



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

November 16, 1999

Commanding Officer
Engineering Field Activity, West
Naval Facilities Engineering Command
Attn: Mr. Stephen Chao
900 Commodore Drive
San Bruno, CA 94066-2402

Dear Mr. Chao:

The U.S. Environmental Protection Agency has reviewed the Enhanced Natural Attenuation of Commingled Plumes Work Plan (Draft), dated July 29, 1999, prepared by Stanford University. Detailed comments prepared by our contractor, TechLaw, as well as a memo from the EPA MEW RPM, are enclosed.

We understand this study is being undertaken for research purposes unrelated to work being performed by the Navy under the existing Federal Facilities Agreement for Moffett Federal Airfield. However, we do want reassurance that implementing the Study will not adversely impact any ongoing or future remedial actions taken by the Navy or MEW companies in the vicinity, or cause damage to existing or future groundwater resources. The Study as currently proposed does not provide enough detail regarding well locations and depths, or the proposed injected enhancer(s)/tracer(s) and their reaction products, to enable this determination. Also, the work plan authors should be aware that pumping by the Navy or MEW at the existing treatment systems may artificially influence the outcome of this study. Please provide the additional information requested in our comments, for our review, prior to implementing this study.

We appreciate the opportunity to review this report and look forward to your response. If you have any questions regarding the comments, please call me at (415) 744-1685.

Sincerely,

A handwritten signature in black ink that reads "Roberta Blank".

Roberta Blank
Remedial Project Manager, Moffett

cc: Joseph Chou, RWQCB; Tim Mower, TetraTech; Don Chuck, Navy; Fred Banker, RMT

Enclosure: (4 pgs)



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75 Hawthorne Street
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SUBJECT: Review Comments on Work Plan for Enhanced Natural Attenuation of
Commingled Plumes, Stanford University
Moffett Federal Airfield and Middlefield-Ellis-Whisman (MEW) Sites

TO: Roberta Blank
Moffett Remedial Project Manager

FROM: Eugenia Chow
MEW Remedial Project Manager

DATE: November 16, 1999

I had a couple of comments on the ENCAP work plan.

1. A map showing the locations for injections and affected areas is really essential. EPA needs to know where they're going to inject and which area(s) it's going to effect so that we can determine whether the MEW companies should be involved. If it is going to affect the MEW remediation, the MEW companies need to be involved in the review since they're pumping quite a bit of groundwater at Moffett. We also need to know which aquifer(s) it's going to affect.
2. Please include the results of the cone penetrometer study into the work plan if it has already been performed. The work plan had indicated that it was to be completed by 7/31/99.

**Review of the Draft ENCAP Work Plan
Moffett Federal Air Field
Mountain View, California**

GENERAL COMMENTS

1. The Plan does not state if regulatory approval of the work will be obtained from the Santa Clara Water District or the Regional Water Quality Control Board (RWQCB). Since approval from these agencies will likely be necessary before the work can be conducted, the Plan should discuss obtaining regulatory approval of the project.
2. The Plan would be easier to follow if a map of the Moffett Federal Air Field were included. The map should show the location where the ENCAP testing is to be performed and should show all of the pertinent surface and subsurface features, including the locations of the proposed ENCAP monitoring and recirculation wells, the size of the groundwater CVOC plume, and the location of the groundwater extraction wells that will capture any excess electron donors that will be injected into the groundwater. Please revise the Plan to incorporate such a map.
3. The ENCAP technology does not result in the removal of any groundwater from the subsurface. Thus, the overall flux of groundwater through the vicinity of the ENCAP wells will not change (except for a transitory change during initial startup when there may be some mounding in the vicinity of the effluent well screened in the unconfined aquifer). Thus, the ENCAP technology will not provide hydraulic containment of the CVOC plume in which the wells are installed. Thus, "mix" would be a better term than "recirculate" to describe the effect the ENCAP system has on groundwater.

The geohydrologic regime that will be established in the vicinity of the ENCAP wells will likely be complex and it is not obvious how much influence the ENCAP wells will have on the aquifers in which they are installed. The radius of influence of the ENCAP wells will be a function of the aquifer properties, the rate at which water is extracted and reinjected into the aquifers, and the orientation of the two wells with respect to the direction of groundwater flow. To allow for some estimate of the effectiveness of the system in terms of the spatial area remediated by the system and the efficiency of the system in dehalogenating the CVOCs that pass through it, please revise the Plan to incorporate the following information:

- A figure showing the direction of groundwater flow and the orientation of the two ENCAP wells with respect to the groundwater flow direction.
- An estimate of the groundwater flux through the region impacted by CVOCs compared to the estimated flow capacity of the injection/reinjection wells (i.e., compared to the mass of contaminated water moving through the region, state how much groundwater will be amended with electron donors by using the ENCAP technology).

- The average CVOC concentration of the water that will pass through the ENCAP system in each of the two aquifers.
- The theoretical amount of electron donor (propionic acid or benzoate plus the spilled hydrocarbon) that will be required to dehalogenate the estimated mass of CVOCs that will pass through the ENCAP system in a given time period (which should be the groundwater flux in the zone under the influence of the ENCAP wells times the average CVOC concentration) and an estimate of the excess electron donor that will actually be required to dehalogenate all of the CVOCs that pass through the ENCAP system.
- An estimate of the amount of electron donor that will be injected into the aquifer per unit mass of groundwater that flows through the ENCAP system.

The Navy may wish to consider performing simplified groundwater modeling to evaluate flow particle tracking around the ENCAP wells.

SPECIFIC COMMENTS

1. **Section 2.3, Contaminant Distribution:** The maximum contaminant levels (MCLs) provided in Table 1 are federal levels. The state of California MCLs are much lower. Groundwater cleanup at the Site is subject to the more stringent of the state and federal MCLs. Therefore, please revise Table 1 to include the California MCLs and indicate that the most stringent of the cleanup goals will be achieved..
2. **Section 4.3.2, Analytical Procedures:** The Plan indicates that the only fuel hydrocarbons to be analyzed in groundwater samples collected at the Site are Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX). As BTEX compounds are not likely to comprise even 10% of the total hydrocarbons resulting from a fuel spill, it would seem that the total quantity of available electron donors present in the aquifer before amendment will be much higher than the analyses will show. Please revise the Plan to discuss the effect that petroleum hydrocarbons other than BTEX would have on the dehalogenation of CVOCs and provide a rationale for not analyzing groundwater samples for these compounds.
3. **Section 4.3.3, Additional Analyses:** The Navy indicates that it may be problematic to differentiate between ethylene, ethane and vinyl chloride contained in groundwater samples collected from the Site aquifers. However, Section 4.5 indicates that the production of ethylene and ethane in groundwater compared to vinyl chloride will be a key metric in evaluating system performance. Please revise the Plan to indicate how the Navy will report the concentrations of compounds that co-elute with vinyl chloride.
4. **Section 5.1, Pre-operation Characterization:** If the cone penetrometry survey has not already been conducted, the Navy should consider the use of a piezocone since piezocone results provide the following additional information which will be helpful in the selection of the most appropriate location for the ENCAP system:

- the ability to distinguish drainage condition during cone penetration;
- the ability to correct measured cone penetration resistance and to some extent sleeve friction to account for unbalanced water forces due to unequal end area in cone designs;
- the ability to assess equilibrium groundwater conditions;
- improved soil profiling and identification;
- improved evaluation of geotechnical parameters; and
- the ability to evaluate flow and consolidation characteristics.