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

STAFF REPORT FOR REGULAR MEETING OF OCTOBER 21, 2005
Prepared on September 21, 2005

ITEM NUMBER: 7

SUBJECT: **Perchlorate Cleanup Sites**

DISCUSSION:
New information is shown in ***italics***. Please refer to previous staff reports for historical information.

Olin Corporation Facility, 425 Tennant Avenue, Morgan Hill, Santa Clara County
Project Manager:David Athey 805-542-4644

Current milestones in the investigation of perchlorate contamination, on and off, the former Olin facility include:

On-site Groundwater Treatment and Containment:

Update: Water Board staff met with Olin on September 7, 2005, to discuss long- and short-term treated groundwater disposal options. Olin currently discharges treated groundwater to the Butterfield Retention Basin. The Basin is owned by the City of Morgan Hill (City) and was designed to collect and percolate storm water.

The City asked Olin to evaluate the pond's current performance. The City believed that algae build up and siltation may have caused a loss of infiltrative capacity since the amount of standing water has increased. Olin investigated the problem and believes that a groundwater mound has formed beneath the pond as a result of prolonged infiltration. Olin believes that the retention basin water and groundwater are in equilibrium and the standing water in the pond will not increase. Considering the city's concern, Olin is investigating on-site disposal options. Olin has performed preliminary analysis and has determined that injection wells may be the best option. Water Board staff anticipates receiving Olin's plans to modify disposal before the October Board Meeting.

On-site Ex Situ and In Situ Soil Treatment:

Update: The in situ soil treatment system began operation on August 16, 2005. Olin will perform treatment system optimization for a three-month period. System optimization includes determination of infiltrative capacity for each treatment cell and nutrient injection optimization. According to Olin, approximately 640,000 gallons of amended groundwater was applied to the treatment area by the end of August. Water Board staff will continue to monitor Olin's in situ cleanup activities.

Groundwater Monitoring and Reporting:

Update: Water Board staff has reviewed Olin's Second Quarter 2005 Groundwater Monitoring Report (Report). The Report details Olin's efforts to comply with Monitoring and Reporting Program No. 2001-161. Water Board staff reviewed the report and provided comments to Olin on August 31, 2005. Report information includes:

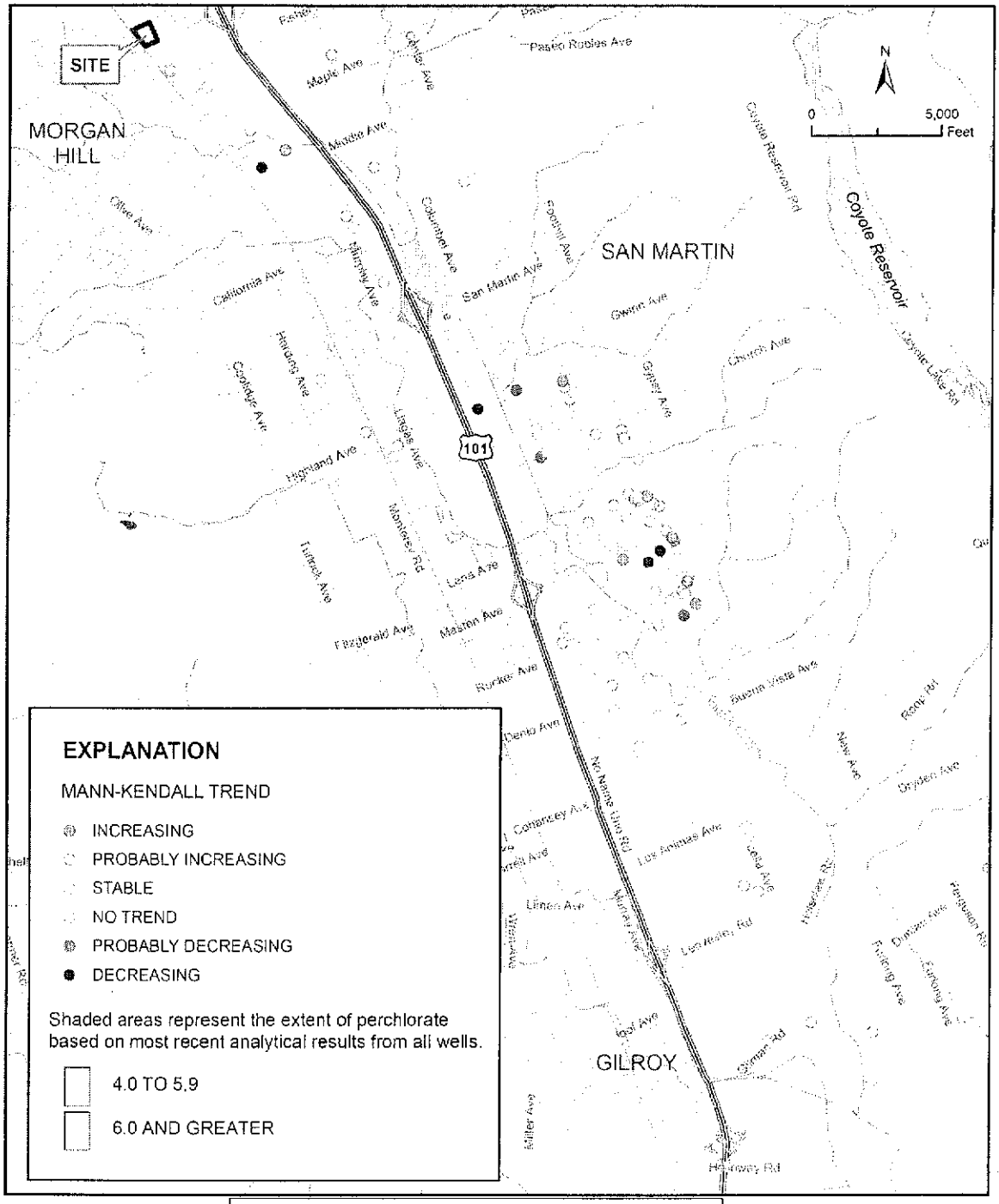
1. *Olin sampled 515 off-site groundwater wells. According to Olin, 327 wells had no perchlorate detections above 4 µg/L, 147 wells had detections above 4 µg/L, 39 wells had detections above 6 µg/L, and 2 wells had detections above 10 µg/L. The two wells that had detections above 10 µg/L, located within one half mile of the site, had concentrations of 85 and 24 µg/L*

2. *Olin performed statistical analysis on all wells with four quarters of data having*

perchlorate concentrations above 4 µg/L. Seventeen wells were evaluated; four were statistically increasing, four showed no trend, one was probably decreasing, five were decreasing, and three were stable.

3. *The off-site regional groundwater flow direction in the Llagas Subbasin was to the south-southeast with a gradient of 0.0003 feet per foot. According to Olin, this is consistent with maps generated in previous investigations.*

The plume map from Olin's report is shown below (Figure 23). This map represents an estimate of the perchlorate plume's extent south of Olin's site. Olin only used wells that have well logs to generate this map. Data collected from Olin's southern investigation will be used to update the plume map and



MACTEC 2005, 2nd Quarter Report, Figure 23

potentially fill data gaps.

Northeast Perchlorate Area:

Update: Olin provided additional northeast piezometer transducer data on September 15, 2005. The transducer data show the change in groundwater elevation every ten minutes. Olin is required to install transducers in the multi-channel and single-stand pipe piezometers. Olin has not installed transducers in all piezometers as required because of procurement and calibration delays. Olin will continue to perform groundwater elevation monitoring in the northeast perchlorate area.

The Executive Officer issued a Notice of Violation (NOV) to Olin on September 15, 2005. The NOV was for failure to meet deadlines of a December 8, 2004 section 13267 Water Code Order (Order). The Water Board and Olin Corporation agreed to stay the Order dates for sampling, reporting, and forensic analysis investigation. Olin subsequently violated The Conditional Stipulated Stay due dates for sampling and reporting. The NOV is included as ***Attachment 1****.*

Cleanup or Abatement Order No. R3-2004-0101

Update: Olin continues to install groundwater ion exchange (IX) treatment systems on domestic wells. Olin is working with the Department of Health Services on certification issues. Olin has not provided Water Board staff with an update regarding when IX certification is expected.

According to Olin's recent status report, IX system installation status is as follows:

- *Five wells have operational IX systems.*
- *Two IX systems are being installed.*
- *One IX system design is pending*
- *Two well evaluations are pending (Olin collects each wells flow rate and head characteristics for system design.)*
- *Four well access agreements are pending with one received.*
- *One well is not used for potable water.*
- *One well is inoperable.*

Cleanup or Abatement Order R3-2005-0014

Update: Olin submitted the Llagas Subbasin Characterization Work Plan (Work Plan) on August 12, 2005. The report was due on June 3, 2005. The Work Plan presents Olin's site conceptual model and describes proposed work to fill data gaps and refine the conceptual model. Work Plan comments were received from the Santa Clara Valley Water District and cities of Gilroy and Morgan Hill. Water Board staff reviewed the Work Plan and submitted comments to Olin. In general, more detail is needed. The Work Plan comment letter is included as ***Attachment 2****.*

Perchlorate Community Advisory Group

The Next PCAG meetings will be held at the San Martin Lions Club; 7 pm, on September 30, 2005, and 2 pm, on November 4, 2005.

Olin reports and significant correspondence can be accessed on our web site by going to: http://www.swrcb.ca.gov/rwqcb3/Facilities/Olin%20Perchlorate/Olinsite.htm

McCormick Selph, 3601 Union Road, Hollister, San Benito County
Project Manager:David Athey 805-542-4644

The Discharger will submit the full-scale corrective action work plan by September 30, 2005. Water Board staff will evaluate that report and provide comments to McCormick Selph.

Whittaker Ordnance Facility, 2751 San Juan Road, Hollister, San Benito County
Lead Staff: Kristina Seley 805-549-3121

Perchlorate and volatile organic compound (VOC) remediation efforts continue at contaminated areas on and off the Whittaker Ordnance site. *Whittaker submitted the First Semi Annual 2005 Groundwater Monitoring and Remediation Status Report on July 31, 2005. The Report includes groundwater monitoring results and the status of remedial activities underway. An update of Site remediation and domestic use treatment systems is provided below. See* ***Attachment 3***

for the remediation sites and areas of concern. ***Attachment 4 and 5*** *include second quarter 2005 perchlorate and trichloroethene (TCE) results.*

- ***North Building 5 Former Septic Tank Area-*** *The groundwater extraction and treatment system treats perchlorate and VOC impacted groundwater at the North Building 5 Former Septic Tank Area. An average of 16,000 gallons of groundwater is treated each month. During the reporting period (January to June 2005), 0.2 pounds of perchlorate and 2 pounds of VOCs were removed. In addition to groundwater treatment, the soil vapor extraction system has removed approximately 280 pounds of VOCs since operation began in 2002. During the reporting period, 45 pounds were removed; therefore, Whittaker concludes the system is still effective in removing mass from the subsurface. Whittaker has proposed to decommission the groundwater extraction system following startup of the proposed site-wide groundwater containment system, as it will be redundant.*

- ***Riverside Well Air Stripper-*** *The Riverside well is an agricultural well that operates during the dry season. The Riverside well air stripper treated approximately 11,500 gallons of groundwater and removed 0.003 pounds of VOCs. The system is not designed to treat perchlorate, which was detected in the influent and effluent at an average of 60 ppb. Therefore, Water Board staff required Whittaker install a perchlorate treatment system or decommission the well. Whittaker will decommission the Riverside Well; this will reduce the possibility of vertical contaminant migration as the well is screened across the Unit 3 and Unit 4 aquifers.*

- ***Point of Use Carbon Adsorption and Ion Exchange Systems-*** *In 1993, carbon absorption systems were installed on three wells near the Whittaker Ordnance Site. An ion exchange treatment system was added to the Christopher Trailer treatment system in 2003 for perchlorate removal.*

  During the reporting period, perchlorate and VOCs were not detected or were near detection limits (<1 ppb). In the first quarter of 2006, Whittaker will decommission two of wells, the Christopher Well and the Terra Linda Water Association Well, to prevent vertical migration of contaminants.

- ***In situ Reactive Zone (IRZ)-*** *In situ reactive zone groundwater remediation programs are currently underway at the northwest site boundary, Building 23 area, upper burn area, and southwest burn area. A diluted solution of corn syrup is injected into the upper aquifer units to enhance biodegradation. Results have varied. For example, at the upper burn area, the initial maximum perchlorate concentration in the shallow Unit 1 aquifer monitoring wells was 510,000 µg/L; the current maximum value is 2,800 µg/L. However, the deep Unit 1 monitoring well has increased in concentration from 19,000 µg/L to 34,000 µg/L. In the Remedial Design/Remedial Action Work Plan, Whittaker proposes to discontinue IRZ activities because the proposed groundwater containment and treatment system will capture on-site groundwater impacts.*

Draft Sampling and Analysis Plan – in February 2005, this Draft Sampling and Analysis Plan (SAP) was submitted in response to Water Board staff's request for a comprehensive review of on- and off-site groundwater monitoring. The draft report applies to soil and groundwater sample collection, analysis, and data review. It also applies to the soil vapor extraction systems, groundwater extraction systems, and domestic and irrigation supply well treatment systems. Staff provided comments on April 25, 2005. The April 25th letter requires updates to the SAP, including expansion of data reporting and monitoring and sampling protocols. The SAP will serve as the monitoring and reporting doctrine for the Whittaker site. The SAP will be a living, stand-alone document

that will be updated by Whittaker with Water Board concurrence. Changes will be made as monitoring, sampling, and remediation efforts alter or new data is received.

Update: On September 9, 2005, Whittaker submitted a final draft copy of the Reporting Requirements section for review by staff. Staff provided comments to the additional section. The final SAP is due September 30th; staff anticipate approving the plan prior the October Board meeting.

- **Remedial Design/Remedial Action Work Plan (Work Plan)** - On January 27, 2005, Water Board staff met with Whittaker's consultants to discuss their development of a comprehensive site strategy. The consultants presented their draft site cleanup strategy, a site model with remedial alternatives for contaminated areas, and a proposed remedial program. The conceptual site model identified six soil source areas impacting groundwater. Remediation alternatives for each soil area and each impacted groundwater zone were developed. Perchlorate and VOC remedial alternatives were ranked based on effectiveness, time, and cost. Water Board staff provided feedback to the proposed strategy, including a request for a compilation of data presented in a site strategy report. In a May 2, 2005 letter, staff directed Whittaker to submit a Remedial Design/Remedial Action Work Plan (Work Plan) for site-wide cleanup by May 28, 2005.

  The Work Plan was received May 31, 2005 and the Off-Site Groundwater Fate and Transport Modeling Report was received on June 3, 2005.

  Update: The Work Plan describes a remedial approach to groundwater and soil impacts at the Whittaker Ordnance Facility. The Report includes a description, rationale, schedule, and implementation for the design to clean up site constituents of concern (COCs) including perchlorate, hexavalent chromium, and volatile organic compounds (VOCs).

  The treatment design consists of 1) a groundwater extraction well network, 2) conveyance to treatment system, 3) treatment, and 4) discharge of extracted groundwater. Whittaker proposes to construct a groundwater containment system consisting of clustered extraction wells in the shallow alluvium, Unit 1, and Unit 3 aquifers. Four clustered sets of extraction wells are proposed in the alluvium Unit 1 for a total estimated flow of 70 gpm. Two Unit 3 extraction wells are proposed to operate at 22.5 gpm each. The wells will be located on the site and may not capture off-site impacted groundwater.

  After the on-site groundwater is extracted, it will be treated and discharged into the San Benito River (approximately 2000 feet north of the Site boundary) under an NPDES permit. The draft treatment system consists of granular activated carbon for VOC removal and either ion exchange or a bioreactor for perchlorate remediation. The Work Plan proposes off-site contamination be treated by natural attenuation, including dilution and dispersion for perchlorate ions. Results of the off-site monitored natural attenuation (MNA) approach indicated that once the on-site groundwater containment system is operational, the off-site COC plumes will stabilize and contract over time. The MNA approach will be developed and implemented, including identification and construction of additional monitoring wells, following the start-up of the on-site containment system.

  Whittaker states source area soil remedial measures in the most heavily impacted areas will not greatly benefit the restoration of Site-wide groundwater to cleanup goals within a reasonable time frame. Therefore, capping of the soil, opposed to soil remediation, is the preferred soil cleanup approach.

  Water Board staff have compiled comments to the Remedial Design/Remedial Action Report. Staff will provide and discuss comments with Whittaker and their consultants prior to the October Board meeting.

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

On June 24, 2005, United Defense representatives informed the Water Board that BAE Systems purchased United Defense Industries. Although BAE Systems now operates the facility, staff has not changed.

United Defense submitted the Phase III Environmental Investigation Report (Report) on September 30, 2004. The Report provides supplemental information to the Initial Site Assessment and Phase II Reports. The Phase III investigation was conducted to more fully assess the extent of perchlorate, nitrate and nitrite, energetics (explosive compounds, e.g. TNT), and aluminum contamination in site soil, groundwater, and surface water. The following areas were investigated:

- Arena 1: Previous sampling during the Phase II investigation found perchlorate at a maximum of 2,900 milligrams per kilogram (mg/kg) in soil and 2,600 micrograms per liter (µg/L) in groundwater. Soil results from the Phase III investigation ranged from below detection to 3.4 mg/kg. As stated in the Report, Phase II and Phase III perchlorate soil samples are generally highest within two feet below ground surface. Perchlorate detections in groundwater for the Phase III analysis ranged from not detected to 8.5 µg/L. These results are from groundwater samples taken from recently installed groundwater wells. Previous groundwater perchlorate results were collected from temporary soil borings.
- Arena 2: One soil boring at 0.5 ft had a perchlorate detection of 3.7 mg/kg.
- Three Nearby Groundwater Wells: Perchlorate was detected in the Rancher's well at 15 µg/L and the Windmill well at 34 µg/L. Nitrate + nitrite (as N) was detected in the Windmill well and WW-1 at 45 µg/L and 4.2 µg/L respectively.
- Ranch Pond Dredge Area: Perchlorate was detected at 1.1 mg/kg in one of the two soil boring samples taken. Nitrate + nitrite (as N) was detected at 8.2 mg/kg and 27 mg/kg in the two borings. Aluminum was also detected at 13,000 mg/kg and 17,000 mg/kg, but results were below the background sample results of approximately 25,000 mg/kg.
- Building No 6 Area: Additional energetic sampling was conducted near Building No. 6 to further assess the extent of HMX, RDX, and TNB (energetics) contamination. The Report states that generally concentrations increase with depth. HMX, RDX, and TNB were found at 2,400 µg/kg, 1,200 µg/kg, and 240 µg/k, respectively, 20 feet below ground surface.
- Building No 1 Area: All groundwater and surface water results tested non detect for energetics and perchlorate.
- Santa Ana Creek: All surface water samples of perchlorate, nitrates and nitrites, and energetics were non-detect. Dissolved aluminum was detected in four samples ranging from 0.14 mg/L to 0.25 mg/L. Sediment samples exhibited similar results; perchlorate, nitrates/nitrites and energetics samples were all non-detect. However, aluminum concentrations ranged from 6,300 mg/kg to 13,000 mg/kg.

On November 30, 2004, United Defense submitted its Phase III Environmental Investigation Report Addendum. The Addendum provided additional monitoring results to fill data gaps; findings from the Addendum are included below.

- Arena 1: Additional soil borings were advanced to assess the extent of perchlorate contamination. One of 33 soil samples detected perchlorate at 1.1 mg/kg at a depth of 1.5 to 2 feet below ground surface (bgs).
- Cattle Guard: Soil samples where Arena 1 drainage meets the Santa Ana Creek were non-detect for perchlorate.
- Water Well WW-2: Groundwater was collected from WW-2 and analyzed for perchlorate, nitrate + nitrite, and nitroaeromatics/nitroamines (energetics). Perchlorate and energetics were not

detected, however, nitrate + nitrite as N was detected at 3.5 mg/L.

Water Board staff has completed review of both the Phase III Report and Report Addendum. Water Board staff provided comments to United Defense on December 22, 2004. Water Board staff directed United Defense to proceed with the on-site environmental investigation and provide a Phase IV Report by April 1, 2005. The following highlights information United Defense is required to submit as part of the Phase IV Report:

- Resample the Windmill well. If perchlorate is confirmed, propose an investigation to identify the source and extent of perchlorate contamination.
- Continue to monitor for perchlorate and nitrate + nitrite in the Ranch Pond Dredge area.
- Determine vertical and lateral extent of energetic contamination at Building 6.
- Begin quarterly sampling of the Rancher's well and Windmill well and installed monitoring wells for nitroaromatics/ nitroamines (energetics), perchlorate and nitrate + nitrite.
- Develop a site-specific monitoring plan for monitoring of constituents of concern (COCs).

On February 4, 2005, Water Board received the following documents.

- **Revised Analytical Results for Table 1 and 2 for the Phase III Environmental Investigation** – The Phase III revised results include a greater detail of perchlorate concentrations. The lab's method detection limits were decreased to 4 ppb for perchlorate groundwater results and 10 to 40 ppb for perchlorate soil results. The laboratory reanalyzed the same samples with the increased sensitivity of 4 ppb. The decrease resulted in two soil detections at Arena 2 and over 16 soil detections between 0.17 mg/kg and 1.8 mg/kg that were previously non-detect.
- **Storm Water Pollution Prevention Plan**
- **Storm Water Monitoring Program**
- **Addendum Work Plan Phase IV Environmental Investigation** – The Addendum Work Plan proposes work to be performed during the Phase IV Environmental Investigation (EI). The Phase IV EI will address Water Board comments issued in our December 6, 2004 letter and comments from the landowner who leases the site to United Defense. The EI will further assess site stratigraphy, water quality, and lateral and vertical extent of COC contamination, particularly at Arena 1. Water Board staff anticipates approving the proposed work.

On February 8, 2005, Water Board staff spoke with United Defense's consultant, URS. URS stated they were moving aggressively with the work plan and have already begun site work. The Reports have been reviewed and the addendum work plan was found to be adequate. Water Board staff approved a request by United Defense to extend the Phase IV Report due date from April 1 to May 15, 2005.

On March 28, 2005, Ms. Seley spoke with URS staff member Susie Vedantham, United Defense's consultant. Ms. Seley discussed the request by the Water Board to implement interim corrective action at source areas. Pursuant to the request, URS will continue with the Phase IV work to delineate the perchlorate and energetic contamination to characterize the source areas. URS will also propose a draft cleanup level, which will be the basis for cleanup. Once the two items are complete, Water Board staff will request a proposal for interim remedial options at the source areas and an overall cleanup strategy.

Staff received the Phase IV Report on May 13, 2005, and met with United Defense's consultant URS on June 2, 2005. URS reviewed the report findings and Water Board staff discussed initial comments.

Water Board staff provided comments to the Phase IV Report on June 28, 2005. Comments included 1) approval to discontinue monitoring of the on-site windmill well 2) submittal of a work plan including well installation for two wells in the Arena 1 perchlorate contaminated area 3) additional groundwater analysis for energetics at the Building 6 area.

On July 12th, United Defense submitted its Phase V Environmental Investigation Work Plan. The Work Plan includes the efforts required to submit the Phase V Environmental Investigation Report due October 31, 2005. United Defense concluded additional site work should be completed prior to submittal of a risk-based soil cleanup goals for perchlorate and energetics. Following the Phase V site investigation, which includes additional soil and groundwater sampling and contaminant delineation, United Defense will propose risk-based soil cleanup goals.

Update: BAE Systems' consultant, URS, continues with the Phase V on-site investigation. They have completed drilling of additional monitoring wells, soil sampling, and hydropunch sampling. As requested, they will submit a plan for interim remedial action at Arena 1. URS anticipates excavating and removing perchlorate-contaminated soil at the higher concentrated area prior to the upcoming rainy season (October 2005). BAE Systems will submit a work plan for the possible excavation in September. Following review by Water Board staff, BAE systems will move forward with the interim remedial action.

On July 1, 2005, the Executive Officer issued Monitoring and Reporting Program No. 05-0113 for the BAE site. The first quarterly report, the Third Quarter 2005 Groundwater Monitoring Report, is due October 31, 2005.

ATTACHMENTS

1. Olin – September 13, 2005 letter to Richard McClure – Notice of Violation.
2. Olin – September 23, 2005 Llagas Subbasin Characterization Work Plan comment letter to Richard McClure.
3. Whittaker-Site Map
4. Whittaker-Unit 1 TCE Iso-concentration Contour Map
5. Whittaker-Unit 1 Perchlorate Iso-concentration Contour Map