



## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

## REGION IX

75 Hawthorne Street  
San Francisco, CA 94105

February 25, 2003

Mr. F. Andrew Piszkin  
BRAC Environmental Coordinator  
Base Realignment and Closure  
Marine Corps Air Station, El Toro  
7040 Trabuco Road  
Irvine, CA 92618RE: Draft Technical Memorandum. Groundwater Modelling, Operable Unit 1 and 2A, Former  
Marine Corps Air Station, El Toro, dated January, 2003

Dear Mr. Piszkin:

EPA has reviewed the above-referenced document. The technical memorandum presents results of groundwater modeling conducted for the TCE plumes at Sites 18 and 24. These modeling results will be used to support remedial design of the groundwater extraction well field which is part of the remedy selected in the Record of Decision for these sites.

Overall, the quality of the technical memorandum is high and the model results closely correlate with measured conditions over the 10-year (January 1991 through December 2001) transient flow calibration. As acknowledged in the conclusions and recommendations section, uncertainties exist with regard to flow rates achievable with the proposed extraction wells in both the shallow and principal aquifer. Some disparity may occur between predicted and achievable plume contours after remedial actions are underway. However, given the length of time that the plume has existed as well as the fact that TCE continues to migrate, it is appropriate to begin extracting TCE mass from groundwater while using data that is collected as part of the monitoring program to further optimize the system.

If you have any questions, please call me at (415)972-3012.

Sincerely,

A handwritten signature in black ink, appearing to read "Nicole Moutoux", written over a light blue horizontal line.

Nicole Moutoux  
Project Manager  
Federal Facilities Cleanup Branch

John Broderick, RWQCB  
Karnig Ohannessian, SWDIV  
Herb Levine, EPA  
Marcia Rudolph, RAB Subcommittee chair

EPA comments on Draft Technical Memorandum  
Groundwater Modeling, OU-1 and OU-2A

## GENERAL COMMENTS

1. We appreciate the extensive use of color figures and the detailed presentation of the particle tracking results in plan view.
2. Evaluating the movement of contaminated groundwater between the shallow aquifer and the principal aquifer is a key component of the modeling effort. However, it is difficult to fully comprehend how this occurs without including cross sections. To help illustrate the vertical model discretization and movement of particles between model layers, please include the following cross sections: (1) one regional cross section that shows the vertical profile of the geologic strata at the site, (2) one cross section that shows the model layers in vertical profile and (3) for each scenario, several cross sections that document the pathlines of model particles between layers over the duration of the model simulations. This would help demonstrate how the model discretization incorporates the regional geologic setting and illustrate how model particles move between model layers.
3. The modeling results do not include an active source term or any provision for the possibility that multiple pore volumes will likely be required to remediate the aquifers to site cleanup goals. While this approach is acceptable, given the complexities and uncertainties in estimating groundwater remediation time frames, the Technical Memorandum should include some caveats that indicate the high degree of uncertainty in the model derived estimates for aquifer restoration.
4. In the past EPA has expressed concern over dewatering the shallow groundwater unit. Please provide a figure which shows declining water levels due to extraction over time for the shallow groundwater unit.

## SPECIFIC COMMENTS

1. **Section 2.2.1, Transient Flow Calibration, Page 2-4:** The paragraph directly below Table 2-2 discusses the fact that maps depicting computed heads vs. observed heads were not presented for the principal aquifer since it is undergoing pumping and the transient calibration used monthly average pumping rates. It would be highly beneficial to perform a transient calibration of the model domain surrounding one the extraction wells in the principal aquifer using pumping test data or other detailed observation well data to demonstrate that the model is calibrated to instantaneous, transient measurements. This step could be a way to “verify” the model and increase the credibility of the capture zone estimates for the principal aquifer.
2. **Section 2.2.2, Updated Conditions, Page 2-25:** In the paragraph directly below the dispersivity equation, it is stated that “A horizontal transverse dispersivity of 5 feet (one-tenth of longitudinal dispersivity) and a vertical dispersivity of 0.5 feet (one-hundredth of

Please describe in more detail what is meant by minimal effect.

3. **Section 2.2.3, Model Assumptions, Page 2-26:** This discussion of the model assumptions does not include any discussion of aquifer pore volumes. In general, model derived cleanup estimates usually underestimate aquifer restoration time frames since the removal of multiple pore volumes of contaminated groundwater is usually required to remediate an aquifer. Please include a discussion of how multiple flushing cycles may be required to remediate the aquifers discussed in this section.
4. **Section 3.2, Extraction Scenarios, Pages 3-2 through 3-21:** No cross sections illustrating the movement of particles between layers are included in this section. Please include particle tracking runs in cross section so the movement of particles between layers can be demonstrated.
5. **Section 3.2, Extraction Scenarios, Pages 3-2 through 3-21:** The travel time for the particle pathlines is not included on the pathline figures. Please provide a "callout" box or other demarcation that documents the travel time for a few of the particle pathlines on each particle pathline figure.
6. **Section 3.3.1, Modeling Uncertainty Discussion, Page 3-22:** This section does not include any discussion of the uncertainty in model derived aquifer restoration estimates or solute transport modeling. Please include a detailed discussion in this section that describes the uncertainty in solute transport modeling and how the model derived aquifer restoration estimates may underestimate the total remediation time due to the possibility that multiple pore volumes may be required to completely flush out the contamination in the aquifer.
7. **Section 4, Conclusions and Recommendations, Page 4-1:** It is stated in the third paragraph that simulation results show that scenario 2 will result in compliance with RAOs. Please also discuss the amount of time required under scenario 2 to achieve MCLs and compare this to the discussion in the ROD for sites 18 and 24.