California Regional Water Quality Control Board

Central Coast Region

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January 8, 2007

Mr. Curt Richards
Olin Corporation
Environmental Remediation Group
P.O. Box 248
Charleston, TN 37310-0248

Dear Mr. Richards:

SLIC: 425 TENNANT AVE, MORGAN HILL; SECOND AND THIRD QUARTER 2006 GROUNDWATER MONITORING REPORTS, THIRD QUARTER 2006 ON-SITE REMEDIATION PERFORMANCE MONITORING REPORTS, AND EAST OF SITE CHARACTERIZATION REPORT

This letter provides comments on the reports listed below, and includes additional requirements based on the data presented in the reports:

- July 30, 2006 *Second Quarter 2006 Groundwater Monitoring Report, Olin/Standard Fusee Site, 425 Tennant Avenue, Morgan Hill, California* (2Q Monitoring Report)
- October 30, 2006 *Third Quarter 2006 Groundwater Monitoring Report, Olin/Standard Fusee Site, 425 Tennant Avenue, Morgan Hill, California* (3Q Monitoring Report)
- October 30, 2006 *Third Quarter 2006 On-Site Remediation Performance Monitoring Report, Olin/Standard Fusee Site, 425 Tennant Avenue, Morgan Hill, California* (3Q On-Site Remediation Report)
- September 29, 2006 *East of Site Characterization, Olin/Standard Fusee Site, 425 Tennant Avenue, Morgan Hill, California* (East of Site Report)

MACTEC Engineering and Consulting, Inc. (Mactec) and Geosyntec Consultants submitted the above-mentioned reports on Olin Corporation's (Olin) behalf. Olin submitted the Monitoring Reports and On-Site Remediation Reports in accordance with Monitoring and Reporting Program No. 2001-161 (MRP No. 2001-161). Olin submitted the East of Site Report to comply with our July 24, 2006 *SLIC: 425 Tennant Ave, Morgan Hill; First Quarter 2006 Groundwater Monitoring Report* letter.

The Monitoring Reports present the results of groundwater monitoring conducted by Olin during the second and third quarter 2006 monitoring periods. Olin's monitoring objectives are to monitor and delineate the lateral and vertical extent of perchlorate,

monitor perchlorate concentrations over time, determine groundwater flow directions within the aquifer zones of the Llagas Subbasin, and provide data to advance and improve the Llagas Subbasin hydrogeologic conceptual model.

The 3Q On-Site Remediation Report documents the operation and performance of the on-site groundwater containment and perchlorate removal system and the on-site recharge system during the third quarter of 2006. The objective of the on-site groundwater containment and perchlorate removal system is to provide hydraulic containment and removal of perchlorate in on-site groundwater. The on-site recharge system recharges groundwater treated by the groundwater treatment system to the shallow aquifer, in the northern portion of the Olin site.

To summarize and present the volumes of data collected each quarter in each Monitoring Report is an enormous task. We appreciate Olin and Mactec's significant efforts to present the data in a way that enhances our understanding of the perchlorate distribution in the Llagas Subbasin and the basin hydrogeology. Central Coast Water Board staff provides the following comments, recommendations, and requirements to improve the presentation of, and aid in our evaluation and understanding of, the data collected for the Olin cleanup case.

Central Coast Water Board staff reviewed and considered comments received from the Santa Clara Valley Water District (Water District), dated December 5, 2006, and comments received from the City of Morgan Hill's consultant WorleyParsons Komex, dated August 14, 2006, October 20, 2006, and November 22, 2006. Copies of the comments received are attached for reference.

2Q AND 3Q MONITORING REPORTS

Olin measures groundwater elevations and collects groundwater samples from on-site depth-discrete monitoring wells, off-site depth-discrete dedicated monitoring wells, sentry wells owned by the City of Gilroy, and off-site domestic supply wells. Olin conducts sampling pursuant to:

- Monitoring and Reporting Program No. 2001-161,
- Cleanup or Abatement Order (CAO) No. R3-2004-0101, which pertains to monitoring of domestic wells associated with replacement water, as modified by State Water Resources Control Board (State Water Board) Order No. WQ 2005-0007 and the Central Coast Water Board's October 6, 2006 *SLIC: 425 Tennant Ave, Morgan Hill; Termination of Replacement Water and Post Monitoring Requirements* letter, and
- Central Coast Water Board's July 24, 2006 *SLIC: 425 Tennant Ave, Morgan Hill; First Quarter 2006 Groundwater Monitoring Report*, which pertains to the requirement for Olin to collect quarterly perchlorate groundwater samples and groundwater elevations from all of the multi-level depth discrete MP/PZ wells located northeast of the Olin site.

Central Coast Water Board staff provides the following comments, recommendations and requirements concerning the second and third quarter 2006 groundwater monitoring reports:

1. Revised Monitoring and Reporting Program

Central Coast Water Board staff recognizes the need for a revised MRP that updates and incorporates all the monitoring requirements necessary to effectively monitor perchlorate concentrations over time, plume migration, and cleanup progress. Additionally, a detailed monitoring network must be in place to ensure that perchlorate concentrations are effectively monitored in specific areas of the plume to ensure that increasing trends in groundwater with perchlorate concentrations below, but near six micrograms per liter (µg/L) can be identified prior to these concentrations reaching domestic supply wells. Central Coast Water Board staff is in the process of updating, revising, and consolidating all the monitoring requirements into a new MRP, and plans to issue the new MRP during the first quarter of 2007.

2. Continued Monitoring of Groundwater Elevations

Beginning in August 2005, Olin installed transducers in each single-screen and multi-level piezometers northeast of the Olin site. Mactec connected a data logger to each transducer and the data logger records groundwater elevation at 10-minute intervals. Continuously recording groundwater elevation data is informative and provides an understanding of groundwater elevation responses to pumping of the City of Morgan Hill municipal supply wells. Central Coast Water Board staff concurs with Olin's recommendation to continue recording groundwater elevations continuously for a second year (until the end of the third quarter of 2007) in all MP/PZ wells (including newly installed PZ-04-335 and PZ-04-375) located northeast of the Olin site.

A new multi-level well, MP/PZ-05, has been installed east of PZ-04 along the north side of Tennant Avenue. We understand that construction of MP/PZ-05 is similar to the other MP/PZ wells in the area northeast of the Olin site and will be sampled quarterly for groundwater elevation and perchlorate for a minimum of one year. Central Coast Water Board staff assumes that continuous groundwater elevation monitoring with transducers will be done at PZ-05 until at least the third quarter of 2007 to better understand groundwater fluctuations in PZ-05 due to pumping. Please provide an update on the results of the continuous groundwater elevation monitoring in the next quarterly monitoring report.

The City of Morgan Hill's Tennant Well has been in continuous operation since November 2004. Therefore, Olin has not had the opportunity to observe groundwater elevation responses due to pumping of the Tennant Well. In the 3Q Monitoring Report, Olin states that results from continued monitoring of on-site wells will be evaluated with results from off-site wells to further assess influence by the resumed pumping at the Tennant Well. In our June 29, 2006 *SLIC: 425 Tennant Ave, Morgan Hill; Llagas Subbasin Characterization Report* letter we recommended that Olin evaluate whether it

is more beneficial (from a water quality perspective) to operate the Tennant Avenue well or to shut it down indefinitely. We also encouraged Olin to work closely with the City of Morgan Hill and the Water District on this issue.

By March 9, 2007, please provide an analysis of how the Tennant Well pumping affects perchlorate distribution and capture zones in the intermediate and deep aquifer zones. The analysis should evaluate if the Tennant Well is pulling the perchlorate plume downward, and to what extent the Tennant Well is providing hydraulic containment of the perchlorate plume in the intermediate and deep aquifer.

3. Interpretation of Groundwater Flow Directions

Evaluating groundwater flow directions in the Llagas Subbasin is complex because groundwater elevations and flow directions are influenced by pumping from agricultural, domestic, and municipal supply wells, heterogeneity of the subsurface, and the availability of usable data (e.g., appropriate screen intervals in different aquifer zones). Given these factors, interpretation of groundwater flow direction may vary. To better understand Olin's interpretation of groundwater flow directions, Olin is required to present the assumptions made when contouring the groundwater elevation data on figures or in tables for easy reference. For example, on Figure 3.3 of the 3Q Monitoring Report, the groundwater elevation for MP-04-038 and MW-09SA1 were not used to draw contours. A discussion on Figure 3.3 or in the tables should be provided to explain why the groundwater elevations for MP-04-038 and MW-09SA1 were not used.

In general, Central Coast Water Board staff's position remains that the groundwater flow direction in the shallow and intermediate aquifer is predominantly in a southwest to southeast direction. However, in the deep aquifer zone, there is a northerly component of flow in the area northeast of the Olin site.

4. Reporting and Illustrating Data

The 3Q Monitoring Report presents perchlorate concentration data in less detail than previous reports. To aid in our evaluation of the perchlorate results, Central Coast Water Board staff requires that tables and figures in all future reports submitted include the following:

- The method detection limit[1] (MDL) must be included with all perchlorate data presented (in both tables and figures). For example, if a sample is non-detect for perchlorate and the MDL is 1.4 µg/L, then the concentration must be reported as "ND (<1.4)".
- Perchlorate results between the MDL and practical quantitation limit[2] (PQL) must be reported as J-flagged[3] results. For example, if a perchlorate result is 2.6 µg/L and

[1] MDL is the minimum concentration of a substance that can be measured and reported with a 99 percent confidence that the analyte concentration is greater than zero and is determined from the analysis of a sample in a given matrix containing the analyte.
[2] PQL is the lowest concentration that can be reliably measured within specified limits of precision and accuracy for a specific laboratory analytical method during routine laboratory operating conditions in accordance with *Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods*, EPA Publication No. SW-846.

the PQL is 4.0 µg/L, then the perchlorate result is reported as "2.6 J" on both tables and figures.

Central Coast Water Board staff requires Olin to modify the way the perchlorate concentrations are contoured and presented on figures. We understand that the concentration contours shown on several figures of the 3Q Monitoring Report were generated using kriging functions within EVS-Pro. An illustration of the perchlorate distribution is accomplished by extracting a two-dimensional horizontal plane through each aquifer at specific depth intervals. Central Coast Water Board staff finds the contours helpful in visually interpreting the perchlorate data. However, we require that Olin contour the perchlorate data in each aquifer zone in such a manner that all the perchlorate concentration data collected within each representative aquifer zone is incorporated in the contours. For example, Figure E3.2d shows color-filled contours of perchlorate for the intermediate aquifer's mid-point. However, other perchlorate data in the intermediate aquifer zone (e.g., MW-53-195, 09S03E35D010, MP-52-175, San Pedro, MP-03-195) are not included in the contours. In general, Olin must utilize all available data when drawing concentration contours. If a given perchlorate concentration is not included in the contour for a reason then justification must be provided.

To aid in our visual interpretation of the perchlorate data, Olin must insert one figure in each groundwater monitoring report that shows a contoured plan view map of all the perchlorate concentration data from all the aquifer zones projected onto one two-dimensional horizontal plane. Olin must also include another contour interval from 2.0 to 4.0 µg/L to better illustrate all of the perchlorate data that is available. Additionally, Olin must include a figure at the end of each year (e.g., each first quarter groundwater monitoring report) that illustrates cumulative or means of perchlorate concentration data for each aquifer zone collected to date.

The following comments are specific to the 3Q Monitoring Report:

- On page 3-6, Section 3.2 Perchlorate Sampling, in this section a MDL of 2 µg/L is reported. We assume that the reporting limit was 2 µg/L and the MDL was 1.4 µg/L. Please clarify in the next quarterly monitoring report what the third quarter 2006 PQL and MDL for perchlorate were.
- On Figure 4.2, do the depths of the cone penetrometer testing (CPT) locations reflect depths of first encountered groundwater?
- Figure 4.2 does not provide J flag data; only ND < 4.0 data is reported instead of < MDL data. The MDL must be included with all perchlorate data presented (in both tables and figures) in future reports.
- Figure 4.2 does not provide on-site perchlorate data. Include on-site and off-site perchlorate data on figures in future reports.

[3] J-flag data is defined as an analyte concentration detected between the MDL and the PQL. In general, J-flag data represents an estimated concentration. Therefore, the numerical value associated with a J-flag is an approximate concentration of the analyte in the sample. The MDL is instrument-specific and is defined as the lowest concentration that a given instrument can record. In comparison, the PQL is method-specific and is the lowest concentration that can be measured with known accuracy by a given method. The MDL for perchlorate using United States Environmental Protection Agency (USEPA) Method 314.0 is typically 1.4 micrograms per liter (µg/L), and the PQL is usually 4.0 µg/L.

- Figure 4.2 shows a perchlorate result of 5.2 µg/L in the shallow aquifer at the CPT-OS-51-55 location east of the Olin site. There is no discussion in the text or the figure regarding the detection of perchlorate in the shallow aquifer. Provide an analysis of these results **by March 9, 2007**.
- A figure is not included for the deep aquifer following Figure 4.5. Provide an explanation as to why a figure of the deep aquifer zone was not included **by March 9, 2007**. Include a figure for the deep aquifer zone in all future reports, if applicable.
- The aquifer zone boundaries are missing on Figure 4.6. The lines differentiating shallow, intermediate and deep aquifer zones are helpful in evaluating the data on a cross-section. Also, include PZ-2 on the inset of Figure 4.6.
- Figure E3.3b shows intermediate aquifer wells on a deep aquifer zone figure.
- Include a table showing the wells with concentrations greater than the public health goal (PHG) in Area I, II, III, and IV in future groundwater monitoring reports (e.g., page 39 in the 2Q Monitoring Report).
- The on-site and off-site perchlorate results tables must include all of the historical perchlorate results for each well sampled. For example, tables 4 and 5 of the 2Q Monitoring Report provide all the analytical data for each well sampled compared to tables 3.4 and 3.5 in the 3Q Monitoring Report, which only provides the third quarter sampling results.
- Provide a discussion on why perchlorate concentrations in MW-06C went from less than the PQL to 44 µg/L during the third quarter monitoring event.

5. Southern Extent of the Perchlorate Plume

On page 36 of the 2Q Monitoring Report, Olin reports "Detections of perchlorate farther south were below the PHG, which support the current delineation of the southern extent of perchlorate." To clarify, Central Coast Water Board staff requires that the perchlorate plume be delineated to at least 4.0 µg/L. Central Coast Water Board staff recommends that Olin identify monitoring wells at the southern distal end of the plume for perchlorate sampling. Olin is required to show that the plume remains stable or shrinking and not expanding further southeast. Thus, it is important to confirm, with data, the full extent of the plume. Provide an analysis of the southern plume delineation and its stability **by March 9, 2007**.

6. Sampling and Validation Program

Olin's consultant collects groundwater samples from on-site and off-site monitoring wells in accordance with the February 11, 2003 *Sampling and Analysis Plan for the Olin/Standard Fusee Site*, the *Quality Assurance Project Plan*, and the *Healthy and Safety Plan*. Analytical results are validated in accordance with the procedures specified in Environmental Protection Agency (USEPA) Contractor Laboratory Program, National Functional Guidelines for Inorganic Data Review, and the quality control criteria specified in EPA Method 314.0 for perchlorate. Olin must update the February 2003 Sampling Plan. Central Coast Water Board staff intends to reference the updated sampling and analysis plan and quality assurance project plan, in the revised MRP for the Olin cleanup case.

The updated sampling and analysis plan and quality assurance project plan must include procedures for validating perchlorate results. Central Coast Water Board staff does not agree with Olin's use of the USEPA National Functional Guidelines for Inorganic Data Review to validate perchlorate results. The National Functional Guidelines for Inorganic Data Review is intended for inorganics analyzed by Inductively Coupled Plasma-Atomic Emission Spectroscopy. We understand that the National Functional Guidelines for Inorganic Data Review is one of the only guidance documents available for validating inorganic data, therefore, we recommend that Olin use the National Functional Guidelines for Inorganic Data Review and the quality assurance procedures provided in the perchlorate test method as a guide to develop a perchlorate specific data validation program for the Olin cleanup case.

The updated sampling and analysis plan and quality assurance project plan is due **no later than March 9, 2007**.

7. Perchlorate Concentration Trend Analysis

To evaluate perchlorate concentrations for long-term trends, Olin statistically evaluates analytical data from wells sampled least four times, with at least half of the results indicating perchlorate concentrations greater than 4.0 µg/L. Typically, the long-term trends represent perchlorate results from wells that have been sampled since 2003 (three years of data). There appears to have been an increase in perchlorate concentration in the last year. To evaluate if there is a difference in the long-term trend (past three years) versus a short-term trend (first quarter 2006 to present), Olin must include an analysis comparing long-term perchlorate concentration trends versus short-term perchlorate concentration trends by **March 9, 2007**.

8. Quality Control/Quality Assurance of Perchlorate Results

On page 3-10 of the 3Q Monitoring Report, Olin discusses the data validation and precision assessment for the data collected in the third quarter of 2006. The relative percent difference (RPD) for duplicate field samples ranged from 0 to 29 percent, with an overall average of 9.4 percent. Olin indicates that these results indicate high precision for each of the analytical results. However, as stated in Section 9.4.2.2 of EPA Method 314.0, *"Duplicate analysis may exhibit a matrix dependence. If the RPD for the duplicate measurements of perchlorate falls outside ± 15% and if all other QC performance criteria are met, laboratory precision is out of control for the sample and perhaps the analytical batch. The result for the sample and duplicate should be labeled as suspect/matrix to inform the data user that the result is suspect due to a potential matrix effect, which led to poor precision. This should not be a chronic problem and if it frequently recurs (>20% of duplicate analyses), it indicates a problem with the instrument or individual technique that must be corrected".* Some of the duplicates analyzed by the laboratory exceeded a RPD of 15 percent. In all future quarterly monitoring reports a more detailed discussion on sample results that are outside the control limits set in the test method is required. Provide an explanation in the next

quarterly monitoring report detailing why the precision was considered high in the 3Q Monitoring Report for duplicate sampling when the RPD values ranged outside the control limits. Olin is required to evaluate how sample results with quality control parameters outside of the control limits that are still validated as usable may be biased low. For example, if the RPD for a duplicate sample is 29 percent and the sample result for the duplicate sample is 5.5 µg/L, what could the concentration range of the actual result be? We are particularly interested in an evaluation of sample results outside control limits that have a sample result close to the PHG.

We recommend that Olin reevaluate the dissolved oxygen data presented in Table A5 of the 3Q Monitoring Report. The ORP values indicate low oxygen conditions, but the dissolved oxygen results indicate aerobic conditions.

In the 2Q Monitoring Report, perchlorate was detected at 2.7 µg/L in well 10S04E32E003. Well 10S04E32E003 is located upgradient from the Gilroy municipal supply well field. This well was not sampled during the third quarter of 2006 to confirm if perchlorate concentrations have changed or continue to be detected in this well. Olin must sample well 10S04E32E003 quarterly to evaluate any concentration trends. Future quarterly monitoring reports must include a discussion concerning any changes in perchlorate concentration over time.

9. Post Replacement Water Termination Monitoring

During the second quarter of 2006, Olin requested revisions of sampling frequencies for numerous domestic supply wells in accordance with CAO No. R3-2004-0101, revised by State Water Board Order WQ 2005-0007 and our letter dated October 6, 2006 *SLIC: 425 Tennant Ave, Morgan Hill; Termination of Replacement Water and Post Monitoring Requirements*. Central Coast Water Board staff responded to Olin's request for revised sampling frequencies in our December 8, 2006 *SLIC: 425 Tennant Avenue, Morgan Hill; Replacement Water Monitoring Response Letter.*

10. Database and Numerical Models

Olin indicates that the GeoSoft OASIS Montaj, Version 6.0 software is used to create regional groundwater potentiometric contour maps of the shallow, intermediate, and deep aquifers. Please provide the Central Coast Water Board with a copy of the modeling software, electronic input data files, assumptions used, model calibration information and all other data or information used to effectively run the model.

Perchlorate concentration contours were generated from a three-dimensional model of the plume that has been constructed using kriging functions within EVS-Pro. Olin must provide four-dimensional interactive model (4DIM) files created in EVS-Pro and a copy of a licensed 4DIM Player.

The GeoSoft files and software and 4DIM files and player are due **no later than March 9, 2007**.

Olin recently provided Central Coast Water Board staff with a Microsoft Access 2003 database file that includes all perchlorate results for on-site and off-site wells sampled to date. The database has provided an efficient and effective means for reviewing perchlorate groundwater results and a great reference tool to provide the public with timely answers to questions specific to their well. Olin is required to include a database update in each future quarterly monitoring report to aid in our review of the analytical data. Additionally, we require that Olin provide all available inorganic data for all on-site and off-site wells in a separate Access 2003 database table.

The update to the Access database file for perchlorate is required in all future monitoring reports and the inorganic database is required **no later than March 9, 2007**.

11. Northeast Assessment

Groundwater elevation monitoring in the MP/PZ wells located northeast of the Olin site continue to show a southeasterly direction of flow in the shallow and intermediate aquifers. Groundwater elevations in the deep aquifer show significant influence from municipal well operation and a northerly component of groundwater flow continues to exist in the deep aquifer.

With the exception of CPT-OS-51-55, perchlorate was not detected in the shallow aquifer during the third quarter of 2006. In the intermediate aquifer, perchlorate was detected up to 45 µg/L in CPT-OS-21-90 and perchlorate was detected up to 4.0 µg/L in wells screened in the intermediate aquifer. In the deep aquifer zone, perchlorate was detected up to 6.0 µg/L. Olin continues to delineate the perchlorate detections in the intermediate aquifer using CPT and the deep aquifer zone by installing depth-discrete multi-level wells. A new multi-level well, MP/PZ-05, has been installed east of PZ-04 along the north side of Tennant Avenue. We understand that construction of MP/PZ-05 is similar to the other MP/PZ wells in the area northeast of the Olin site and will be sampled quarterly for a minimum of one year.

We appreciate Olin's continued proactive approach investigating the perchlorate detections in the area immediately east of the Olin site and north of Tennant Avenue. On December 21, 2006, Central Coast Water Board staff issued CAO Order No. R3-2006-0112, which clarifies Olin's responsibility to investigate perchlorate in groundwater east and northeast of the Olin site. The amendment is necessary to ensure that CAO Order No. R3-2005-0014 is consistent with the recent groundwater data, and to clarify that Olin is required to fully characterize the lateral and vertical extent and degree of groundwater pollution that originates from the Olin site. It continues to be Central Coast Water Board staff's position that site characterization activities are an ongoing process and that characterization activities will be evaluated continuously and modified based on investigation findings, site-specific conditions, and other pertinent factors.

Based on the perchlorate concentrations detected in the deep aquifer during the third quarter of 2006, Olin must conduct additional delineation of perchlorate concentrations

in the deep aquifer. Further details on these requirements are provided in our comments to the East of Site Report.

12. Other Potential Sources

Central Coast Water Board staff has concluded its investigation at a mushroom farm located north of the City of Morgan Hill's Nordstrom Well. In March 2006, perchlorate was detected in the mushroom farm's surface wastewater pond at 17 µg/L. The mushroom farm owner was required to collect a first encountered groundwater sample to evaluate if perchlorate impacts had reached underlying groundwater. The results of the investigation indicate that no perchlorate was detected above the MDL of 1.3 µg/L in groundwater beneath the wastewater pond that had been identified to contain perchlorate in March 2006. 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 it is confirmed with data, we must assume that it is plausible that the source(s) of perchlorate detections in this area includes the Olin site as well as any of the other identified potential sources.

13. Comments from the City of Morgan Hill and the Water District

Central Coast Water Board staff requests a response from Olin regarding the following specific comments from WorleyParsons Komex and the Water District:

- Detailed comment number six from the WorleyParsons Komex's November 22, 2006 *Review of Olin Third Quarter 2006 Groundwater Monitoring Report*. WorleyParsons Komex calculated theoretical responses to pumping using the Theis solution. Based on this calculation, the large-scale hydraulic conductivity for the deep aquifer appears to be significantly higher than estimated by Olin.
- Comment number 3 from the Water District's December 5, 2006 *Santa Clara Valley Water District Comments on Olin Third Quarter 2006 Monitoring Report*. Olin's working hypothesis for detection of perchlorate in the intermediate aquifer east of the Madrone Channel ponds is due to other sources of perchlorate. However, Central Coast Water Board staff requests a discussion on past flow regimes and other hydraulic influences that may have caused perchlorate migration in the intermediate aquifer and resulted in the observed perchlorate concentrations.
- Comment number 10 from the *Water District's December 5, 2006 Santa Clara Valley Water District Comments on Olin Third Quarter 2006 Monitoring Report*. Has Olin evaluated whether a pump test at the Tennant Well would provide valuable information?

Responses to the above comments are requested **by March 9, 2007**.

14. City of Morgan Hill Municipal Supply Well Perchlorate Results

On December 21, 2006, the City of Morgan Hill provided Central Coast Water Board staff with perchlorate results for all municipal supply wells reported to the MDL. The

estimated perchlorate results are attached for your information. Provided the estimated perchlorate results are available, Central Coast Water Board staff requests that Olin include these data on figures in future groundwater monitoring reports to aid in our evaluation of the perchlorate data. We will encourage the City of Morgan Hill to share these data with Olin in a timely manner to provide a more complete picture on the perchlorate distribution in the area northeast of the Olin site.

3Q ON-SITE REMEDIATION PERFORMANCE MONITORING

The 3Q On-Site Remediation Report has a different format from previous reports. We appreciate Olin's efforts in providing a more concise means for presenting all of the information collected. We generally agree with the new report format, however, we find that a discussion on the operations and maintenance of the extraction and on-site recharge system and hydraulic containment is beneficial. Therefore, we require that future reports include a summary of the operations and maintenance of extraction and on-site recharge systems (similar to Section 2.3 of the 2Q Remediation Report) and a summary of the performance monitoring of the extraction system (similar to Section 2.4 of the 2Q Remediation Report). The summary should focus on estimating the area of hydraulic containment by means of measuring hydraulic response in performance monitoring wells and simulating hydraulic containment by means of a numerical groundwater flow model calibrated to current site conditions. Additionally, a maintenance and modification section should be added to the Groundwater Extraction System Summary, the Ion Exchange System Summary, and the On-Site Recharge System Summary of the report.

The on-site remediation performance monitoring reports must include a discussion concerning the extraction system's overall effectiveness and need for additional extraction and/or injection wells within existing extraction zones including the need for the installation of extraction wells within the deeper aquifer zone. All future reports must include a running total of perchlorate mass removed.

The following comments are specific to the 3Q On-Site Remediation Report:

- Perchlorate results must be reported to the MDL.
- A numerical groundwater flow model is used to simulate groundwater flow conditions near the Olin site. Mactec updated the model to include pumping from the nearby Tennant Well and recharge of the treated groundwater via the on-site injection wells. In addition to utilizing the numerical model to evaluate ambient flow directions in response to varying gradients, the model is also used to simulate hydraulic capture by the extraction system. Three dimensional groundwater pathline analysis confirms that on-site groundwater flow within the shallow A-zone and intermediate B1-aquifer zone is toward the groundwater capture and perchlorate removal system extraction wells. Performance of these wells has been enhanced with the installation of three injection wells along the northern boundary of the Olin site. Extraction and injection wells are explicitly simulated in the model as illustrated with backward and forward transient particle pathlines, respectively. By **March 9, 2007**, provide the Central Coast Water Board with a copy of the modeling software, electronic input data files,

assumptions used, model calibration information and all other data or information used to evaluate the particle pathlines and groundwater flow conditions that are modeled.

- Olin predicts that there is complete hydraulic capture of on-site perchlorate in groundwater for the A and B1 aquifer zones. By **March 9, 2007**, Olin must provide the results of an evaluation that provides assurance that there is sufficient field data to support the prediction that there is complete on-site hydraulic capture in the A and B1 aquifer zone in all directions.
- During the second quarter of 2006, the difference between the extraction and injection totals (approximately 400,000 gallons) resulted from the water application to the in-situ bioremediation infiltration unit. During the third quarter of 2006, Olin reports that approximately 15,746,000 gallons of groundwater was extracted and 15,877,200 gallons of water was re-injected through the on-site recharge system. In the next quarterly remediation performance report, Olin must provide an explanation for the extra 130,000 gallons of water that was injected during the third quarter of 2006. Additionally, Olin must provide an explanation for any extraction and injection total discrepancies in all future remediation performance reports.

EAST OF SITE REPORT

The East of Site Report provides information on the distribution of perchlorate east of the Olin site in the shallow and intermediate aquifer zones, as well as its presence in units within interlaying aquitards. Mactec collected direct-push grab groundwater samples in September/October 2005 and June/July 2006.

1. Further Delineation in the Shallow and Intermediate Aquifer

Based on the perchlorate results collected, Central Coast Water Board staff concurs with Olin's proposal to install additional borings as shown on Figure 4-1, to further characterize perchlorate in the B1 and B2 zones of the intermediate aquifer. In addition to collecting additional groundwater samples in the B1 and B2 zones of the intermediate aquifer, Olin must collect shallow grab groundwater samples at the CPT-75 and CPT-76 locations to delineate the detection of perchlorate previously detected at CPT-OS-51. Central Coast Water Board staff also concurs with Olin's proposal to collect additional pore water samples from within the A/B1 aquitard east and south of the Olin site. Olin is reminded that all perchlorate results must be reported to the MDL.

2. Further Delineation of Perchlorate in the Deep Aquifer

Delineation of perchlorate farther east and north of the Olin site is required in the deep aquifer. Based on the 3Q Monitoring Report, Olin reports perchlorate concentrations above the PQL in the deep aquifer at MP-01-262, PZ-02-315, PZ-02-415, PZ-03-427, MP-04-273, and PZ-04-335. A new multi-level depth-discrete monitoring well (MP/PZ-05) was recently installed south of MP/PZ-02 and east of the Olin site. Therefore, MP/PZ-05 provides further delineation east of MP/PZ-02. Further delineation in the deep aquifer is also required northeast of the site. Considering that perchlorate has

been detected at 6.0 µg/L at PZ-03-427, and there appears to be an increasing trend in perchlorate concentrations at this location, Olin is required to install proposed monitoring well PZ-06. Based on the perchlorate results from groundwater collected from PZ-06 and continued monitoring of PZ-03, an additional well north of PZ-03 may be required in the near future. By **March 9, 2007**, Olin must provide a workplan that details well construction and installation schedules for the proposed PZ-06 well. We concur with the proposed location of PZ-06 as it is shown on Figure 3-5 in the East of Site Report. In the workplan, Olin must include details on its plans for delineation of perchlorate north and west of the Olin site.

3. Comments by City of Morgan Hill

On October 20, 2006, WorleyParsons Komex provided comments on the East of Site Report. The comments provided by WorleyParsons Komex *Review of Olin East of Site Characterization Report* are attached for your information.

CONCLUSIONS

Central Coast Water Board staff comments included herein require several specific responses. Requirements for technical reports, sampling and analysis and quality assurance plans, and work plans, and request for information are made pursuant to Section 13267 of the California Water Code. Pursuant to Section 13268 of the Water Code, a violation of a request made pursuant to Water Code Section 13267 may subject you to civil liability of up to $1,000 per day for each day in which the violation occurs.

The Central Coast Water Board needs the required information in order to ensure that perchlorate concentrations are fully characterized and monitored. You are required to submit this information because available data indicates that the Olin site is a source of perchlorate. More detailed information is available in the Regional Board's public file on this matter.

Any person affected by this action of the Central Coast Water Board may petition the State Water Resources Control Board (State Water Board) to review the action in accordance with Section 13320 of the California Water Code and Title 23, California Code of Regulations, Section 2050. The petition must be received by the State Water Board, Office of Chief Counsel, P. O. Box 100 Sacramento, 95812 within 30 days of the date of this order. Copies of the law and regulations applicable to filing petitions will be provided upon request.

We look forward to reviewing the 2007 Llagas Subbasin Characterization Report. We anticipate that a majority of the required information outlined in this letter will be addressed in the Characterization Report update or the next quarterly groundwater monitoring report. We appreciate your continued cooperation and proactive approach to conduct the monitoring and characterization activities. We look forward to successful completion of all remaining characterization tasks and to proceed with cleanup. If you

have any questions, please contact **Hector Hernandez at: (805) 542-4641** or via e-mail at: Hhernandez@waterboards.ca.gov, or Eric Gobler at (805) 549-3467.

Sincerely,

for Roger W. Briggs
Executive Officer

S:\SLIC\Regulated Sites\Santa Clara Co\OLIN Corp\Water Board\Groundwater Monitoring Reports\2006\Comments_3Q2006_Mon_Rpt.DOC

Attachments:

Santa Clara Valley Water District, December 5, 2006, *Santa Clara Valley Water District Comments on Olin Third Quarter 2006 Monitoring Report.*
WorleyParsons Komex, August 14, 2006, *Review of Olin Second Quarter 2006 Groundwater Monitoring Report*
WorleyParsons Komex, November 22, 2006, *Review of Olin Third Quarter 2006 Groundwater Monitoring Report*
WorleyParsons Komex, October 20, 2006, *Review of Olin East of Site Characterization Report*
WorleyParsons Komex, December 21, 2006, *City of Morgan Hill Historic J-Flag Data*

cc via e-mail:
Ms. Lori Okun
Office of the Chief Counsel
State Water Resources Control Board

Olin Technical Contacts IPL

cc via U.S. Mail:

Olin Correspondence IPL