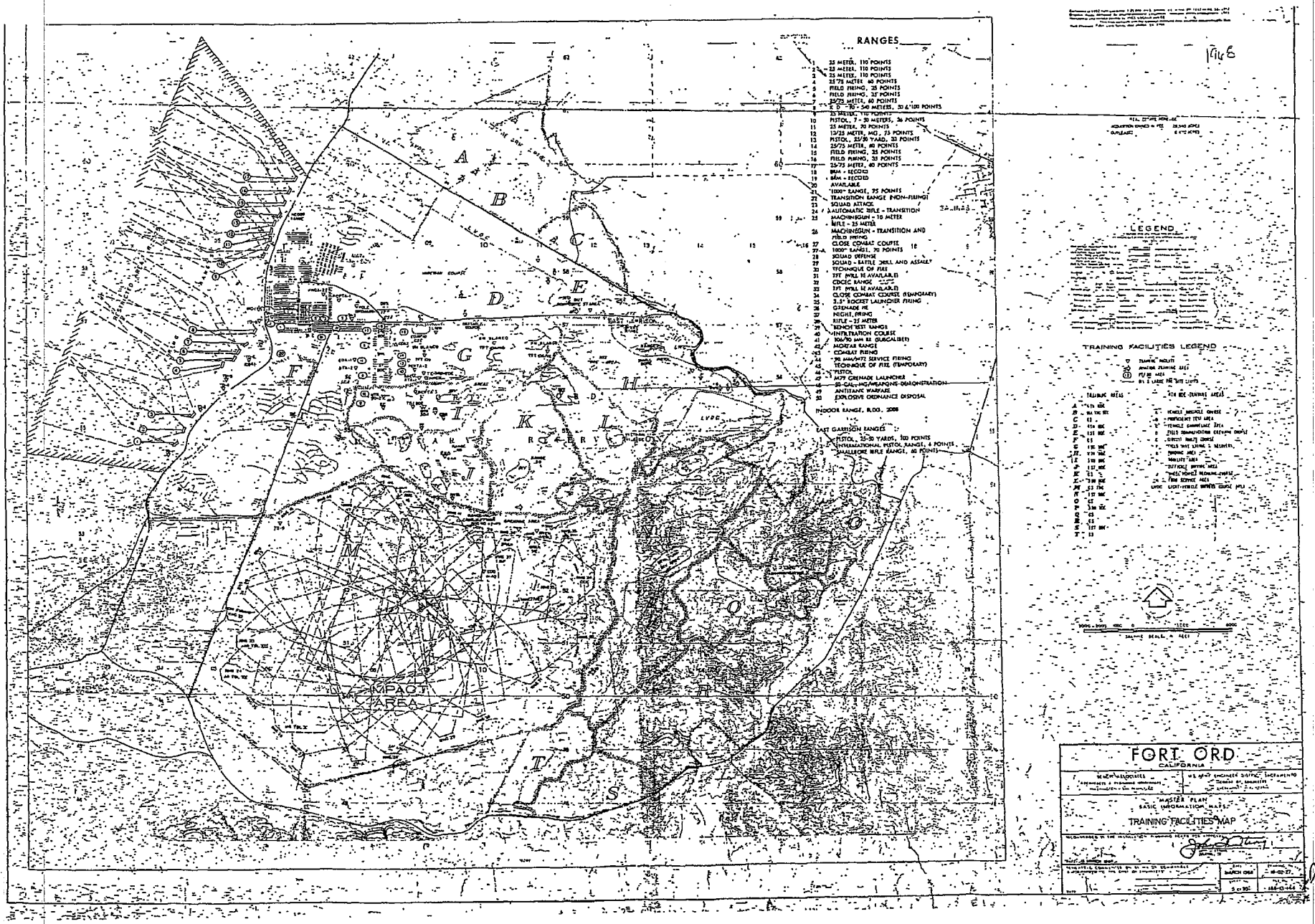

FORT ORD AND VICINITY
MAIN GARRISON
AREA
EAST GARRISON
NORTH
SOUTH
MOAG AREA
OFF LIMITS
LEGEND
RESERVATION BOUNDARY
TRAINING AREA BOUNDARY
ROAD
DIRECTOR OF TRAINING
TRAINING FACILITIES
FORT ORD AND VICINITY, CALIF.
REVISED AUGUST

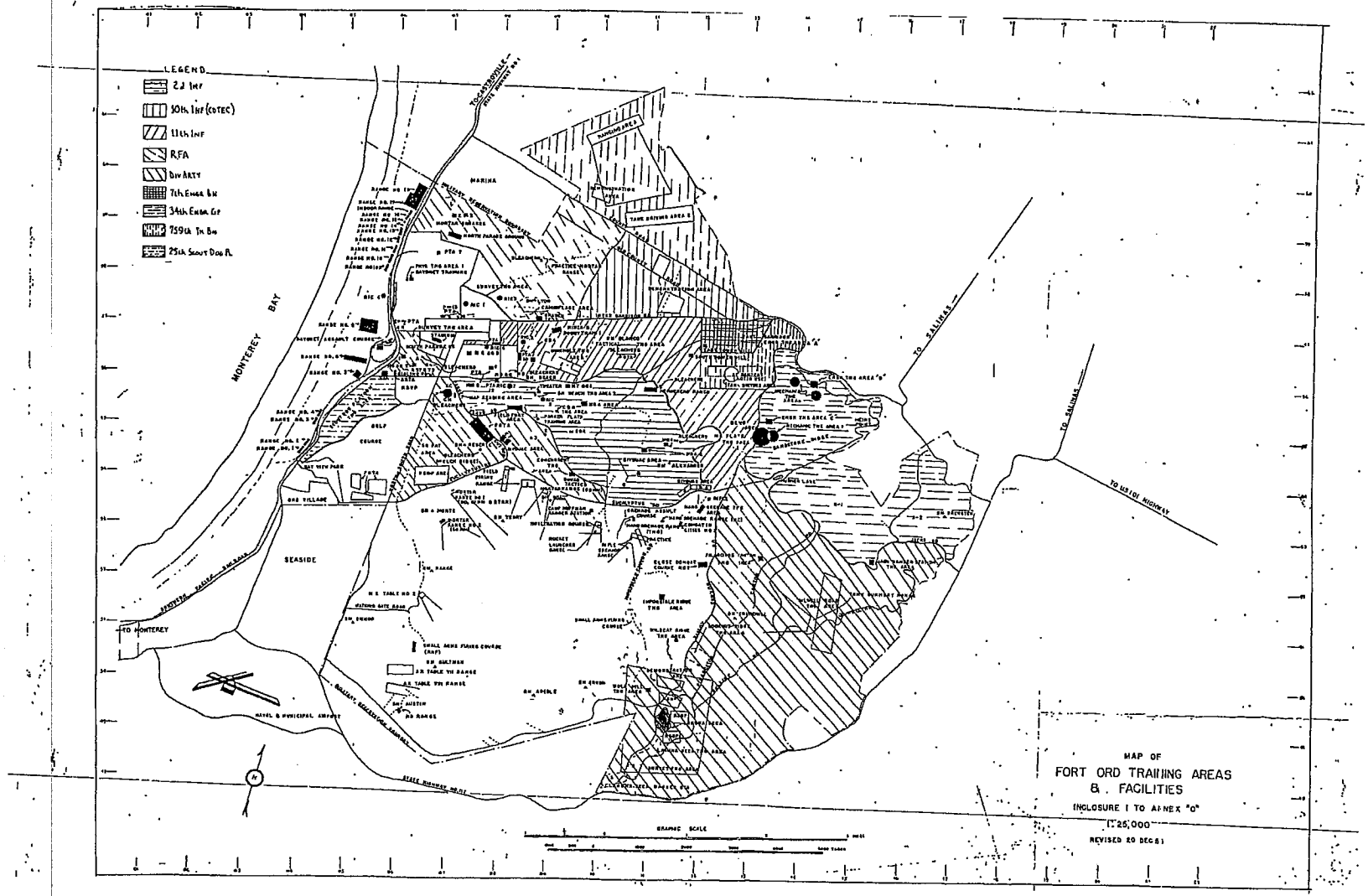
D-1


GRAPHIC SCALE
1000 500 0 1000 2000 3000 4000 5000 Yards
REVISED AS OF 30 JUNE 1961
REVISED AS OF 11 DECEMBER 1960
REVISED AS OF 31 DECEMBER 1959
CORPS OF ENGINEERS
U S ARMY
MASTER PLAN
FORT ORD, CALIFORNIA
BASIC INFORMATION
TRAINING FACILITIES
PREPARED & CHECKED
APPROVED BY
PLANNING BOARD
DATE 31 DECEMBER 1956

D-2


LEGEND:
1st BRIGADE
3d BRIGADE
4th BRIGADE
34th ENGR GP
41st SIG BN
MONTEREY BAY
SEASIDE
BAYVIEW PARK
OLD VILLAGE
TO MONTEREY
TO SALINAS
TO SALINAS
TO U.S. HIGHWAY 101
LEASED AREA
FIELD EXPEDIENT AREA (MAINE)
NAVAL & MUNICIPAL AIRPORT
GRAPHIC SCALE
MAP OF
FORT ORD TRAINING AREAS
& FACILITIES
INCLOSURE 1 TO APPENDIX 1 TO ANNEX H
SCALE: 1:25,000
REVISED: 10 JAN 1958


RANGES
LEGEND
TRAINING FACILITIES LEGEND
IMPACT AREA
FORT ORD
CALIFORNIA
TRAINING FACILITIES MAP

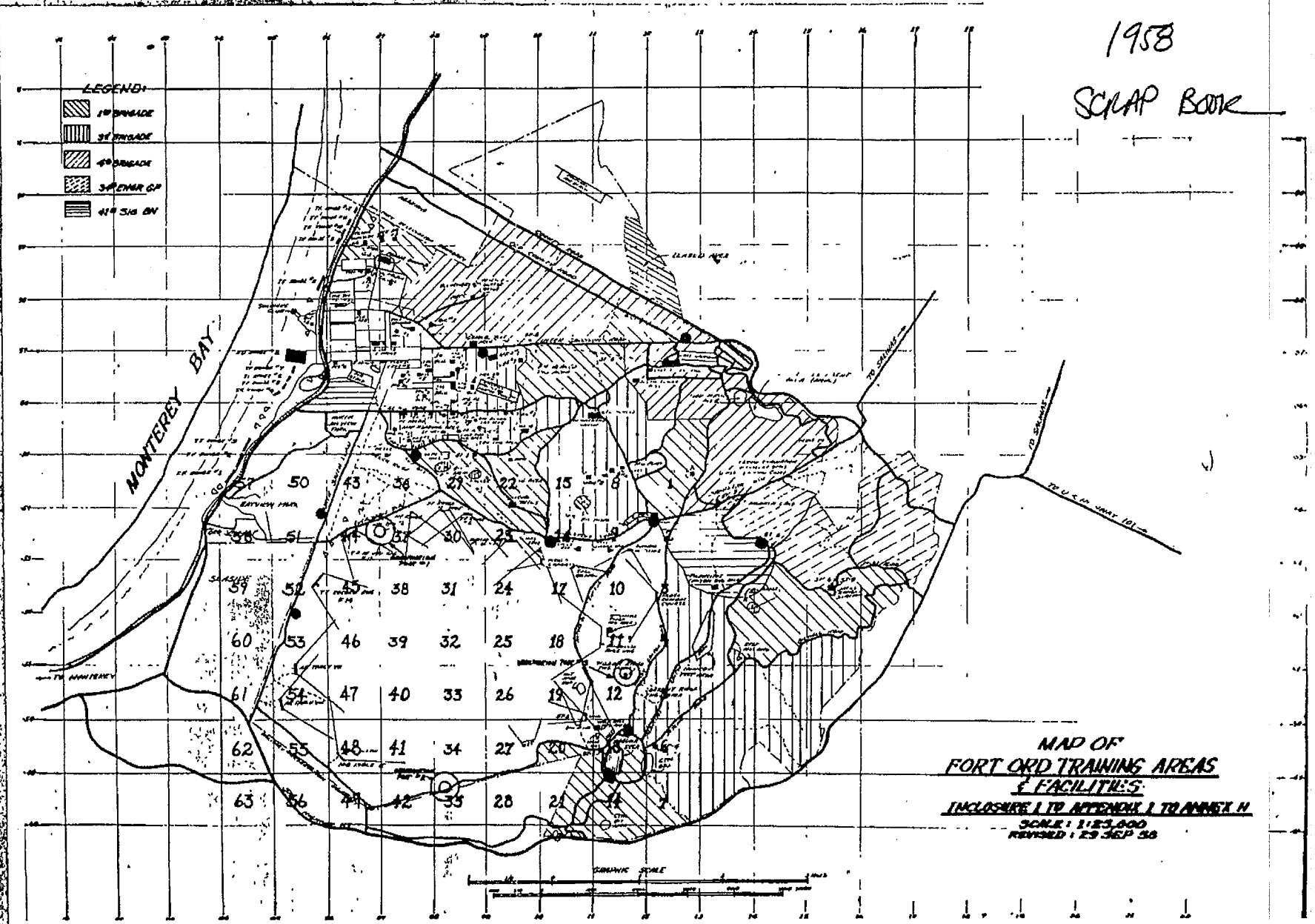

LEGEND
2d Inf
10th Inf (COTEC)
11th Inf
RFA
Div Arty
7th Engr Bn
34th Engr Gp
759th Tn Bn
25th Scout Dog PL
MONTEREY BAY
MARINA
SEASIDE
TO MONTEREY
TO SALINAS
TO SALINAS
TO US 101 HIGHWAY
GRAPHIC SCALE
MAP OF
FORT ORD TRAINING AREAS
& FACILITIES
INCLOSURE 1 TO ANNEX "O"
1:25,000
REVISED 20 DEC 61

D-8

FIRE DEPARTMENT

1958

SCRAP BOOK



B-6

Ten each double faced forest fire prevention signs were placed at strategic locations

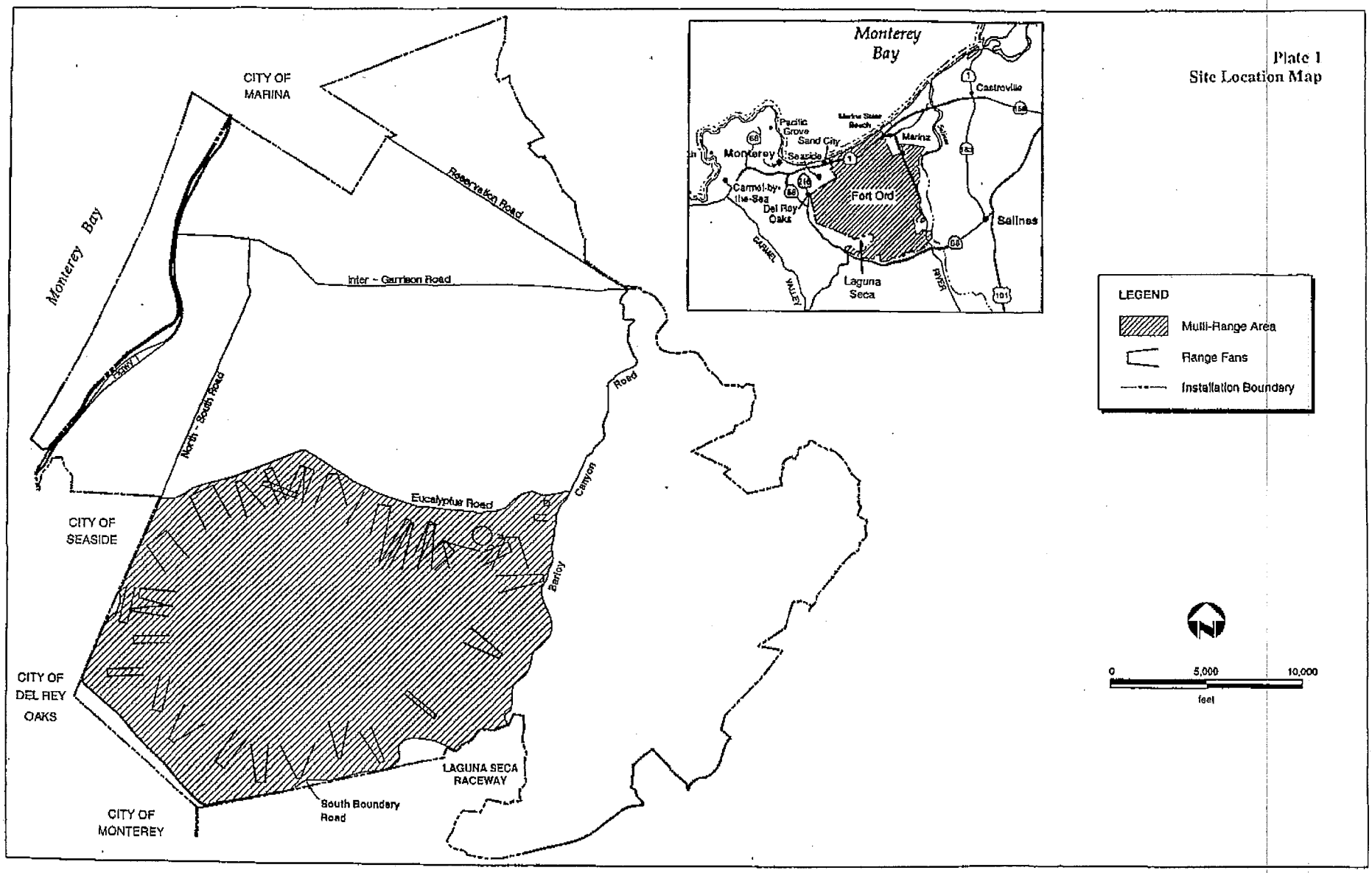


Plate 1
Site Location Map
CITY OF MARINA
Monterey Bay
Reservation Road
Inter - Garrison Road
North - South Road
Eucalyptus Road
Canyon Road
Blanco Road
CITY OF SEASIDE
CITY OF DEL REY OAKS
CITY OF MONTEREY
LAGUNA SECA RACEWAY
South Boundary Road
Monterey Bay
Castroville
Marina State Beach
Pacific Grove
Sand City
Marina
Monterey
Seaside
Fort Ord
Carmel-by-the-Sea
Del Rey Oaks
Salinas
CARMEL VALLEY
Laguna Seca
RIVER
LEGEND
Multi-Range Area
Range Fans
Installation Boundary
0
5,000
10,000
feet

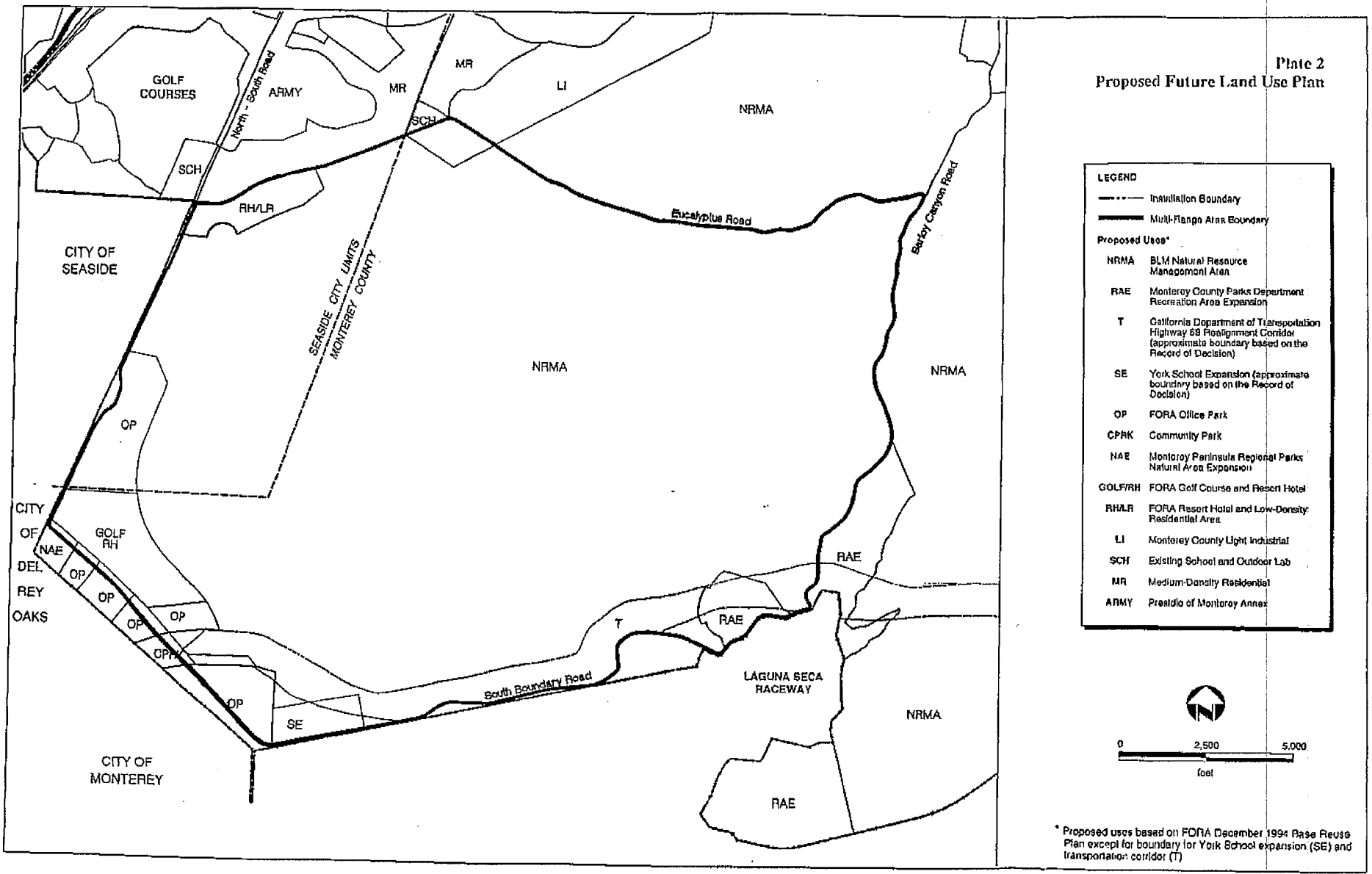


Plate 2
Proposed Future Land Use Plan

LEGEND

Installation Boundary

Multi-Range Area Boundary

Proposed Uses*

NRMA	BLM Natural Resource Management Area
RAE	Monterey County Parks Department Recreation Area Expansion
T	California Department of Transportation Highway 68 Realignment Corridor (approximate boundary based on the Record of Decision)
SE	York School Expansion (approximate boundary based on the Record of Decision)
OP	FORA Office Park
CPRK	Community Park
NAE	Monterey Peninsula Regional Parks Natural Area Expansion
GOLF/RH	FORA Golf Course and Resort Hotel
RH/LR	FORA Resort Hotel and Low-Density Residential Area
LI	Monterey County Light Industrial
SCH	Existing School and Outdoor Lab
MR	Medium-Density Residential
ARMY	Presidio of Monterey Annex

0 2,500 5,000
feet

* Proposed uses based on FORA December 1994 Base Reuse Plan except for boundary for York School expansion (SE) and transportation corridor (T)

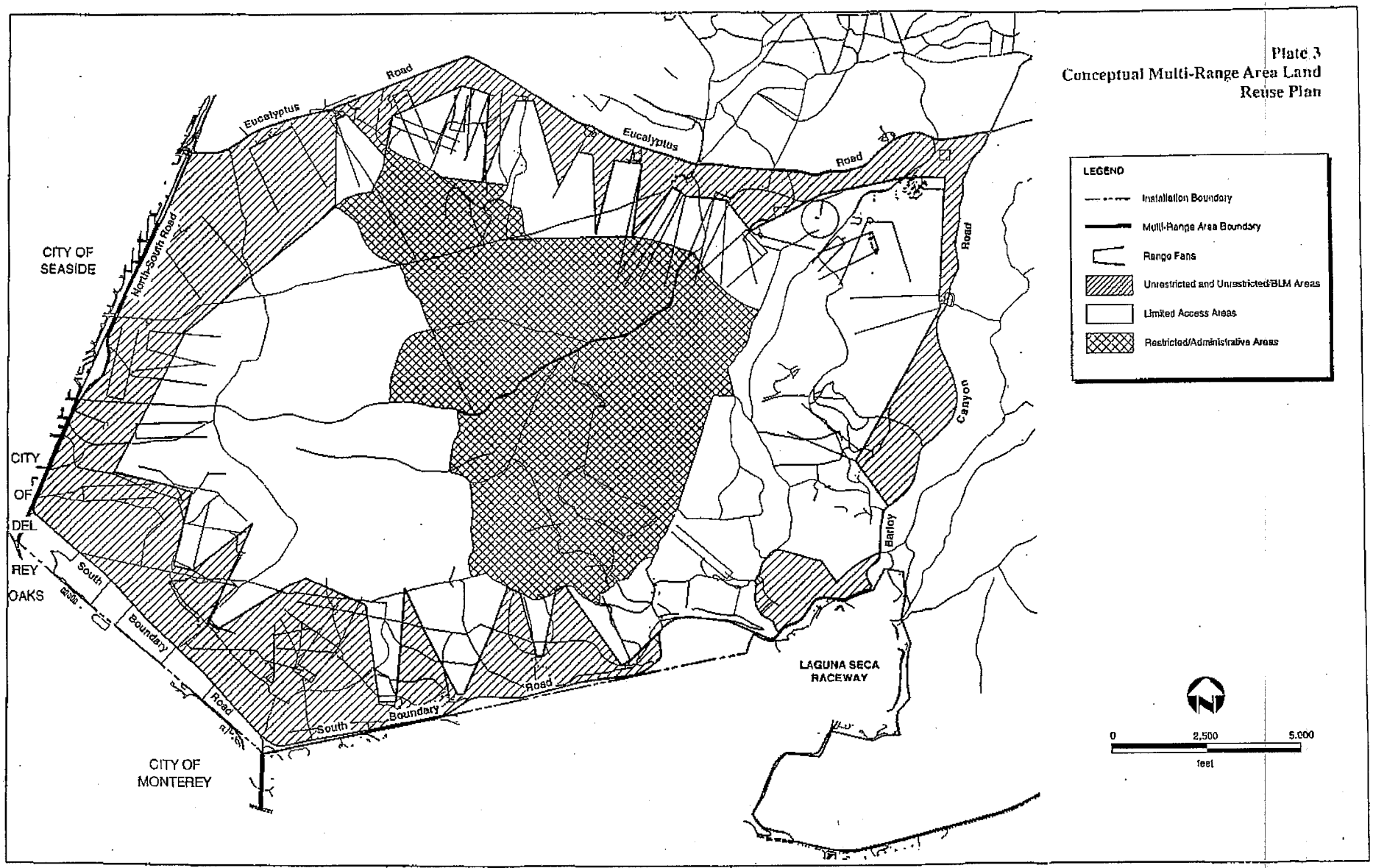


Plate 3
Conceptual Multi-Range Area Land Reuse Plan
LEGEND
Installation Boundary
Multi-Range Area Boundary
Range Fans
Unrestricted and Unrestricted/BLM Areas
Limited Access Areas
Restricted/Administrative Areas
CITY OF SEASIDE
North-South Road
Eucalyptus
Road
Eucalyptus
Eucalyptus
Road
Road
Canyon
Barloy
CITY OF DEL REY OAKS
South Gate
Boundary
Road
South
Boundary
Road
LAGUNA SECA RACEWAY
CITY OF MONTEREY
N
0
2,500
5,000
feet

Table 3. Summary of Ordnance Types and Functions - Site 39
Volume II - Remedial Investigation, Basewide RI/FS
Fort Ord, California

Ordnance Type	Function
Shotgun rounds	Ball
9 mm rounds	Ball, tracer
20 mm rounds	Ball, tracer, armor piercing
5.56 mm rounds (MG)	Ball, tracer, armor piercing
7.62 mm rounds (MG)	Ball, tracer, armor piercing
.30 cal rounds	Ball, tracer, armor piercing
.357 cal rounds	Ball
.38 cal rounds	Ball
.45 cal rounds	Ball, tracer
.50 cal rounds	Ball, tracer, armor piercing
60 mm Mortar	High explosive, white phosphorous, smoke, illumination
81 mm Mortar	High explosive, white phosphorous, smoke, illumination
Stokes Mortar	High explosive, smoke
4.2" Mortar	High explosive, white phosphorous, smoke, illumination
66 mm Rocket (M74 flash)	Incendiary

Table 3. Summary of Ordnance Types and Functions - Site 39
Volume II - Remedial Investigation, Basewide RI/FS
Fort Ord, California

Ordnance Type	Function
35 mm LAW	Photo flash
66 mm LAW	HEAT
SMAW	HEAT, inert
37 mm Cannon	High explosive, armor piercing, inert
57 mm Recoilless Rifle	HEAT
75 mm Recoilless Rifle	HEAT
90 mm Recoilless Rifle	HEAT
106 mm Recoilless Rifle	HEAT
40 mm Aircraft Rounds	High explosive
40 mm Grenade	High explosive
40 mm Airburst	High explosive
Fragmentation Hand Grenade	High explosive
40 mm Round (M203)	High explosive, photo flash, inert
Rifle Grenade	High explosive, white phosphorous

Table 3. Summary of Ordnance Types and Functions - Site 39
Volume II - Remedial Investigation, Basewide RI/FS
Fort Ord, California

Ordnance Type	Function
14.5 mm Subcaliber Artillery	Photo flash
75 mm Howitzer	High explosive, white phosphorous, smoke, illumination
105 mm Howitzer	High explosive, white phosphorous, smoke, illumination
155 mm Howitzer	High explosive, white phosphorous, smoke, illumination
Claymore Mine (M18A1)	High explosive
Anti-Tank Mine	High explosive
Dragon M47	HEAT, inert
2.36" Anti Tank Rocket (Bazooka)	HEAT
3.5" Anti Tank Rocket	HEAT
84 mm Round (M136)	HEAT
Gustov Mortar	HEAT
100 lb. GP Bomb	Inert
250 lb. GP Bomb (M57A1)	High explosive
500 lb. Bomb	Inert

Table 3. Summary of Ordnance Types and Functions - Site 39
Volume II - Remedial Investigation, Basewide RI/FS
Fort Ord, California

Ordnance Type	Function
7" Naval Rounds	High explosive, illumination
8" Naval Rounds	High explosive, illumination
Bangalore Torpedo	High explosive
Blasting Caps	High explosive
C-4	High explosive
TNT	High explosive
Military Dynamite	High explosive
Shaped Charges	High explosive
Riot Gas Projectile (M79)	Tear gas

Comments on

Draft
MRS-SEA.1-4
Time Critical Removal Action and Geophysical Operations (Phase 1)
Technical Information Paper
Former Fort Ord, California
July, 2004.

Prepared by Dr. Peter L. deFur
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September 2004

Comments prepared for the Fort Ord Administrative record

These comments were prepared at the request of the Fort Ord Environmental Justice Network (FOEJN) to provide technical comment to the Army and summarize the report on the Munitions and Explosives of Concern removal at the Seaside sites for the community. FOEJN represents the affected community in the greater Fort Ord area in the clean up of contamination and ordnance related waste.

Mention of any trade name or commercial product or company does not constitute endorsement by any individual or party that prepared or sponsored this report.

Recommendations:

1 conduct an independent quality control/ quality assurance review of the removals because of the uncertainty with finding all of the identified anomalies;
2 conduct soil sampling for chemical weapons material compounds because WW I weapons used with chemical weapons were found on the site;

Purpose of this report and this action: The report on the Time Critical Removal Action cleanup at the Seaside areas near Gen. Jim Moore Blvd is meant to summarize all of the work that was done at these sites in the period from 2002 to 2004. The work was to clear some brush, remove surface Munitions and Explosives of Concern, do a geophysical survey and then remove the buried Munitions and Explosives of Concern. All of these steps were taken and are described

in this report. The Army is required to report on what was done and how effective the work was in both finding and removing the Munitions and Explosives of Concern. Any problems with finding debris or Munitions and Explosives of Concern are supposed to be identified.

There are several significant findings in this report, having to do with other aspects of the Fort Ord clean up.

First, this site survey used several different pieces of equipment to locate debris and unexploded ordnance, one of which was the Schonstedt metal detector. The report notes that Parsons recommended discontinuing use of the Schonstedt at one point because it was not working out as they had hoped. We raised this issue on the First Tee site- that the exclusive use of a Schondstedt was not sufficient to locate more deeply buried munitions.

Second, the site survey and excavations dug up three older types of munitions or unexploded ordnance (UXO): Livens projector, Stokes mortars and 4.2 inch mortars. All three of these have the potential to contain chemical warfare materiel. At least one other military site from WW I has these types of munitions and chemical weapons. The Army has stated in meetings that chemical weapons were not used or found on the site. The finding of Livens, Stokes and 3.5 inch mortars is evidence to the contrary. These were some kind of chemicals or smokes used on Fort Ord back in the WW I era. This issue warrants further investigation.

Summary:

This technical information paper is a summary of the work conducted by Parsons under contract to the Army to find and remove unexploded ordnance, munitions debris and other debris from a part of Fort Ord. The area under study is designated as MRS-SEA.1-4, constituting four adjacent plots along Gen. Jim Moore Blvd and Eucalyptus Rd. through the Del Ray Oaks and Seaside areas.

The activity that this report describes is the brush clearing and then the clean-up of old munitions, waste, unexploded ordnance, debris, etc. All the waste and munitions that were left behind on the site were supposed to be identified, mapped and removed.

The MRS-SEA areas are not intended to be part of the future wildlife habitat. Therefore the wildlife protection issues are not the same as for the range areas that were burned last fall (October 2003). The cleanup plan (Fort Ord Ordnance and Explosives clean up Programmatic Work Plan) calls for manual clearing of the shrubbery using heavy cutting equipment, some digging equipment, and hand held chain saws. Approximately 70% of the clearing was done with equipment and 30% by hand (page 3-2).

The initial removal of surface Munitions and Explosives of Concern was done as a Time Critical Removal Action (Time Critical Removal Action) (explained immediately below). Following the Time Critical Removal Action, the contractors proceeded to conduct the more intensive and time-consuming geophysical investigation for clearing the area to depth.

TCRA is a Time Critical Removal Action: The Time Critical Removal Action is a clean up action that happens quickly and with little delay because the agencies recognize there is an immediate threat to human health. Time Critical Removal Action cleanups are done when an agency is cleaning up a contaminated site and discovers exposed contamination or something equally as dangerous. In the case of Fort Ord and the Munitions and Explosives of Concern, a Time Critical Removal Action cleanup is done, and was in the case of the Seaside areas, when there are exposed Munitions and Explosives of Concern or dangerous debris. The location of this action also made a Time Critical Removal Action necessary because the public could readily get to the sites.

A Time Critical Removal Action cleanup is also conducted with a streamlined administrative process so that it can proceed faster to remove the threat to public health.

The Army Corps of Engineers defines a Time Critical Removal Action as: "Removal Actions where, based on the site evaluation, a determination is made that a removal is appropriate, and that less than 6 months exists before onsite removal activity must begin."

Time-Critical Removal Action

The first step was a survey of these areas and staking out the corners of the grids. After they surveyed the areas, they removed the brush, largely by cutting it with heavy equipment, but they did use some hand clearing on some parts of the site. After clearing, the contractor unexploded ordnance (UXO) teams walked the entire area to find surface debris and Munitions and Explosives of Concern. The teams used hand-held Schonstedt magnetometers to aid the visual inspection and investigation. The debris was removed; the Munitions and Explosives of Concern was identified and anything confirmed as explosive was either removed and destroyed, or blown in place. When explosives were blown in place, the item was covered with sand bags and plywood for protection.

The report summarizes the Munitions and Explosives of Concern items: 247 items were found to be Munitions and Explosives of Concern, 10 of which could not be moved because it was too dangerous (page 3-4). The other 237 items were removed to staging/ collecting areas and detonated later. The maps of the location of each MEC item are presented as figures 3-1 through 3-4. The contractors determined that 226 of the 247 items were in fact Munitions and Explosives of Concern, only 21 were really debris.

The Munitions and Explosives of Concern items included the following (Table 3-1, pages 3-4 and 3-5):

Smoke grenades
Fuzes
Rockets, practice, various sizes
Projectiles, practice and high explosive, various sizes

Cartridge, practice
Illumination signal

A Quality Control/ Quality Assurance (QA/QC) inspection consisted of inspectors walking over 10% of the areas and re-inspecting them to be certain that the visual inspection had not missed anything. The QA/QC inspection found nothing had been overlooked in the initial inspection. Nor did the QA/QC inspection find any explosives mis-identified and placed with the debris.

TIME CRITICAL REMOVAL ACTION Issues and Questions:

The Time Critical Removal Action inspection and removal seems to have been conducted according to the specifications in the project work plan with no deviations and nothing abnormal. The results of the investigations turned up the debris and Munitions and Explosives of Concern that was expected. There are no lingering concerns over this part of the report.

The surface inspection and removal is more straightforward than the geophysical investigation because the team is looking for Munitions and Explosives of Concern and debris that is on the surface. The contractors are not (yet) looking for the buried ordnance and debris.

Non Time-Critical Removal Action:

The contractors followed the surface inspections with a geophysical survey of the entire area with different types of metal detecting equipment. For the most part, they tried to use equipment that could be pulled behind small tractors and cover larger areas in a day. After the entire area was surveyed with geophysical survey equipment, the results were put into computers to generate maps of the places where they found something. The specific spots and objects found are referred to anomalies. The report gives maps of what equipment was used where, in maps 4-1 through 4-4.

The contractors used the following metal detectors on this project:

EM61-MK2 – detects iron and non-iron metals; used as the primary digital survey device; is towed behind a tractor or pulled by hand
G-858- detects only iron containing metals; has two ways to operate
Schonstedt – hand held device that detects iron-containing metals

Once the anomalies had been mapped out, and the results entered in the computers, the contractors created maps of the anomalies, figures 4-5 through 4-80. The teams returned to confirm the presence and location of each anomaly and then remove the item. A great number and range of types of munitions and waste was found on the site during this investigation.

The teams dug up and removed 43,695 specific anomalies, weighing nearly 50,000 pounds, and consisting of debris and munitions from the areas. Most of the material was range debris, totaling 46,745 lbs; 2963 lbs were munitions debris, and 292 items were identified as munitions.

52 of these munitions and explosives were too deteriorated and unsafe to remove from the site. These unsafe items were blown in place. These items included Stokes mortars and 4.2 inch mortars, plus Livens projectiles. These items were scrutinized carefully, and when the contents could to be confirmed, the contractors called in the Army special unit that deals with chemical warfare materials (CWM). This unit examined the three types of Munitions and Explosives of Concern for chemical weapons materials and found titanium tetrachloride in all of them. Titanium tetrachloride was used during WW I as a smoke agent in projectiles that were fired at enemy lines to obscure sight lines and decrease visibility.

The results of the anomaly excavations that yielded Munitions and Explosives of Concern are presented in Table 4-2, with the identity and description of the item, the location, type of excavation, number and depth. The table shows at least 9 Stokes mortars and 2 Livens projectors. These Munitions and Explosives of Concern items are from WW I and did contain chemical weapons materials (smokes are considered CWM).

Parsons conducted a check (QA/QC) on the geophysical survey and re-location of the items they found, in the Quality Assurance and Quality Control operations (QA/QC). They buried a number of items in the areas to be sure that the survey teams would find them. This activity was largely successful, but several items were not recovered. These items were in places that are hard to find, or nearly inaccessible.

Non- Time Critical Removal Action Issues and Questions:

There were problems with the investigations intended to serve as a check on the process (QA/QC), leading the teams to repeat some surveys and to have to go back over some of the grids that had been examined or dug up. These problems have not been completely resolved and an additional review (QA/QC) should be conducted by an independent organization.

I have concerns that the quality assurance and control review (QA/QC) revealed problems that may indicate more problems remain. Some independent check on the investigation needs to be conducted.

The equipment issues are not serious, largely because they found these problems with using the Schondstedt and took steps to correct the problem by discontinuing use.

The greatest problem may be the presence of WW I Munitions and Explosives of Concern that did contain chemical weapons materials, specifically titanium tetrachloride. The titanium tetrachloride was used as a smoke agent. The compound is toxic and can cause serious health problems. Titanium tetrachloride is highly irritating to mucus membranes and can increase the instance of bronchitis and pneumonia. Exposure can lower ventilating capacity, and inhaled TiCl4 can actually become embedded in the lungs as titanium dioxide. Long term or acute exposure can lead to the formation of lung polyps. At room temperature TiCl4 can react with copper to form copper titanium chloride (CuTiCl4), and also readily reacts with all ketones.

The Army needs to take soil samples at the locations where the chemical weapons materials munitions were recovered and at random locations throughout the areas, sampling for chemical weapons materials, chemical weapons materials residues and metals. This sampling is needed to confirm that no chemical contamination residues remain in the soil. The community remains extremely concerned about human health effects from the contaminants at Fort Ord and the soil sampling and testing for contaminants is needed to confirm that further contamination will not add to the present health threats faced by the community.

I do think that an independent survey needs to go back over these areas and conduct an additional confirmation or QA/QC investigation. In addition, the areas where they found the WW I munitions need soil sampling to test for chemical weapons materiel.

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The Faroes Statement: Human Health Effects of Developmental Exposure to Chemicals in Our Environment

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The periods of embryonic, foetal and infant development are remarkably susceptible to environmental hazards. Toxic exposures to chemical pollutants during these windows of increased susceptibility can cause disease and disability in infants, children and across the entire span of human life. Among the effects of toxic exposures recognized in the past have been spontaneous abortion, congenital malformations, lowered birthweight and other adverse effects. These outcomes may be readily apparent. However, even subtle changes caused by chemical exposures during early development may lead to important functional deficits and increased risks of disease later in life. The timing of exposure during early life has therefore become a crucial factor to be considered in toxicological assessments.

During 20–24 May 2007, researchers in the fields of environmental health, environmental chemistry, developmental biology, toxicology, epidemiology, nutrition and paediatrics gathered at the International Conference on Fetal Programming and Developmental Toxicity, in Tórshavn, Faroe Islands. The conference goal was to highlight new insights into the effects of prenatal and early postnatal exposure to chemical agents, and their sustained effects on the individual throughout the lifespan. The conference brought together researchers to focus on human data and the translation of laboratory results to elucidate the environmental risks to human health.

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Research State of the Art

The developing embryo and foetus are extraordinarily susceptible to perturbation of the intrauterine environment. Chemical exposures during prenatal and early postnatal life can bring about important effects on gene expression, which may predispose to disease during adolescence and adult life. Some environmental chemicals can alter gene expression by DNA methylation and chromatin remodelling. These epigenetic changes can cause lasting functional changes in specific organs and tissues and increased susceptibility to disease that may even affect successive generations.

New research on rodent models shows that developmental exposures to environmental chemicals, such as hormonally active substances (endocrine disruptors), may increase the incidence of reproductive abnormalities, metabolic disorders such as diabetes, and cancer, presumably through epigenetic mechanisms that do not involve changes to DNA sequences but which may, nevertheless, be heritable.

Prenatal exposure to diethylstilboestrol, an oestrogenic drug no longer used during pregnancy, has been shown to cause an increased risk of vaginal, uterine and breast cancer

in human beings and animal models. In animal models, low-level developmental exposure to a plastics ingredient, bisphenol A, may increase the susceptibility to breast or prostate cancer, and prenatal exposure to vinclozoline, a common fungicide, may also promote later development of cancer. These substances are only weak carcinogens, if at all, in the adult organism but are nonetheless hazardous to the growing foetus. In addition, when exposure to a carcinogenic substance occurs during early development, the expected lifespan will exceed the normal latency period for development of the disease.

The human reproductive system is highly vulnerable to changes in the intrauterine hormonal environment. In men, there is an increase in the occurrence of testicular cancer, poor semen quality and cryptorchidism, jointly termed the testicular dysgenesis syndrome. In animals, a similar combination of outcomes is replicated by developmental exposure to certain phthalate esters. However, links between environmental chemicals and the testicular dysgenesis syndrome in human beings are still unclear, although suggestive associations have been found with maternal smoking, fertility treatment of the mother, phthalate exposure and occupational exposure to pesticides with suspected oestrogenic and anti-androgenic activity. Perinatal exposure to endocrine-disrupting chemicals, such as polychlorinated or polybrominated biphenyls or dichlorodiphenyltrichloroethane compounds, may affect puberty development and sexual maturation at adolescence. Many other environmental chemicals can cause such effects in animal models. Expression of some of these effects may be promoted by predisposing genetic traits.

The brain is particularly sensitive to toxic exposures during development, which involves a complex series of steps that must be completed in the right sequence and at the right time. Slight decrements in brain function may have serious implications for future social functioning and economic activities, even in the absence of mental retardation or obvious disease. Each neurotoxic contaminant may perhaps cause only a negligible effect, but the combination of several toxic chemicals, along with other adverse factors, such as poor nutrition, may trigger substantial decrements in brain function.

The immune system also undergoes crucial developmental maturation both before and after birth. New evidence suggests that a number of persistent and non-persistent environmental pollutants may alter the development of the immune system. Studies in a variety of species of experimental animals indicate polychlorinated biphenyls to be highly immunotoxic. While exposures of human adults show little indication of such effects, early life exposures appear capable of inducing similar aberrations in children as seen in other species. Asthma, allergic sensitization or greater susceptibility to infections may be linked to prenatal or early postnatal chemical exposures. In addition, because of multiple interactions between the immune and nervous systems, abnormal maturation of immune responsiveness may also be implicated in some neurodevelopmental disorders.

While the research on developmental toxic effects has, to date, emphasized maternal exposures and the infant environment, the possibility exists that paternal exposures may also affect the child's development. Experimental studies suggest that ionizing radiation, smoking and certain environmental chemicals may be of importance, and that some exposures may affect the health and development of children, as well as the sex ratio of the offspring.

Conclusions

Three aspects of children's health are important in conjunction with developmental toxicity risks. First, the mother's chemical body burden will be shared with her foetus or neonate, and the child may, in some instances, be exposed to larger doses relative to the body weight. Second, susceptibility to a wide range of adverse effects is increased during development, from preconception through adolescence, depending on the organ system. Third, developmental exposures to environmental chemicals can lead to life-long functional deficits and disease.

Research into the environmental influence on developmental programming of health and disease has, therefore, led to a new paradigm of toxicologic understanding. The old paradigm, developed over four centuries ago by Paracelsus, was that 'the dose makes the poison'. However, for exposures sustained during early development, another critical, but largely ignored, issue is that 'the timing makes the poison'. This extended paradigm deserves wide attention to protect the foetus and child against preventable hazards.

These insights derive in part from numerous animal studies indicating that events during the foetal and early postnatal period may be responsible for reproductive, immunological, neurobehavioural, cardiovascular and endocrine dysfunctions and diseases, including certain cancers and obesity. Some of these adverse effects have been linked to environmental chemicals at realistic human exposure levels (i.e. levels similar to those occurring from environmental sources).

Among the mechanisms involved, particular concern is raised about changes in gene expression due to altered epigenetic marking, which not only may lead to increased susceptibility to diseases later in life, but may, in some cases, also affect subsequent generations.

Most chronic disease processes are characterized by multicausality and complexity. Understanding such processes requires a broad systems approach that focuses on integrative biology within socio-environmental contexts.

Recommendations

Studies on the aetiology of human disease need to incorporate early development and characterize appropriately the factors that determine organ functions and subsequent disease risks. Such associations can best be examined in long-term prospective studies, and existing and planned pregnancy or birth cohorts should be utilized for this purpose.

The aetiology of human disease can be better understood through cross-disciplinary approaches, translation of animal data, better exposure biomarkers and understanding individual susceptibility. Improved communication needs to be

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stimulated among the scientific disciplines involved and between scientists and policy-makers.

Environmental chemical exposure assessment should emphasize the time period of early development. Exposure data already routinely collected should be applied, when feasible, in epidemiological studies. In addition, cord blood, cord tissue, human milk and other biological samples should be collected for assessment of exposure biomarkers and for determination of gene expression changes.

Because human beings are exposed to numerous chemicals during development and throughout life, mixed exposures need to be considered in a life-course approach to disease. Other factors, such as nutrition, other lifestyle factors and societal environment, need to be considered for additive or interactive effects. This research should also capitalize on the ability of genetic variation and gene–environment interaction to explore the causal nature of environmental exposures with respect to health outcomes.

Risk assessment of environmental chemicals needs to take into account the susceptibility of early development and the long-term implications of adverse programming in a variety of organ systems. Although test protocols exist to assess reproductive toxicity, neurodevelopmental toxicity and immune toxicity, such tests are not routinely used, and the potential for such effects is, therefore, not necessarily considered in decisions on safety levels of environmental exposures.

The accumulated research evidence suggests that prevention efforts against toxic exposures to environmental chemicals should focus on protecting the embryo, foetus and small child as highly vulnerable populations. Given the ubiquitous exposure to many environmental chemicals, there needs to be renewed efforts to prevent harm. Healthier solutions should be researched and proposed in future work. Prevention should not await definitive evidence of causality when delays in decision-making would lead to the propagation of toxic exposures and their long-term, harmful consequences. Current procedures, therefore, need to be revised to address the need to protect the most vulnerable life stages through greater use of precautionary approaches to exposure reduction.

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Neurodevelopmental Disorders in Children

Autism and ADHD

environmentalchemistry.com/yogi/environmental/200804childrenautismadhd.html

By Mona Sethi Gupta, Ph.D.
April 14 2008

Autism, ADHD, learning disabilities, developmental delays and intellectual retardation are among the neurodevelopmental disorders that extract an enormous emotional, mental and financial toll in terms of compromised quality of life and lifelong disability. Additionally, these require special education, psychological and medical support services that drain resources and contribute to further stress on the families and communities. While it is generally accepted that the cause for these disabilities is likely to include genetic and environmental factors, for a vast majority of these disabilities, the cause remains unknown. Many factors contribute in complex ways to brain development. These include gene expression, heredity, socioeconomic factors, stress, drugs, nutrition and chemical contaminants. Brain development is a long, complicated process involving cell proliferation, migration, differentiation and cell death (apoptosis). There are multiple ways by which chemicals can disrupt neurological development such as influencing gene expression, protein pathways [(1)] and hypothyroidism [(2)]. It is a well established fact that a child's nervous system is more sensitive to chemical exposures compared to an adult nervous system. This is evident from incidence of permanent brain damage in fetus of pregnant mothers who consumed alcohol during their pregnancy resulting in fetal alcohol spectrum disorder [(3)]. Similarly, pregnant women involved in methylmercury disasters showed minimal signs of toxicity compared to their children who displayed effects ranging from cerebral palsy to delayed development [(4)].

In the 1950s, Thalidomide was introduced into the market to treat morning sickness and as a sedative. It created an epidemic of 15,000 babies worldwide with missing limbs and other developmental disabilities including mental retardation and autism [(5)]. Today, it is a widely accepted fact that chemicals in the environment can cause developmental disabilities in children. Even more intriguing is the fact that certain environmental agents can cause long-lasting damage to the developing brain at exposure levels that have no lasting effect in the adult.

A wide range of toxic chemicals in the environment have been associated with neurodevelopmental disabilities which affect an estimated 3-8% of the 4 million babies born each year in the Unites States. In a recent study published in The Lancet, researchers from Harvard School of Public Health and the Mount Sinai School of Medicine examined publicly available data on chemical toxicity to identify the industrial chemicals likely to damage the developing brain. The researchers compiled a list of 202 industrial chemicals that are known to be toxic to the human brain using the Hazardous Substance Data Bank of the National Library of Medicine and other data sources [(6)]. The exposure to these chemicals came from industrial accidents, occupational exposure, suicide attempts and accidental poisonings. The authors noted that the list was not comprehensive since the number of chemicals that can cause neurotoxicity in laboratory animal test exceeds 1000. A key point highlighted in the study was the fact that even though moderate amounts of

chemicals, such as lead and mercury, were needed to cause neurological damage in most adults, only small amounts might be needed to damage the developing brains in babies, infants and young children.

It is a well known fact that certain chemicals, such as lead, mercury, PCBs, dioxins, arsenic and toluene can cause clinical and sub-clinical deficits in neurobehavioral development through injury to the fetal brain. The developing brain is extremely vulnerable to these environmental agents at doses much lower than those that affect adult brain function. Studies have shown that prenatal exposure to even relatively low levels of lead result in lifelong reductions of intellectual functions and disorders of behavior [7]. Polychlorinated biphenyls (PCBs) cross the placental barrier and can cause injury to the developing brain [8]. Organic mercury compounds such as methyl mercury are among the most potent neurotoxins causing severe developmental problems [9]. In view of this fact, it seems disconcerting that there is little information available on possible toxic potential for the 80,000 chemicals registered with the Environmental Protection Agency (EPA). Of the 3000 chemicals produced or imported at over 1 million pounds a year, a mere 23% have been tested for their potential to cause developmental damage [10].

Autism is a neurodevelopmental disorder characterized by impaired social interaction as well as verbal and non-verbal communication. There are various degrees of severity involved in this disorder. Therefore, this condition is commonly referred to as "autism spectrum disorders" or ASD which include autism, Asperger's syndrome, pervasive developmental disorders not otherwise specified (PDD-NOS) and high-functioning autism. Statistics based on data gathered in 2002 indicates that more than 550,000 children are affected by varying degrees of autism spectrum disorders (ASD). In fact, it has been reported that autism is the fastest growing developmental disability, increasing at a rate of 10 to 17 percent annually according to the Autism Society of America. While improved diagnostic measures may contribute to the perceived increase in the number of cases, it is becoming increasingly apparent that environmental neurotoxins in combination with genetic predispositions could also create adverse gene-environment interactions.

Surveys conducted in California indicate an almost 210% increase in the number of cases of autism in children over the past 10 years. There is increasing concern that certain chemicals (such as mercury, halogenated aromatics and pesticides) and biotic factors (such as vaccine antigens) may act synergistically to alter certain susceptibility or genetic risk factors to result in ASD. The UC Davis Center for Children's Environmental Health has established the first large scale epidemiological study to investigate the underlying causes of autism. The UC Davis researchers at the Children's center have suggested an association between thimerosal (ethyl mercury) and immune system dysfunction in mice. In a recent study, Windham et. al. (2006) explored the possible association between ASD and environmental exposures to hazardous air pollutants in the San Francisco Bay area [11]. Based on the data from the study, the authors suggested that living in areas with higher ambient levels of HAPs, especially metals and chlorinated solvents, during pregnancy or early childhood could be associated with a moderately increased risk of autism. This study highlighted the need for more complex etiologic studies combining exposure to multiple compounds by various pathways with genetic information to further understand the contribution of environmental exposures to the development of autism.

Another developmental disorder that affect the areas of social skills, behavior and communication is Attention Deficit Hyperactivity Disorder (ADHD). Presently, some researchers believe that there is a correlation between ASD and ADHD. It is estimated that ADHD affects approximately 4.5 million children in the US. The main characteristics that define ADHD include inattention, hyperactivity and impulsivity. Though almost everyone at some point in their life blurts out something inappropriate or has difficulty focusing on a task or could become forgetful, experts say that such behavior must be demonstrated to a degree that is inappropriate for that age, for a diagnosis to be made. There is insufficient evidence that suggests that ADHD could be a result of simply social factors or child-rearing factors. Other factors such as environmental agents like heavy metals and organohalides, traumatic brain injury, food additives and sugar, neurobiology and genetics have been implicated in the etiology of this condition.

Medications that seem to be most effective in treating ADHD are a class of drugs known as stimulants such as Ritalin (methylphenidate). However, there is mounting controversy over the widespread use of methylphenidate and possible life-threatening effects from its long-term use. This makes it imperative that alternative modalities be implemented for ADHD management. Nutrient deficiencies are common in ADHD; supplementation with minerals, the B vitamins (added in singly), omega-3 and omega-6 essential fatty acids, flavonoids, and the essential phospholipid phosphatidylserine (PS) can improve ADHD symptoms [12]. In a first of its kind study, Dr. Sarina Grosswald, an educator and expert in cognitive learning and clinical neuropsychologist, William Stixrud investigated the effect of meditation in kids with ADHD in the school setting. For the study, kids with ADHD meditated 10 minutes, twice a day. This study revealed that kids who meditated showed a 45 to 50 percent reduction in stress, anxiety and depression. These kids also showed significant improvements in organizational skills, memory, strategizing, mental flexibility, attention and impulsivity. According to Stixrud, teaching a child to regulate his own body and mind in response to anxiety should be the first response rather than putting them on medication.

Neurodevelopmental disorders have increased over the past 30 years and are at least partly attributed to exposure to environmental contaminants. Therefore, it becomes imperative to mitigate environmental factors that may influence disease. The impact of environmental toxins on children's health has become a major focus in the federal government resulting in establishment of eight new research centers in children's environmental health with joint funding from EPA and the National Institute of Environmental Health Sciences (NIEHS). "The brains of our children are our most precious economic resource, and we haven't recognized how vulnerable they are," says Philippe Grandjean, adjunct professor at Harvard School of Public Health and the lead author of the study published in The Lancet . "We must make protection of the young brain a paramount goal of public health protection. You have only one chance to develop a brain."

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FORT ORD COMMUNITY ADVISORY GROUP
POSITION PAPER

Fort Ord Community Advisory Group
PO Box 2173
Monterey, CA 93942
Email: focag@fortordcag.org
Website: www.fortordcag.org

3-11-08

FOR THE ADMINISTRATIVE RECORD
Hand delivered to FORA 3-12-08

Fort Ord Reuse Authority (FORA)
100 12th St., Building 2880
Marina, CA 93933
c/o Mr. Stan Cook, Ms. Laura Baldwin

RE: Comments; FORA ESCA Remediation Program (RP) / Document Control Number: 09595-07-078-001

Dear Mr. Cook and Ms. Baldwin,

Most agree the Army needs to clean up the mess it made at Fort Ord. However, under no circumstance should munitions cleanup be privatized and a waiver granted exempting adherence to Environmental laws in place to protect the publics health, safety, and the environment. To do so would be an abomination of due diligence and process. What is the justification for the Covenant Deferral Request?

"Because of missing or incomplete range activity records , misdirected shots, and poor or undocumented disposal practices, no area in Site 39 can be considered clear of UXO/ OEW". This statement is typical of military munitions training ranges at former Fort Ord. The proposed 3300 acres to be transferred for residential housing, commercial and other public uses is highly contaminated with UXO, OEW, and military munitions constituents.

1994 RI/FS;
"Site 39 was used Since the early 1900s for ordinance training activities. As a result, OEW, including UXO, is present at the site. OEW is defined as bombs and war heads; guided And unguided ballistic missiles; artillery, mortar, and rocket ammunition; small arms ammunition; anti-personnel and anti-tank mines; demolition charges; pyrotechnics; grenades; torpedoes and depth charges; containerized or uncontainerized high explosives and propellants; nuclear materials; chemicals and radiological agents; and all similar or related items designed to cause damage to personnel or materials. Oil in which explosive

compounds are detected will be considered OEW if the concentration is sufficient to present an imminent hazard. UXO is a subset of OEW and consists of unexploded bombs, warheads, artillery shells, mortar rounds, and chemical weapons. Components or ordnance items (e.g., boosters, bursters, fuzes, igniter tubes) are also included in the UXO definition. Many of the UXO/OEW items listed above have been found at Site 39. Nonuclear materials, chemical agents, or biological agents have been found or reported to have been used at the site."

To date only limited sampling and removal has been conducted at most of the sites part of the Remediation Program (RP). The proposed FOSET and remediation is in large part based on assumptions rather than sound scientific methodology. There is a significant difference between sampling and clearance to a prescribed depth for a particular use. CERCLA would require a revised RI/FS and ROD for this program. Since the 1994 Base Wide RI/FS, the scope of land uses have changed significantly. Many sites included in the RP were not considered for residential uses because of the exposure dangers to public health and safety from UXO, OEW, and residual contamination.(1) (2) The extent of contamination at former Fort Ord from military munitions training and disposal is unknown. Historically, dangerous military munitions and constituents show up in the most unlikely places. No square inch of former training ranges should be assumed to be free or safe from dangerous ordnance and chemicals. A example of military munitions live and inert found in parcels slated for residential development include but are not limited to the following;

fragment hand grenades MKII ,smoke hand grenades M18, hand grenade M10, 4inch trench mortars MK1, 4inch trench mortars FM, 4inch trenordnance components, blasting caps M6, blasting caps M7, hand grenade fuzes M228, 75mm Shrapnel MK1 , 37mm LE MK1 , 75mm HE MK1, Livens projector FM, surface trip flare M49, 3.5inch rocket M29, 35mm Rockets M73, 3inch Hotchkiss projector, activator mine AT M1, mine AT M1, primer igniter tube M57, cartridge ignition M2, signal illumination M125, mine fuze M6A1, rifle grenade M22, 57mm projector HE M306, flash artillery M110, projectile PD M503ch mortars HC, 3inch trench mortars MK1, 81mm mortar HE M43, 40mm projector M781

Because of the nature of military munitions use and cleanup, the strictest standards available, i.e. CIRCLA should be implemented to the greatest extent possible. Any attempts to side step or circumvent this public health and environmental law must not be allowed . To do so will likely result in negative human health and environmental impacts.

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Historical maps indicate that over the years as ranges were decommissioned, new ranges were opened. It appears that over time there are literally layers and overlaps of ranges the extent of which is unknown. How many millions of troops trained at Fort Ord? How many millions of pounds of munitions were used at former fort Ord? Of the millions of pounds of munitions used , how many millions of pounds of constituents were released into the environment? Were did the residual contamination go?

A new previously unidentified exposure pathway to human and ecological receptors now exists. The burning of former training ranges has resulted in a new and significant threat to human health and safety. A new RI/FS should include Ash analysis for all sites burned purposely or accidentally, and the potential onsite and offsite exposure to human and ecological receptors. This new exposure and potential effects on human and ecological receptors was never analyzed in the 1994 Base Wide RI/FS.

In the Monterey Herald dated 12-05-07 Pg. B6, there was a brief account of a recent U.S. Geological Survey study of ash resulting from the Southern California wild fires. The USGS study found caustic alkali materials and elevated levels of arsenic, lead, and other metals. The studies led author said that USGS found that "rainwater runoff from burned areas may hurt eco systems, aquatic wildfire habitat and surface water quality." Has the ESCA process analyzed the data revealed in this study? If not, why not?

It appears USGS is well equipped with staff and technology to analyze potential significant negative impacts resulting from burning wild land habitat. USGS participation in analyzing burn impacts at former Fort Ord could result in significant new information that would greatly benefit the full disclosure of impacts resulting from the burning. This new significant information will greatly benefit the understanding of potential adverse impacts by the public, regulators, decision makers, Army and all those involved in the ESCA process.

If USGS is not required to analyze data at the former Fort Ord, what justification exists for this decision?

Many military munitions constituents are known endocrine disruptors, carcinogens, mutagens, ect.. Environmental contamination is reaching epidemic levels likely due to lax regulation, oversight, and enforcement of environmental laws over industry and commerce. Nationally, conservatively, 1 in 150 children has autism. Asthma, Alzheimer's Disease, cancer, to list a few are at epidemic levels. Today, the U.S. public is sicker than ever before. USGS studies show pharmaceuticals are increasingly showing up in U.S. reclaimed and drinking water supplies. Is there endocrine disruptor screening being conducted at former Fort Ord? If not, why not? Does Soil analysis of ranges include every known or suspected OEW constituent used at For Ord? If not, why not?

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The public is very concerned with the undermining of the Regulatory agencies and their current ability to protect human health, safety, and the environment. A 1999 EPA Range Rule position letter addressing Military Base Closures states; "During the last several years an increasing number of issues have arisen relative to UXO, hazardous contaminants, and military range cleanup. The following represents a description of the major EPA issues or concerns along with installations where we have encountered these problems. This list should not be construed as exhaustive." Since this EPA position letter it appears efforts are being made to circumvent the environmental laws in place to protect the public.(3)

FORA should adopt the Precautionary Principle (1998 Wingspread Statement) and apply it to the Fort Ord Reuse Plan to ensure safety for current and future generations to the greatest extent possible.(4)

Thank you for the opportunity to comment on this project. We look forward to your response to our concerns.

Sincerely,

Lance Houston
FOCAG Member

Cc.
Assemblyman John Laird
Cal DTSC, c/o Joyce Whiten and Yolanda Gaarza
U.S. EPA, Region 9, c/o Viola Cooper
Mick Weaver, FOCAG
Bruce Becker, FOCAG
Debra Mickelson
David Dilworth, HOPE

Attachments;
(1) Scientific Integrity in Policy Making Update-July 2004 Introduction / Union of Concerned Scientists / Full Repot @ www.ucsusa.org
(2) EPA - Why we need a code of professional ethics www.nteu280.org/Issues/NTEU-%20Professional%20Ethics.htm
(3) 1999 EPA letter to DoD, Range Rule www.epa.gov/fedfac/documents/uxomemo.htm
(4) 1998 Wingspread statement www.rachel.org/library/getfile.cfm?ID=189

Union of Concerned Scientists
www.ucsusa.org

Scientific Integrity in Policy Making Update-July 2004

Introduction

On February 18, 2004, 62 preeminent scientists including Nobel laureates, National Medal of Science recipients, former senior advisers to administrations of both parties, numerous members of the National Academy of Sciences, and other well-known researchers released a statement titled *Restoring Scientific Integrity in Policy Making.* In this statement, the scientists charged the Bush administration with widespread and unprecedented "manipulation of the process through which science enters into its decisions." The scientists' statement made brief reference to specific cases that illustrate this pattern of behavior. In conjunction with the statement, the Union of Concerned Scientists (UCS) released detailed documentation backing up the scientists' charges in its report, *Scientific Integrity in Policy Making.*

On April 2, the White House Office of Science and Technology Policy issued a statement by Director John H. Marburger III that dismissed the scientists' concerns and attempted to debunk the specific charges. In a detailed analysis released April 19, UCS reviewed each charge again, and directly addressed the administration's responses, concluding, "UCS stands by the findings and conclusions of our report." The UCS analysis found that the White House response failed to offer substantive evidence to support its claims. Instead, the White House document was filled with largely irrelevant information and arguments unrelated to the scientists' charges.

"The administration is dismissive of the concerns of leading scientists across the country," said Kurt Gottfried, UCS board chair and emeritus professor of physics at Cornell University. "The absence of a candid and constructive response from the White House is troubling, as these issues—from childhood lead poisoning and mercury emissions to climate change and nuclear weapons—have serious consequences for public health, well-being, and national security."

Since the release of the UCS report in February, the administration has continued to undermine the integrity of science in policy making seemingly unchecked. Many scientists have spoken out about their frustration with an administration that has undermined the quality of the science that informs policy making by suppressing, distorting, or manipulating the work done by scientists at federal agencies and on scientific advisory panels. For instance, Michael Kelly, a biologist who had served at the National Oceanic and Atmospheric Administration's National Marine Fisheries Service for nine years, recently resigned his position and issued an indictment of Bush administration practices. As Kelly wrote, "I speak for many of my fellow biologists who are embarrassed and disgusted by the agency's apparent misuse of science."

This document investigates several new incidents that have surfaced since the February 2004 UCS report. These new incidents have been corroborated through in-depth interviews and internal government documents, including some documents released through the Freedom of Information Act. The cases that follow include:

- ! egregious disregard of scientific study, across several agencies, regarding the environmental impacts of mountaintop removal mining;
- ! censorship and distortion of scientific analysis, and manipulation of the scientific process, across several issues and agencies in regard to the Endangered Species Act;
- ! distortion of scientific knowledge in decisions about emergency contraception;
- ! new evidence about the use of political litmus tests for scientific advisory panel appointees. These new revelations put to rest any arguments offered by the administration that the cases to date have been isolated incidents involving a few bad actors.

Concern in the scientific community has continued to grow. In the months since the original UCS report, more than 4,000 scientists have signed onto the scientists' statement. Signers include 48 Nobel laureates, 62 National Medal of Science recipients, and 127 members of the National Academy of Sciences. A number of these scientists have served in multiple administrations, both Democratic and Republican, underscoring the unprecedented nature of this administration's practices and demonstrating that the issues of scientific integrity transcend partisan politics.

The United States has an impressive history of investing in and reaping the benefits of scientific research. The actions by the Bush administration threaten to undermine the morale and compromise the integrity of scientists working for and advising America's world-class governmental research institutions and agencies. Not only does the public expect and deserve government to provide it with accurate information, the government has a responsibility to ensure that policy decisions are not based on intentionally or knowingly flawed science. To do so carries serious implications for the health, safety, and environment of all Americans.

Given the lack of serious consideration and response by the administration to concerns raised by scores of prominent scientists, UCS is committed to continuing to investigate and publicize cases—corroborated by witnesses and documentation—in which politics is allowed to stifle or distort the integrity of the scientific process in governmental policy making. UCS—working with scientists across many disciplines, other organizations, and elected officials—will also seek to develop and implement solutions that will protect government scientists from retribution when they bring scientific abuse to light, provide better scientific advice to Congress, strengthen the role of the Office of Science and Technology Policy, strengthen and ensure adherence to conflict of interest guidelines for federal advisory panels, and ensure full access to government scientific analysis that has not been legitimately classified for national security reasons.

NTEU CHAPTER 280 - U.S. ENVIRONMENTAL PROTECTION AGENCY, NATIONAL HEADQUARTERS
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WHY WE NEED A CODE OF PROFESSIONAL ETHICS

www.nteu280.org/Issues/NTEU-%20Professional%20Ethics.htm

This document is intended to explain why a code of professional ethics is needed in the EPA workplace.

8/25/99

Management Practices and Workplace Conditions of Concern Because They Create Pressure To Violate the Code of Ethics For Professionals at EPA

There are current management practices and workplace conditions at EPA condoned by some elements of management which place strong pressure on EPA professionals to violate ethical principles and practices. Several examples follow:

1. Fear by some EPA managers of political retribution from economically powerful industries that are doing things harmful to the environment is one negative condition we as professionals must deal with at EPA. Some managers fear being punished if they tell the truth and/or "do the right thing" with regard to controlling the environmental problem which that particular industry is causing. This is especially problematic when the fearful manager is at the top of an organization's chain of command. The fearful manager "chickens out," because its easier to deal with the dismay and anger of the professionals that work for him or her than to deal with the dismay and anger of higher echelon managers or of an industry with lots of money to contribute to the re-election campaigns of members of Congress and with plenty of access to those members and their staffs, and with the certainty of a sympathetic hearing.

2. It is this condition - political pressure down the chain of command - that is the source of the problem for most unethical behavior by professionals at EPA: Frightened managers pressure professionals to write assessments and analyses that appear to justify a control action which is well less than that which the real risks and real costs suggest are actually warranted.

3. There is a lack of a management process for dealing with a conflict between a professionals's analysis of an issue and Agency policy on that issue. This is a problem: 1) when facts elicited in an analysis do not support the Agency policy and the analysis is then ignored, altered or otherwise subverted by management; or 2)when the professional refuses to remain silent on the issue, and is then subjected to disciplinary sanctions.

4. Tracking and assessment of professional performance should be based on the number of assessments or analyses prepared and their quality, as judged in light of applicable professional standards, and not exclusively on the number of assessments or analyses that produced a certain prescribed result. (E.g., the performance standard should not be "number of new pesticides registered" but "number of proposed new pesticides assessed.")

5. When work is initially assigned to a professional, the assignment must be made in such a way that it is clear that the work product is to be a complete, unconstrained analysis or assessment of the matter at issue.

6. The amount of work time and calendar time allotted to the professional assigned to do the work by the manager assigning the work must be appropriate to the importance of the results. Consideration must be given to the health and environmental risks involved, control and other costs, the complexity of the subject matter, the size of the relevant literature, and the number of experts on that subject within and outside EPA who must be consulted for a complete and balanced work product to be produced.

7. As civil servants serving the public interest, U.S. Environmental Protection Agency employees are entrusted with the responsibility of acting conscientiously to fulfill EPA's assigned mission to protect human health and the environment:

o Those in our trust include:
– The American public, including dependent minors and others not yet of voting age
– Other people throughout the world who are affected by the actions of Americans both here and abroad
– Future generations
– Other living things
– The Earth itself and its ability to sustain life.

o Those affected by our actions also include:
– Those who release pollutants into our environment
– Producers and users of toxic substances
– Those who generate, transport and dispose of hazardous wastes and other wastes and discards.

Those in this latter group are members of the "regulated community"; they are ***not*** our "customers". They are those whose behavior we must monitor, assess and enforce against environmental standards and the law.

We accept the usefulness of obtaining feedback from those in the first group regarding their satisfaction with our performance. Although some in the latter group appreciate our efforts and do their best to cooperate, many others do not. We reject the validity of assessing how "satisfied" those in the latter group are with our performance.
Every person we deal with, including those in the "the regulated community", deserve to be treated with dignity and respect. But they also need to be handled with candor as to the seriousness of any violations and their impact on the public interest. They need to be handled with firmness when they violate the law.

8. In working to fulfill its mission, EPA managers and staff rarely interact directly with the general public or with regulated firms. Instead, for most programs, EPA managers and staff work with and through State and local agencies. While in some cases the relationship between EPA and the State or Local agency is one of true partnership, more often it is not. Further, with the current focus within EPA on identifying customers and getting customer feedback, there is also a tendency to view State and local environmental agencies as our

"customers." Neither is an accurate description of the nature of the relationship in most cases. Treating State and local environmental agencies and officials as "customers" is therefore inappropriate. They are not our customers; they are at best our partners, but more often they are an additional class of entities and individuals that we - to all intents and purposes - regulate.

Synergism

Canadian Centre for Occupational Health and Safety (CCOHS)
http://www.ccohs.ca/oshanswers/chemicals/synergism.html

What is meant by the term "synergism"?

Synergism comes from the Greek word "*synergos*" meaning working together. It refers to the interaction between two or more "things" when the combined effect is greater than if you added the "things" on their own (a type of "when is one plus one is greater than two" effect).

In toxicology, synergism refers to the effect caused when exposure to two or more chemicals at a time results in health effects that are greater than the sum of the effects of the individual chemicals.

When chemicals are synergistic, the potential hazards of the chemicals should be re-evaluated, taking their synergistic properties into consideration.

What are related terms?

In addition to synergism, other terms are used to define the toxicologic interactions.
Additive Effect - This action occurs when the combined effect of two or more chemicals is equal to the sum of the effect of each agents given alone (they do not interact in a direct way); for example:

2 + 2 = 4

This effect is the most common when two chemicals are given together.

Potentiation - This effect results when one substance that does not normally have a toxic effect is added to another chemical, it makes the second chemical much more toxic; for example:

0 + 2 > 2, not just 2

Antagonism - Antagonism is the opposite of synergism. It is the situation where the combined effect of two or more compounds is less toxic than the individual effects; for example:

4 + 6 < 10

Antagonistic effects are the basis of many antidotes for poisonings or for medical treatments. For example, ethyl alcohol (ethanol) can antagonize the toxic effects of methyl alcohol (methanol) by displacing it from the enzyme that oxidizes the methanol

In comparison, a **synergistic effect** is the situation where the combined effect of two chemicals is much greater than the sum of the effects of each agent given alone, for example:

2 + 2 >> 4 (maybe 10 times or more)

Why does synergism occur?

While the mechanisms of synergism can change from situation to situation, most of the time there appears to be an effect on the enzymes that regulate or influence the way our bodies work.

Our bodies have enzymes that are designed to do specific "jobs". For example, there is an enzyme that helps break down alcohol - this is why we do not stay intoxicated "forever" after consuming alcohol. These enzymes normally transform (metabolize) the foreign substances (alcohol in this example) into less toxic or non-toxic substances which are eliminated out of the body.

With synergism, an enzyme function could either be inhibited (restricted) or accelerated in some way. Either way, the result is that the chemicals are either "free" or "enhanced" to cause a greater biologic effect in the body.

Civil War cannonball kills Virginia relic collector

http://www.newsweek.com/id/135153?tid=relatedcl

By STEVE SZKOTAK Associated Press Writer
Article Last Updated: 05/02/2008 07:24:17 PM PDT

Brenda White, widow of Civil War Relics collector Sam White, looks over... ((AP Photo/Steve Helber)) CHESTER, Va.—Like many boys in the South, Sam White got hooked on the Civil War early, digging up rusting bullets and military buttons in the b attle-scarred earth of his hometown.

As an adult, he crisscrossed the Virginia countryside in search of wartime relics—weapons, battle flags, even artillery shells buried in the red clay. He sometimes put on diving gear to feel for treasures hidden in the black muck of river bottoms.

But in February, White's hobby cost him his life: A cannonball he was restoring exploded, killing him in his driveway.

More than 140 years after Lee surrendered to Grant, the cannonball was still powerful enough to send a chunk of shrapnel through the front porch of a house a quarter-mile from White's home in this leafy Richmond suburb.

White's death shook the close-knit fraternity of relic collectors and raised concerns about the dangers of other Civil War munitions that lie buried beneath old battlefields. Explosives experts said the fatal blast defied extraordinary odds.

"You can't drop these things on the ground and make them go off," said retired Col. John F. Biemeck, for merly of the Army Ordnance Corps.

White, 53, was one of thousands of hobbyists who comb former battlegrounds for artifacts using metal detectors, pickaxes, shovels and trowels.

"There just aren't many areas in the South in which battlefields aren't located. They're literally under your feet," said Harry Ridgeway, a former relic hunter who has amassed a vast collection. "It's just a huge thrill to pull even a mundane relic out of the ground." After growing up in Petersburg, White went to college, served on his local police force, then worked for 25 years as a deliveryman for UPS. He retired in 1998 and devoted most of his time to relic hunting.

He was an avid reader, a Civil War raconteur and an amateur historian who watched History Channel programs over and over, to the mild annoyance of his wife.
"I used to laugh at him and say, 'Why do you watch this? You know how it turned out. It's not going to be any different,'" Brenda White said.

She didn't share her husband's devotion, but she was understanding of his interest.
"True relic hunters who have this passion, they don't live that way vicariously, like if you were a sports fanatic," she said. "Finding a treasure is their touchdown, even if it's two, three bullets."

1999 EPA Position Paper Range Rule
To
Department of Defense (DoD)
Ms. Sherri W. Goodman
Deputy Under Secretary of Defense
dated April 22, 1999

EPA ISSUES AT CLOSED, TRANSFERRED, AND TRANSFERRING MILITARY RANGES
During the last several years an increasing number of issues have arisen relative to UXO, hazardous contaminants, and military range cleanup. The following represents a description of the major EPA issues or concerns along with installations where we have encountered these problems. This list should not be construed as exhaustive.

1. **Range Assessment and Investigation**
    1. Range investigations often lack sufficient site-specific information. The Services and the USACE generally are not adhering to CERCLA standards and procedures for assessment and cleanup. The PA/SI, RI/FS, Removal, Remedial, and NOFA processes need to be equivalent to those specified under CERCLA and the NCP. [For example, at the Black Hills Army Depot the PA/SI did not meet the minimum requirements set by EPA for assessment. The RI/FS workplans and all associated documents were based upon this deficient PA/SI and were also determined not to meet EPA minimum requirements. Other sites with similar issues include Savanna Army Depot, Badlands Bombing Range, Lowry Bombing Range, Fort Ritchie, Fort Meade, and the Nansemond Ordnance Depot.]

    2. There has been an increasing tendency for UXO investigations to use statistical grid sampling methods. Although statistical grid sampling may yield additional information, extrapolation of these results often lead to inappropriate decisions. The statistical grid sampling approach used by the USACE would only be appropriate if one expected a relatively uniform distribution of UXO, which is not the case at military ranges. EPA believes that in order to achieve protection of human health and the environment, UXO investigations should be based on a combination of information such as historical data (e.g., archives, photos, interviews), range use information, visual site inspections, previous detection surveys, previous Explosives and Ordnance Demolition (EOD) Unit response actions, and the resultant knowledge of impact zones and "hot spots." [For example, at the Lowry Bombing Range the USACE proposed and attempted to use the statistical sampling and extrapolation methodology. The State of Colorado has recently indicated that those methods significantly underestimated the amount of ordnance present (inert or live). Other sites that have similar issues are Savanna Army Depot, Fort Ord, Fort Ritchie, and the Nansemond Army Depot.]

    3. Military ranges generally are not designated by the Services or the USACE as areas of concern (AOC) even when the installation is listed on the

Superfund National Priorities List (NPL). EPA believes all areas at closed, transferred, and transferring bases with known or suspected UXO are areas of concern and need to be evaluated in the CERCLA and NCP context. More recently, the Services and the USACE have unilaterally excluded UXO areas from proposed CERCLA Records of Decisions (RODs) or from RODs being implemented where UXO was included in the remedy (e.g., NAF Adak, Umatilla Army Depot) . [At the Umatilla Army Depot, the Army has indicated that they will not address UXO as specified in the ROD. This decision is now in dispute resolution. At NAF Adak, the Navy has recently indicated that they do not wish to proceed with a ROD for a separate UXO operable unit. At Savanna Army Depot, the entire depot (approximately 21 square miles) was initially utilized as a firing range. Activities up to 1997 were not directed at UXO assessment and response, rather they were directed in large degree toward open burning and disposal grounds and non-explosive chemical contamination. Up to this time, UXO in potential firing areas was not included within the realm of the potential cleanup, therefore, most UXO prone or suspected areas were not considered areas of concern. In 1998, the Army tentatively agreed to evaluate several options for assessing areas known or suspected to be contaminated with UXO. The USACE has proposed to use Sitestats/Gridstats which EPA believes is a very problematic analytical method (see 1b above). Other facilities that have ranges with similar issues include, but are not limited to: Jefferson Proving Ground, Lowry Bombing Range, Badlands Bombing Range, Fort Meade, Camp Bonneville, Fort Ord, Aberdeen Proving Ground, Tobyhanna Army Depot, NAF Adak, and Fort Ritchie.]

4. EPA is encouraged by DoD's recent shift to address ranges through a "risk management" strategy focusing on both range assessment and remediation for UXO and other constituents. DoD needs to continue to develop and ultimately implement this approach through the USACE and the Services. However, despite this recent change in strategy, EPA has noted at a number of ranges the USACE continues to apply statistical sampling and risk assessment methods which often lead to premature "informed risk management decisions." Since the proposed Range Rule process is heavily dependent upon accurate "informed risk management decision making," DoD needs to ensure that this revised strategy develops accurate information, reduces short-term risks, and sets the stage to achieve long-term risk reduction goals. The current approach utilized by the USACE generally does not address these goals. [For example, at Fort Ritchie, the Army had proposed to surface clear and provide contractor support in UXO areas that have been proposed by the LRA to include a residential area. Based in large degree upon the statistical sampling, the Army wanted to perform only a surface clearance, even though the DDESB standards recommend much more conservative clearance for residential land use. It is important to note that in many areas where UXO clearance is not performed to the frost line or sufficient depth, additional UXO is likely to surface via frost heaving or erosional processes (i.e., mortars have been found to surface on a golf course). These and other UXO-related issues require the

Army develop a long-term UXO remedial strategy for this area. Other ranges with similar circumstances include Savanna Army Depot, Lowry Bombing Range, Fort Meade, Nansemond Army Depot, Fort Ord, Jefferson Proving Ground, and Badlands Bombing Range.]

5. DoD is generally not applying the best available technologies to assess and remediate UXO. In most cases, there appears to be a standard approach to default to the traditional methods known as "mag and flag". Yet, according to the USACE and others, application of these methods often results in more expensive, slower, and less accurate UXO detections than other demonstrated technologies. DoD needs to begin using better technologies earlier to achieve the most protective level of UXO cleanup, while continuing to examine the capabilities, uncertainties, and acceptabilities of the various detection approaches. [For example, at Fort Ritchie only surface clearance is proposed for areas known to be contaminated with UXO that will be used for residential and commercial purposes. When asked what measures would be used during excavation, the Army indicated they would only have personnel on-site with a magnetometer. At Badlands Bombing Range, the artillery impact area was surveyed using mag and flag but this location would have been suitable for using multiple towed array sensor methods that have yielded more reliable results at other similar locations at Badlands.]

6. In those cases where UXO investigations at ranges (or UXO sites) have been performed, the general approach has been to limit investigation to known ranges/ UXO sites only. Investigations should not be limited to within the "fenceline," especially when information suggests that UXO problems are more extensive. [Although Aberdeen Proving Ground has agreed to perform additional clearance ¼ mile around the existing facility, no additional investigation is being performed off-site (e.g., especially in the adjacent rivers or in the Chesapeake Bay). Other sites with similar issues include the Badlands Bombing Range, Savanna Army Depot, Tooele Army Depot, Lowry Bombing Range, Jefferson Proving Ground, and NAF Adak.]

2. Non-Compliance with Regulatory Authorities

1. DDESB 6055.9 Standards for depth of clearance generally are not being followed. [For example, at Fort Ritchie a surface clearance is proposed for a residential area. DDESB 6055.9 Standards (chapter 12) specifies that default depths of clearance to 10 feet should be used unless an alternative is justified and approved by the DDESB based on detailed site-specific information. As no detailed investigations have taken place over the range areas at Fort Ritchie, a default clearance depth of 10 feet should be used (unless bedrock is shallower). Please note that EPA views chapter 12 as critical due to the nature of explosives safety issues. In addition, many other range situations have already been documented to have uncontrolled listed wastes (and/or hazardous substances) and may present an imminent and substantial endangerment to human health and the environment. Other ranges with similar problems include: Savanna Army Depot, Fort Meade,

Fort Ord, Badlands Bombing Range, Lowry Bombing Range, Umatilla Army Depot, Camp Bonneville, Jefferson Proving Ground, Nansemond Ordnance Depot, Tooele Army Depot, and NAF Adak.]

2. Current EPA environmental regulations, including, but not limited to, RCRA and CERCLA, are applicable, but generally are not being followed. [This is particularly relevant to the depth of clearance of UXO. Many UXO-contaminated areas at closed, transferred, or transferring military ranges are: 1) not being investigated, or 2) when discovered, are not being addressed consistent with human health, environmental, or explosives safety regulations. These types of situations have been noted at many ranges including: Savanna Army Depot, Fort Meade, Fort Ord, Badlands Bombing Range, Lowry Bombing Range, Umatilla Army Depot, Camp Bonneville, Jefferson Proving Ground, Nansemond Ordnance Depot, Tooele Army Depot, and NAF Adak. Other information pertinent to this issue is presented in 1(a) above, and 4(a) below.]

3. Communication, Coordination and Dissemination of Information

Efforts by the Services and the USACE to communicate the scope, nature, and extent of UXO response activities have not always been successful. In some cases, there has been little or no effort. Regulators and the public need to be better informed during all stages of the efforts to address military ranges. The over-reliance on time-critical response actions also tends to reduce coordination with the regulators and other non-DoD parties. [For example, the regulators and the public have been discouraged by the USACE lack of cooperation at the Black Hills Army Depot. Adequate information and answers concerning investigations and cleanup activities have not been provided to these parties. At Fort Wingate there has been little or no public involvement concerning UXO issues. At BRAC RAB meetings only cursory information is presented on the USACE activities. Neither the State, Tribes, or the general public have received sufficient documentation on the USACE UXO activities at Fort Wingate that has both BRAC and FUDS properties. Another example is with the proposed transfer of property at Fort McClellan. The Army has been in the process of negotiating a transfer of UXO contaminated property with the U.S. Fish and Wildlife Service (USFWS). It appears that State and Federal regulatory agencies have not been contacted to participate in these negotiations. Similar situations have been noted at the Badlands Bombing Range, Lowry Bombing Range, Jefferson Proving Ground, Fort Ord, and Fort Ritchie.]

4. Remedy Selection and Implementation

1. EPA believes some range UXO detection/clearance operations may not be appropriate for CERCLA removal nor RCRA emergency situations. To further complicate matters is the Service/USACE preference to implement "CERCLA-like" accelerated actions. Some of these actions may not be consistent with CERCLA and the NCP and generally result in less regulator and public oversight/involvement. Using time-critical/emergency responses as the sole response paradigm should not be a default approach for the Services/USACE, especially for range problems that are well beyond the scope of such actions. [For example, at Fort Ord clearance was conducted

for several years as a time-critical removal action. Similar circumstances are noted at Jefferson Proving Ground, Umatilla Army Depot, and Fort Meade.]

2. There is a general over-reliance on institutional controls as the principal remedy component or as the only remedy to ensure protectiveness. Where employed, the institutional controls may not be adequately defined, roles and responsibilities are left unclear and ultimately they may not prevent future incidents where UXO is encountered. The Services and the USACE are not always implementing adequate access controls (e.g., fencing, posting of guards, patrols, etc.) where needed. In addition, periodic inspections need to be performed at many locations where UXO has been identified, is suspected, or may have surfaced via erosion or frost heaving at previously cleared areas. [For example, at NAF Adak institutional controls are proposed for vast areas outside the town where UXO will generally not be cleared, nor has the area been adequately investigated despite DoD records indicating potentially extensive UXO contamination. This appears to be a problem because the recent reuse proposals to expand the town's uses are expected to lead to an increase in the population (primarily members of the Aleut Tribe, especially children). At Tobyhanna Army Depot, a 20,000 acre UXO area is now a State park where only signs were posted. The park was closed in 1997 when 53 unexploded 37 mm shells were found and a recent removal action has found significant additional UXO. Other examples of access problems have been noted at Camp Elliott (Tierrasanta), Camp Bonneville, Jefferson Proving Ground, Lowry Bombing Range, Badlands Bombing Range, Fort Ritchie, Fort Wingate, and Nansemond Army Depot.]

3. Effective regulatory and DoD oversight is an important aspect of remedy implementation. When it is not implemented, the risk of incidents increase. [For example, the UXO from the Fort Irwin cleanup was mistaken for clean scrap and transported to a scrap yard for recycling (in violation of RCRA – the UXO went to a non-permitted facility without manifest). An employee was killed when he attempted to cut live UXO with welding equipment. Other examples of where better oversight was needed include, Fort Ord, Jefferson Proving Ground, and Fort Meade where UXO contaminated areas were inappropriately slated for transfer.]

5. Transfer of UXO Contaminated Land

1. EPA believes DoD generally should retain ownership and/or control of UXO areas that are not yet assessed and/or cleaned up as determined by DoD, the appropriate regulatory agencies and the public (e.g., "permanently dudded" impact areas; UXO burial sites; sites not yet scheduled to be remediated). Federal land management agencies generally want DoD to complete all environmental restoration prior to any transfer to them. Present land transfer practices by DoD indicate that UXO contaminated lands continue to be transferred. [At Fort McClellan the transfer of approximately 10,000 acres of UXO contaminated land has been proposed. The area has not been adequately assessed and UXO contamination not yet addressed. The

proposed transfer is to the USFWS who do not appear to have sufficient resources to address UXO contamination of this magnitude. At Jefferson Proving Ground, a portion of UXO contaminated property north of the firing line was proposed for transfer to the USFWS. The area was proposed to be used for recreational purposes, but it has not been thoroughly assessed and UXO not addressed. It has also been mentioned that the USFWS has since decided not to proceed with the transfer. At Nomans Land Island,

although the fed-to-fed transfer has already taken place, DoD has a continuing obligation to address UXO safety issues there, as does the USFWS (i.e., to secure the property against trespassers, per the transfer agreement). Although the area is planned to be used as a wildlife refuge, it is known to be frequented by boating enthusiasts, and UXO safety issues remain because storm events and other processes (freeze/thaw) will continue to expose UXO in areas where only surface clearance has been performed. At Fort Wingate, two closed test ranges containing UXO are slated for transfer to the DOI. The land may then be re-developed for residential, commercial, open space, and subsistence farming/ranching uses. Much of these lands are proposed to be transferred to the DOI. Another example is the UXO contaminated areas transferred to the State at the Tobyhanna Army Depot.]

2. In some cases, the Services and the USACE have performed only a cursory investigation (see # 1). Based upon limited information, property has been and is being transferred. Rather than sufficiently assessing sites and making the property safe for use or transfer, the DoD and the Services appear to be transferring the land and then waiting for others to identify problems for DoD response. [For example, DoD is contacted periodically about newly found UXO at a number of transferred sites. This has been noted at the Aberdeen Proving Ground, Raritan Arsenal, Morgan Depot, White Sands Missile Range, Lowry Bombing Range, Badlands Bombing Range, Fort Ritchie, Tobyhanna Army Depot, Fort Ord, Fort Meade (i.e.,Tipton Air Field), Jefferson Proving Ground, Raritan Arsenal, Morgan Depot, and at EPA private sites such as the Cohen Property Site in Massachusetts. Although the EOD units have a good response record, their responses tend to be limited to the newly found UXO, with generally no further investigation performed to determine the nature and extent of any additional UXO. This EOD "house call" type follow-up cannot substitute for adequate investigations.]

The Wingspread Statement on the Precautionary Principle

January 1998

The release and use of toxic substances, the exploitation of resources, and physical alterations of the environment have had substantial unintended consequences affecting human health and the environment. Some of these concerns are high rates of learning deficiencies, asthma, cancer, birth defects and species extinctions; along with global climate change, stratospheric ozone depletion and worldwide contamination with toxic substances and nuclear materials.

We believe existing environmental regulations and other decisions, particularly those based on risk assessment, have failed to protect adequately human health and the environment - the larger system of which humans are but a part.

We believe there is compelling evidence that damage to humans and the worldwide environment is of such magnitude and seriousness that new principles for conducting human activities are necessary.

While we realize that human activities may involve hazards, people must proceed more carefully than has been the case in recent history. Corporations, government entities, organizations, communities, scientists and other individuals must adopt a precautionary approach to all human endeavors.

Therefore, it is necessary to implement the Precautionary Principle: When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.

In this context the proponent of an activity, rather than the public, should bear the burden of proof.

The process of applying the Precautionary Principle must be open, informed and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives, including no action.

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Perchlorate Summaries

Fort Ord, CA

Facility & Location

Fort Ord is located near Monterey Bay in central California, approximately 80 miles south of San Francisco. Since 1917, the installation has served primarily as training and staging facility for infantry troops. In 1940, the 7th Infantry Division (ID) was activated, then 4th, 5th and 6th Divisions as well. In 1957, Fort Ord became a United States Army Infantry Training Center. In 1974, the 7th ID was reactivated at Fort Ord. In 1983, the 7th ID was converted to a light division, operating without heavy tanks or armor. Fort Ord was selected in 1991 for closure under the Base Realignment and Closure (BRAC) process. Troops were reassigned in 1994 when the post formally closed. Although Army personnel still operate a small portion of the post, active Army divisions are not stationed at Fort Ord.

EPA identified Fort Ord as a Superfund site in 1990 due to groundwater contamination. A Multi-Range Area (MRA) located in the south-central portion of Fort Ord is expected to have the highest density of munitions and explosives of concern such as artillery and mortar, containerized and uncontainerized explosives and propellants.

Media Sampled

The Army has tested soil at Fort Ord for perchlorate.
Soil -- The Army tested 442 samples from the Site 39 - Multi-Range Area. Of these, 41 samples detected perchlorate ranging from 13 ppb to 106 ppb. The Army also tested ten soil samples from Site 39-Range 36A. Perchlorate was not detected in any of these samples.

Appropriate Action

Not applicable

POC Information

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These Munitions are widely used in the training of US Military troops.

Pyrotechnics are used to send signals, to illuminate areas of interest, to simulate other weapons during training, and as ignition elements for certain weapons.(1)

Pyrotechnic Devices

Military Explosives (Chemistry) 30 September 1984

UNITED STATES PYROTECHNICS; CHAPTER 10

All pyrotechnic compositions contain oxidizers and fuels. Additional ingredients present in most compositions include binding agents, retardants, and waterproofing agents. Ingredients such as smoke dyes and color intensifiers are present in the appropriate types of compositions.

Oxidizers: are substances in which anoxidizing agent is liberated at the high temperatures of the chemical reaction involved.

Fuels: include finely powdered aluminum, magnesium, metal hydrides, red phosphorus, sulfur, charcoal, boron, silicon, and suicides. The most frequently used are powdered aluminum and magnesium.

Binding agents: include resins, waxes, plastics, and oils. These materials make the finely divided particles adhere to each other when compressed into pyrotechnic items.

Retardants are materials that are used to reduce the burning rate of the fuel-oxidizing agent mixture, with a minimum effect on the color intensity of the composition.

Waterproofing agents are necessary in many pyrotechnic compositions because of the susceptibility of metallic magnesium to reaction with moisture, the reactivity of metallic aluminum with certain compounds in the presence of moisture, and the hygroscopicity of nitrates and peroxides.

Color intensifiers:

hexachloroethane (C2Cl6)
hexachlorobenzene (C6Cl6)
polyvinyl chloride
dechlorane (C1oCl12).

Smoke dyes are azo and anthraquinone dyes. These dyes provide the color in smokes used for signaling, marking, and spotting.

Flares and Signals The illumination provided by a flare is produced by both the thermal radiation from the product oxide particles and the spectral emission from excited metals.

Infrared Flare Formulas:

Silicon
Potassium nitrate (KNO3)
Cesium Nitrate (CsNO3)
Rubidium Nitrate (RbNO3)
Hexamethylene
tetramine
Epoxy resin

Red-Green Flare System:

Barium nitrate
Strontium nitrate 13
Potassium perchlorate
Magnesium
Dechlorane
Polyvinyl acetate resin

Signal flares are smaller and faster burning than illuminating flares. Various metals are added these compositions to control the color of the flame.

Colored and White Smoke The pyrotechnic generation of smoke is almost exclusively a military device for screening and signaling. Screening smokes are generally white because black smokes are rarely sufficiently dense. Signal smokes, on the other hand, are colored so as to assure contrast and be distinct in the presence of clouds and ordinary smoke.

Venturi thermal generator type. The smoke producing material and the pyrotechnic fuel block required to volatilize the smoke material are in separate compartments. The smoke producing material is atomized and vaporized in the venturi nozzle by the hot gases formed by the burning of the fuel block.

Burning type. Burning type smoke compositions are intimate mixtures of chemicals. Smoke is produced from these mixtures by either of two methods. In the first method, a product of combustion forms the smoke or the product reacts with constituents of the atmosphere to form a smoke. In the second method, the heat of combustion of the pyrotechnic serves to volatilize a component of the mixture which then condenses to form the smoke. White phosphorus, either in bulk or in solution, is one example of the burning type of smoke generator.

Explosive dissemination type. The smoke producing material is pulverized or atomized and then vaporized, or a preground solid is dispersed by the explosion of a bursting charge. The explosive dissemination smoke generator may contain metallic chlorides which upon dispersal, hydrolyze in air. Examples are titanium, silicon, and stannic tetrachloride.

Smoke Agent Mixtures:

White phosphorus
Sulfur trioxide
FS agent

HC mixture
FM agent
Crude oil

The preferred method of dispersing colored smokes involves the vaporization and condensation of a colored organic volatile dye. These dyes are mixed to the extent of about 50 percent with a fuel such as lactose (20 percent) and an oxidizer (30 percent) for which potassium chlorate is preferred.

Tracers and Fumers The principal small arms application of military pyrotechnics is in tracer munitions where they serve as incendiaries, spotters, and as fire control. Two types of tracers are used. The difference between the two types is the method of tracking. The more frequently used tracer uses the light produced by the burning tracer composition for tracking. Smoke tracers leave a trail of colored smoke for tracking. Red is the flame color most often employed in tracers.

Igniter and Tracer Compositions

Strontium peroxide
Magnesium
1-136 Igniter
Calcium resinate
Barium peroxide
Zinc stearate
Toluidine red (identifier)
Strontium nitrate
Strontium oxalate
Potassium perchlorate
Polyvinyl chloride

Incendiaries Two types of incendiaries are commonly used. The traditional type is a bomb containing a flammable material. These materials include thermite (a mixture of aluminum and rust), phosphorus, and napalm. In addition, the case of the bomb may be constructed of a material such as magnesium that will burn at a high temperature once ignited.Depleted uranium is used extensively in pyrotechnics which have armor piercing capabilities.

Depleted uranium deficient in the more radioactive isotope U235, is the waste product of the uranium enrichment process. The depleted uranium is formed into projectiles that can penetrate armor because of their high density and mechanical properties. The impact of the projectile causes the uranium to form many pyrophoric fragments which can ignite fuel and munition items.

Pyrophoric Metals

U	Uranium
Th	Thorium
Zr	Zirconium
Hf	Hafnium
Ce	Cerium
La	Lanthanum

Pr	Praseodymium
Nd	Neodymium
Sm	Samarium
Y	Yttrium
Ti	Titanium

Delays and Fuses Delay compositions are mixtures of oxidants and powdered metals which produce very little gas during combustion.

Photoflash Compositions Photoflash compositions are the single most hazardous class of pyrotechnic mixtures. The particle size of the ingredients is so small that burning resembles an explosion. The various photoflash devices are similar, differing principally in size and the amount of delay.

Colored smokes:

Yellow: Auramine hydrochloride
Green: 1,4-Di-p-toluidinoanthraquinone with auramine hydrochloride
Red: 1-Methylanthraquinone
Blue: Not suitable for signaling because of excessive light scatter.

Currently used dyes:

Orange: 1-(4-Phenylazo)-2-naphthol
Yellow: N, N-Dimethyl-p-phenylazoaniline
Blue: 1,4-Diamylaminoanthraqdinone

Black Powders Used in Pyrotechnics

Potassium nitrate
Sodium nitrate
Charcoal
Coal (semibituminous)
Sulfur

Ignition Mixtures Components

Aluminum (powdered)
Ammonium dichromate
Asphaltum
Barium chromate
Barium peroxide
Boron (amorphous)
Calcium resinate
Charcoal
Diatomaceous earth (See also superfloss)
Specular Hematite / Barshot (Fe203) (Red) CAS 14808-60-7 / 14464-46-1
Magnetite/Black Iron Oxide (Fe304) Powder from READE (Black)
Potassium nitrate
Potassium perchlorate
Laminac
Magnesium (powdered)

Sodium nitrate
Nitrocellulose
Parlon (chlorinated rubber)
Pb02 -
Paleo Bond Adhesive Pb304
Sr peroxide
Sugar
Superfloss
Titanium
Toluidine red toner
Vegetable oil
Vistanex (polyisobutylene)
Zinc Stearate
Zirconium

Referances:

1) Handbook on the Management of Ordnance and Explosives at Closed, Transferring, and Transferred Ranges and Other Sites; December 2001 www.epa.gov/fedfac/pdf/IFUXOCTTHandbook.pdf

US EPA 2002: Handbook on the Management of Ordnance and Explosives at Closed, Transferring, and Transferred Ranges and Other Sites

Chemicals Found in Pyrotechnics
Aluminum
Barium
Chromium
Hexachlorobenzene
Hexachloroethane
Iron
Magnesium
Manganese
Titanium
Tungsten
Zirconium
Boron
Carbon
Silicon
Sulfur
White Phosphorus
Zinc
Chlorates
Chromates
Dichromates
Halocarbons
Iodates
Nitrates
Oxides
Perchlorates

Privatization of Superfund Cleanup
Fort Ord, California

Pyrotechnic Devices

These Munitions are widely used in the training of US Military troops, quite possibly the single most widely used munitions in training

Constituents Not being Looked For In areas of Residential Development

Constituents not found in EPA Testing models Table 2

Fort Ord Community Advisory Group
October 2008

Table 2: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminats Fort Ord, California

Compound	CAS No.	Recognized/Suspected Human Health Hazards
1) Lead Azide	13424-46-9	Suspected: Carcinogen P65
2) Mercury Fulminate	628-86-4	Recognized: Developmental Toxicant P65-MC
3) Diazodinitrophenol (DDNP)	87-31-0	No Health data found
4) Lead Styphnate	15245-44-0	No Health data found
5) Tetracene (hydrocarbon)?	92-24-0	Suspected: Carcinogen CCRIS
6) Potassium Dinitrobenzofuroxane (KDNBF)	29267-75-2	No Health data found
7) Lead Mononitroresorcinate (LMNR)	51317-24-9	No Health data found
8) Antimony sulfide	1315-04-4	No Health data found
9) Zirconium	7440-67-7	No Health data found
10) Lead dioxide	1309-60-0	Recognized: Carcinogen P65-MC, Developmental Toxicant P65-MC, Reproductive Toxicant P65-MC
11) Gum Arabic	no match	No Health data found
12) Potassium chlorate	3811-04-9	HAZMAP: Methemoglobinemia, Anemia,
13) Lead mononitroresorcinate	51317-24-9	HAZMAP: Neurotoxin, Hepatotoxin, Nephrotoxin, Reproductive Toxin
14) Nitrocellulose (BK2-W)	9004-70-0	HAZMAP: Neurotoxin,
15) Lead thiocyanate	592-87-0	HAZMAP: Neurotoxin, Hepatotoxin, Nephrotoxin, Reproductive Toxin
16) Nitrostarch	?	No Health data found
17) 1,2,4-Butanetriol Trinitrate (BTN)	6659-60-5	HAZMAP DOT listed Hazardous Materials
18) Diethyleneglycol Dinitrate (DEGN)	693-21-0	HAZMAP DOT listed Hazardous Materials, Suspected: Neurotoxicant RTECS, Respiratory Toxicant RTECS
19) Triethylene Glycoldinitrate (TEGN)	111-22-8	No Health data found
20) 1,1,1 Trimethylolethane Trinitrate (TMETN)	3032-55-1	No Health data found
21) Ethylenediamine Dinitrate (EDDN)	20829-66-7	No Health data found
22) Ethylenedinitramine (Haleite)	505-71-5	No Health data found
23) Nitroguanidine (NQ)	556-88-7	Suspected: Respiratory Toxicant RTECS
24) 2,4,6Trinitrophenylmethylnitramine (Tetryl)	479-45-8	Suspected: Immunotoxicant HAZMAP, Neurotoxicant DAN RTECS, Respiratory Toxicant HAZMAP, Skin or Sense Organ Toxicant HAZMAP RTECS
25) Ammonium Picrate	131-74-8	HAZMAP: Skin Sensitizer, Hepatotoxin
26) Hexamethylene	110-82-7	Suspected: Neurotoxicant DAN HAZMAP RTECS
27) Dechlorane	2385-85-5	Recognized: Carcinogen P65, Suspected: Endocrine Toxicant BKH EPA-SDWA IL-EPA JNIHS KEIT RTECS,Gastrointestinal or Liver Toxicant ATSDR RTECS, Kidney Toxicant MERCK
28) Sulfur trioxide	7446-11-9	Suspected: Respiratory Toxicant RTECS, Skin or Sense Organ Toxicant RTECS
29) Calcium resinate	9007-13-0	No Health data found
30) Barium peroxide	1304-29-6	New Jersey Haz. Sub. Fact Sheet: http://nj.gov/health/eoh/rtkweb/documents/fs/0190.pdf

Table 2: Military Munitions UXO/OEW Contaminates of Concern (COC's) Potential Soil Contaminats Fort Ord, California

31) Zinc stearate	557-05-1	Skin, eye, and respiratory tract irritant CAMEO
32) Toluidine red	2425-85-6	No Health data found
33) Strontium nitrate	10042-76-9	NJ-HSFS: Repeated exposure may damage the lungs, heart, liver, and kidneys and affect the nervous system.
34) Strontium oxalate	814-95-9	No Health data found
35) Auramine hydrochloride (yellow)	2465-27-2	Suspected: Carcinogen CPDB, Gastrointestinal or Liver Toxicant RTECS
36) 1,4-Di-p-toluidinoanthraquinone (green)	128-80-3	No Health data found
37) 1-Methylanthraquinone (red)	954-07-4	HAZMAP: Possible Carcinogen, Hepatotoxin, Skin Sensitizer
38) 1-(4-Phenylazo)-2-naphthol (orange dye)	?	No Health data found
39) N,N-Dimethyl-p-phenylazoaniline (yel dye)	60-11-7	IARC: Possible Carcinogen, HAZMAP: Hepatotoxin, Skin Sensitizer
40) 1,4-Diamylaminoanthraqdinone (blue dye)	2646-15-3	No Health data found
41) Ammonium dichromate	7789-09-5	Recognized: Carcinogen P65-MC, Suspected: Cardiovascular or Blood Toxicant RTECS, Gastrointestinal or Liver Toxicant RTECS, Immunotoxicant EEC SNCI, Kidney Toxicant RTECS, Skin or Sense Organ Toxicant EEC
42) Asphaltum	8052-42-4	Recognized: Carcinogen P65
43) Barium chromate	10294-40-3	Recognized: Carcinogen P65-MC
44) Boron	7440-42-8	Suspected: Cardiovascular or Blood Toxicant KLAA, Developmental Toxicant ATSDR, Neurotoxicant LU, Respiratory Toxicant LU
45) Potassium nitrate	7757-79-1	HAZMAP: Methemoglobinemia
46) Laminac	?	No Health data found
47) Sodium nitrate	7631-99-4	Suspected: Cardiovascular or Blood Toxicant RTECS, Respiratory Toxicant RTECS
48) Parlon (Chlorinated rubber)	9006-03-5	EPA Pesticide Inert Ingredient
49) Superfloss	7631-86-9	No Health data found
50) Vistanex (polyisobutylene)	9003-27-4	No Health data found
51) Thorium Tu	7440-29-1	Recognized: Carcinogen P65-MC
52) Zirconium Zr	7440-67-7	Suspected: Respiratory Toxicant NEME
53) Hafnium Hf	7440-58-6	No Health data found
54) Cerium Ce	7440-45-1	Suspected: Respiratory Toxicant NEME, Dermatotoxin HAZMAP
55) Lanthanum La	7439-91-0	No Health data found
56) Praseodymium Pr	7440-10-0	No Health data found
57) Neodymium Nd	7440-00-8	No Health data found
58) Samarium Sm	7440-19-9	HAZMAP: Internal Toxicity: High
59) Yttrium Y	7440-65-5	HAZMAP: Hepatotoxin, Fibrogenic
60) Rubidium Nitrate	13126-12-0	No Health data found
61) Cesium Nitrate	7789-18-6	Substance may be toxic to blood central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.
62) Specular Hematite	14808-60-7	No Health data found
63) Magnetite	1309-38-2	No Health data found

Constituents compiled from: Chapter 10 Pyrotechnic Devices: Military Explosives (Chemistry) 30 September 1984