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MOFFETT FIELD
SSIC NO. 5090.3

PRC

8/1/95

Mr. Stephen Chao/Mr. Hubert Chan
Department of the Navy
Engineering Field Activity West
Naval Facilities Engineering Command
900 Commodore Drive, Building 208
San Bruno, California 94066-2402

CLEAN Contract N62474-88-D-5086
Contract Task Order 0236

Subject: Moffett Federal Airfield Operable Unit 1 (OU1) Feasibility Study (FS) Response to California Integrated Waste Management Board (CIWMB) Comments

Dear Messrs. Chao and Chan:

PRC Environmental Management, Inc. (PRC) received comments from CIWMB on July 25, 1995 regarding the OU1 FS and the Navy's proposal to remedy the Site 1 and Site 2 landfills. The comments and accompanying cover letter stated that various state and local agencies had reached a consensus that Alternative 2 (recommended in the FS report) does not meet regulatory performance standards and should be modified accordingly. The July 25, 1995 letter then stated that a follow-up meeting has been scheduled to discuss this issue with the Navy, the U.S. Environmental Protection Agency (EPA), and community representatives.

PRC has written this letter to prepare for the August 9, 1995 meeting and to respond to CIWMB's comments. PRC does not agree with CIWMB's conclusion and has identified several areas of concern with the rationale presented in the CIWMB letter. PRC's reply to the CIWMB's conclusions is provided in the paragraphs below and should serve as a basis for discussion during the August 9, 1995 meeting.

CIWMB staff does not concur with Alternative 2 (chosen by the Navy and the U.S. EPA) because the alternative does not meet California Code of Regulations, Title 14 (14 CCR) performance standards for landfill caps. In addition, CIWMB found that Alternative 3 (the basis for comparison) exceeds the prescriptive standards. Therefore, CIWMB believes that the FS report does not consider a cap design that meets the minimum standards. CIWMB indicated that an alternate cap design exists that would still meet performance standards, be more cost-effective than Alternative 3, and be more worthy competition for Alternative 2.

PRC believes that two concerns need to be discussed: (1) Alternative 2's ability to meet performance standards in 14 CCR, and (2) Alternative 3 as the most feasible, alternate choice which will meet performance standards. The following paragraphs discuss these two issues.

Performance Standards

According to CIWMB's letter, three performance standards should be used to evaluate the engineered alternative (soil cap). They are:

1. The need to limit infiltration to the greatest extent possible

contains recycled fiber and is recyclable

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2. The need to control gas emissions
3. The future reuse of the site

To evaluate infiltration, the Navy used EPA's Hydrologic Evaluation of Landfill Performance (HELP) model to show that there is no significant difference in infiltration rates between alternatives. CIWMB questioned this logic because, "a cap that uses a barrier layer and a drainage layer should limit infiltration more than a soil cap." PRC agrees that any cap with impermeable barriers and overlying drainage will decrease infiltration, and the HELP model shows this decrease. However, the important conclusion from the HELP model was that the difference in infiltration rates is insignificant. For Sites 1 and 2, a 3-foot soil cap reduces infiltration into refuse to 1.13 inches per year. A multilayer cap reduces infiltration to 1.06 inches per year. No significant difference in the amount of infiltration occurs, as the multilayer cap reduces infiltration an additional 0.07 inches per year as compared to a soil cap. The results show that the majority of precipitation will be lost through evapotranspiration (91 percent). Therefore, even if an alternate design was used and all of the remaining precipitation was removed, the reduction (1 inch annually) would not be warranted. Most of the already low amount of annual precipitation does not percolate through to the barrier layer.

Equally as important as the HELP model results is a consideration that 14 CCR specifically address, the need to limit infiltration. Regarding engineered alternatives, the regulations state that "the Board or local enforcement agency may require additional thickness and quality of cover depending on, but not limited to:

(1) a need to limit infiltration of water, to the greatest extent possible;
(2) a need to control landfill gas emissions;
(3) the future reuse of a site; and
(4) in order to protect the low-permeability layer from desiccation, penetration by rodents, and heavy equipment damage."

Therefore, according to 14 CCR, the need to limit infiltration to the greatest extent possible must be evaluated when considering an engineered alternative. The FS report clearly demonstrates that there is not a need to limit infiltration. The reasons are as follows:

1. Sites 1 and 2 have been idle for over 20 years and current infiltration rates are not causing leachate plumes to migrate.

2. Based on contaminant transport modeling, leachate plumes are not expected to migrate in the future.

3. At Site 1, leachate will exist regardless of the type of cap employed because refuse is below the water table. Therefore, if leachate migration is to occur, it will likely occur regardless of the type of cap employed. In addition, since waste is saturated below the water table, other technologies will be required to mitigate leachate migration. Using a barrier layer would not enhance the effectiveness of hydraulic

control or significantly decrease the amount of water requiring extraction and treatment.

For these reasons, minimizing infiltration does not need to be a primary cap function. Even though this is clearly the case, the Navy has shown with the HELP model that Alternative 2 will reduce infiltration rates to nearly the same level as achieved by caps with barrier layers.

The proposed engineered alternative is completely consistent with 14 CCR and the Statement of Reasons for 14 CCR. In addition, EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies for Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Municipal Landfills* states that low-permeability, multilayer caps are not considered advantageous when significant amounts of refuse are below the water table and lowering the water table is not practical. Therefore, the proposed capping strategy is also consistent with EPA guidance.

CIWMB also questioned the input data for the HELP model. CIWMB staff found that the slopes proposed for Alternative 3 were not adequate to drain the drainage layer; therefore, a head develops on the barrier layer, producing infiltration. CIWMB stated that "generally landfill side slopes are constructed at 33 percent." First, this statement is not accurate. According to 14 CCR, the goal for landfill cover side slopes is 3 percent to 10 percent. The slopes are designed to be steep enough to control runoff, yet gradual enough so that erosion is not accelerated. Furthermore, 33 percent side slopes would result in a landfill cap at Site 1 well over 100 feet tall and a cover at Site 2 over 60 feet tall. The amount of material needed and the associated costs would not be cost-effective. Secondly, even though 33 percent landfill slopes are not realistic, PRC conducted a sensitivity analysis using the HELP model and plotted infiltration as a function of drainage layer slope. The resulting additional decrease in infiltration from 5 percent slope to 30 percent slope was 0.16 inches. The plot is attached. The amount of infiltration is insensitive to lateral drain slope at these low levels of percolation.

A second performance standard for an engineered alternative according to CIWMB's letter is the need to control landfill gas emissions. CIWMB indicated that Site 1 is generating methane and methane can displace oxygen in the root zone of the vegetative cover. Methane gas can asphyxiate vegetation, thereby reducing the transpiration capabilities of the cap and promoting cap erosion. Therefore, CIWMB concluded that the need to control landfill gas emissions to ensure the integrity of the cap and to protect human health and the environment have not been adequately evaluated in the FS report. First, the Site 1 landfill surface is currently covered with thick vegetation. It is reasonable to assume that methane concentrations in the subsurface are not significant enough to kill vegetation. It is also reasonable to assume that the cap will also be able to sustain similar vegetation. Secondly, on page 148 of the FS report, Alternative 2 is described as including a gas vent layer to remove landfill gases from the cap soil. Unfortunately, Figure 31 was not updated to reflect the gas vents, but the Navy intended to place vents in the biotic barrier to vent gases from the subsurface. Therefore, the FS report includes measures to protect the integrity of the soil cap, even though current conditions indicate vegetation will thrive. The FS report also summarized risk assessment results that indicated landfill gas emissions do not pose an inhalation risk to human health.

According to CIWMB's letter, the third performance standard to consider is reuse of the site. CIWMB stated that, because NASA may use the firing range at Site 1, staff are concerned that an explosive threat exists as well as a carcinogenic risk. In order for methane to pose an explosive hazard, there must be an enclosure for methane to accumulate and mix with air. Currently, no enclosures exist at the pistol range and none are planned. In the event the NASA builds an enclosure, regulations require that NASA continuously monitor the enclosure with a combustible gas indicator (CGI). The CGI would sound an alarm at a fraction of the lower explosive limit (LEL) of methane, alerting personnel and enabling ventilation. These monitoring requirements are necessary regardless of the venting system in place. Regarding carcinogenic risk, nonmethane organic compounds (NMOCs) have been evaluated in the FS and do not require collection and treatment. Furthermore, risk assessment results do not show unacceptable risks from NMOCs. The integrated surface sample (ISS) survey only had one detection of total organic carbon (at 1 part per million) during the Air Solid Waste Assessment Test (SWAT).

Capping Alternatives

As stated earlier, CIWMB indicated that an alternate cap design exists that would still meet performance standards and be more cost-effective than the Alternative 3 cap design. Therefore, an different cap design may be a more-effective basis for comparison (or more worthy competition) with Alternative 2. PRC agrees that the Alternative 3 design may not be the most feasible design for an impermeable cap; however, it is adequate for FS purposes. The FS report evaluates the need for an impermeable cap. A cap specifically designed to prevent infiltration is compared to a simpler cap which takes advantage of site-specific climatic as well as other conditions. A soil cap was found to be more feasible than an impermeable cap. The choice of a single barrier layer (clay) versus a composite barrier layer (clay plus a flexible membrane liner [FML]), or a prefabricated geosynthetic clay layer (GCL) has little significance in the evaluation. Using a GCL will lower the cost of constructing an impermeable cap and may further reduce infiltration. However, a drainage layer, gas venting layer, biotic barrier, and vegetative layer will still be needed and a soil cap would still more feasible because:

1. A single layer cap reduces infiltration to rates similar to those achieved with a low-permeability layer due to climatic conditions at Moffett Federal Airfield.

2. Current infiltration rates are not causing leachate plumes to migrate and, based on modeling, leachate plumes are not expected to exist in the future. Therefore, minimizing infiltration is not critical to preventing leachate migration.

3. A low-permeability cap would be more difficult to construct.

4. A multilayer, low-permeability cap would be more costly.

5. Leachate will exist regardless of cap type because refuse is below the water table. In addition, since waste is saturated below the water table, other technologies will be

required to mitigate leachate migration. If leachate plumes migrate, a multilayer cap would not enhance the effectiveness of hydraulic control or significantly decrease the amount of water requiring extraction and treatment.

PRC believes that Alternative 2 is protective of human health and the environment and is the most cost-effective solution to environmental contamination at OU1. PRC also believes that CIWMB concerns have been addressed. The proposed plan is completely consistent with EPA guidance, 14 CCR, and the 14 CCR Statement of Reasons. In addition, it is the most feasible alternative according to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and CERCLA evaluation criteria. Alternative 2 provides protection to human health and the environment in a cost-effective manner.

PRC has provided this letter to serve as a basis for discussion at the August 9 meeting. The comments and associated responses will be incorporated into the OU1 Record of Decision (ROD) responsiveness summary. If you have any questions, please call us at (303) 295-1101.

Sincerely,

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Enclosure

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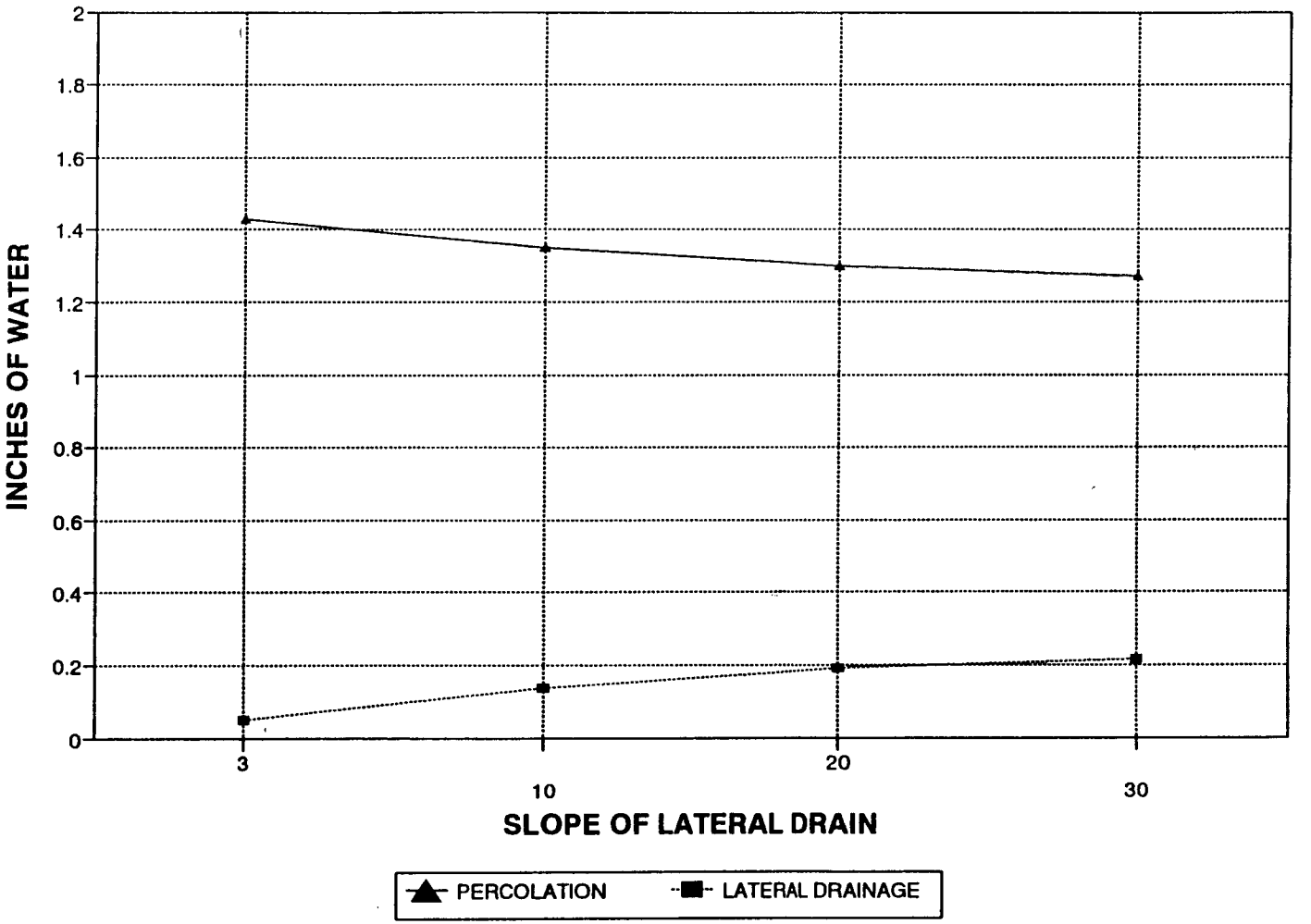
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