California Regional Water Quality Control Board
Central Coast Region

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Linda S. Adams
Secretary for Environmental Protection

Arnold Schwarzenegger
Governor

June 11, 2007

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

Dear Mr. Richards:

SITE CLEANUP PROGRAM: 425 TENNANT AVENUE, MORGAN HILL; RESPONSE TO OLIN'S AREA I EXTRACTION WELL INSTALLATION WORK PLAN

Central Coast Regional Water Quality Control Board (Water Board) staff completed its review of Olin's April 30, 2007 *Area I Extraction Well Installation Work Plan* (Well Installation Work Plan). Geosyntec Consultants Incorporated prepared the Well Installation Work Plan on behalf of Olin Corporation, as required by the Water Board in its March 29, 2007 letter and requirement H of Cleanup or Abatement Order (CAO) No. R3-2005-0014. The Well Installation Work Plan outlines the approach and schedule for design, installation, and hydraulic testing of the groundwater extraction wells that are part of the Water Board's approved plume migration control alternative for Area I of the Llagas Subbasin.

AREA I WORK PLAN

In the December 6, 2006 *Area I Plume Migration Control Work Plan* (Area I Work Plan), Olin described the approach and schedule for design, installation, and startup of a plume migration control remedy for Priority Zone A within Area I. Olin identifies three major uncertainties in the Area I Work Plan that need to be resolved prior to selection and implementation of the final remedial alternative for Area I plume migration control.

1. Identification of final extraction well placement, installation, and testing of the extraction wells to determine pumping rates;
2. Resolution and selection of a final water disposition option [i.e., on-site recharge (OSR) or municipal water supply (MWS)]; and
3. Selection of a final water treatment option.

EXTRACTION WELL DESIGN

According to the Well Installation Work Plan, the design and installation of the extraction wells are dependent on the treated water disposition option selected. For this reason, Olin cannot finalize the extraction well design until the water disposition option is determined.

The well design and location would be significantly different depending on whether the selected disposition option is MWS or OSR. Consequently, Olin has prioritized the sequence of preliminary activities presented in the Area I Work Plan, as follows:

1. Resolution of the water disposition option.
2. Installation and hydraulic testing of the extraction wells (to establish the pumping rates).
3. Selection of the final treatment option.

This Well Installation Work Plan provides an overview for the design, installation, and hydraulic testing of extraction wells that Olin will follow for both the MWS and OSR treated water disposition options. The Well Installation Work Plan indicates there are two ongoing activities that will affect the final design and well locations of the extraction wells:

1. Continued characterization/monitoring of Area I groundwater, including the installation of two deep aquifer, multi-level monitoring wells, MW-55 and MW-60, and
2. Selection of the final treated water disposition option.

The results from ongoing characterization/monitoring will help determine the numbers and general locations of the extraction wells for Priority Zone A in Area I. The selection of a final water disposition option will dictate the types and specific locations of the proposed extraction wells. Olin provides the following tentative schedule for implementation of the Well Installation Work Plan:

1. Installation/monitoring of MW-55 and MW-60: Sampling results will be available by end of June 2007.
2. Selection of Final Water Disposition Option: Olin anticipates a resolution by June 30, 2007.
3. Submittal of *Recommendation for Area I Final Extraction Well Design & Locations*: Olin will submit this report 30 days after selection of Final Water Disposition Option (July 30, 2007). This submittal will include a detailed schedule for the extraction wells.
4. Water Board Approval of Extraction Well Location: Olin anticipates Water Board approval 30 days after submittal of *Recommendation for Area I Final Extraction Well Design & Locations* report (August 30, 2007).
5. Land Access Agreements/Permitting Activities: Olin has not determined a completion date.
6. Extraction Well Installation: 60 days following receipt of permits and land access agreements.

7. Well Yield Testing & Hydraulic Analysis: 60 days following extraction well installation.

Olin has not determined an estimated completion date for the last three activities listed above because the scope of each activity is dependant upon the well designs and locations that Olin has agreed to recommend by the end of July 2007 (Item 3, above).

General Water Board Comments

Comment No. 1: Water Board staff concurs with Olin's reordering of priorities, as explained above. It appears that the proposed and anticipated changes will not delay the implementation of the final design, installation, testing, and pumping of the proposed groundwater extraction system.

As stated in previous correspondence, Central Coast Water Board supports Olin's efforts to select a disposition method or methods in an expeditious manner and is available to help expedite any agreements, permitting, and administrative issues that could potentially delay implementation of required remediation activities. It is our position that economic considerations should not delay implementation of the approved schedule. Olin must implement active remediation within the highest concentration areas (plume core) expeditiously. We reiterate that the most important aspect of this cleanup case is to ensure that active remediation of the Llagas Subbasin begins.

According to the Well Installation Work Plan, Olin anticipates it will select a treated water disposition option by June 30, 2007. Central Coast Water Board staff concurs with Olin's proposed deadline. Therefore, Olin must select a final disposition option by **June 30, 2007**.

Within 30 days of selecting a final disposition option, Olin must finalize the extraction well design by preparing and providing, for Water Board concurrence, *Recommendation for Area I Final Extraction Well Design & Locations* report. The *Recommendation for Area I Final Extraction Well Design & Locations* report must identify the final extraction well design and placement locations, and installation and testing schedules of the proposed extraction wells. The proposed locations and number of extraction wells (within each aquifer zone; shallow, intermediate, and deep) must be adequately substantiated with up to date data.

We understand that characterization of the deep aquifer zone has yet to be completed and Olin may require additional data and time before it may determine the most appropriate number and location of deep aquifer-zone extraction wells. However, we believe that sufficient data exist to determine the most appropriate number and location of extraction wells to achieve compliance with plume migration control and groundwater cleanup within the shallow and intermediate aquifer zones. Olin must provide appropriate justification for any deviation from previously proposed and predicted extraction well locations, extraction rates, and number of wells.

Comment No. 2: The overall objective of the approved groundwater cleanup strategy for the perchlorate-impacted areas of the Llagas Subbasin is groundwater cleanup with the goal of achieving background concentrations. Therefore, we emphasize that while the primary objective of the Well Installation Work Plan is to achieve plume containment (hydraulic control) within the Priority Zone A, groundwater cleanup must also be part of Olin's plume containment strategy. Therefore, subsequent technical reports addressing the Area I remedy must clarify that the cleanup strategy within Area I includes hydraulic control and groundwater cleanup.

We agree that areas of lower perchlorate concentrations may not require implementation of hydraulic control measures. However, Olin must not interpret this to mean that groundwater cleanup is not required in those areas. As discussed in previous Water Board response letters, implementation of hydraulic control measures are most effective and appropriate in area of high concentrations. We agree that Priority Zone A in Area I requires hydraulic control. However, in accordance with Water Board cleanup requirements, Olin is required to implement basin-wide groundwater cleanup to background concentrations. Although perchlorate concentrations may be below Olin's trigger level for plume containment purposes, groundwater cleanup is still required.

Specific Water Board Comments

Comment No. 1: Olin indicates that based on dramatic reductions in perchlorate concentrations observed in the shallow aquifer both on-Site and in Area I, Olin may no longer need to install a shallow aquifer extraction well in Area I in order to meet the Area I remediation goals. Olin indicates it will confirm this conclusion by continuing to evaluate quarterly shallow aquifer perchlorate data.

Response: The reported reductions of perchlorate concentrations in the shallow aquifer are encouraging news. However, we remain concerned with potential rebounding of perchlorate levels due to increased rain or a rise in water table. Upon close review and evaluation of the CPT investigation profiled in the 2006 update to the Llagas Subbasin Characterization Report and the first quarter 2007 groundwater monitoring results, we find that several A/B aquitard wells show elevated concentrations of perchlorate. We believe that additional work needs to be conducted to evaluate the effects of elevated concentrations in the A/B aquitard on shallow aquifer zone perchlorate concentrations. An evaluation is necessary to determine the effects of shallow aquifer perchlorate concentrations from increasing water table levels.

Further, as noted in the attached comments received from the Santa Clara Valley Water District (Water District), data from aquitards show higher concentrations of perchlorate, up to 550 micrograms per liter (µg/L). Water Board staff has reviewed the data referenced by the Water District and concurs with their observations. Based on these observations, we find that the data presented by Olin are not sufficient to justify foregoing extraction in the shallow zone, without further evaluation. Olin must continue to evaluate quarterly shallow aquifer perchlorate data including historical shallow zone data and CPT data before we will consider not requiring groundwater cleanup in the

shallow aquifer. Olin must also evaluate the feasibility of extracting perchlorate from the aquitard.

We understand that Olin will base its decision to forgo the installation of an extraction well in the shallow aquifer zone on recent and future shallow aquifer data showing decreased perchlorate concentrations, below Olin's trigger level for plume containment purposes (24.5 µg/L). For hydraulic control purposes, it is possible that future data will confirm that the installation of shallow zone extraction well(s) may not be needed. However, Olin must understand that in addition to hydraulic control, Olin is required to implement groundwater remediation and achieve compliance with all applicable cleanup requirements. Hence, for the protection of water quality, Olin is required to clean up perchlorate impacted groundwater that exceeds background concentrations.

Olin must continue to evaluate the viability of the monitored attenuation option throughout the Llagas Subbasin. If the Llagas Subbasin groundwater does not continue to have decreasing perchlorate concentrations, then the MA option may not be viable and additional extraction wells will be required to make sure cleanup to background concentrations occurs in a reasonable timeframe throughout the plume.

We recommend that Olin continue to collect and evaluate groundwater data from shallow aquifer wells. Based on the results of the additional groundwater data collected, the Water Board will determine whether it is appropriate to forgo the installation of extraction groundwater wells within the shallow aquifer zone.

Comment No. 2: Olin proposes changes to the intermediate aquifer extraction well or well cluster location of Priority Zone A. Based on data from the first quarter of 2007, Olin has observed that the concentrations and distributions of perchlorate appear to be declining in response to the on-site groundwater treatment system. Olin will review and evaluate data from the second quarter of 2007 to confirm the absence of perchlorate at concentrations above the trigger level to the south of MW-64 and to confirm whether the intermediate aquifer extraction well or cluster is more appropriately located near MW-64 or MW-65.

Response: Water Board staff concurs with Olin's proposed strategy to confirm the appropriate location for the proposed extraction well or well clusters within the intermediate aquifer zone. Olin must evaluate and determine the appropriate number of wells or well clusters that will be capable of preventing elevated perchlorate concentrations in groundwater from migrating further downgradient.

Once Olin installs an extraction well, Olin will be required to evaluate and determine the capture zone of the well and confirm that the extraction system will effectively remediate the entire plume core within the intermediate aquifer zone. Effective remediation means hydraulic control <u>and</u> cleanup. As you know, the plume core within the intermediate aquifer appears to be extensive. As such, depending on the design and location of the extraction wells, more than one extraction well or well cluster may be necessary to ensure effective plume migration control and cleanup of the plume core.

Comment No. 3: The Well Installation Work Plan indicates that additional characterization is ongoing in Area I including the installation of two deep aquifer, multi-level monitoring wells (i.e., MW-55 and MW-60) that will provide valuable information for delineation of Priority Zone A impacts in the deep aquifer in Area I. Olin believes it is premature to select a final deep extraction well location within Area I because data from these wells will not be available until mid to late June 2007. Once these data are available, Olin will select a final location for installation and hydraulic testing of a deep aquifer extraction well and will notify the Water Board of the proposed extraction well location.

Response: Water Board staff concurs with Olin's strategy for completing characterization of the deep aquifer zone and selecting a final location for installation and hydraulic testing of a deep aquifer extraction well.

Olin must not delay implementation of active offsite groundwater remediation for the intermediate aquifer due to delays associated with characterization activities of the deep aquifer zone. We strongly believe it is appropriate and reasonable to move forward with the installation of extraction wells within those areas where the plume core has been adequately characterized (intermediate zones).

CONCLUSION

In general, the Well Installation Work Plan is consistent with Olin's Area I Work Plan in its approach and schedule to resolve the uncertainties associated with the water treatment and disposition options so that Olin may recommend, design, and implement a final Area I plume migration control alternative. The schedule outlined in the Well Installation Work Plan does not change the overall project schedule as set forth in our Water Board's March 29, 2007 response letter concerning Olin's Revised Cleanup FS Report.

By **June 30, 2007**, please provide written confirmation that Olin has selected a final treated water disposition option. Along with your selection of a final disposition option, please provide documentation that you have evaluated all feasible treated water disposition options. The selection of a final disposition option is critical to moving forward with the approved hydraulic control and cleanup measures of perchlorate impacted groundwater.

Failure to comply with these requirements will subject the responsible party to enforcement action by the Water Board, including issuance of an order under Water Code Sections 13267 and/or 13304, and potential administrative civil liabilities.

If you have any questions, please contact **Hector Hernandez at (805) 542-4641** or via e-mail at Hhernandez@waterboards.ca.gov, or Harvey Packard at (805) 542-4639.

Sincerely,

For Roger W. Briggs
Executive Officer

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ENCLOSURE:
June 5, 2007 Comments from Santa Clara Valley Water District on the Area I Extraction Well Installation Work Plan

cc via E-mail:
Ms. Lori Okun
Office of the Chief Counsel, SWRCB

Olin Technical Contacts IPL

cc via U.S. Mail:
Olin Correspondence IPL

Santa Clara Valley Water District

June 5, 2007

Mr. Hector Hernandez
Central Coast Water Board
895 Aerovista Place, Ste. 101
San Luis Obispo, CA 93401

Subject: Comments on the Area I Extraction Well Installation Work Plan – Olin/Standard Fusee Site, 425 Tennant Road, Morgan Hill, California

Dear Mr. Hernandez:

The Santa Clara Valley Water District has reviewed the Area I Extraction well Work Plan prepared for Olin Corporation by Geosyntec consultants. We provide the following comments for your consideration:

Interim vs. Final Remedial Solution

The report states that there are several important design, logistical, permitting, construction, and other issues tied to how the treated water will be re-used, reinjected, or discharged. The District understands the challenge related to these factors; however, in order for remediation to commence, an *interim* solution should be implemented without delay. It is neither a regulatory requirement nor a well permitting requirement to participate in the District's *Treated Groundwater Reuse and Reinjection* program (TGRR). There is also no regulatory mandate to arrange for treated water to be used as drinking water. While this would be a favorable arrangement for the long term, there's no requirement to implement it for interim remediation.

To begin interim remediation, Olin should proceed with installation and operation of an extraction well and treatment system. On an interim basis, local reinjection or discharge to streams near the well site can allow operations to begin sooner than will be the case if Olin waits to secure right-of-way to pipe water back to the 425 Tennant Road site. While Olin's stated goal of seeking to obtain a solution that finds the highest end use of the treated water is laudable, Olin has not explored other interim alternatives such as portable treatment units. By focusing on the *final* disposition of the water at this point in the process, Olin will delay implementation of *interim* remediation. Delays due to permitting, right of way and land purchase agreements, legal agreements with the City of Morgan Hill, or satisfying the specific requirements of TGRR are all likely to contribute to substantial delay in beginning treatment of contaminated groundwater. A distributed treatment configuration with local discharge or reinjection can work as an interim solution until a permanent arrangement can be secured.

Recommendation: The Water Board should require Olin to work out interim solutions to permit remediation to begin sooner. The interim clean up should not be subject to resolution of the disposition of treated water, because delivery of treated water to the City of Morgan Hill or participation in the District's TGRR program is a discretionary action and not a regulatory requirement.

Shallow Zone Contamination Must Be Remediated

Olin reports dramatic reductions in perchlorate concentrations measured in the shallow aquifer, and concludes that shallow aquifer extraction in Area 1 is not required to meet the Area 1 remediation goals. The reported reduction in shallow aquifer perchlorate concentration might be considered encouraging news, but the data do not support this claim. The District believes the data are not sufficient to justify foregoing extraction in the shallow zone.

Olin attributes the reduction in shallow zone perchlorate to the performance of the on-site groundwater containment and treatment system, and the completion of soil remediation. However, the downgradient extent of the benefit from on-site treatment is constrained by the duration of operations since startup in 2004, and the groundwater flow rate. At a maximum, reductions attributable to on-site remediation are likely in only the first mile south of the site and more likely ½ to ⅔ mile; any shallow contamination further south has yet to experience a benefit from on-site treatment.

The CPT investigation profiled in the 2007 update to the Llagas Basin Characterization study presents data from aquitards that were found to contain higher concentrations of perchlorate, up to 550 ppb. It is important to monitor shallow aquifers adjacent to the aquitards which appear to be harboring residual perchlorate mass that could sustain problematic concentrations over the long term.

Not all shallow monitoring wells show a dramatic reduction in perchlorate concentrations. The table below suggests that there would be significant advantage to pursuing remediation in the shallow zone, and to further investigate whether perchlorate stored in aquitards is sustaining problematic perchlorate concentrations in the aquifers. Per Olin's stated strategy of pursuing the worst first, the shallow zone cannot be ignored. The Area I workplan provides a questionable conclusion that shallow zone extraction and treatment is not necessary, based on a partial indication of reduction of perchlorate close to the site. The District believes that it is likely that aggressive pursuit of elevated perchlorate concentrations in the shallow zone will yield long term dividends for overall remediation of perchlorate contamination in the basin.

Recent Shallow Aquifer Perchlorate Results

Location	October 2006 Result	February 2007 Result
MW-61-056	93 ppb	130 ppb & 140 ppb
MW-62-055	590 ppb	590 ppb
MW-63-057	200 ppb	160 ppb
MW-64-060	27 ppb	22 ppb

Recommendation: The Water Board should not permit a waiver of shallow zone remediation. Instead, the Water Board should require that Olin include shallow zone remediation in an interim cleanup action to start as early as possible. Water Board staff should carefully review the last year of shallow zone data, including CPT data, when weighing the degree of remediation appropriate to restore beneficial uses of groundwater in the Llagas groundwater subbasin.

Sufficiency of One Extraction Well per Aquifer Zone

The number of extraction wells proposed, one per aquifer zone, is almost certain to be insufficient to make a material difference to basin cleanup. To confirm that the proposed remedial strategy will be effective, pilot testing of extraction wells and distributed treatment with

local reinjection or discharge of treated water should be pursued to gather remedial performance data to support a long term design.

Recommendation: The Water Board should require that Olin demonstrate proof-of-concept for their proposed remedial strategy through the installation of interim treatment in the shallow and intermediate zones. The Water Board should also require that remedial performance data and analysis be collected and submitted to demonstrate the effectiveness of Olin's remedial plan, and adjusted, including installation of additional wells if necessary, as supported by the data.

Schedule for Interim Remediation

Finally, the Workplan does not include a schedule for interim remediation. While it is understandable that a long-term solution will take some time to develop and implement, a schedule of interim remediation goals should be submitted. Interim remediation of the highest concentrations in the shallow zone should begin in summer of 2007.

Thank you for considering the District's perspective on the Area I Extraction Well Installation Workplan.

Sincerely,

Thomas K.G. Mohr, P.G., E.G., H.G.
Perchlorate Project Manager

cc: Rick W. McClure, Olin Corporation
Jim Ashcraft, City of Morgan Hill
Rick Smelser, City of Gilroy
Suzanne Muzzio, Santa Clara County Environmental Health Department
Greg van Wassenhove, Santa Clara County Agricultural Commissioner
Sylvia Hamilton, Perchlorate Community Advisory Group
Warren Chamberlain, MACTEC Engineering and Consulting, Inc.
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Behzad Ahmadi, Melanie Richardson, Emily Cote