

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

STAFF REPORT FOR REGULAR MEETING OF JULY 10, 2009

Prepared on June 12, 2009

ITEM NUMBER: 8

SUBJECT: Perchlorate Cases Update

Background

Perchlorate (ClO_4^-) occurs both naturally and as a man-made chemical. 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 man-made sources of perchlorate in the United States:

1. Ammonium perchlorate, used as an oxidizer in solid rocket propellants,
2. Sodium perchlorate, used in slurry explosives, and
3. Potassium perchlorate, used in road flares and air bag inflation systems.

Fate and Transport

Perchlorate is a highly soluble, mobile compound that dissolves and moves like a salt in water. For comparison, perchlorate has similar chemical properties as nitrate.

Health Effects

Perchlorate interferes with the natural function of the thyroid gland by inhibiting the uptake of iodide. Iodide is an essential component 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

Perchlorate is a regulated drinking water pollutant in California, with a maximum contaminant level (MCL) of 6 micrograms per liter ($\mu\text{g/L}$), effective October 18, 2007. Currently there is no federal drinking water MCL for perchlorate.

Treatment Methods

Treatment of perchlorate in water is complicated because the perchlorate anion does not respond to typical water treatment techniques due to its fundamental physical and chemical nature. Currently, ion exchange is the most common treatment technology for removing perchlorate from groundwater. Perchlorate can persist in the environment for many decades under typical groundwater and surface

water conditions because of its resistance to reacting with other available constituents (e.g., soil particles).

Perchlorate Cleanup Cases Status Updates

The Central Coast Water Board (Water Board) regulates five perchlorate sites. Two of the five perchlorate sites (Olin Corporation and Whittaker) have significant offsite groundwater plume migration. In the following sections, Water Board staff provides a status update for each perchlorate site.

OLIN CORPORATION FACILITY

Project Manager: Hector Hernandez: 805-542-4641

Technical Support: Diane Kukol

KEY INFORMATION:

Location:	425 Tennant Avenue, Morgan Hill, Santa Clara County, approximately 30-miles southeast of San Jose and 0.5-miles west of Highway 101.
Responsible Party:	Olin Corporation, Inc.
Current Owner:	Olin Corporation, Inc.
Type of Operation:	Manufacturing of Signal Flares
Type of Discharge:	Potassium Perchlorate
Existing Orders:	<u>Cleanup Orders</u> <ul style="list-style-type: none">• Cleanup and Abatement Order (CAO) No. R3-2007-0077 <u>Replacement Water Orders</u> <ul style="list-style-type: none">• Cleanup and Abatement Order No. R3-2004-0101• State Board Order No. WQ 2005-0007 <u>General Waiver of Waste Discharge Requirements:</u> <ul style="list-style-type: none">• Resolution No. R3-2008-0010 (General Waiver) <u>Monitoring and Reporting Program</u> <ul style="list-style-type: none">• Monitoring and Reporting Program No. R3-2008-0028 (Revised May 22, 2009)

THIS ACTION: Status Update – Information item only

SUMMARY:

This section of the staff report provides an update on the status of the Olin groundwater cleanup site addressing the following items:

- Decreasing perchlorate trends in the Llagas Sub-basin groundwater basin;
- Replacement water and domestic supply well treatment with ion exchange status;
- Cleanup status and Olin's compliance with Cleanup and Abatement Order No. R3-2007-0077 (Cleanup Order No. R3-2007-0077);
- Perchlorate Community Advisory Group efforts; and

- Background information on Olin site history and hydrogeology.

Perchlorate concentrations continue to decrease throughout the Llagas Sub-basin due to attenuation through natural physical processes (e.g., dilution and dispersion), successful onsite soil remediation, and operation of the onsite hydraulic containment and treatment system. Currently, nine domestic supply wells exceed the drinking water standard for perchlorate in the Llagas Sub-basin compared to 188 wells during the first quarter of 2004. In addition, after eight years of investigation, Olin completed delineation of the shallow, intermediate, and deep aquifers for the purposes of implementing groundwater cleanup southeast of the site.

Olin continues to operate the onsite groundwater containment and treatment system. As of February 26, 2009, Olin has treated over 250 million gallons of groundwater and successfully removed 83 pounds of perchlorate from onsite groundwater. Based on perchlorate concentrations from the GWTS influent (SV-100), this represents an average of 48.5 µg/L. Olin also continues with offsite cleanup. Olin has installed and tested two offsite extraction wells that will hydraulically contain and treat the offsite intermediate and upper/middle deep aquifer plumes southeast of the site. Water Board staff has also directed Olin to submit a deep aquifer cleanup plan to address elevated perchlorate concentrations in the area east of the site to prevent further migration of elevated perchlorate concentrations in this area. Water Board staff anticipates a delay in startup of the offsite cleanup system because Olin and Water Board staff have determined that the current approved cleanup approach (hydraulic containment, treatment, and reinjection) must be modified to address elevated nitrate concentrations in groundwater. Olin found elevated nitrate concentrations in the vicinity of the offsite extraction wells which prevent Olin from recharging treated groundwater into the shallow aquifer without addressing the nitrate. Elevated nitrate concentrations in groundwater are a challenge throughout the Llagas Sub-basin, as discussed at the June 2009 Water Board meeting, and are not the result of Olin's industrial activities. Olin is currently reevaluating treated water disposition methods and groundwater treatment strategies to address the nitrate. Water Board staff supports a municipal re-use effort, as this is a lower energy use choice than reinjection. Providing treated groundwater for potable use would result in a more environmentally sound and sustainable groundwater management scenario, and it would also maximize the beneficial reuse of groundwater within the Llagas Sub-basin. Additionally, providing treated groundwater for municipal supply would help mitigate future water supply challenges facing the communities overlying the Llagas groundwater sub-basin.

DISCUSSION:

Site Background

The former Olin Corporation Facility (Olin) is a 13-acre parcel located in southern Morgan Hill in Santa Clara County. Olin and Standard Fusee used potassium perchlorate to manufacture flares from 1956 to 1995. Perchlorate was first detected at the site in August 2000 during a due diligence investigation by a potential buyer. Since February 2001, Olin continues to investigate and cleanup perchlorate impacts from this

site. Perchlorate pollution at the site may have occurred primarily from an unlined evaporation pond that received wastes from the manufacturing process.

Perchlorate migrated into groundwater below the site, resulting in a perchlorate plume that extends approximately 10 miles southeast of the site and to a depth of over 500 feet. Perchlorate has degraded groundwater in the shallow, intermediate, and deep aquifer zones of the Llagas Sub-basin. **Attachments 1A** through **1E** show the current perchlorate distribution in the shallow, intermediate, and upper, middle, and lower portions of the deep aquifer.

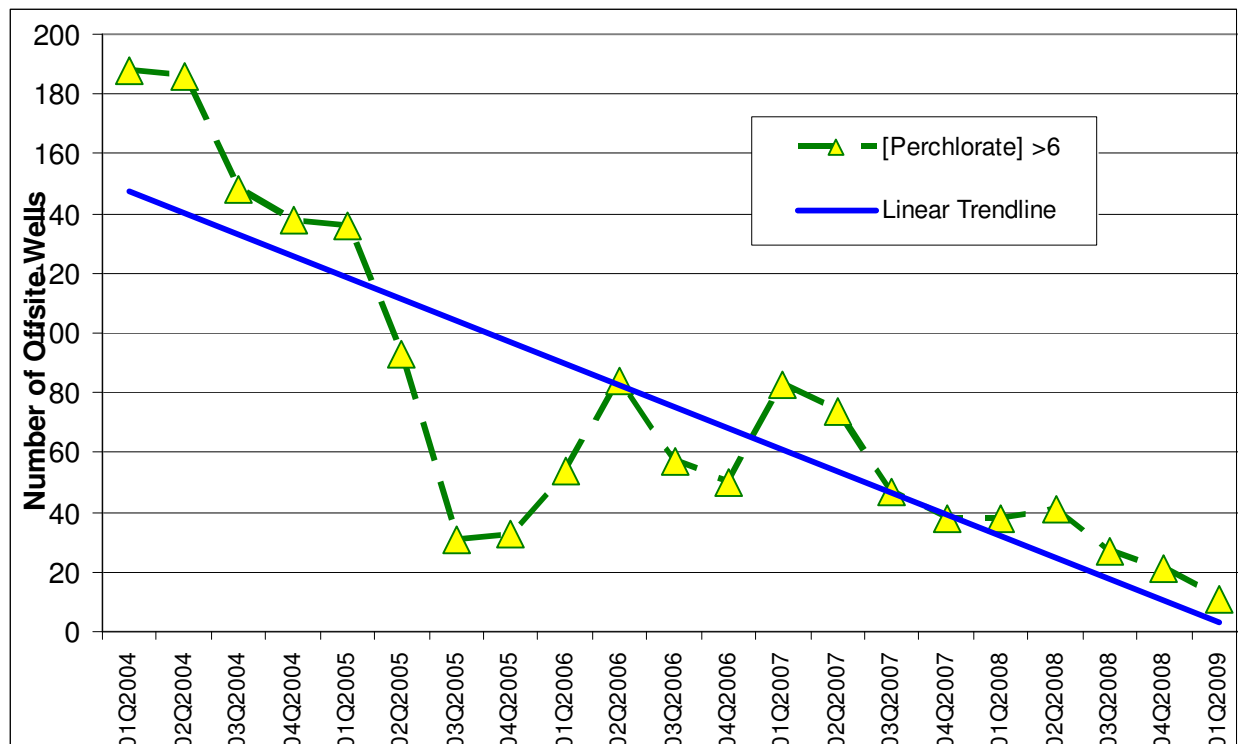
Geology/Hydrogeology

The Olin site is located in the Llagas Sub-basin of the Gilroy-Hollister Groundwater Basin in south Santa Clara County. Groundwater in this area typically occurs in alluvial sediments, at depths ranging from seven to about 570 feet below ground surface. The alluvial deposits are composed of heterogeneous layers of clay, silt, sand, and gravel. Interconnected multiple aquifers exist within the area. In general, regional groundwater flow is toward the south in all three aquifers, except near large-capacity pumping wells where strong, localized hydraulic gradient reversals exist in the lower intermediate and deep aquifers. Olin has included a detailed description of geology and hydrogeologic conditions within the Llagas Sub-basin in several reports. The most up-to-date hydrogeologic site conceptual model is included in Olin's January 31, 2009, Llagas Sub-basin Characterization – 2008, Santa Clara County Olin/Standard Fusee, Morgan Hill, California (2008 Characterization Report)¹.

Decreasing Trends in Perchlorate Concentrations in the Llagas Subbasin

Residents, agricultural operations, businesses, and communities near the former Olin site rely solely on groundwater for domestic, municipal, agricultural, and industrial supply purposes. Olin began monitoring perchlorate in offsite wells in 2004. Since offsite monitoring of domestic wells began, perchlorate concentrations have generally decreased throughout the Sub-basin, particularly south of Middle Avenue (approximately 1.5 miles south of the site). Historically, over 800 domestic supply wells, predominantly screened in the intermediate aquifer, exhibited perchlorate impacts. In the first quarter of 2004, 188 domestic supply wells had perchlorate concentrations greater than the MCL. There are now nine domestic supply wells above the MCL. Of these nine domestic supply wells, seven wells are within 1.5 miles of the former Olin site near the plume core. Below is a graph that shows the decreasing trends in the number of domestic supply wells above the MCL over the past five years. The decreases in perchlorate concentrations demonstrate that attenuation by natural physical processes such as dilution, successful onsite soil remediation, and onsite groundwater containment have resulted in decreasing trends in perchlorate throughout the Llagas Sub-basin over the last five years.

¹ The 2008 Characterization Report is located at:
<ftp://swrcb2a.swrcb.ca.gov/pub/rwqcb3/Olin%20Perchlorate/Olin%20Llagas%20Subbasin/Charac%20Rpt%20Update%202008/>



Attachments 2A and 2B of the staff report show perchlorate groundwater plumes in the intermediate aquifer (70 – 200 feet below the surface) for the first quarter 2006 and the first quarter of 2009. These figures reveal a dramatic reduction in the size of the perchlorate plume outside the area of the plume core (area with perchlorate concentrations above 24.5 $\mu\text{g}/\text{L}$ within 1.5 miles south of the site). We expect these decreases in perchlorate concentrations at domestic wells will continue, and will likely accelerate once offsite hydraulic control of Priority Zones A and B (perchlorate concentrations greater than 11 $\mu\text{g}/\text{L}$) is initiated with extraction well IEW-1.

Replacement Water Service Terminations

Olin is required to provide replacement water (e.g., bottled water or wellhead treatment) to well owners and tenants whose drinking water wells have perchlorate concentrations greater than 6.0 $\mu\text{g}/\text{L}$. Currently, Olin provides bottled drinking water to users of 52 domestic supply wells which serve 76 households. Olin also operates and maintains ion exchange wellhead treatment for 12 of the 52 domestic supply wells. Olin provides bottled water in accordance with the Water Board Cleanup and Abatement Order No. R3-2004-0101 (CAO No. R3-2004-0101), as revised by the State Water Resources Control Board in its Order WQ 2005-0007 (State Water Board Order) and Water Board staff's letter dated October 6, 2006. In accordance with these Orders, Olin may terminate replacement water service, with Executive Officer concurrence, for users of wells that have four consecutive quarters of perchlorate results less than or equal to 6.0 $\mu\text{g}/\text{L}$.

After bottled water service is terminated, Olin is required to monitor perchlorate in those wells in accordance with the requirements of the State Water Board Order. Since July

2006, the Water Board Executive Officer concurred with Olin's request to terminate bottled water service for 628 wells (two of which are equipped with ion exchange systems) in accordance with State Water Board Order requirements, because each of these wells had exhibited at least four consecutive quarters with perchlorate concentrations below the MCL. 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.

Domestic Supply Well Ion Exchange Systems

Olin continues to operate and maintain ion exchange systems on 12 private domestic supply wells; the systems continue to remove perchlorate as designed. All domestic supply wells that are actively used as a potable water source and have perchlorate concentrations above 7.9 µg/L are equipped with ion exchange systems, with the exception of two wells. Of these exceptions, Olin is pursuing a municipal connection for one; at the other, bacteria counts exceed Santa Clara County recommendations. Olin has not installed any new ion exchange systems since December 2006.

Olin continues providing bottled water to well users with ion exchange systems installed on their wells. In an effort to terminate bottled water service to wells with ion exchange systems, Olin submitted a *Demonstration Project Report on Small Perchlorate Removal Systems for Use in South Santa Clara County, California* to the California Department of Public Health (CDPH). Olin conducted the two-year demonstration project to provide CDPH, Santa Clara Valley Water District, and the Santa Clara County Department of Environmental Health with information to certify that the treatment systems using a disposable ion exchange resin are a reliable treatment method for perchlorate reduction on private domestic wells.

CDPH's response to the demonstration project indicated that they do not have regulatory authority over private domestic water supplies, including wells that serve individual homes and businesses serving fewer than 25 people for less than 60 days per year. Therefore, CDPH stated that they will not certify this treatment system under its residential treatment device statutes and regulations, but will evaluate the efficacy of the proposed treatment systems. CDPH determined that the ion exchange disposable resin treatment systems used for the perchlorate treatment are reliable. CDPH also outlined several recommendations for Water Board staff's consideration for the operation of the ion exchange systems.

CAO No. R3-2004-0101 requires CDPH certification of ion exchange systems on private wells in order to cease providing bottled water to well owners whose wells are equipped with ion exchange. Water Board staff is currently in the process of revising CAO No. R3-2004-0101 to allow Olin to discontinue bottled water services provided Olin maintains and operates the ion exchange systems in accordance with CDPH recommendations.

Status of Activities and Compliance with Cleanup Order No. R3-2007-0077

Cleanup and Abatement Order No. R3-2007-0077 (Cleanup Order No. R3-2007-0077) outlines Olin's groundwater investigation and groundwater cleanup requirements, including the groundwater cleanup approach and schedule². Olin's approved cleanup strategy consists of a phased cleanup that includes hydraulic containment and treatment of groundwater in the area of highest concentrations (plume core) in combination with monitored attenuation for those areas with lower perchlorate concentrations.

Groundwater Investigations – For the purposes of implementing groundwater cleanup southeast of the site, Water Board staff concludes that after eight years of groundwater investigations, delineation of the perchlorate plume in the shallow, intermediate, and deep (upper, middle, and lower zones) aquifers is complete.

Olin has not yet delineated the area east and northeast of the site (area bounded by MP/PZ-01, -02, and -03, and MP/PZ-04 and -05) in the middle and lower deep aquifer zones. In an effort to mitigate further migration of perchlorate east of the site, Water Board staff required Olin to submit a deep aquifer cleanup workplan to address the elevated perchlorate concentrations in the middle and lower deep aquifer zones instead of additional groundwater investigations in this area.

In May 2009, the Executive Officer issued a letter requiring Olin to evaluate the adequacy of the existing well network between the site and the City's new Diana Park well. In March 2009, Water Board staff learned that the City of Morgan Hill installed a high capacity municipal supply well (Diana Park Well) approximately one mile north of the site. If Olin determines that the current well network does not provide sufficient coverage to monitor potential plume mobilization due to operation of the Diana Park Well, Olin must develop and submit a contingency plan; the plan will describe specific implementation tasks and deadlines in the event the Olin perchlorate plume impacts the Diana Park well. Upon operation of the new Diana Park Well, the City may terminate operation of the Tennant Avenue well, located adjacent to the Olin site. Therefore, Olin is also required to evaluate the current monitoring well network west, north, and south of the City's Tennant Avenue well to determine potential perchlorate plume impacts due to termination of pumping.

Onsite Groundwater Treatment System – In 2004, the Executive Officer required Olin to initiate operation of the onsite groundwater treatment system (GWTS), and Olin began operation on April 7, 2004. The system extracts perchlorate-impacted groundwater from the shallow aquifer and the upper-intermediate aquifer at the southern (downgradient) boundary of the site. Olin treats the extracted water with a perchlorate-specific ion exchange process. Olin then reinjects the treated groundwater into the shallow aquifer along the northern portion of the site. To date, Olin has treated over

² Cleanup and Abatement Order No. R3-2007-0077 is located at:
<http://swrcb2a.waterboards.ca.gov/Olin%20Perchlorate/December%207%202007%20Board%20Meeting/>

250 million gallons of groundwater and successfully removed 83 pounds of perchlorate from groundwater.

Since 2004, operation of the onsite GWTS coupled with successful onsite soil remediation, have effectively decreased the mass of perchlorate in the shallow aquifer beneath and adjacent to the site. In July 2008, drought conditions resulted in GWTS operational difficulties due to declining water levels in the shallow aquifer. Water Board staff approved Olin's request to discontinue groundwater extraction in the shallow aquifer for a one-year period because perchlorate concentrations have declined over the past three years and water levels are below the extraction well pump intakes. Olin continues to operate the GWTS in the upper intermediate aquifer and Water Board staff continues to evaluate monitoring data to watch for increasing trends in perchlorate concentrations due to the shutdown of the shallow aquifer extraction wells. If perchlorate concentrations show consistent increases downgradient of the site, the Executive Officer will require Olin to restart shallow aquifer extraction.

Offsite Intermediate Aquifer Cleanup Status - As required by Cleanup Order No. R3-2007-0077, Olin completed installation and hydraulic testing of an intermediate zone groundwater extraction well (IEW-1). Numerical modeling results indicate that the extraction well will achieve hydraulic containment of the 1.5-mile perchlorate plume with concentrations greater than 11 µg/L upgradient of the extraction well (Priority Zones A and B), as required under Cleanup Order No. R3-2007-0077. Water Board staff approved a cleanup approach that includes extracting groundwater from IEW-1 and conveying the water via buried pipeline to the site where the water will be treated using ion exchange and then recharged into the shallow aquifer.

Based upon additional groundwater data collected over the past few months, Water Board staff and Olin determined that intermediate aquifer nitrate concentrations exceed receiving water nitrate concentrations in the shallow aquifer, preventing Olin from discharging treated water to the shallow aquifer. The elevated nitrate concentrations in the treated groundwater cannot be reinjected into the shallow aquifer because this would violate the State's anti-degradation policy (State Board Resolution 68-16³). Water Board staff has required Olin to re-evaluate the treated water disposition and nitrate management in a Feasibility Study Assessment II Report (FSA II Report). Olin must therefore resubmit a 90% Design Report that addresses elevated nitrate concentrations, and provide new compliance dates and schedule for cleanup. Olin has agreed to these requirements, and as expressed in a May 14, 2009 meeting between Olin and Water Board staff, intends to continue to evaluate both nitrate treatment/blending and municipal supply water re-use options as part of their treated water disposition strategy. Water Board staff supports Olin's municipal re-use efforts, as this is a more energy efficient choice than re-injection. We concur with Olin that providing treated groundwater for potable use would result in a more environmentally sound and sustainable groundwater management scenario, and it would also maximize the beneficial reuse of groundwater within the Llagas Sub-basin. Additionally, providing

³ State Water Resources Control Board Resolution 68-16, Anti-Degradation Policy.

treated groundwater for municipal supply would help with future water supply challenges facing the communities using the Llagas Sub-basin.

Our requirement for a revised 90% Design Report and the subsequent re-evaluation of the treated water disposition option will likely result in delays in the cleanup implementation and necessitate developing new groundwater system start-up dates for Cleanup Order No. R3-2007-0077. However, these delays will not result in an increased threat of perchlorate to affected well owners. In fact, appropriate treatment and/or management of elevated nitrate concentrations in the Llagas Sub-basin will result in a more environmentally beneficial cleanup project that will benefit water quality and all domestic well users within the Llagas Sub-basin. However, delays do prolong the period of time that affected well owners may need to rely on bottled water.

Offsite Deep Aquifer Cleanup Status – Cleanup Order No. R3-2007-0077 requires Olin to hydraulically contain and treat offsite perchlorate concentrations greater than 24.5 µg/L (Priority Zone A) in the deep aquifer. Olin completed installation of DEW-1 in November 2008, and this well is expected to hydraulically contain perchlorate concentrations greater than 24.5 µg/L in the upper and middle deep aquifer southeast of the site. Olin recently completed delineation activities in the lower deep aquifer and is currently evaluating nitrate concentrations in this zone prior to selecting a lower deep aquifer extraction well location.

Notification of Elevated Nitrate Concentrations in Domestic Supply Wells

On April 15, 2009, Water Board staff sent letters to domestic well users in the Llagas Sub-basin informing them of elevated nitrate concentrations detected as part of Olin's investigation activities. Well-specific notification letters were mailed to 72 individual well owners/users whose wells contained nitrate concentrations above the MCL of 45 parts per million. The primary purpose of these letters was to ensure all well owners/users are aware of the potential health risks associated with drinking water that contains elevated levels of nitrate. A copy of the letter is included as **Attachment 3**.

Upcoming Reports

- Second Quarter 2009, Groundwater Monitoring Report.
- Monthly Progress Reports. Refer to **Attachment 4** for the most recent progress report.
- Area I Plume Migration Control FS Addendum II.
- Area I 90% Engineering Design Package.
- Groundwater Cleanup Plan for Priority Zone A concentrations in the MP/PZ-5 area.
- Status Update concerning A/B aquitard.
- Diana Park Well Network evaluation letter report.
- Tennant Avenue Well monitoring network evaluation letter report.

Perchlorate Community Advisory Group

The Perchlorate Community Advisory Group (PCAG) meets quarterly in San Martin. The advisory group provides a forum for public discussion of the perchlorate impacts to

groundwater and potential solutions. Water Board staff solicits advisory group input at key decision points in the investigation and cleanup process and continues to participate in each PCAG meeting.

PCAG will hold its next meetings at the San Martin Lions Club on July 30, 2009 at 7 pm (tentative) and Thursday, October 29, 2009, at 7 pm. Water Board staff will attend and be available to address questions from the public concerning the ongoing Olin cleanup case.

Olin Reports and Significant Correspondence can be accessed on our website at:
<http://www.swrcb.ca.gov/rwqcb3/Facilities/Olin%20Perchlorate/Olinsite.htm>

WHITTAKER ORDNANCE FACILITY

Project Manager: Kristina Seley: 805-549-3121

Technical Support: Diane Kukol

KEY INFORMATION

Location:	2751 San Juan Rd, Hollister, San Benito County
Responsible Party:	Whittaker Ordnance
Current Owner:	Pacific Scientific, Inc.
Type of Operations:	Former Ordnance Manufacturer
Type of Discharge:	Perchlorate, Volatile Organic Compounds (VOCs), Hexavalent Chromium
Existing Orders:	General NPDES Permit for Discharges of Highly Treated Groundwater Cleanup and Abatement Order R3-99-006

THIS ACTION: Status Update – Information item only

SUMMARY:

This staff report provides an update on the status of the Whittaker groundwater cleanup site addressing the following items:

- Update on current status of onsite and offsite investigation activities.
- Water Board staff priorities for the Whittaker cleanup project.
- Startup of onsite groundwater containment and treatment system.
- Human health risk evaluations.
- Upcoming Cleanup and Abatement Order R3-2009-0015.

Over the past two years, in response to requirements and orders issued by the Executive Officer, Whittaker has completed an offsite groundwater investigation; an onsite soil, soil gas, and groundwater investigation for volatile organic compounds (VOCs) at Building 5 and Building 23 areas (VOC source area); and completed the installation of a groundwater containment and treatment system to prevent further offsite

migration of pollutants. Whittaker's next steps are to finalize characterization activities and prepare feasibility and corrective action plans to cleanup soil and groundwater. Water Board staff is finalizing an updated Cleanup and Abatement Order for this cleanup project that provides a schedule for the next steps. Whittaker has provided replacement water to all domestic and agricultural well users impacted by Whittaker's pollution and there are currently no imminent health threats to current workers at the facility, based on characterization work to date.

DISCUSSION:

Site Background

The former Whittaker Corporation (Whittaker) facility is a 94-acre property located in western San Benito County. Whittaker owned and operated an ordnance manufacturing facility from 1980 to July 1993. Pacific Scientific Energetic Materials currently uses a few buildings at the facility for metal manufacturing. Investigation and cleanup activities are complex at this facility. The complexity derives from complicated hydrogeology, the presence of several faults, numerous waste source areas, co-mingled groundwater plumes within multiple water-bearing zones, and the migration of waste into nearby supply wells.

Under various orders and requirements from the Water Board, Whittaker has conducted on- and offsite characterization activities since 1991 for VOCs and hexavalent chromium and, since 1997 for perchlorate. These activities have resulted in Whittaker carrying out the following:

- Ongoing characterization of the nature and extent of waste constituents in soil, groundwater, and soil gas.
- Implementation of interim cleanup actions and pilot testing several remediation technologies.
- Human health risk assessments for specific locations at the Facility.
- Providing replacement water or wellhead treatment for offsite domestic and agricultural supply wells affected by waste migration from the facility.
- Preparation and submittal of several cleanup plans.
- Design, construction, and startup of an onsite groundwater extraction and treatment system.

Over the past two years, Whittaker completed an offsite groundwater investigation; an onsite soil, soil gas, and groundwater investigation for VOCs at Building 5 and Building 23 areas; and Whittaker installed a groundwater containment and treatment system. Based on site data collected over the past couple of years, Whittaker's most recent cleanup plan (2005) and conceptual site model (2008) are outdated and require revision prior to proceeding with a site-wide corrective action plan. The following include ongoing tasks in order of priority for this cleanup case:

- 1A) Evaluate and mitigate potential human health threats to onsite workers due to VOC vapors and to offsite users due to waste constituents in groundwater;

- 1B) Control and treat onsite groundwater to prevent further waste constituent migration offsite;
- 2) Summarize all characterization/investigation data to identify any remaining data gaps, refine the conceptual site model, and provide data necessary for a site-wide feasibility study; and
- 3) Develop a strategy for onsite and offsite soil and groundwater remediation.

Cleanup and Abatement Order

Water Board staff is finalizing Cleanup and Abatement Order (CAO) No. R3-2009-0015 for the Whittaker site. On May 13, 2009, Water Board and Whittaker staff worked together to draft CAO requirements and the associated compliance schedule. Staff is continuing work on the CAO and the Executive Officer intends to issue the CAO in July 2009. The Order will likely include requirements that Whittaker submit the following documents:

- Groundwater containment and treatment system assessment report,
- Onsite soil and groundwater cleanup feasibility study, followed by a corrective action plan,
- Offsite groundwater cleanup feasibility study, followed by a corrective action plan,
- Cleanup progress status reports,
- Well survey updates, and
- Quarterly monitoring reports

Current Worker Exposure Evaluation

Based on recent soil gas sampling results, Water Board staff directed Whittaker to conduct an evaluation of health risks to current workers at the facility. Whittaker submitted the *Updated Current Worker Exposure Evaluation*. In general, staff concurs with the report's conclusion that there is no risk to workers at Buildings 13 and 17. However, additional soil gas sampling is needed to evaluate health risks to current workers at Building 24. Whittaker notified Water Board staff on June 1, 2009, that the current site owner/operator will vacate Building 24, which will mitigate the health risk to workers in that building and alleviate the need for additional soil gas sampling.

Well Survey

On September 10, 2008, Whittaker submitted the *Updated and Expanded Private Water Supply Well Survey Report*. Whittaker performed a thorough survey of private supply wells within two miles of the Whittaker facility. However, based on our review of the report, Water Board staff required additional perchlorate sampling at six nearby offsite supply wells that had little or no prior water quality data. Whittaker submitted the *Results of Private Water Supply Well Sampling* on May 1, 2009. Of the six private wells, four were accessible and all results were less than the detection limit for perchlorate. For the remaining two, one is non-operational, and Whittaker will sample the other well during the agricultural growing season when the well is operational. Our overriding priority on this issue is that Whittaker provides replacement water to all domestic and agricultural well users impacted by Whittaker's pollution.

Groundwater Containment and Treatment System

In June 2009, Whittaker completed construction and testing of the onsite groundwater containment and treatment system. The system includes six extraction wells, along the northwest, west, and southwest site boundary, to extract groundwater from the Unit 1 and Unit 3 aquifers. Whittaker will treat the extracted groundwater with granular activated carbon to remove VOCs, and bioreactors for perchlorate, hexavalent chromium, and selenium remediation. The purpose of the proposed groundwater containment and treatment system is to prevent impacted groundwater from migrating offsite and to restore offsite groundwater beneficial uses.

Whittaker submitted a *Final Design Report for the Groundwater Extraction and Treatment System* on December 1, 2008. Based on Water Board staff comments, Whittaker revised the performance monitoring plan and sampling schedule, and submitted a *Revised Final Design Report for the Groundwater Extraction and Treatment System* on May 22, 2009. Discharge from the treatment system to the San Benito River pursuant to our General NPDES Permit for Discharges of Highly Treated Water will likely begin in July 2009.

Site-Wide Source Area Investigation

In a letter dated December 11, 2008, Water Board staff directed Whittaker to submit a Site-Wide Summary Report. The purpose of the Site-Wide Summary Report is to summarize all characterization/investigation data to identify all potential sources, any remaining data gaps, refine the conceptual site model, and provide data necessary for a site-wide feasibility study. In an effort to optimize the content of this report, Water Board staff and Whittaker's consultants conduct regular working group meetings.

Offsite Investigation

Since April 2008, Whittaker has installed over 140 monitoring wells and collected numerous groundwater samples in the shallow and deep aquifer units to characterize the perchlorate and VOC plumes offsite. **Attachment 5** illustrates the groundwater plumes originating from the facility. The objectives of the offsite investigation were to 1) characterize the groundwater flow, soil type, and determine the lateral and vertical extent of waste constituents of concern; and 2) locate current and future groundwater extraction wells used for potable and agricultural uses to prevent exposure and spread of waste constituents in groundwater. Water Board staff is currently reviewing this report. After staff concurs that characterization activities are complete, Whittaker will prepare an offsite groundwater cleanup feasibility study.

Buildings 5 and 23 Areas Source Investigation

In March 2008, Whittaker submitted a Phase II Source Area Investigation Workplan to further investigate soil, soil gas, and groundwater near Buildings 5 and 23 for perchlorate, hexavalent chromium, and VOCs. The Building 5 and 23 areas are a significant source area for VOCs. The features associated with the VOC, perchlorate, and hexavalent chromium releases include septic tanks, a culvert system, dry wells, and sumps. Whittaker submitted a report summarizing the results on February 20, 2009. After Water Board staff reviews and approves this report, we will direct Whittaker to

prepare a Building 5 and Building 23 Areas cleanup feasibility study, pursuant to the updated CAO.

Compliance with Central Coast Water Board Requirements

Whittaker has been in compliance with our requirements since 1991. Water Board staff and Whittaker continue to work efficiently and effectively together toward improving groundwater quality in the Gilroy-Hollister groundwater basin.

BAE SYSTEMS (FORMERLY UNITED DEFENSE)

Project Manager: Kristina Seley 805-549-3121

KEY INFORMATION:

Location:	900 John Smith Road, Hollister, San Benito County
Responsible Party:	BAE Systems Land and Armaments L.P. (BAE Systems)
Current Owner:	BAE Systems leases land from FRIIS Thomas Ranch L.P.
Type of Operations:	Munitions testing
Type of Discharge:	Perchlorate and explosives
Existing Orders:	13267 Investigation Orders

THIS ACTION: Status Update – Information item only

SUMMARY:

This staff report provides an update on the status of the BAE systems groundwater cleanup site. BAE Systems is completing investigation activities to delineate a perchlorate plume. After delineation is complete, BAE will conduct a risk assessment and feasibility study to establish site cleanup goals and a final corrective action plan for cleanup.

DISCUSSION:

Site Background

Since 1968, BAE Systems (BAE) has conducted munitions testing on a 1,200 acre leased property, known as the Hollister Test Facility, in eastern Hollister. The site contains several buildings, former munitions magazines, and two munitions test arenas. Waste constituents identified in soil and/or groundwater include perchlorate and explosives. BAE has cooperatively investigated the site since 2003, and complied with all Water Board requirements.

Soil and Groundwater Investigation

BAE's consultants have identified three soil source areas (Arena 1, Building No. 3 area, and Building No. 6 area) and two onsite perchlorate groundwater plumes. BAE continues to delineate groundwater and soil source areas.

Cleanup Actions

In late September 2005, BAE voluntarily excavated shallow, perchlorate-impacted soils to minimize potential perchlorate mobilization associated with rainfall and runoff infiltration through the soil source area.

Future Work

Upon completion of the investigative work, BAE will conduct a risk assessment and feasibility study to establish site cleanup goals and a final corrective action plan for cleanup.

MK BALLISTIC SYSTEMS

Project Manager: Kristina Seley 805-549-3121

KEY INFORMATION:

Location:	2707 San Juan Road, Hollister, San Benito County
Responsible Party:	MK Ballistics and land owner
Current Owner:	Family Trustees: Gloria Zuniga, Sheron Johnson
Type of Operations:	Ordnance manufacturer
Type of Discharge:	Phase I investigation underway for perchlorate
Existing Orders:	13267 Investigation Orders

THIS ACTION: Status Update – Information item only

SUMMARY:

This staff report provides an update on the status of the MK Ballistics groundwater cleanup site. During the first quarter of 2009, the landowner's consultant installed five shallow groundwater monitoring wells (MW-1 to MW-5), and based on preliminary data, wastes discharged at this site have not significantly impacted groundwater quality. Water Board staff will evaluate three more quarters of groundwater data prior to considering closure for this site.

DISCUSSION:**Site Background**

The MK Ballistic Systems site is located northwest of the BAE Systems site discussed above. Currently, MK Ballistic Systems leases buildings and storage magazines on the five-acre property and manufactures non-lethal (i.e., bean bag) 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.

A 2005 environmental investigation report prepared for BAE Systems indicated that historical use of perchlorate at MK Ballistic Systems may be the cause of perchlorate pollution in a supply well located upgradient of the BAE System's facility but downgradient of the MK Ballistics Systems site. In 2006, Water Board staff directed the current operator and the landowner to conduct a preliminary soil and groundwater investigation for perchlorate. At the same time, Water Board staff was contacted by Department of Toxics Substance Control (DTSC) staff to halt investigation activities at this site. DTSC was investigating the storage and handling of hazardous waste and explosives contained at the site. Water Board staff delayed the groundwater investigation to allow DTSC and the San Benito County District Attorney to complete their actions regarding inappropriate hazardous waste storage.

On October 2, 2008, Water Board staff received a copy of an August 1, 2008, "Consent Agreement and Stipulation for Entry of Final Judgment" (Agreement). The Agreement, prepared by the District Attorney of San Benito County, requires Michael Keith, the current operator, to conduct localized cleanup of hazardous wastes caused by the improper storage of hazardous materials. For safety reasons, Water Board staff waited for completion of hazardous materials cleanup prior to beginning investigation activities.

Preliminary Soil and Groundwater Investigation

During the first quarter of 2009, the landowner's consultant installed five shallow groundwater monitoring wells (MW-1 to MW-5), and based on preliminary data, this site is not a source of significant groundwater impacts. The landowner will conduct another round of perchlorate groundwater sampling, after which, they will submit a final report with a summary and interpretation of all groundwater and soil results, as well as recommendations for future work or no further action. The landowner has complied with all Water Board requirements.

TDY INDUSTRIES (FORMERLY TELEDYNE MCCORMICK-SELPH)

Project Manager: Hector Hernandez 805-542-4641

KEY INFORMATION

Location:	3601 Union Road, Hollister, San Benito County.
Responsible Party:	Allegheny Technologies Incorporated
Current Owner:	TDY Industries
Type of Operation:	Former manufacturing of pyrotechnics
Type of Discharge:	Perchlorate and VOCs
Existing Orders:	13267 Investigation Orders

THIS ACTION: Status Update – Information item only

SUMMARY:

This staff report provides an update on the status of the TDY Industries groundwater cleanup site. Water Board staff recently located the responsible party and is evaluating status of cleanup implementation.

DISCUSSION:

Site Background

The TDY Industries site (former McCormick Selph facility) is approximately 270 acres. Teledyne Inc. purchased the property in May 1971, and began manufacturing controlled pyrotechnics (electric igniters, electric primers, explosive bolts, gas generators, etc.) for the aerospace and automotive industries. Several name changes occurred but TDY Industries retained certain liabilities as the responsible party, related to environmental issues at the facility. On May 12, 1999, TDY industries confirmed the presence of perchlorate and VOCs in soil and groundwater beneath the site. TDY Industries completed delineation of the perchlorate plume in 2002. Following investigation activities, TDY Industries implemented in-situ bioremediation and monitored attenuation as the cleanup remedy. Verification groundwater monitoring continued until 2005, when Water Board staff was unable to locate the responsible party.

Current Status

In 2009, Water Board staff reestablished communication with the Discharger and its consultants and is working with TDY Industries to implement additional cleanup actions.

CONCLUSION

Water Board staff will 1) continue to address water quality impacts related to perchlorate, 2) prioritize those sites that have impacted drinking water wells, and 3) provide the Water Board with an update on progress related to these perchlorate sites at the July 2010 meeting, or sooner as significant accomplishments warrant.

ATTACHMENTS

Attachment 1A through 1E: First Quarter 2009 Perchlorate Distribution Maps for the Shallow, Intermediate, and Deep Aquifers.

Attachment 2A and 2B: First Quarter 2006 and First Quarter 2009 Perchlorate Distribution Maps for the Intermediate Aquifer.

Attachment 3: General Nitrate Notification Letter

Attachment 4: Olin's Progress Report #82, dated June 10, 2009.

Attachment 5: Whittaker's Perchlorate, VOC, and Chromium 6 Distribution Map.