



# California Regional Water Quality Control Board

## Central Coast Region



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Secretary for  
Environmental  
Protection

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

Mr. Jay McLaughlin  
President and CEO  
Standard Fusee Corporation  
PO Box 1047  
Easton, MD 21601

Dear Mr. McClure and Mr. McLaughlin:

### **SLIC: 425 TENNANT AVENUE, MORGAN HILL; PHASE 3 SOIL AND GROUNDWATER INVESTIGATION AND REMEDIAL ACTION CONCEPTUAL DESIGN REPORT COMMENTS**

The Regional Board has reviewed MACTEC Engineering and Consulting, Inc.'s (MACTEC) June 30, 2003 *Phase 3 Soil and Groundwater Investigation and Remedial Action Conceptual Design Report* (Report) prepared on behalf of Olin Corporation. The Regional Board required submittal of the Report in a letter dated March 13, 2003. The letter detailed items required to fill data gaps and determine the extent of the offsite perchlorate contamination. The letter also required Olin to modify or expand, as appropriate, the Phase 3 Soil and Groundwater Investigation Workplan to characterize the site's geology and hydrogeology, define the extent of the soil and groundwater perchlorate contamination, and determine the hydraulic properties of the affected aquifers to predict perchlorate fate and transport and design remedial measures.

Although Olin continues to provide information after the Report was submitted, Olin has not fully complied with all of the elements set forth by the Regional Board in the March 13<sup>th</sup> letter. Our comments, which incorporate comments provided by Santa Clara Valley Water District (District) and by Komex on behalf of the City of Morgan Hill, are presented below in the same order as presented in our March 13<sup>th</sup> letter.

#### **Regional Hydrogeology**

- The regional groundwater flow directions, and recharge and discharge areas presented in the report are based on 1916 U.S. Geological Survey information. More current information is readily available.
- Section 2.1 of the Report, Regional Hydrogeology, designates the topographic high of the Coyote Creek Fan as the groundwater divide, determined by measured groundwater elevations. The location of the divide is designated as Cochrane Road for convenience. This divide is expected to undergo substantial seasonal shifts in location, and also responds to longer term precipitation and creek flow trends.
- Groundwater Elevations and Flow and Groundwater Recharge and Discharge, Sections 2.3 and 2.4 respectively, overlook the role of the District's recharge operations. As much as

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14,000 acre feet per year are recharged through the District's Main Avenue, San Pedro, Madrone, and Tennant Creek facilities, and an additional 7,000 acre feet per year are recharged through the District's Llagas Creek and Church Pond facilities. Section 2.3 also assumes that clay aquitards impede vertical migration of groundwater and perchlorate. This assumption should be further examined and verified, particularly as regards to the lateral continuity of clay layers and their hydraulic competency.

- Section 3.3 discusses the offsite groundwater investigation and the use of 42 wells to assess perchlorate concentration trends, perchlorate migration within identified discrete groundwater zones, and seasonal variations in the basin. These wells are shown on Figure 10 and listed on Table 1. Table 1 lists only 41 wells and the map does not provide a number or a unique identifying symbol for each well that could be matched with the well listing in Table 1.
- Vertical and horizontal conduits with potential to rapidly convey perchlorate to offsite and lower zones should be discussed to the extent the investigation has targeted identification and evaluation of these features. Contaminated site investigations usually include a vertical conduit search in which past and present wells, borings, cathodic protection wells, etc., are identified and reviewed for their potential to facilitate contaminant migration from the site to the lower aquifer. Similarly, horizontal conduits such as storm drains, surface drainage ditches, sewer lines, septic leachfields and etc., should be inventoried and evaluated for their potential to have played a role in moving significant perchlorate concentrations offsite when the facility was operational.

#### **Discussion of field activities associated with site investigation**

- This section of the Report generally complies with our requirements.

#### **Lithologic Logs, Well Construction Drawings, and Borehole Geophysical Logs**

- All logs and well construction were prepared in compliance with our requirements.

#### **Hydrogeologic Cross Sections**

- Hydrogeologic cross-sections comply with the Regional Board requirements. However, site-specific cross-sections are shown only within the regional cross-sections (Figure 5 through 7) resulting in a very compressed view of the interpretation of site hydrogeology. Site-specific cross-sections should have been prepared to more clearly illustrate the interpretation of site-specific hydrogeology. The offsite down gradient wells used for the construction of the cross-sections are wells that do not have detectable concentrations of perchlorate. This tends to minimize the impact of perchlorate migration. Other wells with detections should have been used in the construction of the cross-sections and would be more useful in interpreting the off-site lateral and vertical migration of perchlorate.
- The directions of vertical gradients reported are not mentioned. Figure 6 (Cross-section A-A') displays groundwater pressure data indicating as much as 16 feet of head drop over a 400 foot vertical interval, suggesting the lowest aquifers are influenced by regional pumping, potentially allowing significant downward vertical migration. Enough heterogeneity and lateral discontinuity is presented within that portion of the cross-section that is supported by lithologic



data to allow the casual observer to easily see how 'C' zone pumping, in this case from off-site wells other than the Tennant Avenue well, which was off at the time that these data were collected, could draw 'A' zone contamination to the lower aquifer.

### **Structure Contour Maps**

- No structure contour maps were prepared.

### **Groundwater Elevation Contour Maps and Potentiometric Surface Maps**

- Groundwater elevation contour maps and potentiometric maps were prepared as required by the Regional Board
- The Report provides only information that confirms preconceived interpretations of site hydrogeology. For instance, groundwater elevations are indicated for the 89-foot to 99-foot screened interval and the 134-foot to 142-foot screened interval, but groundwater contours were not illustrated. The report indicates the inferred easterly groundwater flow directions in these zones may be representative of actual conditions because the well within these zones many not be screened within the same hydrostratigraphic zones. However, groundwater contours for all other screened intervals were illustrated even though horizontal hydraulic gradients for some of these zones (which range up to 0.052) clearly indicate that many of these wells are also not screened within the same hydrostratigraphic zones. A horizontal hydraulic gradient of 0.052 within the 200-foot to 210-foot screened interval zone, as shown in Figure 16, would mean that groundwater elevations within this 10-foot zone would decrease by approximately 43 feet across the entire width of the site in the southeast direction, which is not possible. Elevation data indicate that groundwater flow conditions at the site are complex with variable directions of horizontal flow and vertical gradients. It may not be possible to identify discrete hydrostratigraphic zones that are continuous across the site.
- The explanation dismissing an easterly component to groundwater flow in the 'B' zone relies on lithologic differences as distinguishing hydrostratigraphic units. While this is often true, definition of hydrostratigraphic units often spans multiple lithologies and is best accomplished through observation of the hydraulic response of different zones to hydrologic events. The assumption inherent to the dismissal of an easterly component to flow needs to be more thoroughly examined, and the possible presence of factors that would support easterly flow should similarly be reviewed. The assumptions that only like lithologies belong to the same hydrologic unit suggest that the sand and gravel units encountered beneath the site are laterally extensive and hydraulically interconnected. Similarly, the assumption that aquitards are laterally continuous and competent needs better supporting evidence. The absence of a site-specific cross section showing all recorded lithologies prevents the reader from examining this assumption. Easterly flow was observed in a zone slightly shallower than this one at the nearby Castle-Vegtech site, and local growers report a major pumping center on Tennant to the east of the current location of US 101. It is unfortunate, given the cost and effort involved, that the investigators have determined that the depth-discrete monitoring zones do not correspond to related hydrostratigraphic units.



- In addition, the discussion of depth to groundwater should include the entire site history. Reports by Woodward Clyde cite groundwater encountered seven feet below ground surface.

### **Aquifer Properties**

- The Report provides summary information on regional aquifer properties but provides no information related to on-site aquifer properties. Olin and its consultant have already confirmed that hydraulic testing to obtain site-specific aquifer properties are scheduled to be performed in October 2003.

### **Rates and Directions of Groundwater Flow**

- The previous two items discuss information related to rates and directions of groundwater flow.

### **Complete results from sampling and analyses including laboratory QA/QC summary reports and certifications**

- Sampling reports, including laboratory QA/QC summary reports are in compliance with our request.

### **Contaminant Distribution Maps and Cross Sections**

- As required by the Regional Board, the Report included maps and cross sections of perchlorate concentrations in soil and groundwater. However, the isoconcentration maps presented were prepared using only results for groundwater samples collected from the BARCAD wells. While monitoring well samples results are considered to be more representative than analytical results for grab samples, the information is still useful and should be considered with the overall context of understanding the extent of contamination. If this information is not reliable then these sample methodologies should not have been employed. By excluding these data in preparing the iso-concentrations contours Figures 18 and 19 it appears that the Report minimizes the extent of the groundwater contamination.
- As discussed in Section 4.2 Perchlorate in On-Site Soil, the identification of substantial concentrations of perchlorate in soil associated with storm water catch basins suggests further investigation of site storm water management is warranted. Were these sumps the only locations to which storm water from perchlorate handling areas was directed? Are site grading plans available or on file with the City. Can historic aerial photographs reveal the directions in which site runoff may have conveyed perchlorate?

### **Summarize and interpret results**

- Throughout the Report summary and interpretation of results are included as required.



**Updated site conceptual model**

- The Report did not provide an updated site conceptual model.

**Alternative analysis for long-term, basin-wide groundwater cleanup including proposed schedules for implementation of selected cleanup alternatives**

- The Report did not provide an alternative analysis for long-term basin wide groundwater cleanup including proposed schedules for implementation.

**General Comments**

- The Report was not well organized, with much information presented as a separate report in Appendix A. The information presented in Appendix A could have been incorporated into the main report body, which would have made it easier to evaluate. This would also have eliminated much of the redundant text, the redundant presentation of many of the figures, and the presence of appendices within appendices.
- The conclusions that significant concentrations of perchlorate are only present to depths of approximately 200 feet below ground surface and can only have migrated offsite to the south appear to be biased, or at best, based on incomplete information.

This letter serves to document our comments on Olin's June 30, 2003 report. The Regional Board may at a later date require further information from Olin to fill data gaps and address comments raised in this letter.

If you have any questions, please contact **A. John Mijares at (805) 549-3696** or Harvey Packard at (805) 542-4639.

Sincerely,

Roger W. Briggs  
Executive Officer

ajm/s/icb/cru/johnm/olin../rick mcclure comments june 30 Phase 3 report 3oct03

cc: Olin Correspondence List

