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MEMORANDUM CH2MHILL

Response to Comments by Levine-Fricke on Conceptual Remedial Action Cost Estimate for the Omega Chemical Superfund Site, Whittier, California.

TO: Christopher Lichens, U.S. EPA

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FROM: Tom Perina

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Comments were received from Levin-Fricke (LFR) on the *Conceptual Cost Estimate for Sitewide Remedial Action, Omega Chemical Superfund Site,* prepared by CH2M HILL, dated April 6, 2004. As requested by the Environmental Protection Agency (EPA), CH2M HILL has prepared this memorandum in response to the LFR comments dated May 19, 2004.

The comments essentially center on two main assertions: (1) that the nature and extent of the contaminant plume in groundwater, which was used as a basis of the estimate, is too large; and (2) that the technologies that may be needed to treat the extracted groundwater are excessive and overly complex. These two issues are discussed below.

Plume Extent

The Omega Chemical Superfund Site is defined by the extent of contamination in groundwater from the Omega Chemical facility in the northeast (upgradient) to past Norwalk Boulevard in the southwest (downgradient). The contamination extends southeast slightly past Santa Fe Spring Road, and to the west approximately to Arlee Avenue (*Phase 2 Groundwater Characterization Study,* prepared by Weston Solutions, Inc., dated June 2003 [Weston, 2003, Figure 7]). A reference map (Figure 1) is included at the end of the memorandum. The horizontal and vertical extent of this contaminant plume has not been fully characterized and is under investigation by EPA. The April 6, 2004, *Conceptual Cost Estimate for Sitewide Remedial Action,* prepared by CH2M HILL is for the entire estimated area of groundwater and soil contamination. The extent of the soil contamination at the Omega site is much smaller compared to the extent of the contamination in groundwater. As recognized and discussed below, groundwater contamination at Omega is widespread and appears to originate from multiple sources, including the Omega Chemical facility.

Analytical results for groundwater samples collected during field investigations conducted by EPA indicate the presence of continuous contamination in groundwater downgradient of the Omega Chemical facility. The main contaminants seem to be volatile organic compounds (VOCs), such as trichloroethene (TCE), perchloroethene (PCE), freons, 1,4-dioxane, chloroform, toluene, and acetone. Ongoing investigation includes sampling and analysis for other chemicals, including emergent contaminants. The list of contaminants of concern in groundwater at Omega is not yet complete, and the full extent of the emergent

compounds is not yet known. Consequently, until more data on emergent chemicals are available, incorporating the potential need for treatment of emergent chemicals is prudent.

In addition to the Omega facility, multiple industrial facilities within the estimated extent of the plume are known or potential sources of contamination in groundwater. Most, but not all, of these potential sources are located downgradient of the Omega site. The impact of these potential sources on groundwater is under investigation by EPA and other agencies. Some of the high VOC concentrations in groundwater appear to be associated with the potential sources. Investigations conducted to date have not established the presence of "clean" zones, or discrete chemical signatures that would separate individual plumes. Rather, groundwater contamination originating from multiple sources appears to have commingled into a continuous plume of complex composition.

Although contaminant transport in groundwater at Omega has not been characterized yet, the site history and estimated extent of the contamination in groundwater provide an indication of the plume migration rate. The Omega Chemical facility started operations in 1976. The contamination has apparently migrated almost 13,000 feet southwest from the Omega Chemical facility over 26 years (between 1976 and 2002 field investigations; Weston, 2003). Assuming that a contaminant release occurred in the first year of operation, the average contaminant migration rate is 500 feet per year. This apparent migration rate estimate assumes the longest known timeframe over which the contamination could have traveled in groundwater from the Omega Chemical facility. If the contamination found in portions of the downgradient area of the plume originated from sources other than the Omega Chemical facility, the contaminant migration could be slower.

The Omega plume seems to present a threat to drinking water aquifers. The structure of the Montebello Forebay (the Santa Fe Springs anticline) presents a potential for downward migration of contaminants into deeper hydrostratigraphic units, some of which are drinking water aquifers. In fact, chlorinated hydrocarbons have been detected in one municipal well (Santa Fe Springs Well No. 1), indicating that contamination may already be present in deeper aquifer zones.

Basis for Remedy

The goal of the remedy for groundwater at Omega may be to prevent further contamination of drinking water aquifers and restore groundwater quality in the impacted area. To achieve this goal, the remedy will need to address the entire impacted area with contaminant concentrations in groundwater above the drinking water standards, including Maximum Contaminant Levels (MCLs) and Action Levels (ALs). The presumptive remedy for groundwater is extraction and treatment. Even in the event of separate source areas, the groundwater remedy cannot practically address contamination originating from a single site only. This is not only because the contaminants in groundwater have become commingled, but also because pumping would induce further mixing. As a result, the list of contaminants of concern at Omega may include compounds that have been detected at all of the potential sources.

Treatment Process

The complexity of the assumed treatment process results from the variety of contaminants found throughout the Omega plume. LFR is correct in their comment that the treatment for some of the compounds, such as perchlorate and hexavalent chromium, may not be necessary because their concentrations will be sufficiently diluted in the extracted groundwater. However, these compounds have been found in concentrations above ALs (up to 10 parts per billion [ppb] for perchlorate and up to 177 ppb for hexavalent chromium in February-March 2004 groundwater samples), and their distribution across the plume has not yet been sufficiently characterized. Therefore, the cost estimate accounts for the potential treatment of these compounds as part of the regional remedy.

LFR states that "there is not sufficient data to determine, if .... treatment would be required" for 1,4-dioxane. The concentrations of 1,4-dioxane in groundwater range up to 72,000 ppb and the monitoring well with the highest detected concentration is located within the Omega facility. The California Department of Health Services (DHS) AL is 3 ppb. The extent of the 1,4-dioxane plume has not been fully characterized; however, based on existing data, treatment for 1,4-dioxane seems to be warranted. Currently, advanced oxidation technology is the most cost-effective treatment option available for 1,4-dioxane.

The total flow rate of 1,900 gallons per minute (gpm) used for the estimate would represent an annual flush of 20 percent of the estimated volume of the contaminated aquifer at Omega. Over the duration of 30 years assumed for the treatment system operation, pumping at this rate would result in the extraction of six aquifer volumes. Historical experience indicates that between 10 and 100 complete aquifer flushes are required to restore groundwater quality. Depending on the discount rate, net-present-value costs for more than 30 years of operation and maintenance (O&M) do not increase significantly past 30 years. It is recognized that the actual O&M duration may be longer or shorter. The flow rate used in the estimate is low, considering the estimated extent of the plume, aquifer characteristics, and assumed treatment duration. The cost estimate did not include treatment at other potential source areas, although such source treatment would be an essential part of a regional remedy for the Omega plume. Clearly, facility-specific source control will impact the duration of the regional remedy O&M.

The decrease of contaminant concentrations in the treated groundwater was not considered in the estimate. The rate of such decrease is not known, would be speculative, and will be dependent on facility-specific source control actions.

The contingency amount is 15 percent of the total remedial design/remedial action (RD/RA) cost (net present) of $79,900,000. The contingency reflects the uncertainty in the assumptions used for the estimate. The investigation at Omega is in an early stage, and a feasibility study has not yet started. A more detailed and precise remedial action cost estimate for Omega cannot be prepared at this time. However, according to the June 2, 1992, EPA guidance document titled *"Methodology for the Early De Minimis Waste Contributor Settlements under CERCLA Section 122 (g) (1) (A)"* (OSWER Directive #9834.7-1C), a precise cost estimate is not necessary for a *de minimis* settlement.

LFR cites the EPA *de minimis* guidance document (OSWER Directive #9834.7-1C) as saying, "A Region should use available site and cost information to develop a best estimate of future response costs for the de minimis settlement." LFR further states that, "This estimate

should be based on reasonable judgement and generate a 'best estimate' not 'worst case' cost estimate." The following is the cited text of the guidance document (the beginning of the last paragraph on page 10):

> *A Region should use available site and cost information to develop a best estimate of the future response costs for the de minimis settlement. This estimate should be based on reasonable judgement; a precise figure is not necessary since the Region is not selecting a remedy. This guidance does not establish a set procedure to estimate future response costs for settlement.*

It is CH2M HILL's understanding that this guidance document instructs the Region to develop a best estimate, not an estimate for a best case scenario. The cost estimate prepared by CH2M HILL certainly does not represent a "worst case scenario," as evident from the following:

- A limited duration of groundwater extraction and treatment was assumed.
- A small extraction rate was assumed.
- The horizontal and vertical extent of the plume may be significantly greater than was assumed for the estimate.
- The total volume of extracted groundwater necessary to restore groundwater quality may be greater than the six aquifer volumes assumed for the estimate.
- A higher groundwater extraction rate may be necessary to limit vertical migration of contamination.
- Additional emergent contaminants may be identified in the future that require treatment. At several Superfund sites in Southern California (e.g., Baldwin Park Operable Unit, South El Monte Operable Unit, and Puente Valley Operable Unit), EPA has experienced substantial increases of remedial costs due to emergent compounds.
- Lower (i.e., more stringent) MCLs may be promulgated in the future.
- The highly contaminated source area at the Omega site may require more aggressive treatment technologies than soil vapor extraction (SVE), such as thermally enhanced SVE or steam injection, to remove free-phase solvents (likely present as dense nonaqueous phase liquid above and below the water table).
- The permitting cost for the discharge of the treated water was not included. Also, instead of discharging to a storm drain as was assumed in the estimate, the treated water may be reinjected into the aquifer; the costs for reinjection were not included.
- The costs for treatment of potential source areas other than the Omega Chemical facility were not included. However, the treatment of these source areas will potentially be a necessary part of the remedy for the commingled contaminant plume in groundwater at Omega.

Any of these conditions would result in significant cost increases for the Omega remedial action. Furthermore, at sites with contaminated groundwater, remedial costs are typically more than initially estimated, not lower.

WA-Controlled/Critical Infrastructure-Water Assessments