

California Regional Water Quality Control Board Central Valley Region

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Arnold
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CROWS LANDING
SSIC NO. 5090.3.A

9 December 2010

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30 AUGUST 2010 DRAFT FEASIBILITY STUDY, SITE 17 ADMINISTRATION AREA GROUNDWATER PLUME, CROWS LANDING FLIGHT FACILITY, CROWS LANDING, STANISLAUS COUNTY

The referenced Draft Feasibility Study presents the selection process for determining a remedial alternative for site clean-up. The remedial alternative selected was Alternative 4: Enhanced Bioremediation with Recirculation. As presented, this alternative appears as an acceptable choice to Central Valley Regional Water Quality Control Board staff. Additional details and comments regarding this alternative are presented below.

Analysis of Alternatives

The primary contaminants of concern (COCs) at the Crows Landing facility are benzene; 1,2-dichloroethane (1,2-DCA), carbon tetrachloride (CT), total petroleum hydrocarbons as diesel (TPH-D), and total petroleum hydrocarbons as gasoline (TPH-G). The remedial action objectives for these COCs, as suggested in the Draft Feasibility Study, are:

- Benzene: 1.0 micrograms per liter ($\mu\text{g/L}$)
- 1,2-DCA: 0.5 $\mu\text{g/L}$
- CT: 0.5 $\mu\text{g/L}$
- TPH-D: 490 $\mu\text{g/L}$
- TPH-G: 100 $\mu\text{g/L}$

Several remedial alternatives were considered. All were evaluated using the following criteria:

- Protection of human health and environment;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, and volume through treatment;

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- Short-term effectiveness;
- Implementability; and
- Cost.

The four primary alternatives that were evaluated in detail were: 1) No Action, 2) Monitored Natural Attenuation, 3) Enhanced In Situ Bioremediation, and 4) Enhanced Bioremediation with Recirculation. After considering the merits of each remedial alternative, Alternative 4, Enhanced Bioremediation with Recirculation was selected. Of the four alternatives, Enhanced Bioremediation with Recirculation had the highest rating for protection of human health and the environment; long-term effectiveness and permanence; reduction of toxicity, mobility, and volume through treatment; and short-term effectiveness. Compared to the other alternatives, Alternative 4 had a medium rating for implementability and cost.

Alternative 4 assumes that a total of 14 extraction wells would be installed on the site. Ten extraction wells would be screened across the shallow and mid-shallow aquifers, three wells would extract groundwater from the mid-deep aquifer, and one extraction well would be used for the deep aquifer. The groundwater extraction rate anticipated for the shallow and mid-shallow aquifers is 12 gallons per minute (gpm); for the mid-deep the extraction rate is anticipated to be 10 gpm; and the deep aquifer extraction rate is 20 gpm. After treatment, which is anticipated to be carbon filtration or air stripping, the extracted groundwater would be amended with a carbon source and injected back into the various aquifers. Ten injection wells would be utilized for the shallow and mid-shallow aquifers, four injection wells for the mid-deep aquifer, and three injection wells for the deep aquifer.

In comparison to the other options, the Alternative 4 remedial option prevents or reduces the potential for continued off-site migration of COCs within a reasonable amount of time. Alternative 4 also addresses off-site migration by implementing hydraulic controls so that remedial action objectives (RAOs) along the property line at Bell Road would be achieved in a relatively short time. Closure is estimated to be within approximately 8 years, as compared to 20 years for Alternative 3 and 24 years for Alternative 2. Costs to implement Alternative 4 are approximately \$5.5 million, compared to Alternative 2 at \$3.3 million and Alternative 3 at \$8.9 million.

The Draft Feasibility Study estimated the RAO for CT would be achieved at the Bell Road property line within 4.5 years, preventing any further off-site migration. Additionally, 1,2-DCA is estimated to be reduced to its RAO at Bell Road within approximately 2 years.

Comments

The selection of Alternative 4, Enhanced Bioremediation with Recirculation, is an acceptable remediation choice to Central Valley Water Board staff. Additionally, the RAOs for the COCs are also acceptable.

The Central Valley Water Board's single comment/question is presented as follows:

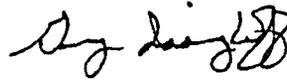
Models used to estimate the amount of time to attain the RAOs using Alternative 4 is presented in the Draft Feasibility Study. The estimates include the time it will take to

achieve the RAOs for CT and 1,2-DCA at the property line along Bell Road. However, the models do not indicate when RAOs will be attained off-site. In 2008, CT was reported as high as 19 µg/L in monitoring well 17-MW-42(D), which is on the Escobar property east of the site, across Bell Road. The latest sampling results (April 2009) show CT concentrations in 17-MW-42(D) at 8.7 µg/L. Similarly, the new Escobar irrigation well (6/8-16M1) reported CT concentrations of 2 µg/L in April 2009. These CT concentrations exceed the proposed RAO for CT of 0.5 µg/L. As such, given the proposed clean-up methodology that will be utilized for Alternative 4, what is the estimated time frame to achieve RAOs for impacted off-site properties?

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



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