

**STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION**

STAFF REPORT FOR REGULAR MEETING OF JULY 6, 2007
Prepared on May 30, 2007

ITEM NUMBER: 8

SUBJECT: Perchlorate Cases

DISCUSSION:

Background

Perchlorate is both a naturally occurring and man-made chemical, although it is rarely found naturally in the United States. One-third of all perchlorate used in the United States is used in California and 90% of California's perchlorate use is related to the aerospace industry. There are three major sources of perchlorate in the United States: ammonium perchlorate has been and continues to be used as an oxidizer in solid rocket propellant, sodium perchlorate is used in slurry explosives, and potassium perchlorate is used in road flares and air bag inflation systems. Wastes from the manufacture and improper disposal of perchlorate-containing chemicals are increasingly being discovered in soil and water.

Health Effects

Perchlorate is known to interfere with the natural function of the thyroid gland by inhibiting the uptake of iodide. Because iodide is an essential component of thyroid hormones, perchlorate disrupts how the thyroid functions. Such an effect decreases production of thyroid hormones, which are needed for prenatal and postnatal growth and development, as well as for normal body metabolism. Potassium perchlorate was used until recently to treat hyperthyroidism related to Graves disease, and is still used diagnostically to test thyroid hormone production in some clinical settings.

Regulatory Standards

Currently there is no California or federal drinking water maximum contaminant level (MCL) for perchlorate. Both the U.S. Environmental Protection Agency (USEPA) and the California Department of Health Services (DHS) are in the process of studying the occurrence and health effects of perchlorate.

On March 12, 2004, the Office of Environmental Health Hazard Assessment (OEHHA) published a final public health goal of 6.0 micrograms per liter ($\mu\text{g/L}$) (or parts per billion) for drinking water. The PHG is a public health-based drinking water goal used to establish the MCL. *The California DHS proposed a primary MCL for perchlorate of 6 $\mu\text{g/L}$. The second and final public comment period for the California DHS proposed primary MCL for perchlorate closed on April 20, 2007. A final regulations package which proposes a primary MCL for perchlorate is currently being prepared for approval by the California DHS Director's Office. Once the final regulations package is signed by the Director's Office, the package goes to the Office of Administrative Law for final review for Administrative Procedure Act compliance. The final review by the Office of Administrative Law can take up to 30 days. Following approval of the proposed primary MCL by the Office of Administrative Law, the regulations are filed with the Secretary of State and becomes effective 30 days later.*

Until an MCL is in place, DHS uses a 6.0 $\mu\text{g/L}$ advisory action level (or notification level) to protect consumers from perchlorate's potential adverse health effects. A notification level is an advisory

level and is not an enforceable standard. When it is exceeded, a water purveyor is required to notify local governing agencies and is recommended to issue a consumer notice. In addition, DHS recommends that a source of drinking water be taken out of service if perchlorate contamination exceeds 40 µg/L.

Treatment Methods

Treatment of perchlorate contamination in water is complicated because the perchlorate anion does not respond to typical water treatment techniques because of its fundamental physical and chemical nature. The perchlorate tetrahedron itself is structured such that the four oxygen atoms surround the central chlorine atom, effectively blocking reductants from directly attacking the chlorine. Although perchlorate is thermodynamically a strong oxidizing agent, it is a kinetically sluggish species, making its reduction generally very slow and rendering common reductants ineffective. It can persist in the environment for many decades under typical groundwater and surface water conditions because of its resistance to react with other available constituents.

Perchlorate treatment technologies may be generally classified into categories of destruction or removal technologies. Destructive processes include biological reduction, chemical reduction, and electrochemical reduction. Physical removal processes include anion exchange, membrane filtration (including reverse osmosis and nanofiltration), and electrodialysis, which all require subsequent disposal of removed perchlorate. The optimum treatment technology for a given perchlorate occurrence may depend on several factors, including perchlorate concentration, the presence and concentration of co-contaminants, other water quality parameters and geochemical parameters. The presence of indigenous perchlorate-reducing microbes and substances inhibitory to their activity will also influence perchlorate treatment technology effectiveness. For in-situ treatment of perchlorate contamination, variables related to the site hydrogeologic setting, such as depth to and distribution of contaminants, soil permeability, groundwater flow velocity, etc. are also additionally important.

Olin Corporation Facility, 425 Tennant Avenue, Morgan Hill, Santa Clara County

Project Manager: Hector Hernandez

Technical Support: Thea Tryon

Note: *New information concerning the following sites is shown in italics.*

The former Olin Corporation site is a 13-acre parcel located in southern Morgan Hill. Olin and Standard Fusee used potassium perchlorate to manufacture signal flares from 1956 to 1995. Olin manufactured signal flares at the facility for about 32 years from 1956 to 1988. Standard Fusee leased the site and manufactured signal flares for seven years from 1988 to 1995. Perchlorate was first detected at the site in August 2000 during a due diligence investigation by a potential buyer. Olin made initial contact with Central Coast Water Board staff regarding the perchlorate contamination in February 2001. Perchlorate contamination at the site may have occurred primarily from an unlined evaporation pond that received wastes from the cleaning of the ignition material mixing bowls, on-site incineration of cardboard flare coatings with residues on them, and accidental spills. The Central Coast Water Board never formally regulated waste disposal practices while the facility operated, but facility records do make reference to inspections by Water Board staff.

Three aquifers, referred to as the shallow, intermediate, and deep aquifers (also referred to as the A, B, and C aquifers, respectively), are present in the Llagas Subbasin. Approximate depth intervals of these three aquifers beneath the Site are from 0 to 55 feet (ft) below ground surface (bgs) for the shallow aquifer, 70 to 200 ft bgs for the intermediate aquifer; and greater than about 200 ft bgs for the deep aquifer. These depth intervals vary with distance from the Site. Beneath and immediately surrounding the Site, the intermediate and deep aquifers are each further subdivided into three aquifer zones based on the hydraulic head profiles: upper (B1;C1), middle (B2;C2), and lower

(B3;C3). Most domestic and agricultural wells throughout the Llagas Subbasin are screened within the intermediate aquifer. Most deep aquifer pumping is limited to municipal wells owned and operated by the City of Morgan Hill near and northeast of the Site and the City of Gilroy south of the Site.

Recent characterization activities have identified six distinguishable sedimentary facies within the Llagas Subbasin. These range from debris-flow like colluvium generated from the Santa Cruz Mountains (Facies A) to alluvial deposits (paleochannel structures to distal floodplain sediments) principally associated with southward flow of the ancestral Coyote Creek. Channel deposits (Facies B) represent the main aquifer units, while the floodplain (Facies D and E) represent the main aquitard units in the Subbasin.

The regional groundwater-flow pattern is typically to the south or southeast and mimics Subbasin topography. Regional groundwater flow is largely controlled by sedimentary facies, resulting in relatively complex lateral and vertical groundwater flow. Variables contributing to the complexities in groundwater flow include natural Subbasin topography, natural and artificial recharge, particularly in the upper aquifers (e.g., shallow and intermediate), while induced gradients due to extensive pumping in the deep aquifer result in local perturbations in groundwater flow. While groundwater transport of highly soluble, ionic chemicals such as nitrate and perchlorate is largely controlled by directions of groundwater flow in the paleochannel units of Facies B, it is complicated by aquitard storage and subsequent leakage effects from Facies D and E.

Current perchlorate contamination investigation milestones include:

CLEANUP ORDER NO. R3-2004-0101

Bottled Water Service Terminations: Central Coast Water Board staff continues to take a conservative approach addressing all issues related to bottled water service termination and monitoring requirements after bottled water service has been terminated. Private domestic supply well users in the Morgan Hill, San Martin, and Gilroy area depend on their well water as their main drinking water source.

Olin continues to provide bottled drinking water to well owners and tenants whose wells have perchlorate concentrations greater than 6.0 µg/L. Olin provides bottled water in accordance with the Central Coast Water Board Cleanup or Abatement Order No. R3-2004-0101, as revised by the State Water Resources Control Board in its Order WQ 2005-0007 (State Water Board Order) and Central Coast Water Board staff's letter dated October 6, 2006. The October 6, 2006 letter provides comments and clarifies all replacement water requirements (e.g., bottled water) and post bottled water termination monitoring.

Central Coast Water Board staff has carefully reviewed the analytical data and laboratory quality assurance/quality control (QA/QC) data and has determined that the State Water Board Order criteria have been met for eight phases of bottled water service termination. To date, Central Coast Water Board's Executive Officer has concurred with the request to terminate bottled water service for 534 wells, in accordance with State Board Order requirements. This means that at the time of bottled water termination approval, the concentration of perchlorate at each of these wells was below the public health goal for at least four consecutive quarters of monitoring. *To date, bottled water was reinstated for 21 of the 534 wells.* Central Coast Water Board staff will continue to review and evaluate all data submitted by Olin that is associated with bottled water terminations and post-bottled water termination monitoring.

Presently, Olin provides bottled drinking water to owners and tenants at 181 wells that do not meet State Board criteria for terminating bottled water service. A total of 263 households are associated

with these wells. Currently, 74 domestic supply wells have concentrations of perchlorate above 6.0 µg/L. Central Coast Water Board staff must review and concur with all of Olin's requests for changes to the post bottled water termination monitoring frequencies in accordance with our letters dated October 6, 2006 and December 8, 2006.

Ion Exchange (IX) System Installations: To date, Olin has installed ion exchange systems on 16 wells. The IX systems continue to operate as designed. Installation of an IX system at one well remains on hold pending resolution of pre-existing bacterial issues and an access agreement is being sought at another well. Olin is required to install ion exchange systems on candidate wells that have had greater than 6.0 µg/L perchlorate detections during the past four quarters. Data evaluation continues for the other candidate wells. Olin will continue providing bottled water to ion exchange wells pending DHS acceptance of the domestic ion exchange systems.

CLEANUP ORDER NO. R3-2005-0014

Olin's 2006 Llagas Subbasin Characterization Report: Central Coast Water Board staff completed its review and prepared comments concerning Olin's January 1, 2007 Llagas Subbasin Characterization – 2006, Santa Clara County, Olin/Standard Fusee Site, 425 Tennant Avenue, Morgan Hill, California (2006 Characterization Report).

The 2006 Characterization Report presents an evaluation of data collected in 2006 and updates the first Characterization Report that Olin submitted on March 29, 2006, which included an evaluation of all the data collected up to and including 2005. The objectives on the 2006 Characterization Report are to:

1. Evaluate additional hydrogeologic and perchlorate data collected in 2006,
2. Evaluate the monitoring system performance in 2006,
3. Evaluate and recommend changes based on the revised hydrogeologic conceptual model.

Approved Cleanup Strategy: Central Coast Water Board staff concurs with Olin's objectives for groundwater restoration within the Llagas Subbasin and its proposed phased groundwater remediation approach. The phased remediation approach includes hydraulic control and remediation of the plume core (the area of perchlorate with concentrations exceeding 24.5 µg/L in groundwater), and monitored attenuation in lower perchlorate concentration areas. The approved remediation approach was conditionally approved in our March 29, 2007 response letter concerning Olin's Revised Cleanup FS Report, Area I FS Report and Area I Work Plan. The plume core cleanup is specifically addressed in the Area I FS and Area I Work Plan reports. The Revised Cleanup FS Report addresses perchlorate cleanup in groundwater outside the plume core. Subsequent to the conditional approval, the Central Coast Water Board approved Olin's request to extend the due date for submittal of the Llagas Subbasin Cleanup Work Plan, from May 15 to June 15, 2007. The requested Cleanup Work Plan must detail the implementation plans for the selected and approved remedial alternative(s) including, an implementation schedule, a Performance Monitoring Program, a Remediation Contingency Plan, and all other information deemed necessary.

Background Determination: Background perchlorate levels in the Llagas Subbasin have not been determined. Further, Central Coast Water Board staff does not concur with Olin's proposed cleanup level. Central Coast Water Board staff believes it is premature to determine whether it will be feasible to clean up perchlorate impacted groundwater in a reasonable time within each individual aquifer zone to levels below the PHG. At this time, many uncertainties exist with respect to the effectiveness, expediency, and efficiency of the selected groundwater remedial strategy. Considering all of these unknowns and uncertainties, it is not prudent at this time to establish a cleanup level.

We believe it is not productive to spend any additional time debating the background concentration. Such debates only serve to delay implementation of active remediation of the most contaminated portions of the Llagas Subbasin. As additional data are collected and evaluated, including data associated with the Water District's forensic chemistry study (for background determination purposes) and ongoing performance monitoring data, and as the parties thoroughly evaluate the efficacy of the selected remediation strategy, the appropriateness of establishing an alternative cleanup level greater than background will be reevaluated. Further discussions and evaluation of establishing an appropriate cleanup level must take place concurrent with implementation of the phased groundwater remediation strategy proposed by Olin.

Cleanup Goal: *In its March 29, 2007, response to Olin's Revised Cleanup FS Report, Central Coast Water Board directed Olin to implement active remediation within the highest concentration areas expeditiously. Olin is required to proceed with immediate implementation of groundwater remediation with the primary cleanup objective (goal) of achieving the background concentration¹ within each individual aquifer zone and throughout all affected portions of the Llagas Subbasin. Since Olin must at least achieve the maximum allowable cleanup level (6.0 µg/L), it is appropriate to use the maximum cleanup level as an interim groundwater cleanup goal. As groundwater cleanup proceeds, Olin must reevaluate the feasibility of achieving the primary cleanup goal (assuming that a background concentration has been established) or may reevaluate the feasibility of achieving an alternative groundwater cleanup level.*

Status of Issuance of Replacement Cleanup Order: Central Coast Water Board staff intends to issue an additional cleanup order that will replace Cleanup Order Nos. R3-2005-0014 and R3-2006-0112 in the near future. The replacement cleanup order will address the overall groundwater cleanup strategy and include a comprehensive cleanup implementation schedule and a groundwater cleanup goal for perchlorate in the areas of the Llagas Subbasin affected by the Olin Site. We anticipate the replacement cleanup order may be available for public comment by the summer of 2007. *We intend to present the proposed replacement order to the Central Coast Water Board during a public hearing and request the Board to provide direction to staff on issuance of the proposed replacement order.*

Status of Monitoring and Reporting Program (MRP) Revisions:

Central Coast Water Board staff continues to work closely with Olin and its consultants on updating, revising, and consolidating all monitoring requirements (MRP No. 2003-0168 and MRP No. 2001-161) into a new MRP. As part of the MRP consolidation process, Central Coast Water Board staff is in the process of reviewing an updated Sampling and Analysis Plan and Quality Assurance Plan, and continues to review and evaluate all available groundwater monitoring wells and relevant data.

Reports Under Review: By the date of this update, Central Coast Water Board staff has completed or is in the process of completing its review and preparation of comments concerning the following reports:

- January 30, 2007, *Fourth Quarter 2006, Groundwater Monitoring Report, Olin/Standard Fusee Site, 425 Tennant Avenue, Morgan Hill, California (4Q Monitoring Report).*
- April 30, 2007, *First Quarter 2007, Groundwater Monitoring Report, Olin/Standard Fusee Site, 425 Tennant Avenue, Morgan Hill, California (1Q Monitoring Report).*
- March 9, 2007, *Olin Response to Central Coast Water Board Comments concerning Second and Third Quarter 2006 Groundwater Monitoring Reports, and East of Site Characterization Report.*
- April 30, 2007 *Area I Extraction Well Installation Work Plan (Well Installation Work Plan).*
- June 15, 2007 *Llagas Subbasin Cleanup Work Plan (Cleanup Work Plan).*

¹ If the implemented cleanup technology proves unsuccessful in achieving background in a technically and economically feasible manner, the Central Coast Water Board may adjust cleanup goals later.

Characterization and Monitoring in Northeast Area: The sharing of water level data between the City of Morgan Hill's consultant (WorleyParsons-Komex) and Olin's consultant (MACTEC) continued throughout the first part of 2007. The sharing of water level measurements from several City water supply wells and Olin's monitoring wells located northeast of Tennant Avenue has helped all parties gain a better understanding of water level fluctuations northeast of the Olin facility. Further, trace perchlorate concentration data provided by City of Morgan Hill from its municipal water supply wells and data collected by Olin from private domestic wells located north of the Olin site indicate that concentrations of perchlorate are present up to three-miles north and northeast of the Olin site.

Pursuant to Cleanup or Abatement Order No. R3-2006-0112, Olin continues implementing a step-wise approach of characterizing the lateral and vertical extent and degree of groundwater pollution that originates from the Olin site.

STATUS OF REMEDIATION ACTIVITIES

On-site Groundwater Treatment and Containment: The on-site groundwater treatment system continues uninterrupted operation. The treatment system began operation on February 23, 2004. Groundwater is extracted at a rate ranging from 50 to 175 gallons per minute (gpm). Extracted groundwater is filtered, and perchlorate is removed using an ion-exchange process. The treated groundwater is reinjected at a rate of 50 to 250 gpm. *To date, perchlorate has been removed from over 172 million gallons of water.* Olin continues to evaluate the effectiveness of the extraction and re-injection system to ensure that hydraulic control is occurring.

Per a request by the Board during the May 11, 2006 Board Meeting, Central Coast Water Board staff is researching Olin's estimate of the total mass of perchlorate in the Llagas Subbasin. Water Board staff will convey its finding to the Board at the July 6, 2007 meeting.

UPDATE CONCERNING OTHER POTENTIAL SOURCES

To date, none of the other potential perchlorate sources identified by Olin have been investigated to determine if any of them are contributing to groundwater impacts. Therefore, until confirmed with data, Central Coast Water Board staff believes it is plausible that the source(s) of perchlorate concentrations detection could include the Olin site as well as any of the other identified potential sources.

PERCHLORATE COMMUNITY ADVISORY GROUP

The Perchlorate Community Advisory Group (PCAG) meets monthly in San Martin. The advisory group is a forum for public discussion of the perchlorate problem and potential solutions. Central Coast Water Board staff solicits advisory group input at key decision points in the investigation and cleanup process.

The next PCAG meeting will be held at the San Martin Lions Club on *Friday, June 29, 2007, at 2 pm.* Central Coast Water Board staff will attend and be available to address questions from the public concerning the ongoing Olin cleanup issues.

Olin Reports and Significant Correspondence can be accessed on our website at:

<http://www.swrcb.ca.gov/rwqcb3/Facilities/Olin%20Perchlorate/Olinsite.htm>

Olin's latest monthly update to the Water Board is included as Attachment 1.

Whittaker Ordnance Facility, 2751 San Juan Road, Hollister, San Benito County**Project Manager: Kristina Seley: 805-549-3121****Note:** *New information concerning the following sites is shown in italics.*

Remedial Design/Remedial Action Work Plan (Work Plan): On May 28, 2006, Central Coast Water Board staff received Whittaker's "Remedial Design/Remedial Action Work Plan" (Work Plan). The Work Plan contains the remediation strategy for perchlorate, hexavalent chromium, and volatile organic compounds (VOCs) contamination in soil and groundwater on and off of the site. The Work Plan includes a design description, rationale, and schedule to mitigate the soil and groundwater impacts. The Work Plan includes design of a groundwater extraction and treatment system, plans to fill hydrogeologic data gaps, plans to conduct an additional source area investigation, and plans to decommission two offsite agricultural wells.

Groundwater Extraction and Treatment System: The purpose of the proposed groundwater extraction and treatment system is to contain groundwater migrating from the site to reduce the risk of impacting off-site groundwater beneficial uses. After the on-site groundwater is extracted, Whittaker will treat and discharge the water into the San Benito River (approximately 2,000 feet north of the Site boundary) under the General National Pollutant Discharge Elimination System (NPDES) permit for Discharges of Highly Treated Groundwater to Surface Waters. The treatment system consists of granular activated carbon for VOC removal and a bioreactor for perchlorate remediation.

Whittaker installed seven on-site extraction wells for the groundwater extraction and treatment system. Whittaker has not completed construction of the treatment system. Whittaker anticipates starting the system in late summer of 2007. On December 7, 2006, the Central Coast Water Board approved the reissued General NPDES Permit for Discharges of Highly Treated Groundwater. On December 19, 2006, Central Coast Water Board staff informed Whittaker that the updated General NPDES permit requires Whittaker to sample all extraction wells for the 126 priority pollutants, and sample the San Benito River (receiving water) at the discharge location when there is surface water flow. *On June 6, 2007, Whittaker informed staff that one of the priority pollutants, selenium, was detected in one of the seven groundwater extraction wells over ten times the effluent limit. Whittaker will submit the results in a memorandum, and Central Coast Water Board staff will meet with Whittaker to discuss permitting options. Based on the NPDES requirements, Whittaker will have to treat for selenium or explore other permitting options before the system begins operation.*

Additional Hydrogeologic Assessment On December 22, 2006, Whittaker submitted the "Hydrogeologic Data Gap Investigation and Well Installation Report." The report presents results from the soil borings, new groundwater monitoring wells, and groundwater extraction wells and it evaluates aquifer performance through pump tests to fill data gaps necessary for the design of the treatment system.

Central Coast Water Board staff met with Whittaker's consultants on April 12, 2007, to discuss staff's draft hydrogeologic report comment letter and discuss the draft Conceptual Site Model outline. Whittaker's consultants produced meeting minutes that document Whittaker's responses to staff's draft comment letter. Central Coast Water Board staff commented that results from the Hydrogeologic Report filled some data gaps at the southern site boundary, but Whittaker has not completed delineation of the Unit 1, 3, and 4 offsite contaminant plumes. As discussed at the meeting, Whittaker will prepare an off-site delineation Work Plan. The meeting concluded with a list of deliverables, which include:

- 1. Draft Conceptual Site Model.*
- 2. Draft Groundwater Extraction Treatment System Performance Monitoring Plan.*
- 3. Groundwater Extraction Treatment System Construction and Startup Completion Report.*
- 4. Off-Site Delineation (Data Gaps) Work Plan.*

6. *Monitored Natural Attenuation Plan.*
7. *On-Site (Buildings 5 and 23) Phase II Work Plan.*

Offsite Agricultural Wells: In the RD/RA Work Plan, Whittaker proposed to decommission the Riverside and Christopher agricultural wells to reduce the vertical migration of contaminants. The agricultural wells are screened across multiple deep aquifer units. Whittaker first focused on the Christopher well located approximately 200 feet west of the property boundary.

Christopher Well: On November 2, 2006, staff approved the Perry Farms Replacement Well Work Plan received October 30, 2006. The Work Plan presents Whittaker's proposed scope of work for installing an agricultural supply well to replace the Perry Farms' existing Christopher well. The Christopher well was identified as a possible vertical conduit for migration of contaminants from the Whittaker Facility. Therefore, Whittaker must abandon the well and provide replacement water supply to the Perry Farms. The Work Plan proposed to install a sampling well to obtain design data for the Perry Farms well. Depending on the results, Whittaker will install new monitoring wells screened across the deeper aquifer zones to serve as an early warning sign of lateral or vertical migration between the site and the new agricultural supply well. Whittaker found significant clay layers up to 740 feet below ground surface (bgs) and completed installation of the sampling well at about 950 feet bgs. Whittaker sampled the well and found that the water quality does not meet agricultural supply use criteria; therefore, Whittaker may not be able to use the well for replacement water supply. *Whittaker is currently researching other replacement water options including supply from San Benito County's irrigation supply line.*

Riverside Well: The Riverside well is an agricultural supply well impacted with both VOCs (430 µg/L to 600 µg/L in 2005) and perchlorate (50 µg/L to 100 µg/L in 2005). In 1993, Whittaker voluntarily equipped the well with a VOC treatment system for continued agricultural use and connected the 12 well users to City water for domestic supply. Because the well is impacted with perchlorate, and because the well may act as a vertical conduit for plume migration, Central Coast Water Board staff requested Whittaker to shut down the well and properly decommission it.

The well was originally pumped at 500 gallons per minute (gpm) for crop and pasture irrigation. Whittaker proposed, in the 2005 Remedial Design/Remedial Action Work Plan, to abandon the Riverside well and provide alternative water supply to the associated users.

Central Coast Water Board staff met with Whittaker's consultant and five of the 12 Riverside Irrigation Company members on February 15, 2007. Central Coast Water Board staff explained our concern that irrigation with the Riverside Well poses a health risk and causes migration of perchlorate-impacted groundwater. We requested that the Riverside Irrigation Company members de-energize the well and that Whittaker decommission the well to prevent vertical migration of groundwater. Whittaker must obtain permission from the Riverside Irrigation Company members to conduct well decommissioning. Following the meeting, a Riverside Well Irrigation Company representative informed the Central Coast Water Board that PG&E shut down power to the Riverside well on February 23, 2007. Central Coast Water Board staff is working with the well users and Whittaker to decommission the well.

At the February 15, 2007 meeting, Whittaker's representative informed the Central Coast Water Board staff and Riverside Irrigation Company members that Whittaker does not legally have to provide replacement water based on a settlement agreement between the two parties in 1997. Central Coast Water Board staff is working with the Riverside Irrigation Company users and Whittaker's consultants to obtain an agreement between the two parties with respect to replacement agricultural supply water for the Riverside Well. *Whittaker's consultants are currently working on a solution to replace the Riverside agricultural supply well, which may include hook up to the "Blue Valve" agricultural supply line. Staff encourage Whittaker find a similar solution for replacing the*

Riverside well water and reach an agreement for replacement with the Riverside Irrigation Company members.

BAE Systems (former United Defense), 900 John Smith Road, Hollister, San Benito County
Project Manager: Kristina Seley 805-549-3121

Background: BAE Systems has conducted military armor and tracked vehicle testing since 1968. The site, located on approximately 1,200 acres, is developed with several buildings, former munitions magazines, and two munitions test arenas. Constituents of concern identified in soil and/or groundwater include perchlorate and explosives.

Cleanup Actions: In late September 2005, BAE Systems excavated shallow perchlorate-impacted soils in Arena 1 at concentrations greater than 5 milligrams per kilogram (mg/kg). BAE Systems removed approximately 400 cubic yards of soil and installed a 35,000 square foot temporary chip seal cap at Arena 1 to minimize potential mobilization associated with rainfall and runoff infiltration.

Current Investigation: On October 2, 2006, BAE Systems submitted the "Phase VI Environmental Investigation Report" (Phase VI Report) concurrent with the October 27, 2006 "Third Quarter 2006 Monitoring Report." The Phase VI Report includes the results BAE System's sixth phase of the environmental investigation at the Test Facility. The Third Quarter Monitoring Report, prepared in accordance with Monitoring and Reporting Program No R3-2005-0113, includes analytical results from 24 on-site wells, groundwater gradient and flow direction, and activities planned for the following quarter. The following areas were investigated during the Phase VI environmental investigation. Water Board staff provided comments to the Phase VI Report in a December 11, 2006 correspondence. An area summary, Phase VI Report recommendations, and our response to BAE System's recommended way ahead are included below.

Building No. 3: Building No. 3 housed a hydraulic-powered, heated-platen press to process munitions. Phase VI included the placement of two geoprobe borings to further assess any soil or groundwater impacts. The results showed no energetics in soil or groundwater samples; however, perchlorate was detected in groundwater samples at concentrations of 89 micrograms per liter ($\mu\text{g/L}$) and 130 $\mu\text{g/L}$. The Phase VI Report recommended further investigation measures including a historic investigation to identify potential source areas, then a focused geoprobe investigation in unsaturated zone soils, and advancement of temporary piezometers and at least three borings to 100 feet bgs with continuous core sampling groundwater samples. Staff concurred with the Phase VI Report recommendations and requested that BAE Systems plan to install monitoring either during the next phase of investigation or following the three proposed borings.

Arena 1: The Arena 1 area is the main area of concern with perchlorate and explosive impacts and has undergone extensive soil, groundwater, and drainage stormwater sampling since Phase II. The Phase VI Report suggests that the main mass of perchlorate appears to be in the upper five feet of soil within the Arena. The Phase VI Report also suggests that the southern downgradient extent of perchlorate is limited to the drainage channel area leading westward out of Arena 1, further investigation is necessary at the downgradient end of the perchlorate groundwater plume.

The Phase VI Report recommended further investigation including: 1) continued quarterly groundwater monitoring; 2) the installation of additional borings to the northeast and northwest of the downgradient toe of the plume; 3) installation of an additional monitoring well; and 4) continued monitoring and use of the interim remedial action plan chip seal cap to minimize soil infiltration to groundwater and transport from the drainage system. Central Coast Water Board staff concurred with all of the Phase VI Report recommendations.

Building No. 4: Building No. 4 housed equipment for x-ray film processing and a spent film developer. Prior to 1993, rinse water from the spent film developer was discharged into an outdoor sink and underground drainage system. Neither perchlorate nor energetics were detected during the Phase VI soil borings and grab groundwater samples. The Phase VI Report recommended characterization is complete in the Building No. 4 Area. Any further corrective actions on the soil perchlorate detections will be based on the Risk Assessment and Feasibility Study results. Staff concurs with the recommended completion of the Building No. 4 Area characterization.

Building No. 6 Area: BAE Systems completed a total of 26 soil borings from Phase I to VI, with analysis of 98 soil samples. Energetics have been detected in 15 of the 26 borings. Based on the current data, energetics in the Building No. 6 Area are concentrated in two areas: 1) the former wastewater clarifier area, and 2) the Building No. 6 entrance road area. BAE Systems also detected explosives at low concentrations (less than 20 µg/L) in groundwater samples.

The Phase VI Report concluded that characterization is complete in the Building No. 6 Area, but staff does not concur at this time. Staff requested BAE Systems to install monitoring wells to determine groundwater temporal trends. For soil impacts, staff requested a map with all historical data that shows iso-concentration contour lines for varying sample depths. Staff cannot concur that the soil investigation is complete.

Building No. 1 Area: Rain runoff from metal parts and equipment storage may have resulted in low detections of perchlorate in soil and groundwater. Perchlorate was detected in five of the 22 soil borings drilled at concentrations ranging from 0.015 mg/kg to 0.16 mg/kg. The Phase VI Report recommended that characterization is complete in the Building No. 1 Area and staff concurred.

Central Coast Water Board staff provided Phase VI Environmental Investigation Report comments on December 11, 2006. BAE Systems incorporated our comments with the report recommendations and produced a Phase VII Work Plan on March 1, 2007, for Central Coast Water Board staff review. *On April 25, 2007, Central Coast Water Board discussed Work Plan comments with BAE Systems' consultants via phone, and concurred with the Work Plan recommendations in a letter dated April 26, 2007. BAE Systems will submit the Phase VII Report with findings and recommendations on October 31, 2007. Central Coast Water Board staff will meet with the consultants at the site during Phase VII investigative work to discuss initial findings and review BAE Systems' response to comments regarding the 2006 Human Health and Ecological Risk Assessment Report.*

MK Ballistic Systems, 2707 Santa Ana Valley Road, Hollister, San Benito County
Project Manager: Kristina Seley 805-549-3121

Background: The MK Ballistic Systems site is located west of the BAE Systems Test Facility property. Currently, MK Ballistic Systems leases buildings and storage magazines on the five-acre property and manufactures "less-lethal" explosives and ordnance components and devices. Numerous other tenants have conducted similar operations at the facility and have used perchlorate and other explosive compounds in their manufacturing processes. In 1991, U.S. EPA conducted a time-critical cleanup action when one of the former tenants, Caelus Devices, Inc., went bankrupt and abandoned the facility without proper containment and storage of shock-sensitive explosive chemicals.

Concern: BAE Systems tested all its site wells for chemicals of concern. Perchlorate was detected for three consecutive quarters at about 30 ppb in a windmill well upgradient from all identified soil and groundwater perchlorate impacts. BAE Systems' *Phase IV Environmental Investigation Report* proposed that historical use of perchlorate at the neighboring site, MK Ballistic Systems, may be the cause of contamination. Based on the historical use of perchlorate and explosives at MK Ballistic

Systems, and due to the perchlorate detections in the windmill well, staff believe that current or past practices at the MK Ballistics site may have impacted groundwater.

Action: On January 9, 2006, Central Coast Water Board staff met with the landowner, her attorney and environmental consultant, and the current operator at the facility to discuss our concern that past practices may have impacted the windmill well. In a January 24, 2006 letter, the Central Coast Water Board directed the landowners and current operator to provide a work plan by March 24, 2006. The requested work plan must include a summary of historical practices, proposed investigation tasks, sampling and analysis plan, and time schedule.

On April 14, 2006, staff received the "MK Ballistic Systems Site Environmental Investigation Work Plan." The work plan summarized historical site operations and proposed a perchlorate soil and groundwater investigation. Water Board staff generally concurs with the work plan, and provided comments in a June 23, 2006 letter. MK Ballistic Systems' landowner and lessee are required to submit a summary of their findings and an interpretation of the data in an Environmental Investigation Report.

Water Board staff was contacted by the Department of Toxic Substances Control (DTSC) regarding this site. Currently, DTSC is investigating the storage and handling of hazardous waste and explosives contained at the site. On February 15, 2007, Central Coast Water Board staff met with DTSC staff and the land owner's representatives in Hollister, CA. DTSC staff provided a copy of the soil sampling results that they conducted as part of their investigation.

In a May 23, 2007 correspondence, the Central Coast Water Board directed the responsible party to submit a work plan addendum by June 22, 2007. The directive requires metal analysis in soil at locations DTSC detected elevated surface contamination during their December 2005 site investigation. The consultant is working with DTSC to review DTSC's analytical reports. Central Coast Water Board staff anticipates approving the work plan addendum in mid-July 2007 allowing the consultant to begin the soil and groundwater investigation at the MK Ballistics Facility.

ATTACHMENTS

1. Olin's Progress Report #58, dated June 10, 2007.