STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

STAFF REPORT FOR REGULAR MEETING OF DECEMBER 4-5, 2008
Prepared on October 29, 2008

ITEM NUMBER: **14**

SUBJECT: **Military Facilities Update**

INTRODUCTION

This Staff Report summarizes the progress of cleanup efforts conducted under the Department of Defense's (DoD) Environmental Restoration Program during the last ten months. *Note new information since the last program update is provided in italics to differentiate from information that has been provided in prior reports.*

Regulatory Background

The Environmental Restoration Program was established by the Superfund Amendments and Reauthorization Act of 1986 to address historic activities at federal facilities that that could pose a threat to human health or the environment. DoD follows the investigation, cleanup, and closure process laid out by the Comprehensive Environmental Response, Compensation, and Liability Act. The U.S. Environmental Protection Agency (USEPA) is the lead regulatory agency at all California DoD facilities on the National Priorities List (i.e., federal "Superfund Sites") with support from Water Boards and Department of Toxic Substances Control (DTSC). Former Fort Ord Army Base is the only DoD Superfund site in the Central Coast Regional Water Quality Control Board's (Central Coast Water Board) jurisdiction. DoD has transferred two facilities, Former Fort Ord Army Base and Lompoc Branch U.S. Disciplinary Barracks Federal Correction Facility, to non-military uses. DoD continues to include these sites in the Environmental Restoration Program as "Base Realignment and Closure Installations."

A 1997 agreement between the State Water Quality Control Board (State Water Board) and DTSC designated the respective roles of the two agencies at the various DoD facilities. At DoD facilities in the Central Coast, the Central Coast Water Board either shares the lead regulatory role with DTSC (e.g., Vandenberg Air Force Base) or is the sole lead (e.g., Camp Roberts National Guard Base). The Central Coast Water Board's primary oversight responsibilities include: (1) reviewing and commenting on technical reports and studies designed to develop remedial alternatives; (2) achieving public outreach and education through public meetings; and (3) providing oversight for leaking underground storage tank cases. The Central Coast Water Board's authority for cleanup of polluted DoD sites include: California Water Code, Division 7, Section 1300, Section 13304, and Section 13172, and California Health and Safety Code, Chapter 6.7.

Program Overview

The Central Coast Water Board is reimbursed for regulatory oversight at DoD facilities through the DoD and State "Memorandum of Agreement." Most of the DoD budget for the Central Coast Region covers oversight at Vandenberg Air Force Base, Former Fort Ord Army Base, Lompoc

Branch U.S. Disciplinary Barracks Federal Correction Facility, Fort Hunter Liggett Army Base, Camp Roberts National Guard Base, and Monterey Peninsula Airport (a former U.S. Navy Air Base).

There are numerous other military-related sites in the Central Coast Region that DoD classifies as Formerly Used Defense Sites. Formerly Used Defense Sites are sites that were previously owned, operated, or leased by DoD. An example of a Formerly Used Defense Site currently being addressed through the Environmental Restoration Program is Monterey Peninsula Airport (see site discussion below). Many of the Formerly Used Defense Sites were only used for a short period of time (e.g., during World War II) or had limited activities (e.g., satellite stations). In most cases, there is little site information on Formerly Used Defense Sites and DoD ranks them as low priority for funding purposes. The State Water Board is currently working with the Regional Water Boards, DTSC and DoD to prioritize actions at Formerly Used Defense Sites in California.

The DoD unit consists of two full-time and three partial-time caseworkers, an approximately 1/2-time senior (shared with the Site Cleanup Program), and two student interns. DoD Program resources for fiscal year 2008/2009 are similar to last year's at 4.6 personnel years and approximately $557,000. At the end of September 2008 (most current data available) with 25 percent of the year completed, 20 percent of these budgeted resources had been expended.

Formerly Used Defense Sites Program
Central Coast Water Board staff is requesting Army Corps funding to address underground storage tank issues at the former Navy Marine Air Training Base in Goleta, and the former military airfield in Santa Maria. Although the Formerly Used Defense Site program is highly under-funded, Water Board staff is optimistic that our long history of cleanup successes with the Department of Defense will place us high on this funding list.

VANDENBERG AIR FORCE BASE (VAFB)
Lead Staff: Don Eley, Carol Kolb, Kristina Seley

Background
VAFB, located on the north coast of Santa Barbara County, is the third largest U.S. Air Force (Air Force) installation, occupying almost 100,000 acres and 35 miles of coast line. Basewide cleanup is being implemented through the DoD's Environmental Restoration Program. Program implementation follows the provisions of a Federal Facility Site Remediation Agreement, entered into by the Air Force, Central Coast Water Board, and DTSC on August 22, 1991.

Sites/Chemicals of Concern
Environmental Restoration Program sites at VAFB include: closed landfills, space launch complexes, missile silos, fuel and chemical spill areas, and underground storage tank areas. Typical chemicals of concern include: jet fuels, rocket fuels, petroleum hydrocarbons, solvents, polychlorinated biphenyls, pesticides, perchlorate, metals, and unexploded ordnance.

Emergent Chemicals/Perchlorate
The "Basewide Preliminary Assessment/Site Investigation" for six emergent chemicals of concern (e.g., perchlorate, n-nitrosodimethylamine, polybrominated diphenyl ether, 1,4-dioxane, 1,2,3-trichloropropane [TCP], and total/hexavalent chromium) began in January 2004. In December 2005, the Air Force performed a preliminary assessment on 132 established Installation Restoration Program (IRP) sites, 32 of which were identified for additional limited site investigation (LSI) work, including soil and groundwater sampling. After completing the majority of all drilling and groundwater sampling in December 2007, *the Air Force submitted the*

Draft LSI for California Emerging Compounds of Concern on May 29, 2008. Central Coast Water Board staff approved the Draft LSI with comments on July 30, 2008.

In the LSI, the Air Force describes the work done on the 32 sites identified for additional investigation, including a historic records review that was conducted for 13 sites, field activities that were conducted on 7 sites, a compilation of Basewide Groundwater Monitoring Program (BGMP) data on 7 sites, and the compilation of other program data for 2 additional sites. For each site and emergent chemical investigated, the Air Force recommended that future monitoring of constituents be incorporated into the BGMP for the cleanup site or that no further action was necessary for the chemical at the site. About 10 of the sites investigated under the LSI were already being sampled for perchlorate, TCP, and/or 1,4-dioxane under the BGMP. Eleven sites investigated were non-detect for any emerging chemicals or had previously been tested for emerging chemicals, and because of low or non-detect levels, were subsequently recommended for no further action. Only one area of concern tested positive for perchlorate above the project action level. This site was recommended for additional investigation under the Area of Concern (AOC) program. Central Coast Water Board staff received the Final LSI on August 29, 2008, and will provide review and comment of the Final LSI prior to the Board meeting on December 4, 2008.

Progress/Success Stories

Site 3 *(Former Fuel Transfer Station): Site 3 is located in the cantonment area on the Burton Mesa. The Site is one of several former fuel transfer stations. Historically the Air Force transferred diesel fuel from railroad cars to six, 9,000 gallon aboveground storage tanks which was used to fuel military vehicles; these tanks were removed in 1961. In addition, the Air Force identified five diesel fuel USTs during summer 2006; the Air Force removed the USTs during fall 2004. The northwest site boundary was recently expanded to include the 9300 block of buildings of the cantonment area. These buildings include missile component maintenance and assembly, electroplating, printed circuit board manufacturing, painting and photographic processing. A wastewater line is located on the 9300 Block which formerly conveyed wastewater from the industrial facilities to a surface discharge area near the railroad transfer station. This wastewater line carried solvents, which is likely the source of the volatile organic compounds (VOCs) found in groundwater, soil gas, and soil. In summary, dissolved metals, total petroleum hydrocarbons as diesel (TPHd), trichloroethene (TCE), tetrachloroethene (PCE), cis-1,2-dichloroethene, trans-1,2-dichloroethene, vinyl chloride, benzene, and polynuclear aromatic hydrocarbons, currently exist above California Department of Public Health groundwater Maximum Contaminant Levels (MCLs) in Site 3 wells..*

The Air Force is actively performing soil, groundwater and soil gas investigations at Site 3, which includes additional lateral and vertical assessment in association with TPH sources, and similar assessment in association with TCE-impacted soil resulting from historical use of a wastewater line. In addition, Central Coast Water Board staff requested in an April, 2008 that the Air Force make characterization of soil gas impacts and vapor intrusion a priority because of potential risk to human health and ecological receptors from these pathways. The Air Force subsequently conducted indoor air sampling in August 2008 to assess the potential for imminent risk to human health in the buildings located above the VOC waste at Site 3. All sample results were reported below laboratory reporting limits for all constituents, indicating that there is no imminent threat to human health associated with these constituents. The Air Force will prepare a final report summarizing the results from the additional assessment sampling and any necessary additional actions by December 14, 2008.

Sites 8 and 9: (Space Launch Complex-4 East and Space Launch Complex-4 West): These two adjacent launch complexes were active from 1964 until they were decommissioned in 2006. Launch activities resulted in two long groundwater plumes of TCE and perchlorate. The Site 9 plume extends over 3,000 feet, reaching bluffs above the Pacific Ocean. In November 2003, the Air Force began operation of a dual-phase (groundwater and soil vapor) extraction system at the Site 9 groundwater hot spot. This system successfully removed waste mass through 2007, *and was subsequently turned off due to a diminished mass removal rate.*

The Air Force subsequently installed in-situ bioremediation pilot studies at both Site 8 and Site 9 to test groundwater hot-spot remediation. These bioremediation pilot systems have locally reduced TCE concentrations to below its MCL of 5 micrograms per kilogram (µg/L), and perchlorate concentrations to below the detection limit, which typically is 1 µg/L. Based on the success of these in-situ bioremediation pilot study systems, the Air Force has expanded both systems, and recently obtained approval for installing downgradient in-situ treatment zones to minimize further offsite migration. Implementation of the expanded systems will include injection of carbon substrate, dechlorinating microbes, buffer compound, and tracer media.

Site 15: (ABRES-B Launch Complex): Site 15 is a former launch complex located approximately 1.5 miles from the Pacific Ocean. The complex was built in 1959 and was used for missile launches through 1967. Large quantities of the solvent TCE were used to clean the missiles prior to launch. The TCE migrated into the shallow aquifer in the underlying sand dunes. At least two plumes extend from the launch pads to San Antonio Creek, over 3,000 feet south of the launch complex. Surface water samples show that TCE and its break down products are present at low concentrations in a 3,000 foot reach of San Antonio Creek beyond where the plumes discharge. To date, these detected concentrations are below MCLs and aquatic habitat standards; however, vinyl chloride has been detected at concentrations above its MCL.

In 2008 the Air Force implemented an in-situ permeable reactive barrier pilot study designed to treat a hot spot near the leading edge of the plume. The Air Force recently determined that the deployment method for injecting their preferred permeable reactive barrier material, carbon impregnated with nano-sized iron (reducing compound), was not effective. The Air Force has recently obtained approval for implementing a follow-up pilot study, to test an alternative injection method for distributing this reducing compound. Injection will be performed at a higher pressure using a natural food-grade polymer (guar gum) to hydraulically fracture the targeted zone. This should result in more broadly distributed reducing compound, which will in part be evaluated using tracer media.

***Site 19** (NASA Building): Site 19 is currently an active NASA facility with multiple operations including satellite communications control, hardware assembly, and telemetry. The Air Force apparently used TCE in the past as a degreasing agent for parts cleaning and likely discharged TCE to the ground surface, resulting in a TCE-impacted groundwater plume approximately 240 feet in length, 110 feet in width, and down to 29 feet in depth (depth to groundwater is 9 feet below the ground surface).*

The Air Force initiated an enhanced in-situ biodegradation study in 2006, which included new well installations and injection of a hydrogen releasing compound substrate, and dechlorinating microbes. The initial injections effectively treated the lower sandy zone, but appear to have had limited affect on the waste concentrations in the upper clay zone in some areas. For the purpose of further reducing the TCE and daughter compound concentrations, the Air Force

obtained approval in 2008 for additional biodegradation treatment injections in the most impacted area.

PCE-impacted groundwater has also been identified at Site 19. Characterization of this PCE groundwater plume, which appears to be smaller than the TCE plume, is currently underway.

Site 20: (UST Area 1, Landfill and Drum Disposal Site Areas 2 & 3): Site 20 is located in the main cantonment area and is comprised of an UST Area (Area 1), Landfill 1 (Area 2), and Drum Disposal site (Area 3).

Area 1 contained three 10,000-gallon concrete diesel fuel and gasoline USTs which were removed in 1993; the Air Force did not use the tanks after 1953. Site groundwater waste constituents include: TPHd, TPH as gasoline (TPHg), benzene, toluene, ethylbenzene, xylenes (BTEX), 1,2-dichloroethane, and 1,2-dibromoethane. Since 1998, the Air Force has operated a source reduction system as an interim remedial action at Area 1. The Final Performance Monitoring Report shows that since the system began operating, it has removed an estimated 12,270 pounds of hydrocarbons from the vapor phase and 108 pounds of hydrocarbons from the groundwater phase. The Air Force shut down the source reduction system to conduct an in-situ chemical oxidation treatment that included injection of *10,000 gallons of* Fenton's reagent (an oxidizing agent). *The Air Force's injections at Site 20 reduced the concentrations of waste constituents by the following percentages: TPHg by 83%, TPHd by 42%, benzene by 99%, and 1,2-dichloroethane by 86%. The Air Force completed in-situ chemical oxidation treatment on August 31, 2008, with concurrence from the Executive Officer.*

Area 2 (Landfill 1) served as the main landfill for VAFB between 1942 and 1957. Waste disposed of at Landfill 1 included municipal trash, incinerator ash, scrap metal, pesticides, waste oil, lubricants, and potentially unexploded ordnance. The drum disposal site (Area 3) is located southwest of Landfill 1. Waste constituents buried at the site include drums of waste oil, lubricants, and solvents. The Air Force submitted a field modification report (FMR) on June 24, 2008 to conduct fieldwork to investigate data gaps that were identified during a feasibility study scoping meeting on December 12, 2007. Central Coast Water Board staff accepted the FMR as final. Central Coast Water Board staff expects the Air Force to submit results and analysis of the data gap sampling in late 2008.

Site 21: (Fire Training Area): Site 21 is a former fire training area, used for firefighter training from 1958 through 1989. The fire training area formerly contained a metal mock airplane, a cinder-block smokehouse, two oil/water separators, and two burn pits. During each training exercise, the Air Force sprayed 300 to 600 gallons of jet propellant-4 onto and/or around the mock airplane and then ignited it; 40 to 60 exercises like this were conducted each year.

From 2004 to 2005, the Air Force excavated approximately 30,000 cubic yards of soil polluted with petroleum, polychlorinated biphenyls, volatile organic compounds, and dioxin. The Air Force disposed of the material at an appropriate off-site disposal facility. There is no groundwater found beneath the site in the sands above bedrock, and therefore only soil cleanup is required by DTSC and the Central Coast Water Board.

On December 12, 2007, the Air Force submitted a Focused Feasibility Study which included a risk assessment to determine soil cleanup values (there is no groundwater pathway and no standing surface water). In the Feasibility Study, the Air Force proposed to implement land use controls to mitigate an exposure threat from residual soil wastes that remains in place. *Central Coast Water Board and DTSC staff approved the Focused Feasibility Study on April 2, 2008 and subsequent Proposed Plan on March 3, 2008. The Air Force submitted a Final Record of*

Decision/Remedial Action Plan (ROD/RAP) that proposed implementing land use controls at the site with no additional active remediation. Water Board staff determined that the land use controls remedy was acceptable because remaining detected waste concentrations at the site do not pose a threat to human health, are a negligible threat to ecological receptor health, and do not adversely impact waters of the state. The Executive Officer approved the Final ROD/RAP on October 2, 2008.

***Site 32 Cluster/ Site 35** (Atlas F Missile silos): Site 32 Cluster (32C) is comprised of Sites 32 and 35, which are missile silo complexes that were historically used for launching Atlas F missiles. The Air Force launched two Atlas F missiles from the Site 32 facility in the 1960s. However, this silo facility served primarily as a training facility for active launch operations from Site 35. The Air Force launched seven Atlas F missiles from the Site 35 facility in the 1960s. The Air Force used dry pad technology for launches at both facilities, which typically generated waste including some TCE. More recently, the Air Force used Site 32 as a radar facility until 1999. Site 35 is currently used for equipment storage and office space.*

The Air Force has identified VOC wastes, most notably TCE, associated with the Site 35 facility. Site characterization performed in 2007 and 2008 identified a subsurface paleochannel that conveys VOC-impacted groundwater at least 3,000 feet downgradient to the southwest. The Central Coast Water Board staff and DTSC recently approved the Air Force's plan for implementation of an in-situ bioremediation pilot study, which will include injection of carbon substrate, dechlorinating microbes and tracer media, into a relatively narrow point in the identified paleochannel. Injection wells were installed in November of this year, and the study is scheduled for completion in the summer of 2009.

***Site 33** (Missile Silo 576-E): Site 33 is an active Taurus missile launch facility historically used for launching Atlas F missiles. The Air Force excavated and removed burned metal debris and approximately 40 tons of metal-wastes in soil, and removed a diesel UST and an emergency rocket propellant fuel dump tank, as part of the silo's decommissioning process in 1993 and 1994. The Air Force identified VOC wastes, most notably TCE, in groundwater at Site 33. The lateral extent and amount of TCE groundwater waste is limited and has decreased over time.*

In October 2008, Central Coast Water Board staff recommended closure of Site 33 with land use controls. Based on Central Coast Water Board approval of this recommendation at the meeting on October 17, 2008, the Executive Officer will issue a letter approving closure, with land use controls (i.e., no installation of water supply wells), and directing the Air Force to properly destroy existing Site 33 monitoring wells. The Air Force will then notify the public of case closure. If no comments are received in the 30-day public comment period, the Air Force will generate a Final Record of Decision in accordance with Comprehensive Environmental Response, Compensation, and Liability Act. The Executive Officer will issue a final case closure letter, upon confirmation that land use controls are in place, and receipt of a well destruction report documenting the proper destruction of all monitoring wells.

***Site 50** (Area located between 6th and 8th Streets, and Iceland and Nevada Avenues): Previous Site 50 operations include missile engine assembling and cleaning, metal plating, and hazardous materials storage. The main contaminant of concern in soil and groundwater at Site 50 is TCE and its breakdown products. The Air Force has performed TCE-related treatability studies at Areas 1 and 2 of Site 50. The studies performed in 2007, included in-situ chemical oxidation (injection of oxidants) at Area 1, and in-situ bioaugmentation (injection of carbon substrate and dechlorinating microbes) at Area 2. Both remediation study methods lowered TCE waste concentrations in groundwater.*

The Central Coast Water Board staff and DTSC recently approved the Air Force's plan for expansion of these treatability studies to demonstrate their full-scale remedial practicality. The Air Forces' study expansion will include treatment within the 10,000 and the 15,000 µg/L TCE concentration areas that represent 40% of the calculated dissolved-phase TCE mass in shallow groundwater. The beginning stages of the expansion are currently underway, starting with the Air Force installing new monitoring wells. Treatment implementation will include chemical oxidant injection at Area 1, and carbon substrate and dechlorinating microbe injection at Area 2.

General Waiver Enrollments for Specific Types of Discharges; Resolution No. R3-2008-0010:

The following sites were enrolled under Section D of the General Waiver of Waste Discharge Requirements for Specific Types of Discharges (Resolution No. R3-2008-0010; General Waiver), which was adopted by the Central Coast Water Board at the meeting on May 9, 2008. The Air Force has provided sufficient information to demonstrate compliance with the appropriate General Waiver conditions for these sites. The waste discharge types, which are consistent with those listed in Section D of the General Waiver, are listed as injectate materials in the table below. The wastes targeted for treatment are also listed, as are the dates of the associated General Waiver enrollment letters.

Site Name	*Site Waste(s) Targeted for Treatment*	*Injectate Material*	*Date of Enrollment Letter*
Sites 8 & 9	*TCE and Perchlorate*	*Sodium lactate, sodium bromide, yeast extract, sodium bicarbonate, flourescein dye, and dechlorinating microbes*	*October 22, 2008*
Site 15	*TCE*	*Carbon impregnated with zero-valent iron, food-grade natural polymer, and sodium bromide*	*November 6, 2008*
Site 19	*TCE and PCE*	*Hydrogen releasing compound substrate, and dechlorinating microbes*	*June 4, 2008*
32 Cluster/ Site 35	*PCE*	*Hydrogen releasing compound substrate, sodium bromide, and dechlorinating microbes*	*October 2, 2008*
Site 50	*TCE*	*Hydrogen peroxide with chelated iron catalyst, sodium lactate, lactose, emulsified oil, and dechlorinating microbes*	*August 8, 2008*

Additional Investigations: Areas of Interest and Areas of Concern

The Air Force is proactively investigating multiple onsite areas that be could be associated with waste releases. The Air Force, DTSC, and Central Coast Water Board staff defines an Area of Interest as any area that could cause environmental concern, but does not pose a serious immediate threat to human health and the environment. If a *preliminary assessment (*review of historical information*/site visit)* confirms the potential threat, the Air Force and the agencies will classify the Area of Interest as an Area of Concern and the Air Force will undertake site investigations to determine appropriate subsequent actions. Approximately 160 of the originally identified 166 Areas of Concern have been closed (since 2003, approximately 50 Areas of Interest have been converted to Areas of Concern). Also, 100 additional Areas of Interest have been converted to Areas of Concern. Currently, approximately *40* Areas of Concern are *undergoing site* investigations *and another 80 Areas of Interest are undergoing preliminary assessments.* During the last *ten* months, *10 Areas of Concern and 20 Areas of Interest* were

closed, and an additional *25* are proposed for closure and are being evaluated by the Central Coast Water Board, DTSC, and the California Department of Fish and Game.

Underground Tank Program: To date, a total of *782* UST sites have been closed. Currently, *13* sites are undergoing investigations, and an additional *85 to 100* UST sites may require assessment in the future. *Also, approximately* 7 miles of solvent and petroleum/oil/lubricant transmission lines are *scheduled to be investigated and remediated within the next 5 years.*

FORMER FORT ORD ARMY BASE

Lead Staff: Grant Himebaugh

Background

The former Fort Ord Army Base encompasses 28,000 acres between the cities of Seaside and Marina. The USEPA declared the base a federal Superfund site in February 1990 based on impacts to the City of Marina's municipal water supply from facility-related groundwater wastes. The U.S. Army (Army) base officially closed in September 1994 and most of the facility became available for conversion to civilian use.

Sites/Chemicals of Concern

Since the facility's closure, the Army's base closure team has identified over 40 environmental waste sites. The primary water quality concerns involve landfill gas, one carbon tetrachloride groundwater waste plume, and three TCE groundwater waste plumes.

Progress/Success Stories

On this federal Superfund site, Central Coast Water Board staff work with USEPA and DTSC to oversee cleanup activities. The Army is remediating several large-scale groundwater waste plumes. Landfill gas is being remediated with a gas removal system. *During 2007, the Army removed over 73 pounds of groundwater wastes from the three active groundwater remediation systems. The amount of waste removed is ten pounds more, nearly 16%, than the amount of wastes removed in 2006. The Army credits the waste removal increase to be due mainly to treatment system expansions, system design enhancements, and system efficiency adjustments.*

Army staff and regulators attended a "Groundwater Summit" meeting in June 2008. Meeting attendees discussed comprehensive reviews of current and future cleanup system performance, and eventual exit strategies (e.g., conditions under which cleanup operations would end). Army and regulatory agency staff believe that active planning such as this has typically improved project success.

Operable Unit 1: To complete offsite assessment and prevent Operable Unit 1 TCE groundwater plume migration, the Army hired a separate contractor for the investigation and clean up. *The Army completed offsite plume characterization and construction of the groundwater treatment system in 2008.*

The Army's groundwater extraction and containment system mass removal rates for the original on-base portion of Operable Unit 1 has removed increased levels over the past two years, and now removal rates are predictably slowing down. The Army completed a waste rebound study using the plume's source area extraction wells, which confirmed extraction wells should remain shut down, and the reduced aquifer monitoring is adequate. This original part of the plume treatment and monitoring network is effectively achieving cleanup.

Operable Unit 2: In autumn 2007, Monterey County identified that an agricultural supply well on nearby University of California Santa Cruz property was producing water from shallow aquifers in conflict with the conditions of its operating permit. As this water production threatened to aggravate sea water intrusion and the Army's groundwater cleanups, Central Coast Water Board staff worked closely with University and Monterey County staff to identify possible solutions and terminated pumping of the agricultural supply well. *In recent developments, the University's lease with the grower has been terminated, well destruction funds have been appropriated, and the well is scheduled for proper destruction in November 2008.*

As of December 31, 2007, the Army has extracted over four billion gallons of groundwater and removed approximately 581 pounds of wastes since extraction and treatment operations began in 1996. Of the wastes removed, the Army determined that approximately two-thirds of the wastes were TCE and the remaining wastes were TCE-associated chlorinated hydrocarbons.

Sites 2/12: *The Army has now operated the new air stripper treatment system modification for a full year. The Army uses the air stripper to treat vinyl chloride after extracted groundwater exits the granular carbon treatment units. The Army's modification, compared to the prior treatment (i.e. using carbon alone), creates greater treatment efficiency.*

Carbon Tetrachloride Plume: *The Army and regulatory agencies signed a Record of Decision for the carbon tetrachloride plume, which contains the agreed upon final remedy for this waste. The Army completed operational aspects of a pilot project study in 2008. The Army has kept regulatory staff regularly informed of study results, with all indications pointing towards a successful project. The Army's official pilot study project report is due to Central Coast Water Board staff at the end of the year. The Army has begun construction on the final remedy, an in-situ biodegradation system, which is located largely in the Preston and Abrams Park areas within the City of Marina.*

Challenges
In summer 2008, Army staff did an outstanding job of addressing City of Marina community concerns when an Operable Unit 1 groundwater monitoring well was placed in a residential neighborhood. The Army's public outreach work continues while the carbon tetrachloride treatment system is being installed in the Preston Park/Abrams Park areas with the City. Regulatory agency staff considers timely review and approval of carbon tetrachloride plume documents as an ongoing priority, as project staff must meet "weather window" deadlines in order to prevent treatment system construction delays.

MONTEREY PENINSULA AIRPORT
Lead Staff: Grant Himebaugh

Background
Monterey Peninsula Airport is a Formerly Used Defense Site comprising 455 acres three miles southeast of downtown Monterey. Formerly leased by the U.S. Navy from the Monterey Peninsula Airport District in 1942, today the Airport serves the local area with commercial and private air service.

Sites/Chemicals of Concern:
Known cleanup sites include two former 50,000-gallon concrete USTs with an associated petroleum waste groundwater plume and a TCE waste groundwater plume. A former fire

fighting training facility and several other potentially polluted sites have been ruled out as waste sources.

Progress/Success Stories
In May 2003, The U.S. Army Corps of Engineers (Army Corps) initiated a treatability study to remediate TCE in groundwater at the Casanova Oak Knoll Park. Army Corps began operation of another cleanup system at the Airport's TCE contaminant source area in fall 2003. Community feedback for both of these facilities has been positive.

Challenges
While clean up at both treatment areas is progressing, Army Corps and regulatory staff have questions regarding the cost effectiveness of the system at the Cassanova Oak Knoll Park. *As part of the Army Corps' evaluation, labor costs for balancing water chemistry, and associated chemical and system repair costs suggest that a different cleanup alternative may be more cost effective. After the treatment system's current supply of hydrogen peroxide (the treatment agent) is expended, the Army Corps may adopt a modified treatment strategy.*

In spring 2008, the Army Corps' program manager returned from an assignment in Iraq. As a result, Central Coast Water Board staff looks forward to renewed project progress.

FORT HUNTER LIGGETT
Lead Staff: Grant Himebaugh

Background
Fort Hunter Liggett is an Army training facility consisting of approximately 165,000 acres in southern Monterey County, with current and historic Army uses of this facility to include field exercises and weapons and equipment testing. Most of the land is undeveloped and the Army uses the property for field training. Portions of Fort Hunter Liggett are leased for cattle grazing. The Main Garrison includes offices, barracks, motor pools, and instrument fabrication/testing facilities. DTSC is the lead agency for cleanup activities; however, the Central Coast Water Board is primarily responsible for most of the sites that require further action. Army Corps is coordinating assessment and clean up activities on behalf of the Army.

Sites/Chemicals of Concern
Environmental Restoration Program sites include a closed landfill, former USTs, spill areas, unexploded ordnance areas, hazardous waste accumulation sites, and former fire fighting training areas. The primary chemicals of concern include chlorinated solvents, petroleum, oils, lubricants, heavy metals, chlorinated pesticides, and polychlorinated byphenols. The Army Corps has responded to the Central Coast Water Board's letter regarding assessment for emergent chemicals in a letter stating that, based on site history, the emergent chemicals are not chemicals of concern. Additionally, Army Corps' analytical results for the facility's water supply well found no detectable concentrations of perchlorate.

Progress
The basewide restoration program is ahead of schedule. To date, action is complete at 32 of the 34 sites at Fort Hunter Liggett. The Army's two remaining sites needing action consist of the facility landfill and a groundwater waste plume associated with two former petroleum tanks. The Army Corps is currently addressing both of these sites. In 2007, the Army installation initiated its Military Munitions Response Program. Because this assessment deals mainly with explosives, the DTSC is overseeing this action.

Challenges
In 2008, the Army had significant installation funding challenges. Most of these challenges have been successfully met, and Central Coast Water Board staff is looking forward to renewed project progress in 2009.

LOMPOC BRANCH U.S. DISCIPLINARY BARRACKS
Lead Staff: David Schwartzbart

Background
The Lompoc Branch U.S. Disciplinary Barracks Federal Correction Facility is located approximately two miles northwest of the City of Lompoc in Santa Barbara County. The property was purchased by the War Department in 1941, and operated as part of Camp Cooke until 1946, when it was converted to an Army military detention center. In 1959, the U.S. Bureau of Prisons (Bureau of Prisons) took over management of the facility, which is currently operated as high, medium, and low security prisons. The property consists of approximately 2,900 acres and includes a sign factory, electron cable manufacturing plant, furniture factory, print shop, cattle ranch, dairy, butchering plant, sewage treatment plant, and farm.

This facility was selected for closure as part of the 1995 DoD's Base Realignment and Closure and ownership was transferred to the current operator, Bureau of Prisons, in 2003. In June 1997, the Army completed an Environmental Baseline Survey Report, which delineated potential or known areas of concern.. The Central Coast Water Board is the lead agency for this site and the County of Santa Barbara is also overseeing environmental issues at a closed landfill and at the Wood Dump/Landfill.

Sites/Chemicals of Concern
Cleanup sites include the Wood Dump/Landfill, Washrack Site, and Farm Fuel Site. Chemicals of concern include chlorinated solvents, petroleum, oils, lubricants, and metals.

Progress
Wood Dump: The Wood Dump cover, erosion controls and runoff conveyances functioned well during the *2007-2008* rain season. The Army's ongoing groundwater monitoring and reporting continue to indicate *nil to* relatively minor waste impacts. *Accordingly, Central Coast Water Board staff, County of Santa Barbara, Army, and Bureau of Prison staff are discussing the possibility of reducing Wood Dump groundwater monitoring requirements.*

Washrack Site: Petroleum fuel compounds were formerly present in shallow groundwater. PCE, TCE, and solvent breakdown products were formerly present in shallow groundwater up to approximately 30 times their drinking water MCLs and in the next deeper zone at much lower concentrations. In 2002, the Army performed enhanced reductive dechlorination by carbon injection, but the injections appeared to have limited effect. From September 2005 to June 2007, the Army expanded its injection program, resulting in significant reduction in waste concentrations in shallow groundwater. The site consultant predicted enough carbon was injected by June 2007 to enhance dechlorination to less than waste MCLs by approximately 2012. Consequently, the Army suspended its' injection program in July 2007.

The Army's most recent groundwater monitoring data indicate solvents and metals remain in groundwater above the MCL. For example, in March 2008, PCE was present in groundwater up to 88 µg/L and in December 2007, arsenic was present up to 130 µg/L. For reference, the MCL for PCE is 5 µg/L and the MCL for arsenic is 10 µg/L.

At the April, July, and September 2007 project update meetings, the Army requested that the Central Coast Water Board close the Washrack case. In a letter dated October 11, 2007, Central Coast Water Board explained why case closure was premature. Although petroleum hydrocarbon compounds were almost completely removed and solvent concentrations decreased in some wells after the Army's carbon injections, solvent concentrations were not decreasing uniformly in all wells. Central Coast Water Board staff noticed that solvent concentrations were increasing in perimeter wells, suggesting that the waste plume in shallow groundwater was unstable. In addition, Central Coast Water Board staff identified that PCE and TCE breakdown products persisted in groundwater above MCLs, suggesting that wastes were not fully degrading to inert compounds. Because groundwater at the Bureau of Prisons property has municipal, domestic, and industrial supply beneficial uses, the Bureau of Prisons, as the land owner, would have to also agree to land use controls as a condition of closure if wastes were above MCLs to comply with California Water Code Section 13307.1.

Currently, Central Coast Water Board, Army, and Bureau of Prisons are discussing revisions to the Army's long term Washrack groundwater monitoring plan. Central Coast Water Board staff will continue discussions with the Army and Bureau of Prisons to identify what site conditions should be present to support a future case closure request.

Farm Fuel Site: Petroleum fuels, including BTEX compounds, were discharged to the subsurface from a former site UST. 1,2-dichloroethane, found in leaded gasoline, was once present in the core of the groundwater waste plume up to 310 µg/L. (For reference, the MCL for 1,2-dichloroethane is 0.5 µg/L). In 2002, the Army started enhanced reductive dechlorination by carbon injection, but the injections appeared to have limited effect. From September 2005 to June 2007, the Army expanded the injection program, which resulted in significant reduction in groundwater waste concentrations. The site consultant predicted enough carbon was injected by June 2007 to enhance dechlorination to less than waste MCLs by approximately 2015. The Army suspended its injection program in July 2007.

At the December 7, 2007 meeting, the Central Coast Water Board approved staff's recommendation to close the Farm Fuel case conditional upon favorable third and fourth quarter 2007 groundwater monitoring results, monitoring well destruction, and submittal of a completed Case Closure Summary form. In addition, the Bureau of Prisons will have to record an institutional complex supplement, which is equivalent to a deed restriction, as a condition of case closure.

In December 2007, 1,2-dichloroethane concentrations in one well increased to approximately 8.2 µg/L. Although thought to be a by-product of the injection substrate, arsenic, iron, and selenium were above their respective MCLs in December 2007. However, groundwater samples collected by the Army in March 2008 did not contain solvents above MCLs. Central Coast Water Board, Army, and Bureau of Prisons are proceeding with Farm Fuel case closure and are developing the institutional complex supplement (deed restriction).

CAMP ROBERTS
Lead Staff: Grant Himebaugh

Background
Camp Roberts is a California Army National Guard (National Guard) installation located approximately 10 miles north of Paso Robles. The 42,000-acre facility spans northern San Luis Obispo County and southern Monterey County. The Army built the installation in 1941, and used it as a staging/training area until 1971, when it was transferred to the National Guard. The National Guard and Army currently use Camp Roberts for training. The installation contains two

developed areas, the Main and East Garrisons. The remaining lands are used for training and firing ranges. Most areas of potential or known pollution are associated with industrial-related activities conducted during World War II and the Korean War and are located in the Main Garrison and are being addressed by the Army. Because the Army's funding is limited, the environmental restoration process is being conducted for only limited groups of sites. The Central Coast Water Board is the sole regulatory lead agency at this installation.

Sites/Chemicals of Concern

The Army investigated 58 sites during the Site Inspection phase, which was completed in 2003. The potential chemicals of concerns consist mainly of petroleum hydrocarbons and solvents. The contents of the former landfills are largely uncharacterized but include burn ash and ordnance.

Progress

In the fall of 2005, the Army awarded a "paid for performance" environmental investigation contract. The Army's consultant presented its scope of work and schedule for a Remedial Investigation/Feasibility Study and for closure of two former landfills. *The Army has completed final covers for all landfill cells, except where endangered species issues have prevented some of the work. The Army completed a "Remedial Investigation Report" for six suspected or known waste sites in 2007. Central Coast Water Board staff approved the report, which resulted in soil clean up activities at the FMC Corporation Yard and Site 936 groundwater cleanup. This summer, the National Guard performed a second slurry injection of oxygen release compound (ORC) at Site 936. These treatments have reduced groundwater contaminant concentrations.*

Beginning in late 2005, the Army reported perchlorate detections in the active landfill monitoring program. *Perchlorate monitoring detections are in the 2 µg/L to 5 µg/L range; for reference, the MCL for perchlorate is 6 µg/L. The Army analyzed the facility's water supply and found no detectable concentrations of perchlorate. The Army has continued the landfill detection-monitoring program, and a final evaluation report regarding the perchlorate source and appropriate responses will be issued upon completion of the monitoring program.*

CONCLUSION

The Central Coast Water Board's DoD oversight program remains very active and effective. Cooperative relationships with military personnel, consultants, various regulatory agency staff, and the public have been maintained and substantial groundwater and soil remediation continues.