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PUBLIC HEALTH ASSESSMENT

FORT ORD

MARINA, MONTEREY COUNTY, CALIFORNIA

CERCLIS NO. CA7210020676

Prepared by the

Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30-day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Use of trade names is for identification only and does not constitute endorsement by the Public Health Service or the U.S. Department of Health and Human Services.

FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, is an agency of the U.S. Public Health Service. It was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the *Superfund* law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. (The legal definition of a health assessment is included on the inside front cover.) If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements.

Exposure: As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists then evaluate whether or not there will be any harmful effects from these exposures. The report focuses on public health, or the health impact on the community as a whole, rather than on individual risks. Again, ATSDR generally makes use of existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in disease registries. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further research studies are needed.

Conclusions: The report presents conclusions about the level of health threat, if any, posed by a site and recommends ways to stop or reduce exposure in its public health action plan. ATSDR is primarily an advisory agency, so usually these reports

identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, full-scale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Interactive Process: The health assessment is an interactive process. ATSDR solicits and evaluates information from numerous city, state and federal agencies, the companies responsible for cleaning up the site, and the community. It then shares its conclusions with them. Agencies are asked to respond to an early version of the report to make sure that the data they have provided is accurate and current. When informed of ATSDR's conclusions and recommendations, sometimes the agencies will begin to act on them before the final release of the report.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records, and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E-56), Atlanta, GA 30333.

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LIST OF ACRONYMS

ATSDR	Agency for Toxic Substances and Disease Registry
BGS	below ground surface
BLM	Bureau of Land Management
BRAC	Base Realignment and Closure
BRP	Base Reuse Plan
CAIS	Chemical Agent Identification Sets
CDC	Centers for Disease Control and Prevention
CDHS	California Department of Health Services
CE	Corps of Engineers
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CREG	Cancer Risk Evaluation Guideline
CRL	Certified Reporting Limit
DEH	Directorate of Engineering and Housing
DOD	Department of Defense
EE/CA	Engineering Evaluation/Cost Analysis
EMEG	Environmental Media Evaluation Guide
EOR	Explosive Ordnance Reconnaissance
EPA	Environmental Protection Agency
FFA	Federal Facilities Agreement
FO-SVA	Fort Ord-Salinas Valley Aquiclude
HARP	Health Activities Recommendation Panel
HLA	Harding-Lawson Associates
LTHA	Lifetime Health Advisory for drinking water
MCL	Maximum Contaminant Level
MCHD	Monterey County Health Department
MCWD	Marina County Water District
NaCl	Sodium Chloride
NCEH	National Center for Environmental Health
NPL	National Priority List
OE	Ordnance and Explosives
PCE	Tetrachloroethylene
PHAP	Public Health Action Plan
POM	Presidio of Monterey
ppb	parts per billion
RAB	Restoration Advisory Board
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
1,1,1-TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene

TCRAs	Time Critical Removal Actions
VOC	Volatile Organic Compound
ug/dL	micrograms per deciliter
USACDP	US Army Chemical Demilitarization Program
UXO	Unexploded Ordnance

Fort Ord
Monterey County, California

SUMMARY

ATSDR evaluated the contamination at Fort Ord to determine whether people have been (in the past) or are now being exposed to (in contact with) hazardous substances, and, if so, whether the exposure(s) is harmful and should be stopped or reduced. We looked at the principal areas or sources of contamination and determined that *currently, no one is being exposed to contaminants from Fort Ord sources*. Further we evaluated past exposures and the potential for future exposures in the Fort Ord and Marina, California drinking water supply systems. The past exposures posed *no apparent health hazard* and it is not likely that future exposures of health significance will occur.

The volatile organic compounds (VOCs) detected in the past in Fort Ord's and Marina's drinking water wells were not at levels which could pose a threat to human health. Fort Ord's current drinking water wells are far removed from the landfill or other sources of contamination, drilled to deeper, uncontaminated aquifers, and, therefore, are unlikely to be contaminated in the future. No future pathways of human exposure to hazardous substances at levels of health significance have been identified. On this basis, ATSDR considers Fort Ord to be *No Apparent Public Health Hazard*.

Since Fort Ord was used for infantry training, some unexploded ordnance (UXO) and ordnance and explosives (OE) can be found on site. Those objects can pose a physical hazard. In areas planned for reuse, the Army plans to take all necessary actions prior to land transfer. The Army will produce an Engineering Evaluation/Cost Analysis (EE/CA) and an Action Memorandum which proposes and documents the action to be taken for OE sites. A final draft EE/CA will be available for public comment in October 1996. In the case of Bureau of Land Management (BLM) lands, some potential OE areas may be transferred prior to completing an EE/CA, Action Memorandum, and/or ordnance removal action.

There are seven stormwater outfalls on the Fort Ord beach. Sampling of stormwater discharges has not detected contaminants at levels that might result in adverse human health effects. Stormwater discharge events are infrequent and human contact with those discharges would be seldom and accidental. Therefore, the stormwater discharges from the outfalls are determined to be no apparent public health hazard.

UXO has been found in Monterey Bay and the U.S. Navy has, in the past, removed UXO which has been located. However, specific information is not available on the location and type of UXO that may still be present. In the past, ordnance may have been fired from Fort

Fort Ord

Ord into a designated Restricted Zone within Monterey Bay. Any UXO that might have resulted would probably rest at depths of 169 to 1,890 feet below the surface of the ocean; depths that are accessed only by experienced, technical divers. Because of the lack of information, ATSDR considers the UXO in Monterey Bay to be an indeterminant physical hazard.

The Beach Ranges at Fort Ord contain fragments of small-arms bullets which contain lead. The levels of lead found in the "light" and "moderate" areas of surface bullet coverage are not at levels which could pose a threat to human health. In the areas of "heavy" surface bullet coverage (about 4% of the Beach Range area) the lead and bullet fragments will be removed to a level below 1,860 ppm. A pilot study indicates that the visual and mechanical lead removal method to be employed will result in a clean-up that may be as low as 5.6 ppm. A campground and other recreational uses of a portion of the Beach Range Area is proposed. It is further proposed that access to areas of remaining low-levels of lead contamination will be restricted by boardwalks and railed trails. On this basis, because of the removal of high levels of lead contamination, because access will be restricted to other areas of lower-level contamination, and because the Beach Ranges will only be used for recreational purposes, ATSDR concludes that the proposed future use of the Beach Ranges are no apparent public health hazard.

INTRODUCTION

General Information

The Agency for Toxic Substances and Disease Registry (ATSDR) was established under the mandate of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980. CERCLA, also known as the "Superfund" law, authorized the U.S. Environmental Protection Agency (EPA) to conduct clean-up activities at hazardous waste sites. EPA was directed to compile a list of sites considered hazardous to public health. This list is termed the National Priorities List (NPL). The 1986 Superfund Amendments and Reauthorization Act (SARA) directed ATSDR to perform a public health assessment for each NPL site. In 1990, federal facilities were included as sites to be proposed for or listed on the NPL.

Public health assessments or health consultations are conducted by scientists from ATSDR (or from states with which ATSDR has cooperative agreements). The purpose of ATSDR's investigation is to determine whether people have been (in the past) or are being exposed to (in contact with) hazardous substances and if so, whether that exposure is harmful and should be stopped or reduced.

In conducting the public health investigation ATSDR uses three types of information: environmental data, community health concerns, and health outcome data. A major source of information is the extensive environmental data collected for EPA. This information is examined to determine whether people in the community might be exposed to hazardous materials from the NPL facility. If people are being exposed to these chemicals, ATSDR will determine whether the exposure is at levels which might cause harm. A second source of information used in the analysis is community health concerns. ATSDR collects health concerns of community members and determines whether health problems could be related to exposure to chemicals released from the NPL facility. If ATSDR finds that harmful exposures have occurred, a third source of information, health outcome data (information from local hospitals and other medical organizations), can be used to further assess the occurrence of specific illnesses.

ATSDR is an advisory agency. Its recommendations identify actions which EPA, the facility or local agencies may undertake. ATSDR presents its conclusions about whether exposures are occurring, *and* whether a health threat is present. *In some cases*, if enough information is available, it is possible to determine whether exposures occurred in the past. If it is found that a threat exists, recommendations are made to stop or reduce the threat to public health. *If exposures are occurring at levels which could pose a threat* to public health, ATSDR can undertake health education activities or certain additional follow-up studies. ATSDR can also

identify types of information which might be needed to make public health decisions, if such information is lacking.

Quality Assurance and Quality Control

In preparing this Public Health assessment, ATSDR relies on the information provided in the referenced documents and contacts. The agency assumes adequate quality assurance and control measures were followed with regard to chain-of-custody, laboratory procedures, and data reporting. The validity of the analyses and conclusions drawn in this document are determined by the availability and reliability of the referenced information.

Exposure Evaluation Process

In order to evaluate the effect on public health of contaminants at NPL sites, ATSDR's investigations focus on whether people have been *exposed* to (in contact with) the contaminants. To this end, the two most important tasks are;

1. *determining whether people have been exposed to hazardous materials from the NPL facility, and,*
2. *if exposure is possible or has occurred, determining whether the exposure is at a level and sufficient duration that could be a threat to public health.*

When ATSDR conducts a site visit at an NPL site, information is gathered to determine:

- whether contamination exists in the environment,
- whether contamination is in places where people in the surrounding community might come in contact with the contaminants, and
- if there is exposure, whether it is at a level high enough to affect the health of people in the community.

To make these decisions, the way that people might contact the contaminant will be examined. By this we mean whether the chemical is:

- inhaled;
- ingested (eaten or drunk); or
- absorbed through the skin.

Not all chemicals are a hazard for each of these methods of contact. For example, most metals are not harmful, particularly in very low amounts, if the only contact is by way of the skin.

BACKGROUND

Site Visits and Community Concerns Identified

ATSDR first conducted a site visit to the Fort Ord installation on June 26-27, 1991. The purpose of this visit was to rank the installation on the basis of its public health threat among the 91 other installations visited nationwide at that time. We also met with the public and local officials to gather information about possible public health concerns. Data on volatile organic compound (VOC) contamination of surface soils and groundwater was analyzed. The Fort Ord sanitary landfill and areas of light industrial activity were being studied as possible sources of this surface soil contamination and the groundwater contamination detected in installation supply wells and in the City of Marina's backup supply well. We saw no urgent public health threats at that time.

A second site visit was conducted on July 26, 1994 for the purpose of reviewing the contaminant data gathered during the site remedial investigations, the status of interim cleanup actions, and the plans and progress made in the identification and destruction or removal of unexploded ordnance (UXO) and ordnance and explosives (OE). In meetings with concerned and involved members of the Monterey County area, concerns were expressed to ATSDR about groundwater contamination of drinking water wells and the hazards represented by UXO and OE. After reviewing remedial investigation, base closure, and other relevant documents, a follow-up site visit was conducted by ATSDR on June 21-23, 1995 to meet with community members, the Restoration Advisory Board, and others to confirm the nature of the public health concerns associated with the site and to more fully explain the ATSDR health assessment process. In a fourth site visit ATSDR held public availability meetings in Seaside and Marina, California on May 13 and 14, 1996. During those meetings ATSDR gathered additional community concerns and explained the nature of the public health assessment process.

Through review of the information compiled by the remedial investigation process (Dames & Moore, 1993; HLA, 1994) and the observations gathered during site visits, ATSDR has not found evidence of current pathways of human exposure to contaminants released from Fort Ord sources. However, the community concerns voiced by individual members of the nearby communities during meetings, phone calls, or in correspondence have identified six questions that will be elaborated on further in this assessment:

- * Has groundwater contamination detected at Fort Ord affected drinking water wells on post or in nearby communities and, if so, has or will that contamination result in adverse human health effects?

Fort Ord

* Is the general public's health and safety at risk from unexploded ordnance (UXO) and ordnance and explosives (OE) when they visit Fort Ord or make use of the areas and facilities being made available or developed for public use following closure?

> In addition, do the Chemical Agent Identification Sets (CAIS) reportedly used and buried at Fort Ord represent a potential threat to human health?

* Does the surface water discharge from the beach stormwater outfalls contain contaminants which could threaten human health?

* Do the UXO in Monterey Bay pose a physical hazard to human health?

* Is the lead concentration in the Beach Ranges (Site 3) at levels which could cause adverse human health effects?

Site Description

Fort Ord is a 46 square miles (28,000 acres) former Army installation in northwestern Monterey County, California. The installation is bounded on the north and east by the Salinas River alluvial basin, on the west by the Pacific Ocean, and on the south by the Santa Lucia Range. The cities of Marina and Seaside are adjacent to Fort Ord on the northwest and southwest corners, respectively. The local terrain consists of gently rolling hills of active and older dune sand deposits. (Dames & Moore, 1993, p.4). Figure 1 shows the location of Fort Ord and surrounding areas.

Site History

The U.S. Army purchased 15,000 acres of land for maneuver and training ground for artillery and cavalry troops in 1917. In the late 1930's, permanent improvements were made. An additional 15,000 acres were purchased in 1938 for the development of the Main Garrison, which was constructed between 1940 and the 1960's. Fritzsche Army Airfield was completed in the early 1960's.

Between 1947 and 1975, the 4th Infantry Division occupied Fort Ord. The Fort served as an infantry training center during that time. Fort Ord was the 7th Infantry Division's home prior to 1947 and after 1975. In 1983, the 7th Division was converted to a light infantry division; the light infantry division does not use heavy tanks, armor, or artillery. Fort Ord, when active, employed approximately 15,000 active duty military personnel and 5,000 civilian employees (USACHPPM, 1994, p. 2).

Fort Ord operated as a permanent installation of Headquarters, Department of the Army, Forces Command. The primary mission of Fort Ord was to train troops. It provided command, administration, and logistical support and other functions necessary to operate and maintain facilities at Fort Ord and its subinstallations, the Presidio of Monterey and Fort Hunter Liggett. Fort Ord also supported active Army tenant units and other activities as

assigned, attached, or stationed, including satellite activities off the installation (US Army Corps of Engineers, 1993, p.1-2).

In 1985, chemical analyses of groundwater samples were collected from Fort Ord and Marina through the Marina County Water District (MCWD). When those samples showed trace levels of volatile organic compounds (VOCs), an evaluation of potential contaminant sources was initiated. The Fort Ord Landfill facility, which was active at the time, was suspected as a potential source area. The Central Coast Region of the California Regional Water Quality Control Board (RWQCB) then issued a Cleanup and Abatement Order to Fort Ord in February 1986. This order required Fort Ord to begin a hydrogeologic study to assess the possible effects of their landfills on the groundwater. The order was amended in November 1986 to revise dates and items of compliance for the hydrogeologic investigation.

In order to comply with the RWQCB order, the Fort Ord Directorate of Engineering and Housing (DEH), the Sacramento District of the Corps of Engineers (CE), and Harding-Lawson Associates (HLA) performed an investigation to evaluate groundwater quality and hydrogeologic characteristics in the Upper, 180-Foot, and 400-Foot Aquifer systems. Because the water supply wells are located throughout the site, the investigation was limited to the area immediately adjacent to the landfill.

Fort Ord was placed on the National Priorities List (NPL) by the EPA on February 21, 1990. The U.S. Army, EPA, and state of California entered into a Federal Facilities Agreement (FFA) which outlines the projected scope of work and schedule of work to be conducted at the site (Dames & Moore, 1993, p.1-8).

Under the provisions of public laws 100-526 and 101-510, the Base Realignment and Closure (BRAC) Commission was implemented by the Secretary of Defense to produce annual savings. The Department of Defense (DOD) established eight criteria for selecting bases;

1. Current and future mission requirements and the impact on operational readiness of DOD's total force.
2. The availability and condition of land, facilities, and associated airspace at both the existing and potential receiving locations.
3. The ability to accommodate contingency, mobilization, and future total force requirements at both the existing and potential receiving locations.
4. Cost and manpower implications.
5. The extent and timing of potential costs and savings, including the number of years, beginning with the date of completion of the closure or realignment, for the savings to exceed the costs.
6. The economic impact on communities.
7. The ability of both the existing and potential receiving communities.

8. The environment impact.

On July 1, 1991, the BRAC Commission recommended closure of Fort Ord and the relocation of the 7th Infantry Division to Fort Lewis, WA. As a result of the decision to close Fort Ord, a Base Reuse Plan (BRP; see Figure 2 and Appendix A for details) was formulated to achieve three strategic goals (Base Reuse Plan, 1994, p.1-2);

- environmental protection,
- economic development, and
- education.

The BRP will meet those goals in the following ways:

Environmental Protection: Large areas of land will be dedicated to habitat management. The nearby cities anticipate that agreements can be formed to provide habitat conservation measures for both Fort Ord and the cities.

Economic Development: Up to 60,000 quality jobs will be created over the 50-year time period.

Education: Educational institutions will be founded on surplus Fort Ord property.

1. California State University Monterey Bay
2. University of California Santa Cruz
3. Monterey Peninsula Unified School District
4. Monterey Peninsula College
5. Monterey Institute of International Studies
6. Monterey College of Law
7. Monterey Institute for Research in Astronomy
8. Golden Gate University

These facilities will provide an avenue for improved career training and create jobs.

Local Demographics

ATSDR examines the demographics of communities that are near NPL sites for many reasons. The local demographics may be useful in identifying the presence of sensitive subpopulations, such as young children or the elderly or in providing information on the length of residency and, therefore, the length of potential exposure to contaminants. The demographics of the cities of Marina and Seaside were examined because of their proximity to Fort Ord, their high population density, and to assist in the evaluation of community health concerns.

The total population of Monterey County in 1995 was 370,996. This total county population has continued to grow despite the closure of Fort Ord (see Table 1). The cities of Marina and Seaside, which neighbor the base on the northwest and southwest corners, respectively, have decreased in population since the closure of Fort Ord in 1991 (see Figure 1). Population and housing data from 1980, 1990, and 1995 for the two cities are found in Tables 2 and 3.

The populations of Marina and Seaside declined by over 8,000 residents each between 1990 and 1995. That large population loss can be attributed to the closing of Fort Ord, since many military personnel and their dependents lived in the two cities due to their proximity to the post. The presence of military personnel and their families also accounts for the higher percentages of both males and children under age 10 (i.e., areas near military installations typically have large percentages of young families in their child-bearing years).

Both Marina and Seaside are racially diverse communities. Figure 3, based upon the 1990 census data, shows the population and demographic characteristics of a one-mile wide zone around Fort Ord.

Over 60% of households in both Marina and Seaside were renter-occupied in 1990. The presence of a large, generally transient military population was one of the major reasons for the high percentage of renters in 1990. From 1990 to 1995 the percentages of persons in group quarters, including such facilities as military barracks, prisons, and college dormitories, fell drastically for both cities from 8.8% to 0.1% in Marina and 15.2% to 0.6% in Seaside (see Table 3), due again to the departure of most of the military population; the city limits of both Marina and Seaside overlapped the post boundaries, and those areas included barracks. Average persons per household remained above 3.0, which is quite high, for both cities for all three years. For comparison of Marina and Seaside housing data with county-wide data, see Table 4.

COMMUNITY HEALTH CONCERNS AND POTENTIAL PATHWAYS OF EXPOSURE

The community health concerns evaluated in this section represent concerns expressed about potential pathways of human exposure. We got our information from proposed work plans, remedial investigation reports, sampling data, site visits, public meetings, and newspapers. ATSDR has organized the sections of this report to respond to the specific public health concerns raised by community members.

Concern - Groundwater

- Has groundwater contamination detected at Fort Ord affected drinking water wells onpost or in nearby communities and, if so, has or will that contamination result in adverse human health effects?

Conclusions

ATSDR has drawn several conclusions regarding the past, present, and potential future quality of the drinking water provided by groundwater near the Fort Ord area. Those conclusions are given in the discussion text that follow but the most important of those conclusions are summarized here:

- Groundwater contamination from activities at Fort Ord has not affected the drinking water supply of Seaside, California. Seaside draws its groundwater supply from a different groundwater basin than Fort Ord.
- There are no detections of groundwater contaminants at levels of health concern in the presently "active" drinking water wells on Fort Ord. The water at Fort Ord is safe to drink. Because the drinking water wells currently in use at Fort Ord are located far from sources of contamination, drilled to deep aquifers that are not likely to be contaminated, and monitored regularly, Fort Ord's drinking water supply should be safe to drink in the future.
- Because the concentration of groundwater contamination detected in the past in Fort Ord and Marina drinking water wells was low and the duration of exposure was short, adverse health effects will not likely result.
- The water supplied by drinking water wells presently used by Marina is safe to drink. Further, because Marina's drinking water wells are drilled to deep aquifers and the quality of the water is monitored regularly, Marina's drinking water should be safe to drink in the future.

Discussion

The tap water provided at Fort Ord and supplied to residences and businesses in the nearby communities comes from groundwater, which is water from wells, either private or municipal water supply wells. Fort Ord and the nearby community of Marina both draw groundwater from the Salinas Basin (HLA 1994b, p.5). Seaside located on the southwest side of Fort Ord, draws groundwater from the Seaside Basin Aquifers (see Figure 5a); (HLA, 1994b, p.5). The groundwater contamination at Fort Ord has not affected and will not affect the drinking water supply of Seaside.

Groundwater Hydrology and Groundwater Use

There are four separate groundwater-bearing zones or aquifers that characterize the Salinas Basin beneath Fort Ord (see Figure 4):

- The Upper A-aquifer;
- The Upper and Lower 180-Foot Aquifer;
- The 400-Foot Aquifer; and
- The 900-Foot Aquifer.

The Upper A-aquifer has groundwater levels ranging from 100 to 150 feet below ground surface (bgs). It is composed of fine- to medium-grained, well-sorted sands within the Pleistocene-age older dune sand (HLA, 1994b, p.32). The Upper A-aquifer is unconfined and is recharged from rainfall and surface water infiltration. The groundwater in that aquifer generally flows northwestward towards the Pacific Ocean.

Beneath the A-aquifer an extensive fine-grained relatively impermeable deposit, the Fort Ord-Salinas Valley Aquiclude (FO-SVA), that separates it from and locally confines the deeper 180-Foot Aquifer. In the Fort Ord area, the FO-SVA underlies much of the northwestern portion of the Fort but thins-out and is absent under the remainder of the Fort. The FO-SVA disappears near the Main Garrison and also along the southern Salinas basin boundary (HLA, 1994b, p. 9).

The 180-Foot Aquifer consists of 50 to 150 feet of clays, silts, sands, and gravels. The 180-Foot Aquifer is a confined aquifer where it underlies the FO-SVA but is interconnected with the A-aquifer where the FO-SVA is absent. The Upper and Lower 180-Foot Aquifers are separated from one another by a silty and clayey sand called the Intermediate 180-foot aquitard.

The 400-Foot Aquifer is a confined aquifer that generally consists of 50 to 200 feet of fine sands and silts. The water levels within the 400-Foot Aquifer vary from depths of 300 to 450 feet bgs. Much deeper, the confined 900-Foot Aquifer consists of water-bearing sands and gravels interbedded with layers of clay between depths of 750 to 1500 feet. In the Fort Ord area the 900-Foot Aquifer is isolated from sources of Fort Ord contamination. Even though the 400-Foot Aquifer is confined and probably isolated from sources of Fort Ord contamination, a few, scattered detections of contaminants have been recorded. The possible significance of those detections will be discussed in later sections of this report.

Over the years the development and use of groundwater at Fort Ord and nearby areas has lowered the groundwater level of the 180-Foot Aquifer, which resulted in irregular groundwater flow patterns and salt water intrusion toward the east from the Pacific Ocean. The Main Garrison area of Fort Ord and Marina first observed salt water intrusion in the 1960's. Marina closed all of their 180-Foot Aquifer wells by 1978 because of the declining water quality (HLA, 1994b, p. 66). 400-Foot and 900-Foot wells were then drilled by Marina. Fort Ord ceased the use of 180-Foot Aquifer wells under the Main Garrison area and drilled drinking water wells 29 and 30 to the 400-Foot Aquifer and drinking water wells 31

and 32 to 180-Foot Aquifer. Those wells, drilled in 1984, located in the East Garrison Area are isolated from and up-gradient to known sources of contamination at Fort Ord (see Figure 5b).

The Upper A-aquifer is thought to be unaffected by seawater intrusion because the aquifer is above sea level and the chloride (salt, NaCl) concentrations range from 10 to 259 mg/l (HLA, 1994b, p. 67). Seawater intrusion into the 180-Foot Aquifer beneath the Main Garrison appears to have decreased over time. The chloride concentrations for Fort Ord well 24 have decreased from 550 mg/l in 1981 to 93.5 mg/l in 1992 (HLA, 1994b, p. 67). The confined 400-Foot Aquifer has not been affected by the seawater intrusion. Chloride concentrations in the 400-Foot Aquifer range from 16 to 243 mg/l (HLA, 1994b, p. 68).

Source of Groundwater Contamination

The Fort Ord landfills site (Operable Unit 2) is believed to be the primary source of drinking water chemical contamination on Fort Ord and nearby Marina, CA (see Figure 5a & 5b; HLA, 1994, p.24). The landfill site, consisting of 150 acres, was used for over 30 years. The northern portion of the landfill was used from 1956 to 1966. The main landfill was operated from 1960 until May 1987 when the facility was placed under interim closure (HLA, 1994, p.25; Dames & Moore, 1993, p. 7). No detailed records were kept on the amount or types of waste disposed. The landfill is believed to contain household and commercial refuse, ash from incinerated infectious wastes, dried sewage sludge, demolition materials, and in the main landfill, small amounts of chemical waste (HLA, 1994, p.25; Dames & Moore, 1993, p. 7). The wastes were placed in trenches 30 feet wide, 10 to 12 feet below ground surface, and 10 to 15 feet apart. The wastes in the trenches were placed 10 feet above the trench bottom and covered with two feet of native dune sand deposits excavated during trenching operations (Dames & Moore, 1993, p. 4).

Contaminants from the landfill infiltrated into the Upper A-aquifer and have migrated in a west-northwesterly direction toward the Fort Ord boundary (see Figure 5a & 5b). Contaminants that migrated to the western limits of the FO-SVA may have intermixed with the waters of the Upper 180-Foot Aquifer at that point and may have resulted in local contamination of that aquifer.

Drinking water well quality.

Fort Ord - Current and future drinking water quality.

There are no detections of contaminants above MCLs in the presently "active" drinking water wells on Fort Ord. Presently, only Fort Ord wells 29, 30, and 31 are active water wells (see Figure 5b; POM, 1995a). Well 32 was closed in 1996 and will be replaced by a to-

Fort Ord

be-constructed well 33. Those wells were drilled either into the Lower 180-Foot Aquifer which is partially confined and hydrologically isolated from contamination in the A-aquifer or drilled into the confined 400-Foot Aquifer. The currently used wells are upgradient from the Fort Ord landfill or any other source of groundwater contamination in the Main Garrison Area of Fort Ord. Therefore, the currently active Fort Ord wells will not be affected by contaminants from that source in the future.

The quality of the water produced by the active Fort Ord drinking water wells is regularly monitored thereby further assuring the future safety of that water.

Marina Coast Water District - Current and future drinking water quality.

Contaminants have not been detected in the active Marina Coast Water District wells 10 and 11, both in the 900-Foot Aquifer (see Figure 5b). Water from Marina wells 10 and 11 is safe to drink.

Future contamination from Fort Ord of those wells is unlikely because groundwater contamination from Fort Ord sources does not affect the 900-Foot Aquifer. The quality of the Marina Coast Water District wells is also monitored on a regular basis to ensure its future safety.

Past Drinking Water Contamination

The drinking water well sampling data taken between 1985 to 1993 from Fort Ord's and 1985 to 1994 from Marina's drinking water wells were reviewed by ATSDR to evaluate if contaminants in those wells may have posed a potential health risk to persons drinking and using the water.

To determine which Fort Ord-related contaminants are potentially of public health concern, ATSDR reviewed the analytic data compiled during the interval from 1985-1994. The data reviewed was a record of all detections above the Certified Reporting Limit (CRL). Tables 5 and 6 in this section list those contaminants and concentrations of those contaminants measured in the samples obtained from Fort Ord and Marina drinking water wells. The duration of detections, which is the time interval contaminants were detected in all the drinking water wells in use during the 1985-1994 period, is also given in these tables.

ATSDR evaluated those contaminants to determine whether exposure to them had public health significance. Factors considered in the identification of the contaminants to be further evaluated include:

- Concentrations of contaminants;

- Duration and frequency of exposure;
- Field data quality, laboratory data quality, and sample design.

The listing of a contaminant in Tables 5 and 6 does not mean that adverse health effects will result from exposure to that contaminant. The human health implications of exposure to those contaminants is discussed in the subsequent sections of this report.

The data tables include the following abbreviations:

- LTHA = Lifetime Health Advisory for drinking water (70-years)
- MCL = Maximum Contaminant Level for drinking water; Lifetime exposure.
- ppb = parts per billion (ug/L = micrograms per liter)

The following paragraphs detail the detection of contaminants in individual drinking water wells. We evaluated the human exposure to contaminants as if people were exposed to the maximum levels of the contaminants detected. However, in most cases water is drawn from more than one well at a time, blended with the water from other wells, treated, and pumped to storage tanks and to the water distribution system as finished water. Thus, the contaminant level(s) of the blended, finished, tap water supplied to a residence or other point of use is usually much less than measured in an individual water supply well.

Figure 7 is a schematic profile of the Fort Ord water system. Drinking water from the active wells is first pumped into equalization and/or sand tanks. Then the water is treated and pumped to reservoir tanks. This entire process provides multiple opportunities for "off-gassing" of volatile chemicals (eg TCE, etc.) which further reduces the level of contamination. Finally, the finished water is pumped into the distribution system. All standby wells must be sampled and approved by the California Department of Health Services (CDHS) before they can be used as an emergency water source. No standby wells have been used for drinking water since the mid-1980's (POM, 1996b).

Fort Ord - Past drinking water quality.

Various combinations of traces of carbon tetrachloride, chloroform, tetrachloroethylene (PCE), trichloroethylene (TCE), and xylenes were detected in wells 14, 18, 19, 21, 23, 24, 26, 27, and 28 from May 21, 1985 to March 16, 1993 (see Table 5). Examination of the data and geologic cross-sections given by HLA (1994b, Plates 2 and 5) confirmed that wells 19 and 24 were developed in the 180-Foot Aquifer, while wells 27 and 28 were drilled to the depth of the 400-Foot Aquifer. Those wells lie in the general path of contamination migration in the Upper A-Aquifer from the Fort Ord landfill. The wells in the 180-Foot Aquifer may have been affected by contaminants migrating beyond the limits of the FO-SVA and merging with the groundwater of the Upper 180-Foot Aquifer or by cross-contamination of the aquifers by

poorly constructed or damaged wells. Well 27, even though drilled to the 400-Foot Aquifer, was screened at several levels in the Upper and Lower 180-Foot aquifer as well as the 400-Foot Aquifer and thus, contaminant detections in this well were probably due to causes similar to wells 19 and 24. Well 28 was only screened at greater depths and may have been producing water from the base of the 180-Foot Aquifer or from the top of the 400-Foot Aquifer. The source of limited detection of contaminants in this well was not clear but may be due to cross-contamination through a damaged or poorly constructed well bore.

The locations of Fort Ord and Marina, CA water supply wells used in the past or present, the location of the principle source of groundwater contamination, and the Fort Ord landfills are given in Figure 5b. Table 7 gives the date those wells were drilled, closed (eg high chloride content, mechanical problems, etc.), and/or destroyed (plugged and abandoned).

The history of contamination of individual Fort Ord drinking water wells is given below, as well as ATSDR's conclusion about the potential health risk associated with the consumption of water from those wells. Tables 8 and 9 display the potential cancer and non-cancer risk that might be associated with consumption of water from these wells under "worst-case" assumptions. Please review the footnotes given with Tables 8 and 9 for definition of the "worst- or maximum-case" risk.

The calculated potential cancer risk "maximum" and "possible" given in Table 8 are at levels of $1.00E-5$ or less; this cancer risk is not of public health concern. Similarly the calculated child and adult doses documented in Table 9 are less than Reference Dose levels and do not represent a possible increased human health risk due to non-cancerous causes.

Well 14 had a total of seven trichloroethylene detections from May 14, 1985 to August 2, 1985. Five detections were above the 5.0 ppb MCL, with a maximum value of 14.0 ppb. As of 1975, Well 14 was used as backup well until it was destroyed in 1989. The TCE contamination in well 14 was not present at concentrations high enough or for a time interval long enough to pose a threat to human health.

Well 18 had five detections of trichloroethylene from May 21, 1985 to August 2, 1985, all of which were above the 5 ppb MCL. The maximum trichloroethylene detection was 25.0 ppb. Trichlorofluoromethane was detected once, below the 2000 ppb LTHA, on May 21, 1985. Well 18 became a backup well in 1975 due to its high chloride levels, until its destruction in 1989. The contaminants in well 18 were not present for a duration which could pose a threat to human health.

Trichloroethylene (TCE) was found at concentrations slightly above the 5 ppb MCL in Fort Ord Well 19 (see Figure 5b). Based on the data available to ATSDR 21 samples were taken

from July 31, 1985 to April 5, 1988. Of these samples only two were slightly above the 5.0 ppb MCL, 5.3 and 5.4 ppb. Tetrachloroethylene was also detected six times from July 31, 1985 to August 2, 1985, but none of those detections were above the 5 ppb MCL. Well 19 was drilled in 1952. As of July 1986 well 19 was active, but the use of the well was subsequently discontinued due to increased chloride ion concentration due to seawater intrusion (POM, 1995a). No adverse effects are expected from those contaminants in well 19 because the MCLs are based on a lifetime exposure (70-years) and the exposure was not for a lifetime.

Tetrachloroethylene was detected five times in Well 21, all below the 5 ppb MCL. Trichloroethylene was detected five times from August 6, 1985 to August 8, 1985, all detections were below the 5 ppb MCL. The contaminants in well 21 were not at levels which could cause adverse human health effects.

Well 23 had six detections of trichloroethylene from July 31, 1985 to August 2, 1985, all of which were above the 5 ppb MCL. The maximum detection value was 8.9 ppb. Well 23 was placed on standby status in 1975 due to high chloride levels. The levels of contaminants detected were not at a duration which could pose a threat to human health.

Well 24 only had one detection, 2.5 ug/L of TCE on March 16, 1993. Since that contaminant was detected once and it was not above the MCL, 5 ppb, it did not pose a threat to human health.

Well 26 had four carbon tetrachloride detections from August 6, 1985 to August 7, 1985, all of which were below the 5.0 ppb MCL. The maximum detection value was 0.54 ppb. Well 26 did not pose a threat to human health due to the low contaminant levels.

ATSDR reviewed a memorandum to the Environmental Chief, Jim Willison, from Dann Stein-Freer dated April 19, 1991. That memo noted that concentration levels of 47 ppb tetrachloroethylene and 30 ppb naphthalene had been detected in Fort Ord Well 27. ATSDR has been unable to verify these contaminant concentrations from the available data. The available data indicates that, even if these reported values are accurate, those levels were not sustained over any length of time. For this reason ATSDR did not assign a potential health risk to these unverifiable observations. Carbon tetrachloride was detected four times from July 31, 1985 to August 7, 1985, with all of the values below the 5 ppb MCL¹ established by the U.S. EPA. Well 27 was placed in inactive status in July 1986.

Twenty-four samples were taken from Fort Ord Well 28 between May 21, 1985 to August 31, 1990 (see Figure 5b). Of those samples, six were above the 5 ppb MCL for carbon

¹ The state of California has adopted a MCL of 0.5 ppb for carbon tetrachloride.

tetrachloride¹. Those samples were collected on May 21, 1985, September 9, 1986, September 9, 1986, September 22, 1988, July 12, 1989, and July 17, 1989. The levels detected were 6.0, 9.0, 9.1, 9.8, 6.1, and 8.0 ppb, respectively. On September 22, 1988 a water sample from Well 28 was collected which indicated 9.8 ppb carbon tetrachloride, but upon resampling the well the carbon tetrachloride level was found to be 1.1 ppb.

Tetrachloroethylene was detected in sampling conducted on April 5, 1988, 48.0 and 53.0 ppb. These detections exceed the 5 ppb MCL, but are not considered a threat to human health because of their short duration.

Well 28 was drilled in 1968 (POM, 1995a). Based upon the data available to ATSDR, well 28 was closed in 1988 (correspondence Clifford Bowen 1988). During the 20 years Well 28 was used, there were only five or possibly six times that the level of carbon tetrachloride exceeded the 5 ppb MCL which was established by EPA to evaluate a safe lifetime (70-year) exposure level. Human exposures to carbon tetrachloride of such short duration and at the low levels detected in Fort Ord Well 28 are unlikely to result in any adverse health effects.

Please refer to Tables 8 and 9 for a summary of the potential cancer and non-cancer risks, respectively, from the drinking water in wells 14, 18, 19, 23, 24, 26, 27, and 28. These values are based on the maximum possible exposure.

In summary, all of the contaminant levels recorded were low and human exposures to those contaminants was of short duration. Contaminants detections above the MCLs were only recorded during a 6-year interval, and then, not in all the wells at the same time. Adverse health effects from those exposures is unlikely.

Marina Coast Water District, California - Past drinking water quality

Well 8A, now closed, produced water from both the 180- and 400-Foot Aquifers, contained traces of carbon tetrachloride below the 5 ppb MCL from January 9, 1991 to April 3, 1991 (see Figure 5b).

All detections of contaminants in Marina Well 9, a backup water well in the 400-Foot Aquifer, were below the MCLs. However, in the interval from August 19, 1985 to July 6, 1994 bromodichloromethane, bromoform, bromomethane, carbon tetrachloride, chloroform, cis-1,2 dichloroethylene, dibromochloromethane, trans-1,2 dichloroethylene, 1,1,1- trichloroethane (1,1,1-TCA), tetrachloroethylene (PCE), and trichloroethylene (TCE) were all detected below the MCLs in Marina Well 9 (see Table 6). However, the levels were low. Because the contaminant detections were of short duration and at low levels in backup Well 9, no adverse health effects are likely from use of this well.

In 1991, a few low level detections of bromodichloromethane, bromoform, chloroform, dibromochloromethane, m-p-xylene, and toluene were noted in Marina drinking water Well 12, also drilled into the 900-Foot Aquifer. Since those original contaminant detections, there have not been any reoccurrences (see Table 6). Well 12, drilled in northern Marina about 1200 feet northwest of the Fort Ord - Fritzsche Army Airfield boundary to a total depth of about 2020 feet, is far removed geographically and geologically from the sources of Upper A-aquifer contamination at Fort Ord. The source(s) of contamination recorded in Well 12 may range from sampling errors, to laboratory contamination of samples, to unknown sources of contamination. However, because the contaminant detections were of such short duration and at low levels in Well 12, no adverse health effects are likely to result from the past use of this well. Regular monitoring of the quality of drinking water produced from the Marina wells ensures that present or future use of water from Well 12 or other wells currently used will be safe.

Private wells.

There are no private wells in Seaside or off-post near the landfill or Fritzsche Airfield (MCHD, 1995). A small number of private wells are located throughout Marina. These wells were drilled to depths between 80-120 feet and are used for irrigation only. These private wells showed traces of nitrates (MCWD, 1995). Nitrates commonly originate from sources such as fertilizers or onsite sewage disposal systems. These private wells do not pose a human health risk for the residents if they are used only for irrigation.

Concern - UXO/OE

- Is the general public's health and safety at risk from unexploded ordnance (UXO) and ordnance and explosives (OE) when they visit Fort Ord or make use of the areas and facilities being made available or developed for public use following base closure?

Conclusion

ATSDR reviewed the procedures used to inventory and locate UXO/OE sites and the process and procedures that have been or are being used to cleanup those areas. Those methods and actions are protective of public health and safety. People who trespass into areas of known or suspected UXO/OE may put themselves at risk.

Discussion

Areas of Fort Ord, particularly the Impact Area, were used as field target ranges, maneuver areas, and training and staging areas for infantrymen and light infantrymen. As a result of

these activities a number of Ordnance and Explosives (OE) and Unexploded Ordnance (UXO) have been found on the site. OE consists of remains from the following materials: bombs and warheads; guided and unguided ballistic missiles; artillery, mortar, and rocket ammunition; small arms ammunition; antipersonnel and antitank mines; demolition charges; pyrotechnics; grenades; torpedoes and depth charges; containerized or uncontainerized high explosives and propellants; and all similar or related items designed to cause damage to personnel or material. UXO is a subset of OE consisting of unexploded bombs, warheads, artillery shells, mortar rounds, and chemical weapons (Archives Search Report, 1993, p.6-1).

Suspected ordnance contamination sites were identified through the archives search report (see Figure 6; Archives Search Report, 1993). Those 22 sites were then sampled for OE and UXO beginning on January 6, 1994 (Ft. Ord Final Report, 1994). In the areas zoned for reuse in the BRAC Reuse Plan (Base Reuse Plan, 1994) and those with confirmed contamination, the UXO will be excavated and removed for disposal.

We evaluated 6 of the sites because they are of the greatest community concern and may pose a threat to human safety if not cleared of UXO/OE. Sites 12, 14, 15, 16, 18, and 19 have been identified for clearing the UXO (see Figure 6; Archives Search Report, 1993). Site 22, an OE site is of local community concern.

The UXO sites have been or will be investigated through visual and geophysical surveys. The visual survey involves a visual scan and a sweep of the surface using metal detectors. The geophysical survey entails using magnetometers to explore the surface and subsurface terrain of the site. Any ferrous (iron) detections are marked and recorded for future excavation and follow-up (UXB International, 1994, p. 5). Some of the sites not discussed in detail below, will or are receiving a random surface and/or subsurface investigation to determine the potential for OE to exist within the site (Archives Search Report, 1993). The reader is directed to Figure 6 for the location of the sites discussed below.

Site 12 has undergone a sampling investigation and an ordnance time critical removal action was not recommended (see Figure 8; POM, 1996c).

Site 14 is being investigated and only a portion of the site is recommended for an ordnance time critical removal action (POM, 1996c). Sites 15 and 16 may require burning-off terrain - in order to locate the ordnance and to maintain the local ecologic setting. Sites 15 and 18 may require subsurface excavation. Those sites are expected to have a large volume of UXO confined to a small area. Site 14 was used for subcaliber artillery and mortar practice; site 15 for multi-range/impact area; and site 18 for minefield and air bombing practice (Archives Search Report, 1993). Sites 14, 15, and 16 have been designated for wildlife habitat under the Natural Resource Management Area (Base Reuse Plan, 1994). Sites 15 and 16 require further investigation prior to determining the action required. Parts of site 18 will be used for the

California State University Monterey Bay campus (Base Reuse Plan, 1994). Because site 18 will be used for the university in the near future, it has first priority for clearance (Ft. Ord Final Report, 1994, p.I-3). Site 18 and a large surrounding area has undergone an ordnance time critical removal action to a depth of 4 feet (see Figure 8; POM, 1996c). Site 18 was renamed to Site CSU, which includes sites 4c, 7, 8, 18, and the north portion of site 13b (POM, 1996c). In October 1996, the Army will produce a final draft EE/CA and an Action Memorandum which proposes and documents the action to be taken for OE sites.

We also looked at the Beach Ranges (UXO-Site 22) because the community is concerned about the safety of these ranges because they are accessible from the Pacific Ocean beaches on the west. There is no fencing on the Pacific Ocean side of the Beach Ranges. A portion of site 22 has a surface litter and surface soil contamination of small arms OE. Sharp shards of bullet casings and the lead cores of bullets are easily observed in the target areas of these firing ranges. Until cleanup measures are complete in the areas of high concentration of bullet surface-soil coverage, these sharp bullet fragments pose a physical hazard to trespassers that may walk through or recreate in these areas. The proposed future recreational uses of this area provide for access restrictions, such as boardwalks and railed trails, to areas of hazard (see the following concern on lead in the beach ranges). Site 22 has undergone a sampling investigation and an ordnance time critical removal action was not recommended (POM, 1996c).

Concern - CAIS

> In addition, do the Chemical Agent Identification Sets (CAIS) reportedly used and buried at Fort Ord represent a potential threat to human health?

Conclusion

There is no evidence of the disposal of CAIS kits at Fort Ord. However, if CAIS kits are found on site in the future, they would contain such a small quantity of dilute agent that any adverse human health effects are unlikely.

Discussion

Records show that Fort Ord used CAIS prior to 1974 for troop field training near the Imjin Road landfill area, off 10th Street Gate Road. In 1974, four CAIS in the inventory were removed from the installation (Survey and Analysis Report, 1995, p.CA-1). The specific type of kits is unknown. There is no information to confirm that CAIS kits were disposed of or buried at Fort Ord, but there is public concern that CAIS kits may be accidentally discovered there.

CAIS usually contain blister and nerve agents. If CAIS was discarded at Fort Ord, the specific type of kits is unknown. These kits can contain test tube-sized vials of diluted chemical agents. The blister agents can include Levinstein Mustard, Distilled Mustard, a mixture of mustard agents, and Lewisite. The nerve agents may contain Tabun, Sarin, Soman, and O-ethyl-S-(2-disopropylaminoethyl)methyl phosphonothioate (Toxic Chemical Agent Safety Standards, 1995, p.11-12).

There is local public concern that remedial activities such as construction or excavation may uncover and damage these kits, causing a release. A search of Fort Ord records and site investigations have not discovered any information or evidence that would help to locate any CAIS kits that possibly may have been disposed at Fort Ord. If CAIS kits are discovered it is likely they will be found by accident. However, if the kits are still intact, they would contain a very small quantity of dilute agent. If remediation or construction workers were exposed to an accidental release of CAIS kit contents in an area of limited ventilation, some short-term adverse health effects might result. However, the health of the community would not be affected by the accidental excavation of these kits.

If kits are found, federal law requires that any activity involving the removal, transport or disposal of chemical agents be coordinated with the U.S. Army Chemical Demilitarization Program (USACDP) and the National Center for Environmental Health (NCEH) of the Centers for Disease Control and Prevention (CDC). These two organizations develop safety procedures for chemical agent removal. Safety programs include plans for; excavation that minimize the possibility of an accident, monitoring during activities to detect any leaks that occur, limiting the spread of any contaminants that might leak, and emergency response and emergency medical procedures, if needed.

Concern - Stormwater Outfalls

- Does the surface water discharged from the beach stormwater outfalls contain contaminants which could threaten human health?

Conclusion

The surface water from the beach stormwater outfalls has low levels of contaminants and infrequent discharges which do not pose a threat to human health.

Discussion

There are four ocean surf zone outfalls: OF-01 through OF-04, one beach outfall: OF-30, and two dune outfalls: OF-05 and OF-15 (HLA, 1995; for exact locations see Plate 5). Construction of the storm drain system began in the 1940's. OF-01 was operational by 1949,

OF-02 and OF-03 originally discharged into the dune face in 1956 and then continued to the ocean surf zone by 1966. OF-04 discharged into the dune face by 1966 and then, by 1978, discharged into the ocean surf zone (HLA, 1995). Beginning in the 1960's, storm water was treated before discharge. In the 1970's, National Pollutant Discharge Elimination System (NPDES) permits were obtained which allowed storm water to be discharged without treatment. By 1990 all of the stormwater outfalls were connected to the sanitary sewer system (HLA, 1995).

Records of stormwater releases were maintained beginning in 1979. These records show that there was one release in 1979, one in 1983, one in 1986, two in 1989, 38 in 1990, and 45 in 1991 (HLA, 1994g). The quantity discharged ranged from 30 to 125,000 gallons per event.

Stormwater samples were taken from the outfalls after two storms on January 23, 1994 and March 24, 1994. These samples did not contain any contaminants above the MCLs (HLA, 1994c). Based upon our review of the available data and information, the stormwater outfalls do not pose a threat to human health because of the low levels of contaminants and the short duration of possible accidental exposure.

Concern - Offshore UXO

- Do the UXO in Monterey Bay pose a physical hazard to human health?

Conclusion

Information on the specific location and type of UXO that may exist in Monterey Bay is not available. It is probable, however, that the UXO in the Bay lies at water depths accessible only to well trained technical divers. Because of the lack of information it is not possible to further evaluate the potential physical hazard represented by the UXO in Monterey Bay.

Discussion

The documents reviewed by ATSDR suggest that large caliber ordnance may have been fired into Monterey Bay during World War II training (HLA, 1995, p. 23 & 25). Those documents also suggest that small arms fire could have entered the Bay from the Fort Ord Beach Ranges until 1991, when those were closed (HLA, 1995).

A Restricted Zone was established in Monterey Bay to prevent ships from sailing into the path of fired munitions. Prior to 1952 the Restricted Zone was a wedged-shaped arc which extended 8 miles off the Fort Ord Beach-front area. That zone was later revised to a rectangular area extending 4.5 miles off the Fort Ord southern and northern boundary lines

(HLA, 1995, p. 3 and Plate 2). The depth of the water in the Restricted Zone ranges from 168 to 1,890 feet (HLA, 1995).

There is no detailed inventory of the specific location and type of UXO that may exist in Monterey Bay. The US Navy has removed UXO from Monterey Bay when it has been located. However, the depth of the water in the Restricted Zone ranges from 168 to 1,890 feet (HLA, 1995). Scuba diving to depths of 168 feet or greater requires serious technical diving skills and thus, it is probable that most UXO in Monterey Bay lies below depths commonly visited by recreational divers.

Concern - Lead in the Beach Ranges

- Is the lead concentration in the Beach Ranges (RI-Site 3) at levels which could cause adverse human health affects?

Conclusion

Based upon the available data, the beach ranges, after clean-up of the zones of "heavy" bullet surface-soil concentration, will not contain lead levels which could pose a threat to human health.

Discussion

Lead sampling was performed in three distinct geographic areas broken down by three bullet surface-soil coverage concentration levels. The three geographic areas are: Study Area 1 - Ranges 11 and 12, Study Area 2 - Ranges 5 through 8, and Control Area - area between Ranges 8 and 9. The bullet surface-soil coverage concentration levels are: heavy (≥ 10 percent ammunition cover), moderate (1 to 10 percent ammunition cover), and light (< 1 percent ammunition cover). The "heavy" zones comprise four percent of the Study Areas, the "moderate" zones compose five percent of the Study Areas, and the "light" zones compose 91 percent of the Study Areas (HLA, 1994f). Please see HLA (1994d; Plate 8) for a detailed map of the Study Areas.

A maximum background level of 51.8 ppm for lead in soil was used for comparison (HLA, 1994e). The soil samples were collected from November 30, 1993 to December 9, 1993. The maximum detection of lead in the "light" areas was 43.20 ppm (HLA, 1994d). This value is below the background level and therefore the light zones do not pose a threat to human health.

The "moderate" areas had three elevated detections of 32,600; 3,840; and 2,470 ppm (HLA, 1994d). If these "outlying" samples are removed from consideration, the average detection value was 256.29 ppm. This value is below the 500 ppm EPA Action Level for residential soil clean-up. Since the beach ranges are to be used solely for recreational use, the EPA

Action Level is a very conservative value. Assuming that a child visits the beach once a month, ATSDR determined that a lead level of 4,300 ppm would be safe. It is also assumed that a child would not ingest more than 0.1 g of sand per visit because sand is not palatable. Boardwalks and/or railed trails will be constructed to restrict use of the dunes (BRP, 1994). Based upon the available data and the proposed access restrictions, the "moderate" areas are determined to be no threat to human health.

The "heavy" zones had a maximum detection of 46,300 ppm (HLA, 1994d). All of the "heavy" areas are in the "clean-up process" to levels below 1,860 ppm (POM, 1996b). The U.S. EPA Integrated Uptake BioKinetic Model determined that children's blood-lead levels would not exceed 10 micrograms per deciliter (ug/dL) at lead levels of 1,860 ppm (POM, 1995b; POM, 1996d). The EPA's threshold blood-lead level of concern is a level greater than 10 ug/dL. A pilot study on 1,000 cubic yards removed lead through visual and mechanical methods to an average level of 5.6 ppm. This level of 5.6 ppm is similar to the anticipated lead levels after excavation of the "heavy" areas (POM, 1996c). Most of the lead was detected in the upper 2 feet of the dune sand. It is also assumed that humans will not be exposed to sand greater than 2 feet deep (HLA, 1994f). The proposed clean-up will remove the upper two feet of the "heavy" zone dune sands. Removal of these lead-contaminated sands, coupled with the proposed recreational use restrictions, such as boardwalks and railed trails, eliminates the potential health risk of those areas.

CONCLUSIONS

ATSDR has evaluated environmental routes of exposure using information collected during the remedial process. The following is a summary of the conclusions reached by ATSDR following this evaluation.

1. Groundwater contamination from past activities at Fort Ord has not affected and will not affect the drinking water supply of Seaside, California. Seaside draws its groundwater supply from a different groundwater basin than Fort Ord.
2. There are no detections of groundwater contaminants at levels of health concern in the presently "active" drinking water well on Fort Ord. The water at Fort Ord is safe to drink. Because the drinking water wells currently in use at Fort Ord are located far from the sources of contamination, drilled to deeper aquifers that are not likely to be contaminated, and monitored regularly, Fort Ord's drinking water supply should be safe to drink in the future.
3. The water supplied by drinking water wells presently used by Marina is safe to drink. Further, because Marina's drinking water wells are drilled to deep aquifers and the quality of the water is monitored regularly, Marina's water should be safe to drink in the future.
4. Because the concentration of contamination detected in the past in Fort Ord and Marina drinking water wells was low and the duration was not over a lifetime (70-years), those exposures will not likely result in adverse health effects.
5. ATSDR reviewed the procedures used to inventory and locate UXO/OE sites and the process and procedures that have been or are being used to cleanup those areas. Those methods and actions are protective of public health and safety. However, people who trespass into areas of known or suspected UXO/OE may put themselves at risk.
6. There has been no evidence of disposal of CAIS kits at Fort Ord. If, in the future, CAIS kits are found on site, they contain such a small quantity of dilute agent that any adverse human health effects are unlikely. If remediation or construction workers were exposed to an accidental release of CAIS kit contents in an area of limited ventilation, some short-term adverse health effects might result.
7. The available data indicates that water discharged from the beach stormwater outfalls has not contained elevated contaminant levels which could pose a threat to human health.

8. There is not enough information on UXO in Monterey Bay to fully evaluate this potential physical hazard. However, it is likely that the UXO is located at depths which may only be accessed by experienced, technical divers.

9. Based upon the available data, the areas of light and moderate bullet surface-soil coverage in the Beach Ranges do not contain lead levels which will pose a threat to human health. Because sharp bullet fragments may remain in these areas, they may pose a physical hazard to trespassers that may walk or recreate in these areas. Completion of the proposed clean-up process for the areas of "heavy" bullet surface-soil coverage will assure that those areas will not pose a future threat to human health.

10. ATSDR makes the following public health category conclusions (see Appendix B):

- Fort Ord to be a Category D site - No Apparent Public Health Hazard.
- Seaside Drinking Water - No Public Health Hazard from Fort Ord contamination.
- Fort Ord and Marina Current Drinking Water - No Apparent Public Health Hazard.
- Fort Ord and Marina Past Drinking Water - No Apparent Public Health Hazard.
- UXO/OE - No Apparent Public Health Hazard, except if you trespass.
- Beach Stormwater Outfall Discharges - No Apparent Public Health Hazard.
- Offshore UXO - No Apparent Public Health Hazard.
- Lead in Beach Ranges - No Apparent Public Health Hazard.

PUBLIC HEALTH ACTIONS

The public health action plan (PHAP) for Fort Ord, CA contains a description of actions to be taken by ATSDR and/or other governmental agencies at and in the vicinity of the site subsequent to the completion of this public health assessment. The purpose of PHAP is to ensure that this public health assessment not only identifies public health hazards, but provides a plan of action designed to prevent adverse human health effects that would result from any exposure to hazardous substances in the environment.

Actions Planned

1. The Army will continue to collect and analyze water samples from active drinking water wells. They will also monitor for VOCs of potential concern.
2. Marina Coast Water District will continue to collect and analyze water samples from active drinking water wells. They will also monitor for VOCs of potential concern.
3. The Army will properly remove and dispose of OE and UXO found in areas zoned for reuse.
4. The Army will ensure that warning signs in a sufficient number to be intervisible are posted around the UXO/OE areas. Those signs should be written in English as well as universal symbols. A boundary fence will be maintained only around Site 15.
5. The Army will remove the "heavy" lead-contaminated soil in the Beach Ranges to a level below 1,860 ppm.
6. The Comprehensive Environmental Response Compensation, and Liability Act (CERCLA; also known as Superfund) as amended, requires ATSDR to conduct needed follow-up health actions in communities living near hazardous waste sites. To identify appropriate actions, ATSDR created the Health Activities Recommendation Panel (HARP). HARP has evaluated the data and information contained in the Fort Ord Public Health Assessment for appropriate public health actions. HARP supports the continued efforts to monitor drinking water quality, to identify and properly clear areas of unexploded ordnance (UXO) and ordnance and explosives (OE), and to restrict access to areas where physical hazards may exist. Based upon the information available, this site poses no apparent public health risk. If additional information becomes available that may indicate a public health risk, this information will be evaluated by the HARP. HARP determined that health education and health studies

Fort Ord

follow-up actions are not warranted. As discussed above, there do not appear to have been exposures in the past which resulted in public health problems, and there are no current exposures.

Completed Actions

1. The U.S. Army has, as of May 1996, completed time-critical removal actions for UXO/OE in those areas shown on Figure 8.

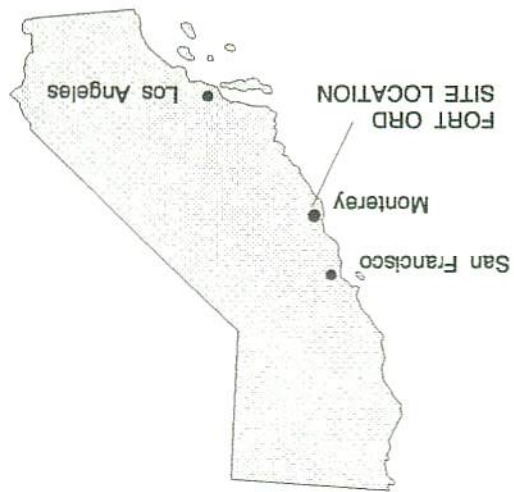
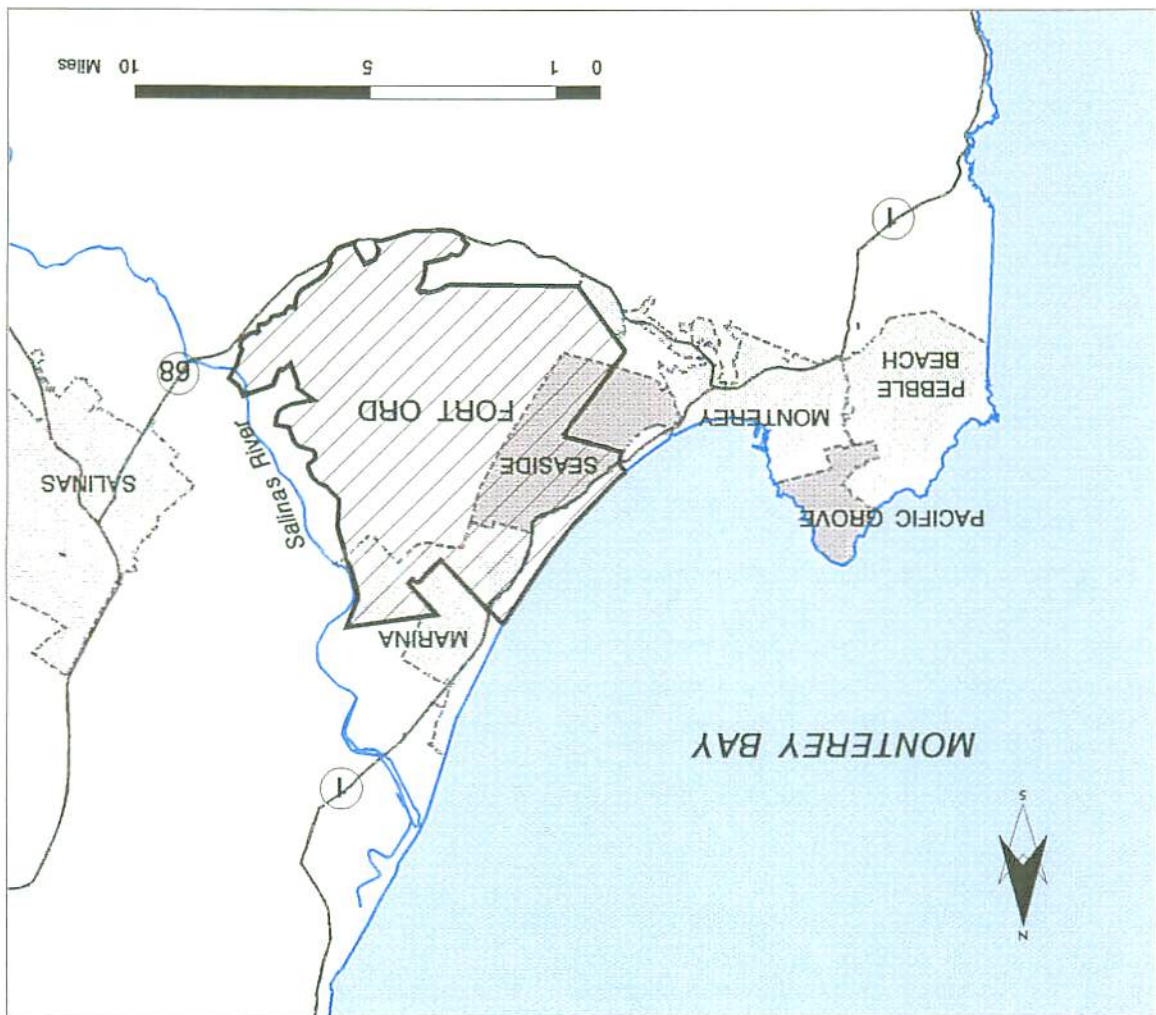


FIGURE 1: Site Location



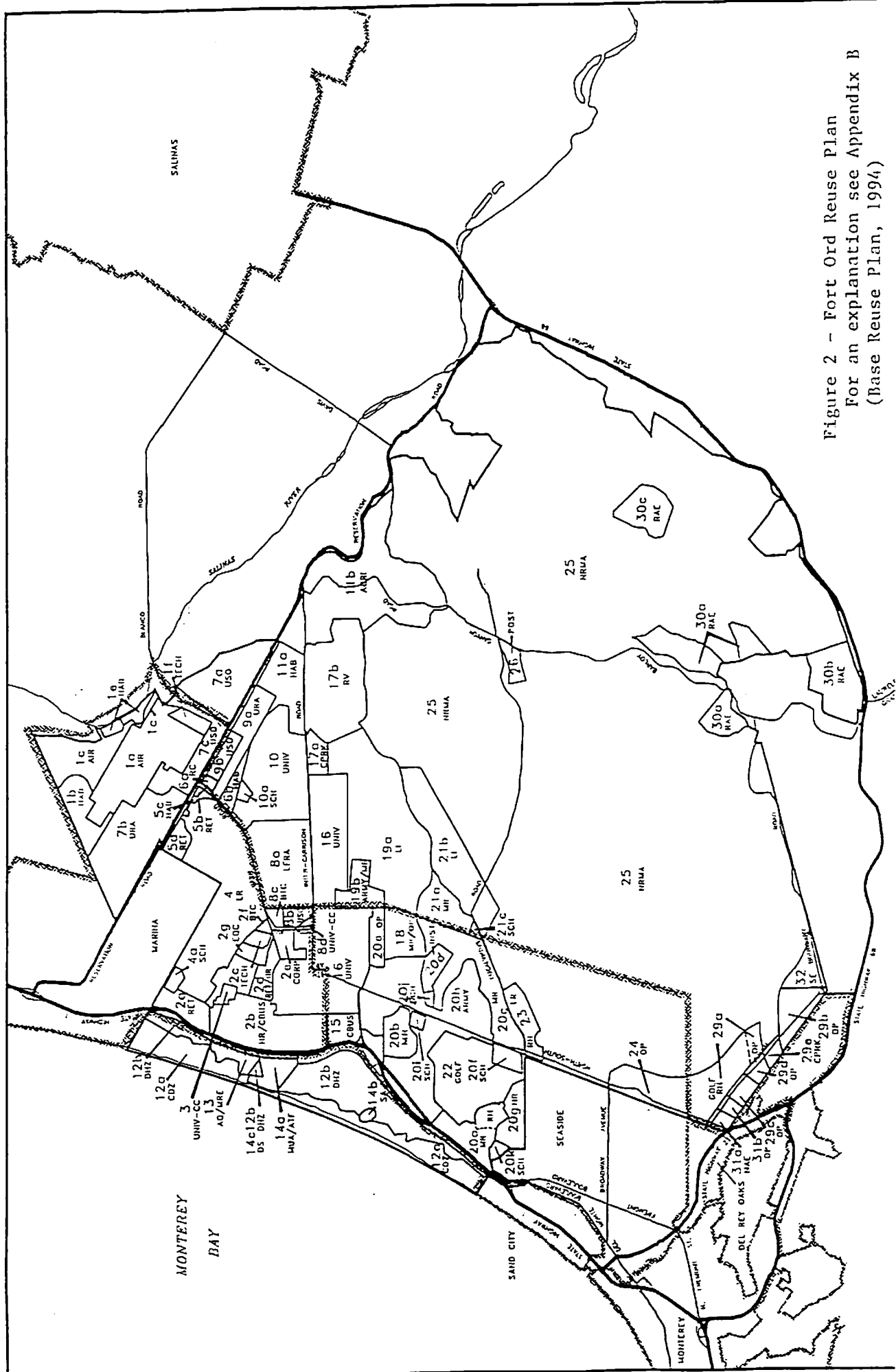


Figure 2 - Fort Ord Reuse Plan
For an explanation see Appendix B
(Base Reuse Plan, 1994)

Fort Ord Monterey, California CERCLIS No. CA7210020676

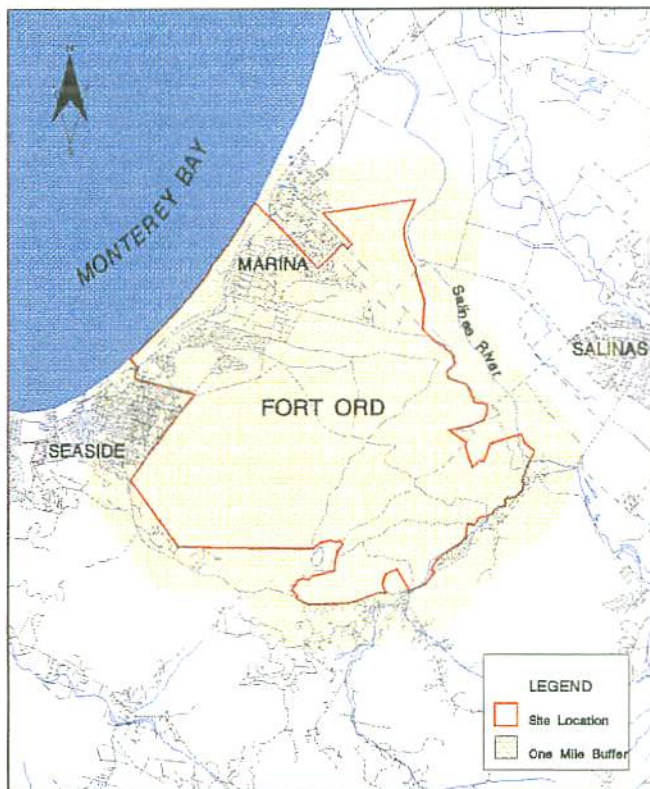
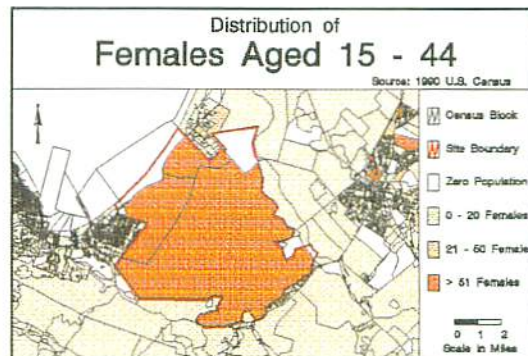
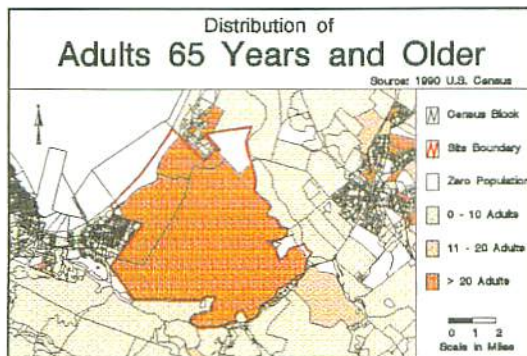
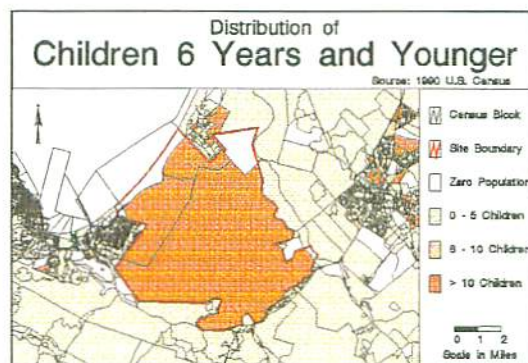
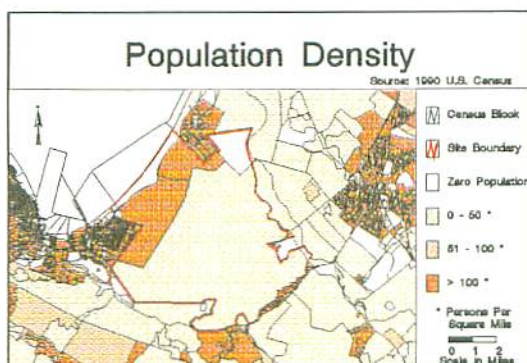


FIGURE 3



Summary Statistics Within One Mile of Site*	
Total Number of People	71,683
Children Aged 6 and Younger	635
Adults Aged 65 and Older	1,415
Females Aged 15 - 44	1,715
Younger Than 18 Years	19,913
18 Years and Older	51,707
White	40,476
Black	14,779
Asian or Pacific Islander	10,623
American Indian, Eskimo, Aleut	577
Other race	5,128
Hispanic origin	9,627

* Calculated using an area-proportion spatial analysis technique



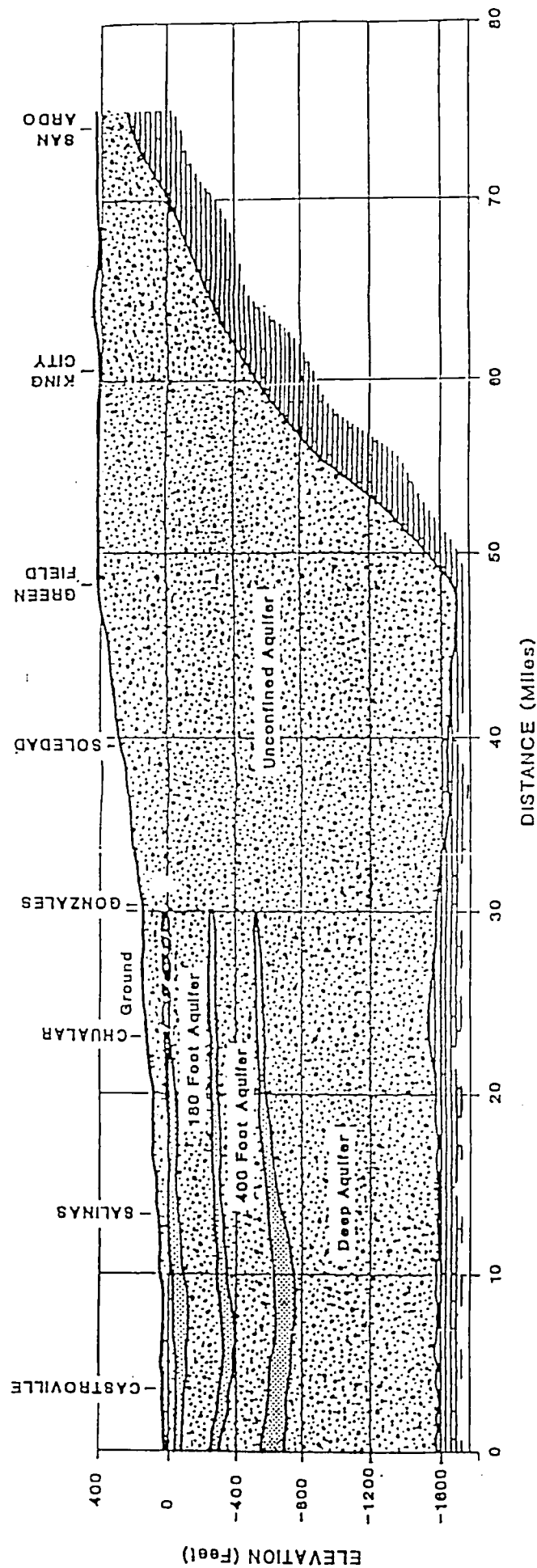


Figure 4 - Geologic Cross-Section,
Fort Ord Area.
(Dames & Moore, 1993)

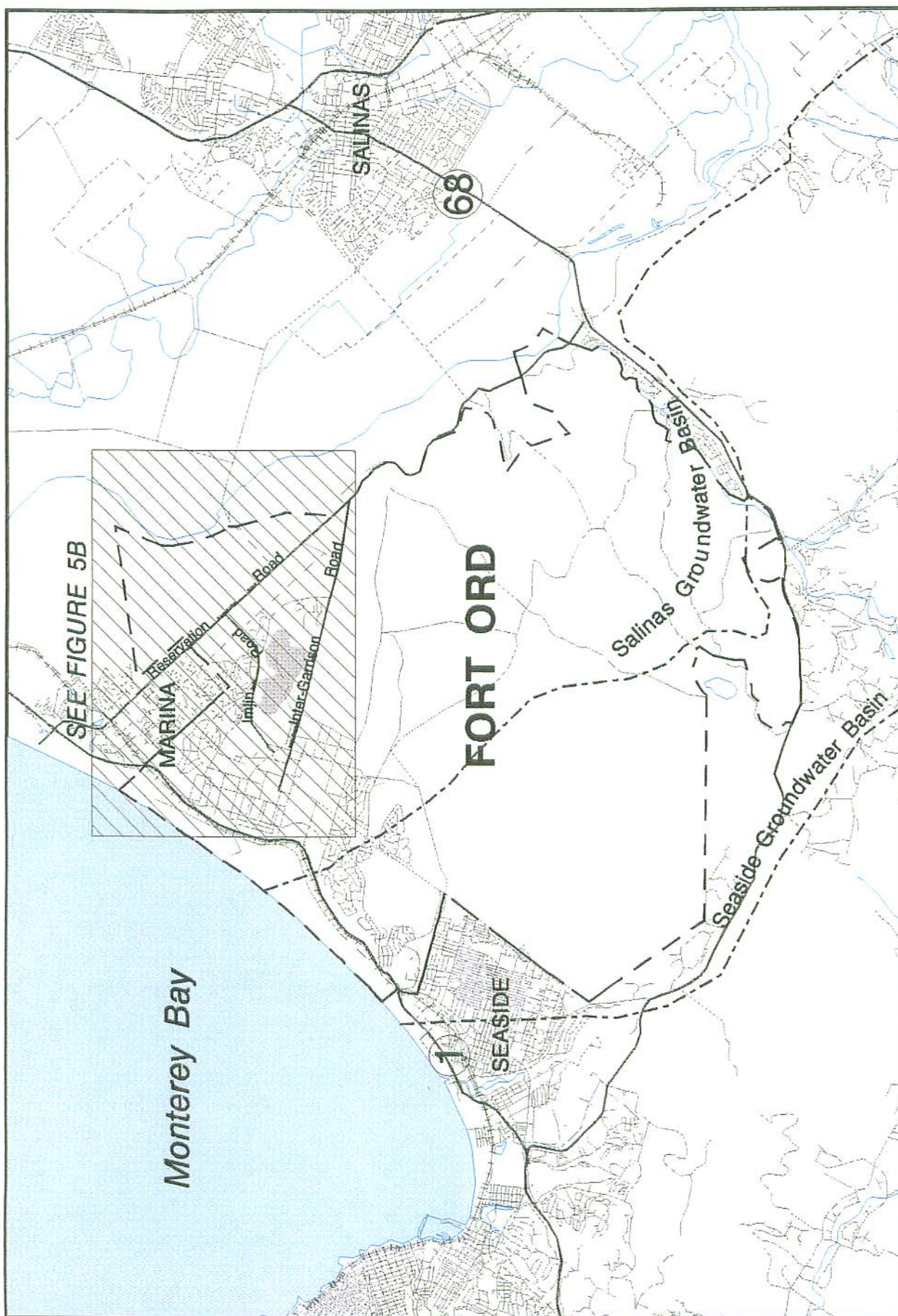


FIGURE 5a: Fort Ord Location Map

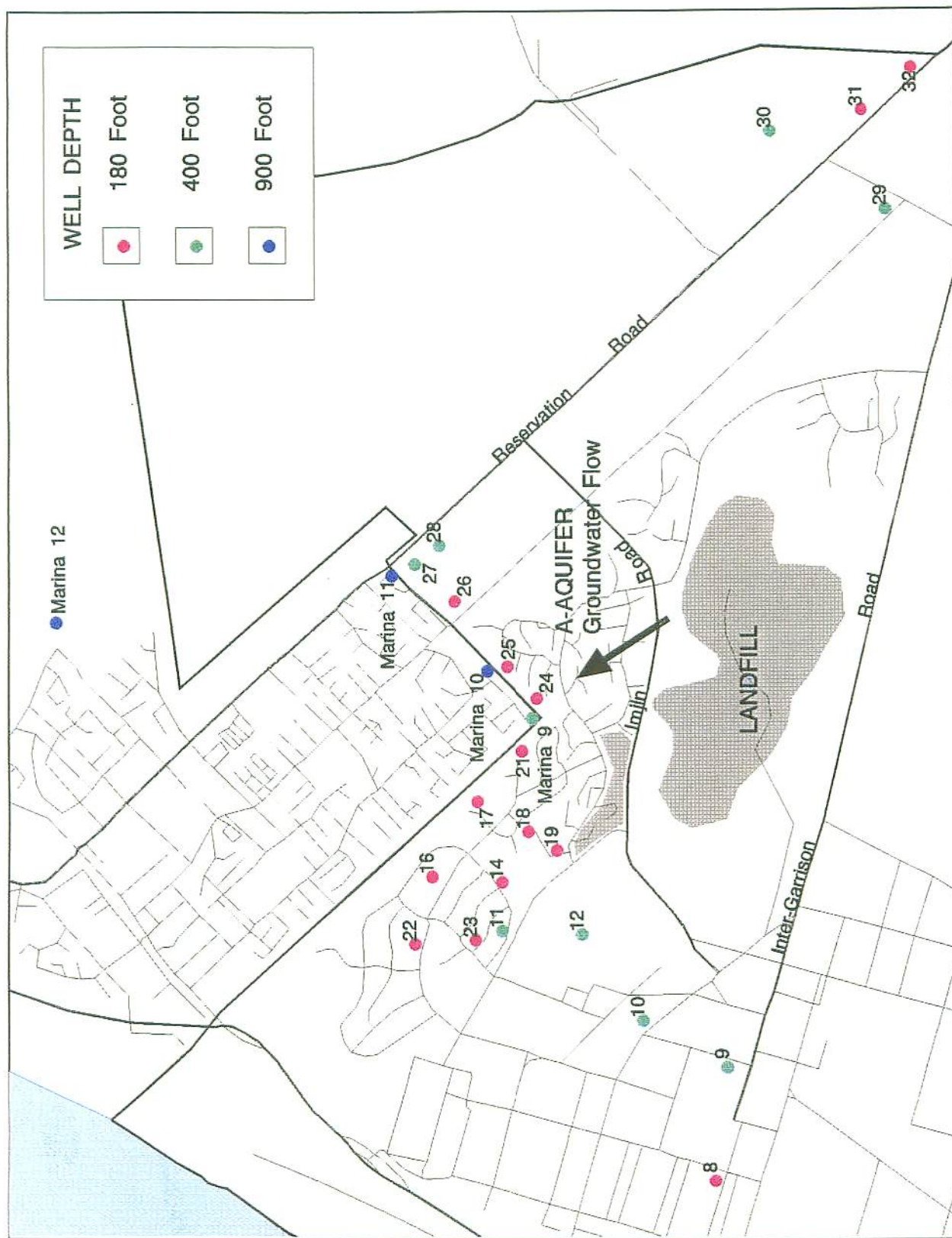
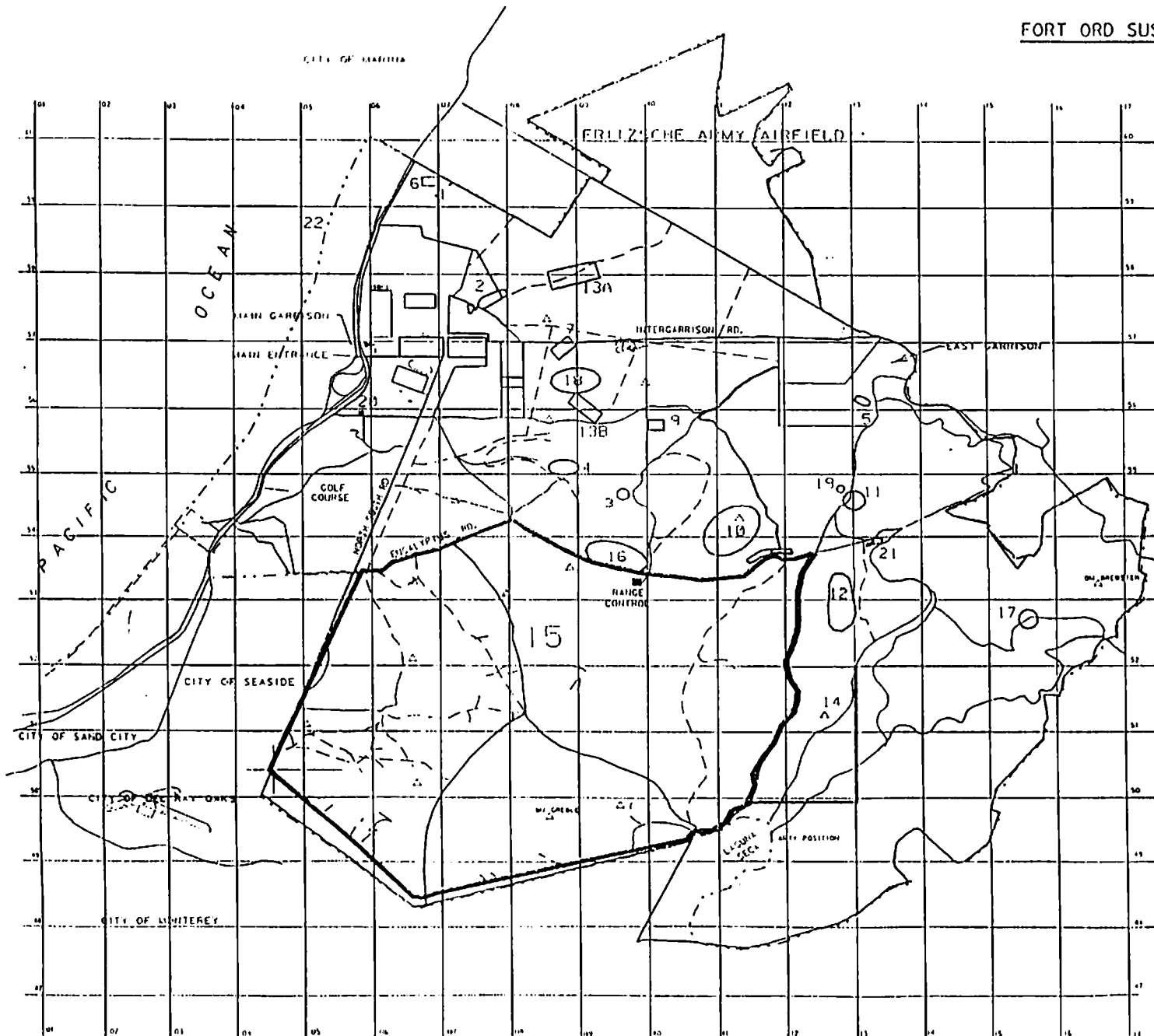


FIGURE 5b: Drinking Water Well Locations, Landfills, Streets

NOTE: Only Fort Ord wells 29-32 and Marina wells 10-12 are currently in use.

FORT ORD SUSPECTED ORDNANCE CONTAMINATION



- 1-FLAME THROWER RANGE
- 2-CHEMICAL TRAINING
-SUSPICIOUS DRUM
-2.36" ROCKETS
- 3-DEMOLITION TRAINING AREA
- 4-CHEMICAL/BIOLOGICAL
RADIOLOGICAL TRAINING
- 5-3.5" ROCKETS
- 6,7,8,9-BOOBY TRAPS &
LANDMINES
- 10-81mm HIGH EXPLOSIVE
MORTAR, OLD RANGE 50
- 11-DEMOLITION TRAINING
AREA, GRENADE FRAGMENTS
- 12-40mm ANTI-AIRCRAFT,
HAND GRENADES
- 13A-PRACTICE MORTAR RANGE
- 13B-PRACTICE MORTAR RANGE
- 14- 7" & 8" NAVAL GUN
ROUNDS, OLD RANGE P-5
- 15-IMPACT AREA
2.36" & 3.5" ROCKETS
HAND GRENADES
37mm ANTI-AIRCRAFT
57, 75, 90, 106mm
RECOILLESS RIFLE
40mm GRENADE
60, 81, 4.2", STOKES MORTARS
LIGHT ANTI-TANK WEAPON
75mm HOWITZER
- 16-2.36" MOVING TARGET
- 17-AT MINE PRACTICE
- 18-100lb BOMB
- 19-RIFLE GRENADE RANGE
- 20-RECOILLESS RIFLE TRAINING
RANGE
- 21-MUDHEN LAKE
- 22-BEACH RANGES

Figure 6 - Suspected UXO,
Fort Ord.
(UXB International, 1994)

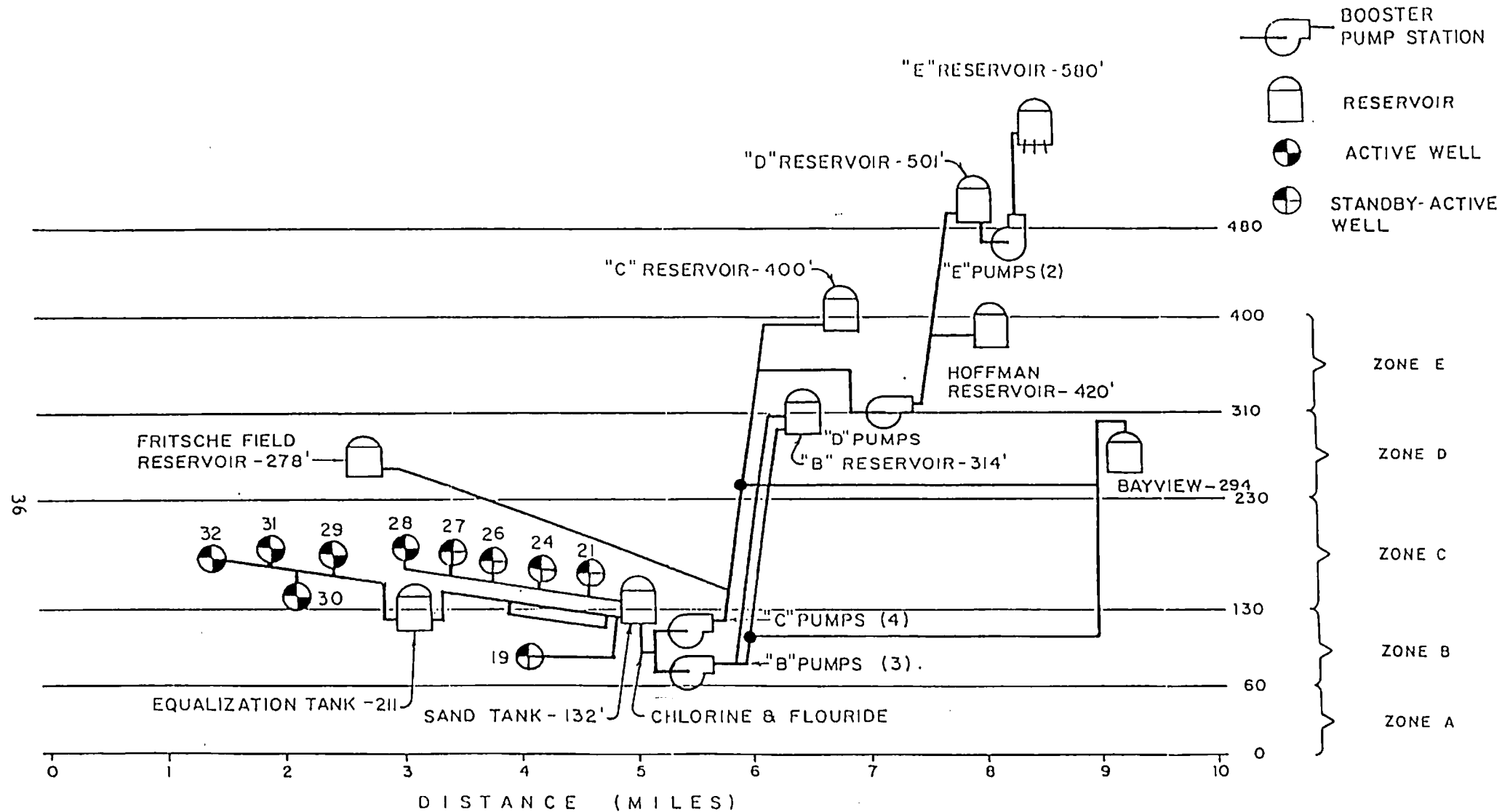








Figure 7 - Schematic Profile of Fort Ord Water Distribution System

Figure 8:

TIME CRITICAL REMOVAL ACTIONS EXCLUDING INLAND RANGE AREA W/ ORDNANCE & EXPLOSIVES (OE) STATUS OF OE REMOVAL ACTIONS

-  FORMER FORT ORD BOUNDARY
-  SAMPLING REQUIRED, OR IN PROGRESS
EE/CA REQUIRED
-  TCRA RECOMMENDED, OR IN PROGRESS
EE/CA REQUIRED
-  PRELIMINARY ASSESSMENT/ SITE
INSPECTION IN PROGRESS
-  NO TCRA RECOMMENDED. EE/CA
REQUIRED
-  TCRA COMPLETE
EE/CA REQUIRED

* TCRA = TIME CRITICAL REMOVAL ACTION
EE/CA = ENGINEERING EVALUATIONS/COST ANALYSIS
NOTE: ALL AREAS ARE APPROXIMATE

0 1000 5000 10000 FEET

PREPARED BY DIRECTORATE OF BASE REALIGNMENT AND CLOSURE
PRESIDIO OF MONTEREY, CALIFORNIA



TABLE 1

POPULATION DATA, MONTEREY COUNTY			
Variable	1980	1990	1995
Total Population	290,444	355,660	370,996
Persons per Square Mile	87	107	112
% Male	51.2	51.9	NA
% Female	48.8	48.1	NA
% White	68.9	63.8	NA
% Black	6.5	6.4	NA
% AIEA*	1.0	0.8	NA
% API#	6.8	7.8	NA
% Other Race	16.9	21.1	NA
% Hispanic	25.9	33.6	NA
% Age 65+	9.2	9.8	NA
% Age < 10	15.9	16.8	NA

* AIEA - American Indian, Eskimo, or Aleut

API - Asian or Pacific Islander

NA - Not available

Sources: Tabulations from Tables 1, 6, 7, 8, and 10 (1980) and Tables P1, P5, P6, P9, and P11 (1990), Summary Tape File 1 (California), U.S. Bureau of the Census. Monterey County Population and Housing Estimates (1995), Report E-5, California Department of Finance, Demographic Research Unit.

TABLE 2

POPULATION DATA, MARINA AND SEASIDE						
Variable	Marina			Seaside		
	1980	1990	1995	1980	1990	1995
Total Population	20,647	26,436	18,356	36,567	38,901	30,102
Persons per Square Mile	2,360	3,023	2,098	4,146	4,408	3,413
% Male	54.5	52.8	NA	57.2	57.0	NA
% Female	45.5	47.2	NA	42.8	43.0	NA
% White	56.2	53.6	NA	50.7	52.7	NA
% Black	17.7	19.0	NA	29.9	23.5	NA
% AIEA*	1.1	0.7	NA	0.9	1.0	NA
% API#	18.0	20.8	NA	11.8	13.5	NA
% Other Race	7.0	5.9	NA	6.7	9.4	NA
% Hispanic	9.9	10.7	NA	10.0	17.4	NA
% Age 65÷	2.4	4.3	NA	4.0	5.4	NA
% Age < 10	19.2	19.1	NA	17.5	17.6	NA

* AIEA - American Indian, Eskimo, or Aleut

API - Asian or Pacific Islander

NA - Not available

Sources: Tabulations from Tables 1, 6, 7, 8, and 10 (1980) and Tables P1, P5, P6, P9, and P11 (1990), Summary Tape File 1 (California), U.S. Bureau of the Census. Monterey County Population and Housing Estimates (1995), Report E-5, California Department of Finance, Demographic Research Unit.

TABLE 3

HOUSING DATA, MARINA AND SEASIDE						
Variables	Marina			Seaside		
	1980	1990	1995	1980	1990	1995
Total Households*	5,724	7,908	6,006	9,875	10,641	9,208
Persons per Household	3.20	3.05	3.06	3.05	3.10	3.25
% Households Owner-Occupied	41.7	34.5	NA	42.4	38.0	NA
% Households Renter-Occupied	58.3	65.5	NA	57.6	62.0	NA
% Mobile Homes	5.6	5.3	5.3	2.0	4.4	4.3
% Persons in Group Quarters*	11.3	8.8	0.1	17.7	15.2	0.6
Median Value, Owner-Occupied Households	85,400	172,500	NA	68,300	150,100	NA
Median Rent, Renter-Occupied Households	265	607	NA	242	565	NA

NA - Not available

* A household is an occupied housing unit, but does not include group quarters such as military barracks, college dormitories, and prisons.

Sources: Tabulations from Tables 1, 3, 15, 26, 39, 44, and 55 (1980) and Tables P1, P3, P28, H3, H17A, H23B, H32B, and H43 (1990), Summary Tape File 1 (California), U.S. Bureau of the Census. Monterey County Population and Housing Estimates (1995), Report E-5, California Department of Finance, Demographic Research Unit.

TABLE 4

HOUSING DATA, MONTEREY COUNTY			
Variables			
	1980	1990	1995
Total Households*	95,734	112,965	113,007
Persons per Household	2.85	2.96	3.17
% Households Owner-Occupied	53.1	50.6	NA
% Households Renter-Occupied	46.9	49.4	NA
% Mobile Homes	4.4	5.2	5.1
% Persons in Group Quarters*	6.2	5.9	3.4
Median Value, Owner-Occupied Households	86,500	198,200	NA
Median Rent, Renter-Occupied Households	263	566	NA

NA - Not available

* A household is an occupied housing unit, but does not include group quarters such as military barracks, college dormitories, and prisons.

Sources: Tabulations from Tables 1, 3, 15, 26, 39, 44, and 55 (1980) and Tables P1, P3, P28, H3, H17A, H23B, H32B, and H43 (1990), Summary Tape File 1 (California), U.S. Bureau of the Census. Monterey County Population and Housing Estimates (1995), Report E-5, California Department of Finance, Demographic Research Unit.

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TABLE 5: Historical Summary of all Contaminant Detections in Fort Ord wells; 1985-1993. Contaminants with detections above the MCLs are shaded in the table.

Contaminant	Min-Max (ppb)	Number of Detections	Duration of Detections	Comparison Values MCL (ppb)	Comments
Carbon tetrachloride	0.50 - 9.8	33	5/21/85 - 1/23/91	5 *	Only 6 detections >5 ppb MCL
Chloroform	0.93 - 1.8	5	11/23/87 - 10/1/88	100 **	No detections above MCL
Dichloromethane	1.2	1	11/25/85	None	No detections above MCL
Tetrachloroethylene (PCE)	0.63 - 53.0	14	7/31/85 - 4/8/88	5	Only 2 detections >5 ppb MCL
1,1,1-trichloroethane (1,1,1-TCA)	7.7	1	6/4/86	200	No detections above MCL
Trichloroethylene (TCE)	0.62 - 25.0	43	5/14/85 - 3/16/93	5	Only 18 detections >5 ppb MCL
Trichlorofluoromethane	5.0	1	5/21/85	2,000 ppb - LTHA	No detections above LTHA
Xylenes	2.6 - 2.8	2	4/5/88 - 4/8/88	10,000	No detections above MCL

* The U.S. EPA MCL is 5 ppb, however, the state of California has adopted a state MCL of 0.5ppb (CCR, Title 22, Sec. 6444a). The level of detection for carbon tetrachloride is 0.5 ppb.

** At this time there is no MCL specifically for chloroform. However, chloroform is regulated under the total trihalomethane MCL of 100 ppb.

TABLE 6 : Historical Summary of All Contaminant Detections in Marina wells: 1985-1994.

Contaminant	Min-Max (ppb)	Number of Detections	Duration of Detections	Comparison Values MCL (ppb)	Comments
Bromodichloromethane	1.0 - 5.3	2	11/7/90 - 10/2/91	100	No detections above MCL
Bromoform	0.68 - 2.0	4	11/7/90 - 10/2/91	100	No detections above MCL
Bromomethane	3.2	1	7/3/91	10 ppb-LTHA	No detections above LTHA
Carbon tetrachloride	0.83 - 1.3	3	1/9/91 - 7/31/91	5	No detections above MCL
Chloroform	0.87 - 3.8	3	11/7/90 - 10/2/91	100 ²	No detections above MCL
cis-1,2 Dichloroethylene	0.56 - 2.0	8	5/24/89 - 7/6/94	None	No detections above MCL
Dibromochloromethane	1.4 - 6.2	2	11/7/90 - 10/2/91	None	No detections above MCL
trans-1,2 Dichloroethylene	0.59 - 2.6	9	8/27/86 - 6/29/88	None	No detections above MCL
Tetrachloroethylene (PCE)	0.50 - 2.4	35	8/19/85 - 7/6/94	5	No detections above MCL
Trichloroethylene (TCE)	0.51 - 2.9	33	9/9/85 - 7/6/94	5	No detections above MCL
1,1,1-trichloroethane (1,1,1-TCA)	0.55 - 3.2	11	1/21/86 - 3/28/89	200	No detections above MCL
Toluene	0.60	1	4/3/91	1000	No detections above MCL
m-p-Xylene	0.95	1	4/3/91	None	No detections above MCL

² - At this time there is no MCL specifically for chloroform. However, chloroform is regulated under the total trihalomethane MCL of 100 ppb.

TABLE 7: Fort Ord Closed Wells (after Geotechnical Consultants, 1986; HLA, 1994)

Well Name	Year Drilled	Year Closed/ Destroyed	Comments
8	1940	1952	Pumped sand and had high chloride content
9	1940	1952	Pumped sand and had high chloride content
10	1940	1952	Pumped sand and had high chloride content
11	1940	1983-closed; 1989	Pumped sand and had high chloride content
12	1942	1952	Pumped sand and had high chloride content
14	1941	1989	High chloride content since 1975 *
16	1942	1962-closed; 1989	High chloride content
17	1946	1971-closed; 1989	High chloride content
18	1952	1989	High chloride content since 1975 *
19	1952	1986-standby; 1989	High chloride content
21	1952	1986-standby; 1989	High chloride content
22	1952	1969-closed; 1989	High chloride content
23	1952	1989	High chloride content since 1975 *
24	1963	1986-Inactive backup well; 1989	High chloride content since 1978
25	1963	1989	High chloride content since 1977 *
26	1962	1986- inactive 1990-destroyed	High chloride content since 1977. Pump failed
27	1968	1986	High chloride content since 1981. Water samples indicated undesirable water source
28	1968	1986-standby; 1988	Sporadic detection of volatile organic chemicals

* After chloride levels became too high, Wells 14, 18, 23, and 25 were used only as occasional backup wells until destroyed.

Fort Ord

Table 8 - Potential cancer risk associated with human ingestion of Fort Ord drinking water assuming "worst-case" (maximum-case)² and "possible-case"³ conditions.

Chemical	Concentration Max. (ppm)	Estimated Dose (mg/kg/day)	Cancer Slope Factor (1/[mg/kg/day])	Exposure Duration "Max." (years)	Cancer Risk "Max."	Exposure Duration "Possible" (years)	Cancer Risk "Possible"
TCE							
Well 14	0.0140	0.0004	0.011	19	1.19E-06	0	0.00E+00
Well 18	0.0250	0.0007	0.011	19	2.13E-06	0	0.00E+00
Well 19	0.0050	0.0001	0.011	33	7.14E-07	1	2.25E-08
Well 23	0.0090	0.0003	0.011	19	7.68E-07	0	0.00E+00
Well 24	0.0020	0.0010	0.011	26	2.33E-07	1	8.98E-09
Carbon Tetrachloride							
Well 26	0.0005	0.0000	0.13	24	6.37E-07	1	2.65E-08
Well 27	0.0020	0.0001	0.13	18	1.91E-06	1	1.06E-07
Well 28	0.0090	0.0003	0.13	21	1.00E-05	1	5.00E-07

² The "worst- or maximum-case" assumptions are that drinking water at the maximum contaminant level ever detected in the individual drinking water well listed is ingested for an exposure duration period beginning with the opening date of the Fort Ord landfills (1956) or the year the well was drilled, if later than 1956, and continuing until the well is closed or destroyed. It is further assumed that the maximum detected groundwater contaminant levels is maintained continuously from the year the landfill was opened and that the water is not blended with water from other wells with little or no contamination.

³ The "possible-case" assumptions include the "worst-case" assumption that the maximum detected level of groundwater contamination is maintained throughout the duration of the exposure, but the possible exposure duration is based upon the first detection of VOC contaminants in groundwater in 1985 and the status of the listed well at that time (eg. closed, standby, active, destroyed) and the date of the action(s) affecting the well status.

Fort Ord

Table 9 - Potential non-cancer risk associated with human ingestion of Fort Ord drinking water assuming "worst-case"⁴ conditions.

Chemical	Concentration Max. (ppm)	Estimated Dose Child Adult (mg/kg/day)		Reference Dose (mg/kg/day)	Intermediate MRL (mg/kg/day)
TCE					
Well 14	0.0140	0.0009	0.0004	0.0060 ⁵	0.0020
Well 18	0.0250	0.0016	0.0007	0.0060	0.0020
Well 19	0.0050	0.0003	0.0001	0.0060	0.0020
Well 23	0.0090	0.0006	0.0003	0.0060	0.0020
Well 24	0.0020	0.0010	0.0010	0.0060	0.0020
Carbon Tetrachloride					
Well 26	0.0005	0.0000	0.0000	0.0007	0.0007
Well 27	0.0020	0.0001	0.0001	0.0007	0.0007
Well 28	0.0090	0.0006	0.0003	0.0007	0.0007

⁴ The worst- or maximum-case" assumptions are that drinking water at the maximum level of contamination ever detected in the listed well is ingested for a lifetime (70-years) and that the water ingested is from the individual well rather than finished tap water resulting from blending with water from other wells with no or little contamination. The estimated dose values that are greater than the RfD or the ATSDR Intermediate MRL value can be interpreted as representing a possibly increased non-cancer human health risk.

⁵ EPA Region 3 RfD. No nationwide RfD exists for TCE at this time.

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APPENDIX A: LAND USE DESCRIPTIONS (from FORA, 1994)

This section includes land use descriptions keyed to the map given in Figure 2.

For purposes of public discussion, the land use polygon descriptions are presented by land use jurisdiction. The polygon boundaries are subject to revision as the Base Reuse Plan (BRP) is refined. These goals were established as part of the Fort Ord Task Force Strategy, June 1992. Many of the descriptions that follow are further delineated in Section VI of BRP.

City of Marina

Polygon 1a: Gross Acreage: 390, AIRPORT (AIR). The former Fritzsche Army Airfield (now renamed marina Municipal Airport) will be converted into a general aviation facility which will complement the adjoining University of California (UC) Center for Science, Technology, Education and Policy (STEP Center). The existing facilities will be reused and 31 acres in the polygon north of the runway will be available for new development desiring an airport location.

Polygon 1b: Gross Acreage: 130, HABITAT PRESERVATION (HAB). This area will be acquired as part of the Fritzsche Airfield conveyance and will be managed for its habitat value by the University of California, except for areas needed for access or utilities (e.g. runway lighting). The area is retained by Marina as a buffer at the end of the runway but managed by the University of California Natural Reserve System as a coastal scrub/grassland habitat adjacent to University Research Area. Good potential exists for spine flower enhancement. This could also provide a link or corridor to riparian habitat of the Salinas river.

Polygon 1c and 1f: Gross Acreage: 313, AIRPORT (AIR). Most of this area will be available for business park, commercial, industrial and airport related uses which will provide income to help support the operations of the airport. Approximately 60 acres will have development restrictions because of FAA requirements.

Polygon 1d and 1e: Gross Acreage: 51, HABITAT PRESERVATION (HAB). These areas include Fort Ord's riparian habitat of the Salinas River and the bluffs above the river.

Polygon 2a: Gross Acreage: 113, RETAIL (RET). Sixty percent of this area will be available for retail, commercial and office uses. The remaining 40 percent will be protected open space for the sensitive species found in the area, including the Yadon's piperia, a locally rare plant that exists only in this area.

Polygon 2b: Gross Acreage: 334, HIGH DENSITY RESIDENTIAL/CENTRAL BUSINESS DISTRICT (HR/CBUS). This is a mixed use area which will provide opportunities for development of an urban core adjacent to both Highway 1 and the California State University (CSU) campus. This area also boasts excellent bay views available for a combination of multi-family residential and commercial/office/cultural uses, much of which can be integrated to take advantage of pedestrian and transit opportunities as well as the excellent freeway access. Although non-residential development would probably precede much of the residential development, about 65 % of the development would be for residential use combined with the parks and schools to serve the residential. The remaining 35 percent would be commercial/office/cultural uses, some of which may be separate from residential development. The maximum residential density would be 14 units per gross acre.

Polygon 2c: Gross Acreage: 111, HIGH TECH BUSINESS PARK (TECH). This area will be redeveloped with business park uses, many of which will occur partially as a result of the nearby CSU campus and the UC Science, Technology, Education and Policy Center.

Polygon 2d: Gross Acreage: 82, RETAIL/HIGH DENSITY RESIDENTIAL (RET/HR). This area would be available to provide a mixture of commercial and residential uses which would support the faculty, staff and students of the adjoining CSU campus. The maximum residential density would be 14 units per gross acre.

Polygon 2e: Gross Acreage: 40, CORPORATION YARD (CORP). This area will contain public agency corporation yards currently planned by the City of Marina, the County of Monterey and the Monterey-Salinas Transit. This area also immediately adjoins the corporation yard planned for the CSU campus.

Polygon 2f: Gross Acreage: 7, BUS TRANSFER CENTER (BTC). This area will be used for a Bus Transfer Center.

Polygon 2a: Gross Acreage: 36, EQUESTRIAN CENTER (EQC). The existing equestrian center will be retained within this area and it may be expanded to additional related uses, all of which will have access to appropriate areas and trails in the undeveloped lands to be held by public agencies.

Polygon 3: Gross Acreage: 30, COMMUNITY COLLEGE (UNIV/CC). This area will be used for a new community college campus.

Polygon 4: Gross Acreage: 665, LOW DENSITY RESIDENTIAL (LR). This low density residential area contains the existing Patton Park and Abrams Park subdivisions.

Polygon 4a: Gross Acreage: 16, SCHOOL (SCH). This is the existing Patton School.

Fort Ord

Polygon 5a: Gross Acreage: 59, RETAIL (RET). This area will be utilized for retail development.

Polygon 5b: Gross Acreage: 5, RETAIL (RET). This small area will be utilized for retail development.

Polygon 5c: Gross Acreage: 11, UNIVERSITY RESEARCH AREA (URA). This area provides the corridor linkage from the maritime chaparral around the airfield to the habitats in the interior. Restoration potential is good.

Polygon 7b: Gross Acreage: 345, UNIVERSITY RESEARCH AREA (URA). This is one of the most important habitat management areas identified in this BRP. It contains higher densities of sensitive species than any other habitat on Fort Ord. This will be managed as habitat by the University of California Natural Reserve System.

Polygon 7c: Gross Acreage: 139, UNIVERSITY OFFICE (USO). This area is proposed for University of California educational, office and research purposes. Approximately 50 acres of this polygon will remain open space and will be incorporated into landscape management, providing opportunity for habitat enhancement. This is not critical for corridor linkage but has restoration/enhancement/public education potential.

Polygon 8b: Gross Acreage: 37, UNIVERSITY OFFICE (USO). A small area (approximately seven acres) may be available for habitat management. Most of this polygon will be developed for university related facilities.

Polygon 8c: Gross Acreage: 20, BUS TRANSFER CENTER (BTC) This site will be used in conjunction with the Bus Transfer Center as a parking area.

Polygon 8d: Gross Acreage: 7.2, GOLDEN GATE UNIVERSITY (GGU) This site will be used for the new campus of Golden Gate University.

Marina/Seaside/Monterey County

California State University Monterey Bay

Polygon 10 and 16: Gross Acreage: 1263, UNIVERSITY (UNIV). This is the site of the California State University Monterey Bay (CSUMB) campus is located on approximately 1300 acres of land, of which 1000 acres is developed. On approximately 500 acres of the developed land are located 1253 housing units to be used for CSUMB housing. Approximately 200 of these units are intended for use as faculty family housing, the remaining 1053 units are intended for use as student housing.

The remaining 500 acres of developed land have numerous permanent and temporary (World War II vintage wooden) structures. Of the permanent three-story, concrete structures, 21 are planned for seismic upgrade and renovation into lecture/laboratory spaces. These will serve as the academic core of CSUMB.

Additional facilities on this acreage include the following: 19 permanent, three-story, concrete structures that will be upgraded and renovated to serve as CSUMB residence halls (after upgrade and renovation, these structures will house approximately 1800 students).

Other permanent single-story and multi-story concrete structures will be upgraded and renovated to meet the administrative space needs of CSUMB. This area will also provide the sites where CSUMB will construct new facilities including additional residence halls, a permanent library building, and a science center as necessary to accommodate a planned 25,000 full time equivalent student campus.

The 300 acres of open, undeveloped land physically connects the area containing the 1253 housing units and the academic core. This area is planned for eventual expansion of not only the university curriculum (e.g., a future environmental studies center) but also possible additional housing units to serve the needs of the students and faculty.

Monterey County

Polygon 6a: Gross Acreage: 12, RESEARCH CENTER (RC). This area contains the existing US Army Reserve Training Center. If the Reserve Center is relocated, the proposed land use would be retail commercial.

Polygon 6b: Gross Acreage: 39, HABITAT PRESERVATION (HAB). This habitat area is to be retained by Monterey County (or transferred to UNRS) to provide further biological linkage/corridor connections between high value areas to the Northwest and Southeast.

Polygon 7a: Gross Acreage: 284, UNIVERSITY/SCIENCE/OFFICE (USO). This area proposed for University of California educational, science, technology and development purposes.

Polygon 8a: Gross Acreage: 352, LANDFILL RESEARCH AREA (LFRA). The area formerly used for landfill would be used for remediation and reuse research. The landfill polygon will realize very limited development after it is remediated.

Polygon 9a: Gross Acreage: 161, UNIVERSITY RESEARCH AREA (URA). This area has value both as a conservation area and as an important link within the habitat corridor.

Polygon 9b: Gross Acreage: 46, UNIVERSITY/SCIENCE/OFFICE (USO). Facilities will be sensitively placed in these polygons to avoid important biological resources and to provide a manageable interface between the built and the open environment.

Polygon 10a: Gross Acreage: 7, SCHOOL (SCH). This is a proposed site for an elementary school.

Polygon 11a: Gross Acreage: 174, HABITAT PRESERVATION (HAB). The parcel has valuable habitat and is critical in the corridor connection to the interior. The boundaries will be adjusted to preserve the corridor between polygons 9a and 25 through the westerly side of polygon 17b while establishing manageable boundaries with Polygons 7a, 10 and 11b.

Polygon 11b: Gross Acreage: 734, AGRI-BUSINESS CENTER/PUBLIC SAFETY TRAINING (AGRI/POST). The proposed uses in this area include an Agri-Business Center and a Public Safety Training Facility. Approximately 200 acres of this polygon will be developed. The remainder will be set aside as open space/habitat. Boundaries will be adjusted to establish logical permanent boundaries between developable and undeveloped lands best held for habitat preservation.

Polygon 17a: Gross Acreage: 58, PARKS AND RECREATION (CPRK). Boundaries will be adjusted to accommodate significant biological resources.

Polygon 17b: Gross Acreage: 458, PARKS AND RECREATION (RV). The existing travel camp in this polygon will be rehabilitated, and minor improvements will be made to accommodate youth camp activities for 250 youths. Most of the area will be used for environmentally-oriented recreation and outdoor education to enhance the corridor connection between interior and coastal habitats to the North.

Polygon 19a: Gross Acreage: 778, LIGHT INDUSTRIAL (LI) with emphasis on light industrial uses supportive of educational objectives of the BRP. More than 320 acres, located at the ecotonal edge between maritime chaparral and oak woodland will be preserved as open space/habitat.

Polygon 19b: Gross Acreage: 91, ARMY/MOTOR POOL (Army/MP). This area is the site of an existing Army motor pool recommended for retention in the POM Annex. Alternatively, the area would be used for light industry/offices supporting CSUMB. This is also a proposed site for a multi-modal transportation center/MST transit operations facility.

Polygon 21a: Gross Acreage: 133, MEDIUM DENSITY/HIGH DENSITY RESIDENTIAL (MR). As appropriate to improve the regional jobs/housing balance.

Polygon 21b: Gross Acreage: 362, LIGHT INDUSTRIAL (LI).

Polygon 21c: Gross Acreage: 14, HABITAT PRESERVE (HAB). This 14-acre site has been requested by Monterey Peninsula College as a California Native Plant Society Plant Preserve.

Polygon 25: Gross Acreage: 15,026, NATURAL RESOURCE MANAGEMENT AREA (NRMA). Public lands managed by the Bureau of Land Management would remain in federal ownership. These lands would be managed primarily to protect and enhance habitat for rare species. These lands would also be available for public recreation and open space uses that are compatible with protection of the biological habitats. It is anticipated that there would be a system of trails for hiking, equestrian, and mountain biking enthusiasts, as well as opportunities for study and interpretation of the natural environments. Other public uses that are expected to occur here include environmental education, biological research, and wildlife fire training. Some areas may also be available for future development of facilities to support public and non-profit agencies such as schools, fire and law enforcement training, parks, etc.

Management guidelines for these lands would be established by a Coordinated Resource Management Plan (CRMP) which would be developed cooperatively by the BLM, local agencies and governments and the local community.

Polygon 26: Gross Acreage: 38, LAW ENFORCEMENT TRAINING (POST). This area is to be used for law enforcement training, utilizing existing MOUT (Military Operations Urban Terrain) facility.

Polygon 30a, b, and c: Gross Acreage: 635, PARKS AND RECREATION (RAE). These are parking areas for Laguna Seca and will be sited and managed to optimize use of previously disturbed areas and minimize permanent damage to habitat. The size and location of these areas is subject to modification.

Polygon 32: Gross Acreage: 87, SCHOOL/EXPANSION (SE). York School will construct a cross country course through this polygon resulting in minimal disturbance to the maritime chaparral habitat. Final polygon boundaries are currently being refined.

Monterey County/Sand City/Marina/Seaside

West of Highway 1

Polygon 12a: Gross Acreage: 404, OPEN SPACE (CDZ). The undisturbed coastal dune zone is entirely preserved by the BRP.

Fort Ord

Polygon 12b: Gross Acreage: 510, PARKS AND RECREATION (DHZ). Family campgrounds and day use facilities with controlled access to beach and dune habitat zone.

Polygon 14a: Gross Acreage: 57, PARKS AND RECREATION (MUA/ATF). The existing Stilwell Hall will be used as a multi-agency visitor center.

A facility and conference center may be built to house up to 80 overnight guest units, dining and support facilities and a variety of large and small meeting rooms.

Polygon 14b: Gross Acreage: 11, PARKS AND RECREATION (SA). The service area will use a previously disturbed area formerly the Ammunition Supply Point (ASP) to provide for equipment parking and storage.

Polygon 14c: Gross Acreage: 4, DESALINATION PLANT (DS). This disturbed area is the site of an old sewage treatment plant. It is a possible site for a desalination plant, utilizing piping, parking and other existing facilities not currently in use. It would be designed and sited to minimize encroachment on the coastal dune habitat and viewshed.

Monterey County/Del Rey Oaks

Polygon 29a: Gross Acreage: 270, OFFICE PARK (OP). This area is proposed for a combination of conference center, corporate headquarters, high tech business park, office park uses and commercial uses. A golf course of approximately 150-160 acres is also proposed, subject to conformity with the EIS and ROD.

Polygon 31a: Gross Acreage: 15, NATURAL AREA EXPANSION (NAE). The Natural Area Expansion polygon is designated to honor Monterey Peninsula Regional Parks District's request for an area to expand the Frog Pond on Fort Ord. The wetlands and ephemeral drainage in this area will be managed as open space/habitat.

Polygon 31b: Gross Acreage: 18, OFFICE PARK (OP). This area is proposed for a combination of conference center and hotel. The area will be developed, allowing for sensitive placement of facilities and adequate buffer with the neighboring Natural Expansion Area (NEA).

City of Seaside

Polygon 15: Gross Acreage: 147, COMMERCIAL BUSINESS (CBUS). This area is proposed for regional retail and commercial uses normally associated with a central business district.

Fort Ord

Polygon 18: Gross Acreage: 110, OFFICE PARK (OP). This area is proposed for office use with a small amount of medium density residential. A Defense Finance and Accounting Service Office (DFAS) will be included.

Polygon 20a: Gross Acreage: 194, MEDIUM DENSITY RESIDENTIAL (MR). and 600 resort hotel rooms with a meeting space.

Polygon 20b: Gross Acreage: 97, MEDIUM DENSITY RESIDENTIAL (MR).

Polygon 20c: Gross Acreage: 313, MEDIUM DENSITY RESIDENTIAL (MR).

Polygon 20d: Gross Acreage: 35, INSTITUTIONAL/MIIS (INST). This is the proposed site for Monterey Institute of International Studies. Approximately five acres will remain undeveloped.

Polygon 20e: Gross Acreage: 85, OFFICE PARK (OP).

Polygon 20f: Gross Acreage: 50, SCHOOL (SCH). This is the site of the existing Fitch Middle School. Approximately 37 acres of the site will remain open space.

Polygon 20g: Gross Acreage: 96, HIGH DENSITY RESIDENTIAL (HR).

Polygon 20h: Gross Acreage: 779, ARMY ENCLAVE (ARMY). The POM Annex Footprint shown in the BRP reflects 1991 BRAC action and community reuse planning as of December 30, 1993. These boundaries may be modified based upon implementation of the 1993 BRAC action and Army/Community Cooperative decision making.

Polygon 20i: Gross Acreage: 16, SCHOOL (SCH). This is the site of the existing Stilwell Elementary School.

Polygon 20j: Gross Acreage: 8, SCHOOL (SCH). This is the site of the existing Marshall Elementary School.

Polygon 20k: Gross Acreage: 27, SCHOOL (SCH). This is the site of the existing Hayes Elementary School.

Polygon 22: Gross Acreage: 404, GOLF COURSES (GOLF). Two existing championship golf courses: Black Horse and Bayonet.

Polygon 23: Gross Acreage: 91, TOURISM (RH). This area is proposed for resort hotels (approximately 525 hotel rooms).

Polygon 24: Gross Acreage: 121, COMMERCIAL BUSINESS (OP). This area is proposed for office use.

Polygon 25: Gross Acreage: 1179, NATURAL RESOURCE MANAGEMENT AREA (NRMA). Public lands managed by the Bureau of Land Management would remain in federal ownership.

Monterey County/City of Monterey

Polygon 29b: Gross Acreage: 92, OFFICE PARK (OP). This area is proposed for a combination corporate headquarters, high tech business park, and office park.

Polygon 29c: Gross Acreage: 30, OFFICE PARK (OP). This area is proposed for a combination of corporate headquarters, high tech business park, office park and City corporation yard uses.

Polygon 29d: Gross Acreage: 25, OFFICE PARK (OP). This area is proposed for a combination of corporate headquarters, high tech business park and office park uses.

Polygon 29e: Gross Acreage: 20, COMMUNITY PARK (CPRK). This area is proposed for overnight camping and hiking. This area may be used as Highway 68 alternative corridor. If the area is used for highway purposes, the California Department of Transportation will provide the City of Monterey a community park site at another location.

APPENDIX B: ATSDR PUBLIC HEALTH HAZARD CONCLUSION CATEGORIES

Category	Definition	Criteria
A. Urgent public health hazard	This category is used for sites that pose an urgent public health hazard as the result of short-term exposures to hazardous substances.	<ul style="list-style-type: none"> evidence exists that exposures have occurred, are occurring, or are likely to occur in the future AND estimated exposures are to a substance(s) at concentrations in the environment that, upon short-term exposures, can cause adverse health effects to any segment of the receptor population AND/OR community-specific health outcome data indicate that the site has had an adverse impact on human health that requires rapid intervention AND/OR physical hazards at the site pose an imminent risk of physical injury
B. Public health hazard	This category is used for sites that pose a public health hazard as the result of long-term exposures to hazardous substances.	<ul style="list-style-type: none"> evidence exists that exposures have occurred, are occurring, or are likely to occur in the future AND estimated exposures are to a substance(s) at concentrations in the environment that, upon long-term exposures, can cause adverse health effects to any segment of the receptor population AND/OR community-specific health outcome data indicate that the site has had an adverse impact on human health that requires intervention
C. Indeterminate public health hazard	This category is used for sites with incomplete information.	<ul style="list-style-type: none"> limited available data do not indicate that humans are being or have been exposed to levels of contamination that would be expected to cause adverse health effects; data or information are not available for all environmental media to which humans may be exposed AND there are insufficient or no community-specific health outcome data to indicate that the site has had an adverse impact on human health
D. No apparent public health hazard	This category is used for sites where human exposure to contaminated media is occurring or has occurred in the past, but the exposure is below a level of health hazard.	<ul style="list-style-type: none"> exposures do not exceed an ATSDR chronic MRL or other comparable value AND data are available for all environmental media to which humans are being exposed AND there are no community-specific health outcome data to indicate that the site has had an adverse impact on human health
E. No public health hazard	This category is used for sites that do not pose a public health hazard.	<ul style="list-style-type: none"> no evidence of current or past human exposure to contaminated media AND future exposures to contaminated media are not likely to occur AND there are no community-specific health outcome data to indicate that the site has had an adverse impact on human health

APPENDIX C: PUBLIC COMMENTS ON THE FORT ORD PUBLIC HEALTH ASSESSMENT

The Fort Ord Public Health Assessment was released for public comment on July 15, 1996. The comment period ended on September 5, 1996.

Comments were received from the U.S. Army Center for Health Promotion and Preventive Medicine, the U.S. Fish and Wildlife Service, the Presidio of Monterey, and the California Department of Health. The U.S. Environmental Protection Agency had no written comments on the assessment.

The specific comments that were received either identified new information; questioned specific sentences or paragraphs in the text or tables; or suggested additions or corrections to improve the clarity, completeness, or accuracy of a specific sentence or paragraph. Those specific comments were not repeated by other respondents and are listed separately. This list of specific comments does not include editorial comments concerning word spelling, sentence syntax, format, etc. If the accuracy of a statement was questioned, the statement was verified and corrected. Comments which requested that information be added to the document without providing documented sources of that information were not addressed here.

SPECIFIC COMMENTS

1. *Table 5 expresses 6 carbon tetrachloride detections above the U.S. EPA MCL of 5 ppb; furthermore, it footnotes the state of California's state MCL of 0.5 ppb. It was suggested that Table 5 express how many of the 33 carbon tetrachloride detections were above the state of California 0.5 ppb MCL.*

Reply

The minimum level of detection was 0.5 ppb for carbon tetrachloride, therefore all 33 detections of carbon tetrachloride were above the state of California 0.5 ppb MCL.

2. *Page 23 - The lead and bullet fragments in the "heavy" surface areas in the Beach Ranges will be removed to below 1,860 ppm, not no detect.*

Reply

New information has been provided to ATSDR on the clean-up lead levels in the Beach Ranges. The "heavy" areas will not be cleaned up to levels of no detect, but rather to a level below 1,860 ppm. The U.S. EPA used the Integrated Uptake BioKinetic Model to determine that a lead concentration of 1,860 ppm would not result in child blood-lead levels over 10

ug/dL. A pilot study of 1,000 cubic yards removed lead through visual and mechanical methods to an average level of 5.6 ppm. The excavation of the remaining "heavy" areas is believed to result in similar clean-up levels.

3. *Page 22 - There is no evidence indicating that large caliber ordnance was fired into Monterey Bay nor is there any evidence indicating that Fort Ord is responsible for any UXO in Monterey Bay.*

Reply

The Enhanced Preliminary Assessment of Monterey Bay reviewed by ATSDR suggests that large caliber ordnance may have been fired into Monterey Bay. However, there is no documentation confirming that Fort Ord is responsible for any UXO in Monterey Bay. The discussion about this is found on page 22.

4. *Page 27 - A boundary fence will only be constructed around the Multi-Range Area, but not around the other Ordnance and Explosives (OE) sites.*

Reply

New information has been provided to ATSDR stating that the boundary fence will only be maintained around Site 15 (Multi-Range Area) and no fencing will be placed around all of the OE sites. The PHA text has been changed accordingly. Warning signs will be placed and maintained around all of the OE sites. The remaining OE sites do not pose a threat to human health because those OE sites are either undergoing Time Critical Removal Actions or further investigations.

5. *Page 19 - OE Time Critical Removal Actions (TCRAs) have not been completed for all areas shown in Figure 6. Some TCRAs have been completed and some are on-going.*

Reply

A current OE program status map has been provided to ATSDR and has been added to the PHA.