Review of Draft Memorandum for Detailed Evaluation of Remedial Alternatives for Groundwater Contamination Source Area Del Amo Superfund Site

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Pursuant to a request from the U. S. Environmental Protection Agency (EPA) Work Assignment Manager (WAM), CH2M HILL has reviewed a technical memorandum entitled Draft Memorandum, Detailed Evaluation of Remedial Alternatives for Groundwater Contamination Source Areas, Del Amo Superfund Site, dated June 14, 2005. The technical memorandum was prepared by URS Corporation (URS) on behalf of the Del Amo Superfund Site PRPs. CH2M HILL’s review comments are divided into general comments, specific comments, and editorial comments.

General Comments

1) The memo would benefit from a brief background section following the introduction. There are several pieces of information that the reader needs to be better oriented for subsequent discussions.

- Explain the overall groundwater plume, ARARs, specific RAOs, and the TI waiver zone up front in the background section. There needs to be a clear explanation of project objectives. If there is a waiver due to technical impracticability, why is source area remediation needed? Is the objective to prevent future non-compliance outside the TI waiver zone? Are there other approaches planned for preventing non-compliance outside the TI waiver zone (e.g., overall plume containment)?

- The only ARAR mentioned in the memo is a general reference to “groundwater ARARs.” Also, in the evaluation, the “groundwater ARARs” are basically dismissed because of the “technical impracticability waiver” that has been established for the groundwater plume. The TI Waiver is an important factor in the groundwater remediation alternatives, but should only be a secondary consideration for the soil FS. ARARs for preventing further impact to site groundwater are in effect even though there is a TI Waiver for the offsite groundwater plume.

- Specific Remedial Action Objectives (RAOs) need to be developed for the site to meet the identified ARARs and be protective of human health and the environment. Only the RAO of “groundwater protection” is mentioned in the memo. The media-specific RAOs...
should specify the contaminants of interest, exposure pathways, and remedial goals, which permit a range of treatment and containment alternatives to be developed in the subsequent sections of the FS. It is understood that certain RAOs will be addressed separately during the upcoming risk-based RA development exercise, but all RAOs should be identified and an explanation provided for which will be addressed herein.

- What are the quantitative clean-up goals for reducing the source area?

2) It is unclear what defines and constitutes a source area. Is the source area defined as vadose zone, LNAPL, and groundwater in Source Area #12? This is confusing because in situ chemical oxidation and hydraulic extraction primarily treat the groundwater, not the sources of contamination to the groundwater. The introductory information needs to explain that there is a larger plume and the source area contributes to the overall plume.

3) The relationship between Source Area #12 and the remainder of the site source areas needs explanation. Is Source Area #12 representative of the other site areas and thus selected for evaluation? Will there be a separate evaluation for other source areas? Can results from the Source Area #12 evaluation be applied to other areas or are the stratigraphy and constituents of concern significantly different in other areas? If each source area is stand alone, alter the title and introduction to describe the document as an evaluation of Source Area #12.

4) The technology screening step in the FS ultimately needs to consider which technologies could be utilized to meet all of the RAOs. By eliminating some technologies based on not being able to meet the groundwater protection RAO alone, alternatives that may greatly reduce exposure to site soil and soil vapor AND reduce the long-term groundwater O&M are not given adequate consideration. Therefore, these evaluations will likely have to be revisited when the groundwater and human health pathway evaluations are combined to create the final FS document.

5) Overall, the document underestimates the advantages of the more active remedial technologies. Clearly, contaminant mass removal will reduce the potential for future non-compliance outside the TI waiver zone. Without explicit objectives, it is difficult to assess the level of effort needed.

6) The active alternatives (3, 4, and 5) are not really favorable. Alternatives 3 and 4 are extreme (expensive and complex). In alternative 5, hydraulic extraction will not achieve high mass removal in the dissolved phase. Pump and treat could operate for a very long duration. At least one alternative should be more moderate. For example, bioventing for 10 years with air sparging or bioventing with a recirculation cell of oxygen-enriched water could be applicable. The goal would be to extract the volatile components and enhance the gradual biodegradation of the semi-volatiles. Because bioventing is the selected alternative beneath the Del Amo waste pits, it should at least be considered here.

7) The document mentions the public acceptance issues for thermal oxidation, but does not address it directly in the technical description of alternatives. Several technical process options could be considered including (1) increased costs of activated carbon treatment (2) thermal/catalytic oxidation with cooling and subsequent carbon treatment, and (3) Vapor treatment and reinjection.
8) Short term effectiveness should consider possible exposure during construction and implementation of the remediation alternative. In general, alternatives that treated either soil vapor or groundwater were given poor to moderate STE ratings because on-site workers and the community would be impacted by the treatment system. There should be very little impact to site workers or the community from treated air or water.

9) Long term effectiveness is rated moderate for all of the alternatives except for no action. LTE for source removal (Alt 3 through Alt 5) has to be rated higher than MNA (Alt 2). Also, the comment that “active remediation will leave a significant fraction of residual contamination” is incorrect. There are plenty of case studies available that show active remediation systems can remove a significant fraction (if not 100%) of the vadose zone contamination. The alternatives should be rated on whether the alternative will permanently remove contamination, thus reducing long term exposure.

10) Reduction of toxicity, mobility or volume is rated poor to moderate for source removal alternatives Alt 3 through Alt 5. Alt 3 may remove 50% of the contaminant mass, and Alt 4 may remove 40%. These are both significant reduction in volume, and are likely underestimated. For example, it is likely that heating near the building may remove a significant portion of the mass beneath the building. There are several case studies to support higher volume reduction, including beneath the building, than is estimated in the memo. This is a good example of why clear remedial objectives are necessary for this type of evaluation. If it is presumed (per the TI Waiver Zone) that removing 100% of NAPL is impracticable, perhaps 50% removal should be considered good rather than poor or poor to moderate?

11) Overall protection of human health and the environment is rated good for MNA (Alt 2) and poor to moderate or poor for the source removal alternatives (Alt 3 through Alt 5). Source removal has to be rated higher for protection of human health and the environment. Even a small amount of mass removal will affect the overall risk more than MNA. ICs will be implemented for all alternatives, so Alt 2 cannot be rated higher than the other alternatives. Also, the memo states that human health will be “impacted” by the treated air and water. There should be no impact from treated air and water.

Specific Technical Comments

1) Page 1, Section 2.0: The table lists individual VOCs as primary contaminants. However, Section 3.0 discusses semi-volatiles in the C6-C23 range. If appropriate, list total petroleum hydrocarbons (TPH) as a contaminant. This impacts the properties of the LNAPL and selection of remedial alternatives.

2) Page 2, last paragraph: Figure 2 is incorrectly referenced. Figure 2 contains electrical resistance heating but not the extent of impacted soil. Figure 2 is correctly referenced on Page 4, paragraph 2. However, Figure 2 does show the extent of the groundwater contamination source area. If this is the same as the extent of impacted soil, change the descriptions to match.

3) Page 4, Alternative 3 - Electrical Resistance Heating: Alternative 3 uses electrical resistance heating and specifically six-phase heating as a basis. Consider broadening this description to soil heating. This more general technology category would also encompass electrical conductive heating, steam injection, hot air injection, and other modes of heating.
the soil. Six-phase heating could then be assumed for the evaluation purposes, but other technology options would be allowable.

4) Page 4, Alternative 3 - Electrical Resistance Heating: What would be the temperature goal of soil heating? From the description in the third paragraph, 20 gpm of steam would be generated; thus, we are assuming that the process involves heating above the boiling point of water. Consider heating the soil to a lower temperature to just remove the more mobile volatile fraction. This is related to the issue of clear remediation goals for the source area.

5) Alternative 4 – In-situ Chemical Oxidation: Does ISCO with Fenton’s reagent work effectively for LNAPL? The hydrogen peroxide is water soluble and the free radical formed by Fenton’s reagent is short-lived. Acidification would extend the life of the free radical, but create acidic groundwater. The analysis does not mention total organic carbon content of the soil (oxidant demand) – a critical parameter for all ISCO applications.

6) Page 8, Alternative 2, Compliance with ARARs: The document states that “Compliance with ARARs [for alternative 2] is good.” It seems biased that for Alternative 2 compliance is good, but for the more active alternatives 3, 4, and 5, ARAR compliance is only moderate. To achieve this conclusion, the logic behind the TI waiver zone has been distorted. Although it is true that by definition, within the TI waiver zone, groundwater ARARs are not required to be met due to technical impracticability, it is also true that the ARARs are not currently being met. Therefore, compliance with ARARs in the TI waiver zone is obviously poor. For the purposes of the evaluation, the closer the remedial alternative brings the TI waiver zone to compliance, the higher it should be rated in the “compliance with ARARs” category. Aggressive mass removal brings the TI waiver zone closer to compliance than more passive measures such as MNA.

7) Page 10, Last Paragraph: The document states that contamination beneath the building can not be addressed. Certainly, SVE on the perimeter of the building can reach beneath much of the building. There have been several sites where soil heating has been performed beneath a building. By conduction, heating soil at the building perimeter will tend to heat soil beneath the building. Temperature control would be important for this.

8) Page 15, Alternative 5: Given the evaluation of alternative 5, there is no reason to retain this exact alternative for detailed evaluation. If the time to restore the aquifer with hydraulic contain is estimated to be 8,500 years, the alternative should include some means of expediting the remediation. For that matter, this comment applies to the seemingly excessive aquifer restoration timeframes for other active remedial alternatives discussed in the document.

Editorial Comments

1) Include a title page or memorandum header with the authoring firm, memo recipient, date, and site name.

2) Figure 2 – label the figure as “Figure 2” similar to the labeling of the other figures.