California Regional Water Quality Control Board
Central Coast Region

Alan C. Lloyd, PhD.
Secretary for Environmental Protection

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Arnold Schwarzenegger
Governor

August 31, 2005

Mr. Richard W. McClure
Olin Corporation
Environmental Remediation Group
PO Box 248
Charleston, TN 37310-0248

Dear Mr. McClure:

SLIC: SECOND QUARTER 2005 GROUNDWATER MONITORING REPORT, 425 TENNANT AVENUE SITE, MORGAN HILL, SANTA CLARA COUNTY

Regional Water Board (Water Board) staff has reviewed Olin's *Second Quarter 2005 Groundwater Monitoring Report* (Report). The report was submitted on August 1, 2005, and represents Olin's activities to comply with Revised Monitoring and Reporting Program No. 2001-161 (MRP No. 01-161). Revised Monitoring and Reporting Program No. 01-161 requires on and offsite perchlorate monitoring and establishes reporting dates. Overall, the report quality is satisfactory and generally complies with Revised MRP No. 01-161 requirements. The following comments should be carefully reviewed and responded to as described at the end of this letter:

1. The first bullet, page vi, states, "*...Groundwater elevations in the upper intermediate (B1), middle intermediate (B2), lower intermediate (B3), and deep (C) aquifer zones decreased throughout April, May, and June 2005, in response to* <u>*decreased*</u> *[emphasis added] offsite water production demand.*" The word decreased is underlined since Water Board staff believes "decreased" should read "increased". Later the report states, "*Elevation changes in the B3 aquifer zone have since dropped 4 to 20 feet in response to the increase in offsite water supply production well demand.*" Water Board staff believes this word has be erroneously transposed since groundwater elevations, depending on the season, usually drop in response to increased offsite pumping.

2. The second bullet, page vi, states, "*Three-dimensional groundwater pathline analysis confirms that onsite groundwater flow within the shallow A-zone and upper intermediate B1-aquifer zone is toward the groundwater capture and perchlorate removal system extraction wells.*" Water Board staff has looked at Appendix C, Three-Dimensional Groundwater Pathline Model, and Figures 11a and 12a, Numerical Model Simulation of Estimated Groundwater Capture, A and B zones, February 2004 through June 30, 2005. Figure 11a represents approximated flow conditions for A-zone groundwater. On the left

side of Figure 11a, groundwater particles are shown to cross each other. It is our understanding that the projected groundwater flow paths should not cross. It appears that the groundwater capture from each well was analyzed individually and then combined on Figure 11a. Olin shall clarify why path lines for well EW-001A cross path lines for well EW-002A and why, individual path lines for well EW-002A appear to cross each other.

3. Clarify why plan view illustrations of groundwater pathline were not included for the C1 and C3 zones. Plan view illustrations were included for the B2, B3 and C2 aquifer zones as shown on Figure 13.

4. The last paragraph, page viii, states, "*...Beginning with the Third Quarter 2005 sampling event, onsite groundwater quality will be evaluated by samples collected from the monitoring wells discussed in the First Quarter 2004 report (MACTEC, 2004b). Groundwater elevations will continue to be monitored at all onsite monitoring wells.*" Water Board staff has reviewed the proposed changes to the onsite monitoring well network contained in the First Quarter 2004 report. Olin is requesting permission to stop sampling seven onsite wells based on proximity to other monitoring wells, detections of perchlorate, or overall screen length. Water Board staff revises MRP No. 2001-161 as follows:

Table 1
Approved Changes to Revised MRP No. 2001-161

WELL	AQUIFER ZONE	CHANGE	COMMENTS*
MW-02	AQUIFER A	NO	GCTS Data is a mixture of surrounding groundwater (including downgradient) and MW-02 is representative of upgradient, onsite A-zone groundwater and has a long historical data set.
MW-11SA1	AQUIFER A	YES	Groundwater Elevation Monitoring Only
MW-10SA1	AQUIFER A	YES	Sample Annually – Alternate sampling between periods of high and low groundwater. This well has had a recent trace detection of perchlorate, reported near recorded high groundwater elevations. Water Board staff will reconsider reducing the monitoring frequency once additional data is collected.
MW-11SA2	INTERMEDIAT B1	YES	Sample Annually – Alternate sampling between periods of high and low groundwater. This well has had a recent detection of perchlorate at 4.0 μg/L, reported near recorded high groundwater elevations. Water Board staff will reconsider reducing the monitoring frequency once additional data is collected.
MW-07SA3	INTERMEDIATE B2	YES	Sample Annually – Alternate sampling between periods of high and low groundwater. This well has had a recent trace detection of perchlorate at 3.1 μg/L, reported near recorded high groundwater elevations. Water Board staff will reconsider reducing the monitoring frequency once additional data is collected.

WELL	AQUIFER ZONE	CHANGE	COMMENTS*
MW-07SA4	INTERMEDIATE B3	YES	Sample Annually – Alternate sampling between periods of high and low groundwater. This well has had a recent trace detection of perchlorate at 3.8 µg/L, reported near recorded high groundwater elevations. Water Board staff will reconsider reducing the monitoring frequency once additional data is collected.
OW-01C	DEEP AQUIFER C	YES	Sample Annually – Alternate sampling between periods of high and low groundwater. This well had a 4.2 µg/L detection of perchlorate in October 2004, reported near low groundwater elevations. Water Board staff will reconsider reducing the monitoring frequency once additional data is collected.

*Olin shall continue to monitor groundwater elevations in all wells.

The Table 1 changes have been incorporated into the attached MRP.

Section 2.1 Subbasin Lithology

According to Santa Clara Valley Water District (Water District) staff, MACTEC has incorrectly Referenced Seena Hoose's work (page 4, second paragraph). The report states, "*The lacustrine clays are present at depths below approximately 165 feet from below San Martin Avenue and continue southward (DWR, 1981; Jenkins,1973; Hoose, 1985).*" The Water District contends that Ms. Hoose's thesis concludes that there was no large Pleistocene lake as proposed by Jenkins. This contradicts MACTEC's summary. Water Board staff request that you review Ms. Hoose's work to check your report's accuracy.

Section 4.0 Evaluation of Monitoring Results

Section 4 provides an evaluation of onsite and offsite monitoring results, including groundwater elevation data. The Report does not include data from the northeast perchlorate investigation area. As a reminder, our February 19, 2004 Groundwater Flow Assessment Workplan approval letter requires investigation and data reporting in your quarterly groundwater monitoring reports. Since the offsite piezometers and private wells were installed and sampled later than Olin planned, the Report did not include northeast perchlorate data. However, the third quarter report is due October 31, 2005, and should include data collected to that date. The data shall include: regional and aquifer zone specific groundwater contour maps, raw groundwater elevation, and other pertinent data. Reporting requirements are contained in our February 19, 2004 northeast perchlorate letter.

Section 4.3 Perchlorate in Offsite Groundwater

Figures 7 and A1 show areal distributed perchlorate concentrations. The shaded areas represent analytical results from the second quarter 2005 and the most recent well result. According to the Report, data interpolation was accomplished using a three-dimensional analysis kriging method. The analysis included data from wells with construction data. Olin included the Second Quarter 2005 well sample results on Figure 7. Water Board staff believes Figure 7 and A1 are useful in determining the plume's general regional location and areal extent; however, the figures contain

discrepancies. A data review of wells that are within two miles of the site indicate that perchlorate concentrations have been above 6 parts per billion. However, Figure 7 indicates that the plume is between 4 and 6 ppb as denoted by green shading. The data actually indicates that the shading should be different from the 6 ppb yellow shade, since concentrations are above 6 ppb. Future figures shall include different shading for concentration above 6 ppb. Water Board staff notes that the plume takes a sharp eastern turn at Church Avenue and a lack of shading in other areas that give the plume a broken up appearance.

Water Board staff understands that the data used to generate the shaded areas on Figure 17 and A1 are limited to wells with screen information and perchlorate results. We believe the aforementioned observations speak to the importance of depth discrete monitoring wells in determining the horizontal and vertical plume extents. We look forward to receiving future figures with depth discrete data so that a more accurate picture of the plumes areal extent can be determined. It may be useful to analyze all of the data, regardless of whether a well log is available. Including all of the data may be helpful in describing regional plume extents until depth discrete data is available. Additionally, the analysis of all of the data may more accurately reflect concentration trends closer to the site where higher concentrations are known to occur.

Tables

Tables 4, 5, and 6 summarize perchlorate concentrations for onsite, offsite and additional offsite wells, respectively. The tables do not include "J" flag values (trace concentrations) for wells, rather lists them as non-detect at 4 ppb with a "J" validation qualifier. Laboratory data sheets indicate that numerous results from this and previous monitoring events have been reported as trace. Approximately 19 onsite wells had trace results during the second quarter 2005. While trace results cannot be quantified, because trace results are less than the practical quantitation limit, trace results are helpful for tracking perchlorate movement. Olin shall denote trace concentrations on tables 4, 5, and 6. In addition, Olin shall amend Tables 4, 5, and 6 to include previous quarters trace results. The data tables shall be modified as follows:

Table 4. Onsite Perchlorate Results
Second Quarter 2005 Groundwater Monitoring Report
Olin/Standard Fusee Site, Morgan Hill, California

Well	Sample Type	Sample Date	Perchlorate Concentration (µg/L)	Validation Qualifier	**Trace Result [if applicable] (µg/L)**
MW- 11SA3		06-Apr-05	nd(4.0)	J	3.9

Figures

Figure 2 depicts regional groundwater flow in the Llagas Subbasin and begins approximately one mile south near Maple Avenue. In recent discussions, Olin has mentioned that several wells to the site's northeast have sounding ports and may be useful for groundwater elevation monitoring. We require that Olin include the northeast area wells, where appropriate, on Figure 2. This additional data will aid in Olin's analysis of regional groundwater flow from just north

of the site to just past the City of Gilroy. Additionally, Olin shall include well number designations next to each well shown on your intermediate zone regional groundwater elevation figure.

Figures 15, 16, and 17 chart perchlorate concentration history for onsite wells versus precipitation. The results and trends for wells with lower concentrations are impossible to determine from Figures 15,16, and 17. Olin's future reports shall separate wells with lower perchlorate concentrations from wells with higher concentrations that are currently shown together on Figures 15, 16, and 17. Separating the low and high concentrations will allow Water Board staff to better analyze Olin's data.

Appendix D contains updated hydrogeologic cross-sections generated from wells throughout the Llagas Subbasin. Water Board staff appreciates the work MACTEC has done to update improve the geologic sections. The updated sections include additional lithologic units, depict proposed wells, and update the interpretation of the intermediate zone lithology and perchlorate results. Water Board staff notes that cross sections B – B' through F – F' now cross-section A - A' at wells rather then arbitrary points. Olin shall update geologic sections as southern well installation and hydrogeologic characterization proceeds.

Additional Comments on Appendix D figures:

5. In order for Water Board staff to evaluate the possible cross-connection between aquifer zones, Olin shall include supply well filter pack intervals on updated geologic sections.
6. Olin shall include additional geologic cross-sections that depict conditions closer to the site. New wells MW-16 and 17 may be useful to generate these sections since depth discrete lithologic data will be collected during well construction. The higher concentration perchlorate plume in this area is likely to be the focus of your remediation efforts and will require additional characterization.
7. The geologic cross-sections show several locations were the shallow and intermediate aquifers are not separated by lower permeability lithology. Those areas shall be queried when approximated or noted on each section.
8. Additional effort is needed to refine geologic cross-section inconsistencies. For example, sections D-D' and A-A' intersect at well 10S4E18B017, yet the green symbol for gravel with clay is absent in D-D'. Similar inconsistencies are seen in well 9S03E34R017. Well 9S03E34R017 is shown on A-A' and B-B'. On A-A' the clay with sand and or gravel is depicted as intermediate aquifer but in B-B' it is not. These are minor deficiencies that we anticipate will show up occasionally, since the investigation area is quite large.
9. As previously discussed with Olin, the original well driller's logs limit the precision and accuracy of the geologic cross-sections. It appears that most of the logs lack detail and are over simplified. This problem appears to exist based on the vertically long sequences seen in some logs. For example, well logs 09S003E34R017 and 09S03E35M001 in B-B' and 10S04E18B017 in A-A' are not as detailed as other nearby logs. As Llagas Subbasin Characterization progresses, Olin shall develop a method to assess driller log validity and to assist interpretation between logs. During our last phone conversation, you mentioned that Olin is working with Lawrence Livermore National Labs to refine the geologic cross-

sections. As the sections are better defined, Olin shall include a discussion of the methodology used to improve geologic cross-section interpretation.

Figures 4 and 6 show well location and current groundwater perchlorate concentrations. Please include extraction well locations on Figures 4 and 6 and the corresponding concentration perchlorate concentrations data.

Pursuant to Section 13267 of the California Water Code, Olin Corporation is required to provide responses to our comments by September 30, 2005. Failure to submit adequate or complete information may subject you to a Water Board enforcement action. The Water Board requires Olin Corporation to submit its response in accordance with Section 13267 of the Water Code to determine the concentrations and movement of the perchlorate plume near the Olin site. We require Olin Corporation to submit the information as the current and former owner of the property, and as one of the previous operators of a flare manufacturing facility that caused soil and groundwater perchlorate contamination at and near the Olin site at 425 Tennant Avenue, Morgan Hill.

Any person affected by this action of the 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 State Water Board must receive the petition within 30 days of the date of this order. Copies of the law and regulations applicable to filing petitions will be provided upon request.

If you have any questions, please contact **David Athey at (805) 542-4644** or Eric Gobler at (805) 549-3467.

Sincerely,

Michael Ramos

for Roger W. Briggs
Executive Officer

Attachments: Revised Monitoring and Reporting Program No. 0161

cc via E-mail:

Ms. Lori Okun
Office of the Chief Counsel
State Water Resources Control Board

Olin Interested Party List

cc via U.S. Mail:

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

MONITORING AND REPORTING PROGRAM NO. 2001-161
(Revised August 31, 2005)
FOR
OLIN CORPORATION
425 TENNANT AVENUE, MORGAN HILL
SANTA CLARA COUNTY

GROUNDWATER MONITORING

Prior to sampling, groundwater elevations and depth to groundwater shall be measured. Wells shall then be purged until pH, temperature, dissolved oxygen (DO), oxidation reduction potential, and electrical conductivity reach a steady state and a minimum of three casing volumes have been removed. Alternative well purging techniques, with technical justification demonstrating equivalency, may also be used. Once recovered, wells shall be sampled and analyzed in accordance with Table 1 below.

TABLE 1
SAMPLING REQUIREMENTS

WELL NO.	CONSTITUENT	UNIT	FREQUENCY
Onsite monitoring wells MW-1 through MW-3 and MW-SW-004 through MW-SW-011, Morgan Hill Tennant Avenue Municipal Well, newly installed monitoring wells, offsite wells 1 through 42[1] (see Table 2), and all offsite[2] domestic or agricultural or municipal wells with previous detections between 2 µg/l and 4 µg/l[3].	Depth to ground water[4] Ground water elevation[4] Perchlorate (Use EPA Method 314)	Feet Feet µg/l	Quarterly in Mar., Jun., Sep., & Dec Quarterly in Mar., Jun., Sep., & Dec Quarterly in Mar., Jun., Sep., & Dec

[1] Wells with similar location, screen interval, and flow rate may be substituted for wells that are not available for monitoring with the concurrence of the Executive Officer of the Regional Board.
[2] Monitoring of perchlorate in offsite wells may be discontinued in wells where perchlorate concentrations do not exceed 4 µg/L for four consecutive quarters.
[3] Monitoring is required as additional wells with perchlorate detections between 2 µg/l and 4 µg/l are identified. The Executive Officer may require sampling of additional wells to assess the variability of perchlorate over time, concentration trends, and lateral and vertical plume migration. If the vertical

distribution of perchlorate cannot be determined with the existing network of monitoring wells, multiple screened monitoring wells may be needed.

[4] Required for all monitoring wells and for those domestic and agricultural wells with wellhead access for measuring water levels.

TABLE 2

45 Representative MRP Wells	09S03E26L004, 09S03E34E005, 09S03E35N013, 10S03E01E007, 10S03E03C009, 10S03E12G012, 10S03E14B006, 10S04E07N005, 10S04E18J011, 10S04E20M002, 10S04E30R002, 10S04E32E007,	09S03E26R007, 09S03E34P001, 09S03E36E007, 10S03E02C005, 10S03E11E007, 10S03E12M009, 10S03E24H004, 10S04E07R009, 10S04E19D015, 10S04E29C001, 10S04E32E004,	09S03E34B005, 09S03E35E006, 09S03E36P003, 10S03E02G002, 10S03E11G001, 10S03E13D001, 10S04E06L008, 10S04E17F011, 10S04E19F008, 10S04E29P002, 10S04E32E005,	09S03E34C002, 09S03E35G005, 10S03E01A011, 10S03E02K001, 10S03E12C004, 10S03E13K005, 10S04E07E035, 10S04E17N012, 10S04E20L007, 10S04E30C005, 10S04E32E006,

TABLE 3

8-31-05 AMMENDED SAMPLING REQUIREMENTS

WELL	AQUIFER ZONE	CHANGE	COMMENTS
MW-02	AQUIFER A	NO	GCTS Data is a mixture of surrounding groundwater (including downgradient) and MW-02 is representative of upgradient, onsite A-zone groundwater and has a long historical data set. Groundwater elevations shall be monitored quarterly.
MW-11SA1	AQUIFER A	YES	Groundwater elevations shall be monitored quarterly.
MW-10SA1	AQUIFER A	YES	Sample Annually – Alternate sampling between periods of high and low groundwater. This well has had a recent trace detection of perchlorate, reported near recorded high groundwater elevations. Water Board staff will reconsider reducing the monitoring frequency once additional data is collected. Groundwater elevations shall be monitored quarterly.
MW-11SA2	INTERMEDIAT B1	YES	Sample Annually – Alternate sampling between periods of high and low groundwater. This well has had a recent detection of perchlorate at 4.0 µg/L, reported near recorded high groundwater elevations. Water Board staff will reconsider reducing the monitoring frequency once additional data is collected. Groundwater elevations shall be monitored quarterly.
MW-07SA3	INTERMEDIATE B2	YES	Sample Annually – Alternate sampling between periods of high and low groundwater. This well has had a recent trace detection of perchlorate at 3.1 µg/L, reported near recorded high groundwater elevations. Water Board staff will reconsider reducing the monitoring frequency once additional data is collected. Groundwater elevations shall be monitored quarterly.

WELL	AQUIFER ZONE	CHANGE	COMMENTS
MW-07SA4	INTERMEDIATE B3	YES	Sample Annually – Alternate sampling between periods of high and low groundwater. This well has had a recent trace detection of perchlorate at 3.8 µg/L, reported near recorded high groundwater elevations. Water Board staff will reconsider reducing the monitoring frequency once additional data is collected. Groundwater elevations shall be monitored quarterly.
OW-01C	DEEP AQUIFER C	YES	Sample Annually – Alternate sampling between periods of high and low groundwater. This well had a 4.2 µg/L detection of perchlorate in October 2004, reported near low groundwater elevations. Water Board staff will reconsider reducing the monitoring frequency once additional data is collected. Groundwater elevations shall be monitored quarterly.

SOIL REMEDIATION MONITORING

Groundwater, vadose zone and soil monitoring locations shall be monitored as outlined in Table 2 as follows:

TABLE 4

MONITORING TYPE	LOCATION	CONSTITUENT	FREQUENCY
Soil Moisture Probes/ Lysimeters	LM-001	Electron Donor, Perchlorate, Bromide	Lysimeters: Monthly during startup/Quarterly thereafter Moisture Probes: Daily, Downloaded Monthly
	LM-002		
	LM-003		
	LM-004		
	LM-005		
	LM-006		
	LM-007		
	LM-008		
	LM-009		
	LM-010		
	LM-011		
	LM-012		
	LM-013		
	LM-014		
	LM-015		
Groundwater Wells	MW-015	Electron Donor, Perchlorate, Bromide, Anions, Dissolved Iron,	Quarterly (When groundwater is present) Mar., Jun., Sep., & Dec Monthly: Groundwater Elevations
	MW-016		

MONITORING TYPE	LOCATION	CONSTITUENT	FREQUENCY
	MW-017	Manganese, Field Measurements[1], Groundwater Elevations	
	MW-018		

[1]Field measurements shall include pH, temperature, conductivity, dissolved oxygen and oxidation-reduction potential.

REPORTING

Monitoring reports shall be submitted **quarterly** to the Regional Board by the **30th day of January, April, July, and October** and shall contain information collected during the previous quarter (October-December, January-March, April-June, July-September). The reports shall include the following:

1. Tabular field sampling data for each well sampled, such as volume of purge water, time, pH, temperature, DO, oxidation reduction potential, and electrical conductivity;
2. Copies of certified analytical reports and chain of custody forms for all analyses;
3. Maps showing locations of all wells sampled and their corresponding current sampling event perchlorate concentrations, calculated potentiometric surfaces in each identified groundwater zone, and groundwater flow direction in each identified groundwater zone;
4. Graphs of perchlorate concentrations versus time and ground water level versus time in monitoring wells with sufficient data;
5. Tabular historic and current groundwater elevation and depth to groundwater data in monitoring wells, and groundwater flow direction in each identified groundwater zone. Numeric data shall be submitted in spreadsheet format using Excel or equivalent program (electronic data using floppy disk or other acceptable medium) to facilitate data analysis;
6. Construction data for each well sampled such as well ID, casing diameter, casing material, boring diameter, total depth, top of casing elevation, screen interval location, and sand pack interval location in tabular form; and
7. An evaluation and interpretation of all available data.

The monitoring reports shall be signed by a principal executive officer of the company of at least the level of a vice president or a duly authorized representative. In addition, the report shall be signed and stamped by a registered professional attesting, under penalty of perjury, that the report is true and accurate.

Copies of all correspondence, technical reports, and other documents pertaining to compliance with this order shall be provided in electronic (i.e. Adobe PDF, Excel) and hardcopy format at time they are submitted to the Regional Board. This includes data submission to Geotracker and direct electronic data submission from Olin's laboratory.

The Regional Board requires Olin Corporation to submit the monitoring reports in accordance with Section 13267 of the Water Code to determine the concentrations and movement of the perchlorate plume in the vicinity of the Olin site. We require Olin Corporation to submit the monitoring reports as

the owner of the property and one of the previous operators of a flare manufacturing facility that caused soil and groundwater perchlorate contamination at and in the vicinity of the Olin site at 425 Tennant Avenue, Morgan Hill. More detailed information is available in the Regional Board's public file on this matter.

ORDERED BY : Michael Thomas 8-31-05

for Roger W. Briggs
Executive Officer

Date

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