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CROWS LANDING
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23 AUGUST 2010 DRAFT TECHNICAL MEMORANDUM, BIOREMEDIATION TREATABILITY STUDY AQUIFER TEST RESULTS AND SUMMARY OF GROUNDWATER MODELING, CROWS LANDING FLIGHT FACILITY, CROWS LANDING, STANISLAUS COUNTY

The referenced technical memorandum summarizes the findings of the aquifer testing activities conducted at the Crows Landing Flight Facility project site. The goal of the aquifer testing was to provide additional data for site flow modeling to guide decisions in the Feasibility Study.

Technical Memorandum Summary
Aquifer testing included three different pumping tests. The first was conducted on the Escobar agricultural well from 10 through 15 August 2009. Water level measurements were collected in the five existing monitoring wells screened in the deep zone, and the closest shallow, mid-shallow, and mid-deep monitoring wells. A step drawdown test was also conducted on monitoring well 17-MW-35(D) on 18 August 2009. In addition, a constant rate test was conducted on 17-MW-35(D) on 19 August 2009.

An unknown irrigation well, termed Well X in the Technical Memorandum, was pumping at varying time intervals throughout the aquifer testing procedures. Affects of Well X when turned on were evident in the collected data. Attempts were made to allow for the interference caused by Well X when calculating transmissivity (T) and storativity (S).

Using data from aquifer testing of the Escobar well, calculated T values ranged from 472 ft^2/day to 5,413 ft^2/day and S values ranged from 0.0000120 to 0.0000910. Calculated T values from the aquifer testing of monitoring well 17-MW-35(D) ranged from 1,032 ft^2/day to 2,620 ft^2/day, and S values ranged from 0.0000529 to 0.000126.

A groundwater flow model for the site was developed using MODFLOW2000 and MT3DM3. The model was used to assess the fate and transport of the primary contaminants at the site, carbon tetrachloride (CT), benzene, and 1,2-dichloroethane (1,2-DCA) and to assess the relative effectiveness of potential remedial alternatives. Using simulated future conditions, the modeling results for each of the aquifer zones are summarized below:

Shallow Zone:

- Benzene will not migrate off the site at concentrations exceeding remedial action objectives (RAOs)
- 1,2-DCA will not migrate off the site at concentrations exceeding RAOs
- CT may continue to migrate off the site at concentrations near the RAOs for approximately 15 years

Mid-Shallow Zone

- Benzene will not migrate off the site at concentrations exceeding RAOs
- 1,2-DCA may continue to migrate off the site at concentrations exceeding RAOs for approximately 1,500 days (4 years)
- CT may continue to migrate off the site at concentrations above RAOs for approximately 15 years

Mid-Deep Zone

- Benzene will not migrate off the site at concentrations exceeding RAOs
- 1,2-DCA will not migrate off the site at concentrations exceeding RAOs
- CT may continue to migrate off the site at concentrations above RAOs for approximately 16.5 years

Deep Zone

- Benzene will not migrate off the site at concentrations exceeding RAOs
- 1,2-DCA will not migrate off the site at concentrations exceeding RAOs
- CT may continue to migrate off the site at concentrations above RAOs for approximately 4.5 years

Comments

Assuming the modeling results are an accurate prediction of the future degradation/attenuation of contaminants in groundwater, it shows that CT is the primary chemical of concern that will continue to migrate off the site for many years before RAOs are reached. Furthermore, on-site CT concentrations will not reach RAOs in a time frame approaching 30 years. Therefore, active remediation of CT will be required to attain RAOs in a shorter time frame and to prevent additional off-site migration.

The model also predicts benzene, with a continuing source, will attain a plume length of approximately 700 feet, and, as long as the benzene source is present, the benzene plume will be more or less in a steady state. Plume size will not decrease until the source is depleted. As such, active remediation of the source of the benzene will also be needed as part of site cleanup.

Closing

Central Valley Water Board staff agree, as indicated in the Technical Memorandum, that the model as presented can be and should be part of the evaluation in choosing remedial alternatives for the site.

If you have any questions, please contact Greg Issinghoff at 559-488-4390.

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