California Regional Water Quality Control Board

Central Valley Region

Robert Schneider, Chair

Terry Tamminen
Secretary for Environmental Protection

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CROWS LANDING
SSIC NO. 5090.3.A

5 August 2004

Mr. Michael Bloom
BRAC Environmental Coordinator
Department of the Navy, Southwest Division
Naval Facilities Engineering Command
1220 Pacific Highway
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COMMENTS TO 8 JULY 2004 *RISK ASSESSMENT, UNDERGROUND STORAGE TANK SITE 109*, NASA CROWS LANDING FLIGHT FACILITY, CROWS LANDING, STANISLAUS COUNTY

We have reviewed the 8 July *2004 Risk Assessment, Underground Storage Tank Site 109, NASA Crows Landing Flight Facility, Crows Landing, California*, which was prepared by your consultant Shaw Environmental, Inc. The Navy has proposed, in a 5 April 2004 transmittal letter, that the results of the risk assessment would be used ". . . to determine if the groundwater cleanup goals could potentially be exceeded by the leachate from impacted soil. If the results indicated that the groundwater cleanup goals would not be exceeded, then no additional corrective action would be required. If the modeling results indicate that the groundwater cleanup goals could be exceeded, then corrective action could be required . . . ." The following comments to the report have been made with the above proposal statement kept in mind.

1. Table 1 (Summary of Analytical Results from UST 109 Soil Boring, October 2001) provides the analytical results for soil samples collected from borings drilled in October 2001. These results are after passive soil venting had occurred at UST Site 109 for a number of years. No tabulated data was provided in the report for soil samples collected and analyzed during the baseline study that was conducted before the passive soil venting wells were installed. Data for these borings are only provided in Figures 3 and 4. Tabulated data (including dates) for the borings drilled prior to the installation of passive soil venting wells should be provided.

2. The report described monitoring wells being installed in 1989 and 1992. Qualitative data is given regarding groundwater sampling and chemical analyses from these wells (described only as low levels of benzene). Tabulated data providing groundwater analytical results, well construction details, depth to water, and groundwater flow directions should be provided. These wells eventually went dry and were replaced with a single monitoring well, 109-MW-01(S), which recent groundwater sampling show nondetect concentrations of petroleum hydrocarbons. Should groundwater rise to 1989 or 1992 levels, then those petroleum hydrocarbons currently adhered to soil grains could dissolve back into groundwater, thereby causing an impact.

3. The fourth and fifth columns in Table 8 (Sensitivity Analysis of Summers Calculation for Aquifer Thickness) appear to be reversed. Concentrations of COPCs in the 170-foot thick aquifer zone are greater than those in the 60-foot thick aquifer zone. One would expect lower concentrations to be in the thicker zone.

4. The sum of the Summers maximum concentration of COPCs (TPH as kerosene) in groundwater in Table 6 (Summary of VLEACH Model Results and Summers Calculations) is approximately 195 µg/L. Although not explicitly stated in Table 6, these calculations are for a 170-foot thick aquifer, or impact to groundwater in the deep zone (a depth of approximately 200 to 220 feet bgs). The calculations can be interpreted to represent the worst-case scenario of COPCs impacting groundwater in the deep zone. However, if the Summers equation is recalculated for a 50-foot thick aquifer, or impact to groundwater in the mid-shallow or shallow zones (a depth of approximately 80 to 100 feet bgs that would be more representative of first groundwater), the sum of concentrations of COPCs is nearly 9,000 µg/L. The Navy and RWQCB have not yet agreed on any water quality goals for the NASA Crows Landing facility, but it would appear that a TPH as kerosene concentration of 9,000 µg/L in groundwater would likely exceed any water quality goals acceptable to the RWQCB. As such, additional soil remediation at UST Site 109 would appear to be necessary.

By 17 September 2004, the Navy should address the above comments, provide the additional requested data, and provide an additional column on Table 6 (Summary of VLEACH Model Results and Summers Calculations) to calculate the Summers maximum concentrations of COPCs in groundwater for a 50-foot thick aquifer. Additional details regarding the above comments are presented in the enclosed memorandum. If you have any questions, please telephone me at (559) 488-4390.

GREG ISSINGHOFF
Engineering Geologist
RG No. 5680

GJI:gji

cc: Ms. Lynn Marie Hornecker, Department of the Navy, Southwest Division
Naval Facilities Engineering Command, San Diego
Mr. Don Chuck, NASA Ames Research Center, Moffett Field
Ms. Francesca D'Onofrio, California Department of Toxic Substance Control, Sacramento
Mr. Alan Barry, California Integrated Waste Management Board, Sacramento
Mr. Mike Sonke, Stanislaus County Hazardous Materials Division, Department of Environmental Resources, Modesto
Mr. Richard Jantz, Stanislaus County Chief Executive Office, Modesto

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Arnold Schwarzenegger
Governor

TO: Russell Walls
Senior Engineer

FROM: Greg Issinghoff
Engineering Geologist, RG No. 5680
Site Cleanup Unit

DATE: 5 August 2004

SIGNATURE:

SUBJECT: COMMENTS ON 8 JULY 2004 *RISK ASSESSMENT, UNDERGROUND STORAGE TANK SITE 109*, NASA CROWS LANDING FLIGHT FACILITY, CROWS LANDING, STANISLAUS COUNTY

The Navy has submitted an 8 July 2004 report entitled *Risk Assessment, Underground Storage Tank Site 109, NASA Crows Landing Flight Facility*. The risk assessment was conducted in accordance with a 5 April 2004 transmittal letter, *Proposed Process for Assessing Risk from Petroleum Hydrocarbons in Soil at UST Site 109*. In the 5 April 2004 transmittal letter, the Navy proposed that the results of the risk assessment would be used ". . . to determine if the groundwater cleanup goals could potentially be exceeded by the leachate from impacted soil. If the results indicated that the groundwater cleanup goals would not be exceeded, then no additional corrective action would be required. If the modeling results indicate that the groundwater cleanup goals could be exceeded, then corrective action could be required . . . ." Our 3 May 2004 letter responded to the proposal, agreeing that the overall approach to the risk assessment was reasonable.

Background Information

The underground storage tank (UST) at UST Site 109 was installed in approximately 1957. Kerosene and JP-5 fuels were reportedly stored in the UST. The UST was removed in 1988 after failing tightness tests. Soil at the time of the UST removal was excavated to a depth of nine feet below ground surface (bgs). Total petroleum hydrocarbons as diesel (TPH-D) were reported at 11,195 milligrams per kilogram (mg/kg) in a sample collected at the bottom of the excavation (nine feet bgs). Additional soil sampling showed petroleum hydrocarbons extended to a maximum depth of 38 feet bgs. Benzene was not detected in any soil samples. Monitoring wells were installed in 1989 and 1992. Groundwater samples collected from these monitoring wells reportedly detected low concentrations of benzene. Actual concentration numbers for the benzene concentrations have not been provided. Declining water table levels eventually resulted in these wells going dry. Monitoring well 109-MW-01(S), which is screened from 40 feet to 68 feet bgs, has been installed in the vicinity of the former UST 109 location. Groundwater samples collected quarterly from this monitoring well from February 2003 to February 2004 have not detected petroleum hydrocarbons.

In 1997, passive soil venting wells were installed at UST Site 109. Baseline soil samples collected before the soil venting wells were installed showed maximum soil TPH-D concentrations at a depth of 20 feet

bgs to be 11,195 mg/kg. This soil sample was collected from boring 109-BV-01 located between the former UST location and Building 109. Maximum TPH-D concentrations in soil after soil venting operations (collected in October 2001) showed 2,900 mg/kg at 20 feet bgs and 10,000 mg/kg at 30 feet bgs. Both of these soil samples were collected from boring 109-VP-1P, which was also located between the former UST 109 location and Building 109.

Depth to groundwater is approximately 80 feet bgs in the southwest portion of the Crows Landing facility, and 40 feet bgs in the northeastern portion of the facility. Groundwater flow direction is toward the northeast. The aquifer beneath the Crows Landing facility has been divided into the following four zones:

- Shallow Zone: screened at or near the water table at approximately 50 to 75 feet bgs in predominately fine-grained sediments.
- Mid-shallow Zone: screened approximately 90 to 110 feet bgs in thin discontinuous sandy beds.
- Mid-deep Zone: screened approximately 160 to 180 feet bgs in a permeable sand unit present beneath Cluster 1 (but not present beneath UST Site 109).
- Deep Zone: screened approximately 200 to 225 feet bgs in a permeable sand and gravel unit that is present directly above the Corcoran Clay.

Risk Assessment Results

The risk assessment conducted by the Navy utilized the VLEACH (version 2.2) model to determine the potential mass of contaminants that leach into groundwater (mass loading) over a period of time. The Summers model was then used to estimate the potential concentration of contaminants in groundwater using the results of the VLEACH model.

Chemicals of potential concern (COPC) that were included in the risk assessment were toluene and total petroleum hydrocarbons as kerosene. Kerosene is a refined petroleum distillate intermediate in volatility between gasoline and diesel fuel, comprised of hydrocarbons in the range of C_8 to C_{17}. Because most of the chemicals that comprise kerosene are not specifically identified or do not have either the United States Environmental Protection Agency (USEPA) or the Office of Environmental Health Hazard Assessment (OEHHA) toxicity factors, the Navy used a fractionation-surrogate approach developed by the Utah Department of Environmental Quality to conduct the risk assessment.

The conceptual site model proposed by the Navy stated that because contaminated soil had been excavated to a depth of nine feet during the UST removal, no direct exposure pathways exist. Indirect exposures are assumed from use of groundwater for firefighting purposes. A covenant prohibits the use of groundwater within a restricted area extending 2000 feet around the Administration Area Plume, within which UST Site 109 is located. The only potentially useable water supply well on the Crows Landing facility property that is within the 2000-foot restricted area is NASA Supply Well #3, which is located approximately 1,600 feet upgradient from UST Site 109. The covenant only allows the use of groundwater in the restricted area for emergency firefighting purposes. The Navy's exposure scenario, therefore, is one firefighter being exposed to groundwater from NASA Supply Well #3 during one fire

incident per year, with each fire incident lasting five days, over a period of 25 years. The ingestion rate is assumed to be 0.12 liters per day (10 milliliters per hours multiplied by a 12 hour firefighter working day).

Results of the risk assessment showed a combined oral and dermal hazard index (HI) of 0.02 for an aquifer (mixing zone) 170 feet thick (the deep zone) and an HI of 0.01 for an aquifer (mixing zone) 60 feet thick (mid-shallow zone). Both of these hazard indices are less than one, and therefore would not be considered a significant health threat.

The risk assessment also showed that, when using the Summers model and an aquifer of 170-foot thickness (deep zone), the maximum concentration of TPH as kerosene that would leach into groundwater (i.e., reach the deep zone) would be approximately 195 micrograms per liter (μg/L). This number (195 μg/L) is the sum of the fractional-surrogates listed in the fifth column (Summers Maximum Concentration in Groundwater) on Table 6 (Summary of VLEACH Model Results and Summers Calculations). The majority of the fractionation-surrogates fell in the C_7 to C_8 (hexane surrogate), C_9 to C_{10} (nonane surrogate), and C_{11} to C_{12} (nonane surrogate) carbon ranges, comprising 189 μg/L of the 195 μg/L total.

Comments

My comments regarding the Risk Assessment for UST Site 109 are presented below.

1. Table 1 (Summary of Analytical Results from UST 109 Soil Boring, October 2001) provides the analytical results for soil samples collected from borings drilled in October 2001. These results are after passive soil venting had occurred at UST Site 109 for a number of years. No tabulated data was provided in the report for soil samples collected and analyzed during the baseline study that was conducted before the passive soil venting wells were installed. Data for these borings are only provided in Figures 3 and 4. Tabulated data (including dates) for the borings drilled prior to the installation of passive soil venting wells should be provided.

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