



California Regional Water Quality Control Board

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N60211_000398
CROWS LANDING
SSIC NO. 5090.3.A

8 November 1999

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DRAFT GROUND WATER MODELING TO SUPPORT ALTERNATIVE REMEDIATION OPTIONS AT SITE 17, CROWS LANDING FLIGHT FACILITY, STANISLAUS COUNTY

We have reviewed the *Draft Groundwater Modeling Report to Support Alternative Remediation Options at Site 17* (Modeling Report), for Crows Landing Flight Facility (Crows Landing), Stanislaus County, received April 1, 1999. The Modeling Report was prepared to support the draft final feasibility study (FS) for IRP Site 17. The specific objectives of the Modeling Report were to evaluate two pump-and-treat remedial alternatives, optimize the extraction well configuration to contain the carbon tetrachloride (CT) plume, and prevent commingling to the extent possible of petroleum hydrocarbon related contaminants from Cluster 1 and UST 117.

The Modeling Report provides limited technical support for the proposed pump and treat remedy presented in the draft final FS. The modeling effort falls short of being a complete ground water modeling document that addresses our concerns associated with the CT and TPH/benzene plume. We requested that the Navy develop a 3-D ground water flow and transport model for the contamination at IRP Site 17, UST 117 and Cluster 1. At a minimum, the ground water model is to evaluate the capture zone to aquifer cleanup levels for CT and include cleanup times for the benzene plume. We recognize that the requested modeling effort may have to be achieved in phases since the Navy has not fully defined the lateral and vertical extent of the CT plume at IRP Site 17. The modeling effort provided for the Modeling Report will suffice for the current definition of the CT plume; however, it will not negate the Navy's requirement to submit a comprehensive site model for the remedial design/remedial action phase of the project.

GENERAL COMMENTS:

1. We are concerned with Alternative A, Pump and Treat with ReInjection, proposed in the Modeling Report. As previously stated in our April 8, 1999 comments to the Draft FS, we believe that the Navy has not adequately characterized the vertical and horizontal extent of the CT ground water plume at IRP Site 17. As a result, we believe that further characterization of the plume is required before the reinjection alternative can be adequately evaluated. In order to fully characterize the CT plume, the Navy should install additional monitoring wells both inside and outside the suspected perimeter of the

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plume. Due to variable ground water flow, a minimum of four well clusters, with a well screened in each of the four zones, should be installed outside of the north, south, west, and east edges of the plume. Based on the March 1998 figures presented in the Modeling Report, additional monitoring wells should be installed inside the perimeter of the plume to fully define the vertical extent. At a minimum, the following wells should be installed: a mid-deep well at location 17-MW-11 (MS); a mid-shallow and mid-deep well at location 17-MW-01(S); a mid-deep well at location 17-MW-09(MS) and at 17-MW-10(MS); a mid-deep well at location 117-MW-07(MS); a mid-deep and deep well at location 17-MW-03; a deep well at location 17-MP-03D; a deep well at location 117-MW-06; and a mid-shallow well at location 17-MW-05. In addition, the Navy should step out to the north of monitoring well 17-MW-15 (D) and install a deep zone well to define the lateral extent of the contamination at that depth. The data gaps mentioned above can be addressed in a pre-design investigation.

2. As requested, the Modeling Report did not evaluate remediation of the CT plume to MCLs in all zones (the shallow, mid-shallow, mid-deep, and the deep zones) using a ground water flow and contaminant transport model. The Navy must collect additional field data in order to construct a 3-D comprehensive model capable of evaluating proposed remedies for the entire site. The next phase of modeling must be designed to evaluate the TPH/benzene plumes associated with the UST sites, evaluate the effect of the irrigation wells on plume migration, and evaluate the CT plume at Site 17. We require that a Work Plan be submitted for this next phase of ground water modeling.

SPECIFIC COMMENTS:

1. To perform a thorough evaluation of hydraulic conductivity at Crows Landing, aquifer tests must be performed on the irrigation wells surrounding the site. The lack of monitoring wells near the irrigation wells may require installation of piezometers to adequately measure aquifer response and determine aquifer properties. Furthermore, the Navy should investigate design specifications for each irrigation well. Such an investigation can be performed with a down hole video camera.

2. Hydrostratigraphic cross sections are required to properly evaluate the remedial alternatives proposed in the FS and in this Modeling Report. Detailed cross sections must be included in the Final FS and referenced in the Modeling Report. Isopach maps, fence diagrams, and geochemistry of the water between zones must be provided, in an attempt to identify geological features that indicate preferred pathways.

3. The evaluation of pump and treat for IRP Site 17 only considers the effect of the system on the CT plume. According to the plates provided in the Modeling Report, the TPH/benzene plume associated with UST 117 and Cluster 1 overlap with the CT plume for IRP Site 17. In order for the model to be complete and comprehensive, the effects of the proposed remedial system on the contaminants associated with site UST 117 and Cluster 1 must also be considered in all contaminated zones.

4. The capture zone simulations presented in this report do not display isoconcentration contours for CT and as a result it is unclear whether the system actually provides full plume capture. The Modeling Report must include figures with isoconcentration contours for CT to address this concern.

5. A technologic and economic evaluation, for the two pump and treat scenarios proposed, should be included in the Modeling Report. Please provide the financial cost, both capital and operational, along with the technical feasibility of operating a pump and treat system to clean up CT in groundwater to the lowest concentrations (i.e. background or non-detect for anthropogenic constituents) achievable to protect beneficial uses versus clean up to MCL.

If you have any questions in this matter, please contact me at (916) 255-3050.



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Transmittal

Date: 1 Apr 2002

From: Lynn Marie Hornecker *LMH*
Code 06CC.LMH

To: Diane Silva
Code 01LS.DS
Administrative Record Manager

Subj: **CERCLA ADMINISTRATIVE RECORD MATERIALS**
NALF Crows Landing

Installation: NALF Crows Landing

UIC Number: N60211

Document Title:

Draft groundwater modeling

Author:

Carie Romine, RWQCB

Recipient:

Hubert Chan

Record Date:

8 Nov 1999

Approximate Number of Pages:

3

Sites:

Site 17

Key Words:

Model, groundwater

Contract:

~~*H62474-99-D-7609*~~

CTO Number:

219