

MEETING MINUTES{PRIVATE }

**MOFFETT FEDERAL AIRFIELD
RESTORATION ADVISORY BOARD MEETING
JUNE 8, 1995 7:00 P.M.
MOUNTAIN VIEW POLICE AND FIRE AUDITORIUM**

Mr. Paul Lesti, Mountain View resident and community co-chair, opened the meeting of the Moffett Federal Airfield (Moffett Field) restoration advisory board (RAB) by reviewing the agenda and soliciting comments on the minutes of the previous meeting. The agenda for this meeting included the following:

- Minutes approval
- Committee reports
- Summary of agenda for remedial project managers' (RPM) meeting
- Focus topics
 - Ecological presentation
 - Ecological review of operable units (OUs) 1 and 5
 - Summary of OU5 - east-side aquifers
- Agenda for next meeting

Minutes Approval

There were no comments on the minutes of the previous meeting, and the minutes were accepted by voice vote.

Committee Reports

Mr. Lesti introduced reports on activities of the following committees: (1) technical, historical, and educational (THE); (2) cost; (3) communications, media, and outreach; and (4) organizational.

Dr. James McClure, Harding Lawson Associates (consultant to the Middlefield-Ellis-Whisman companies) and chair of the THE committee, reported that the committee met on May 17, 1995, and that

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the next meeting was ~~scheduled~~ for June 14, 1995 at 7:00 p.m. He indicated that discussions at the last meeting involved the OU1 ~~feasibility~~ study (FS) report. Dr. McClure indicated that the RAB had requested an extension of ~~the~~ 30-day public comment period for the OU1 proposed plan. Mr. Lesti confirmed the request for ~~an~~ extension and indicated that the comment period would probably be extended to 60 days. Dr. McClure noted that several members have copies of the OU1 FS report and could provide them to other ~~members~~ if there was interest. He indicated that discussion of OU1 would be the focus of the THE ~~committee~~ for the next few weeks and added that Ms. Cynthia Sievers, League of Women Voters, was ~~one of the~~ committee members who was reviewing the OU1 FS report. Mr. Peter Strauss, MHB Technical ~~Associates~~ (consultant to the Silicon Valley Toxics Coalition [SVTC]), asked whether the THE ~~committee~~ also was reviewing the responses to comments on previous versions of the OU1 FS report. Ms. Sievers ~~replied~~ that she had reviewed only comments from the regulatory agencies.

Ms. Christina Scott, Lockheed ~~Martin~~, reported that the cost committee met on May 24, 1995. She indicated that the committee ~~had~~ discussed the roles of committee members and the RAB charter, and had submitted proposed wording for the charter to the organizational committee. Ms. Scott noted that the OU1 and OU5 FS reports were discussed at the meeting. She summarized the following concerns expressed by committee members:

- OU1
 - Accuracy of cost projections
 - Funding of future expenses, especially repairs
- OU5
 - Accuracy and reliability of cost projections

Ms. Scott indicated that the committee would submit comments on the OU1 FS report to the Navy and the U.S. Environmental Protection Agency (EPA). She added that the next cost committee meeting was scheduled for June 21, 1995, at the Mountain View police and fire auditorium. Mr. Strauss asked whether Navy staff attended at the cost committee meeting. Ms. Scott replied that no Navy personnel were present. She noted that the committee was awaiting the final version of the OU5 FS report. Mr. Stephen Chao, U.S. Navy co-chair, added that the regulatory agencies were reviewing the final report and that it would be available soon.

Ms. Leslie Byster, SVTC, and Mr. Edwin Pabst reported on activities of the communications, media, and outreach committee. Mr. Pabst distributed a sign-up sheet for members who would be interested in presenting information to community groups. He indicated that the committee was considering preparing a newsletter and solicited technical information from the THE committee, especially concerning OUs 1 and 5. Mr. Thomas Harney noted that a reporter from the San Jose Mercury News attended the May 18, 1995 field trip to Moffett Field.

Mr. David Glick, Geoplexus and community vice co-chair, reported that the organizational committee had prepared a draft RAB charter and bylaws. He indicated that this document was available for review and solicited written comments to be submitted by the next RAB meeting. Mr. Glick added that, if few written comments were received, oral comments would be heard at the next RAB meeting, and a vote would be conducted to approve the charter and bylaws. Mr. Ted Smith, SVTC, noted that the voting table (page 11 of the draft charter) indicated that many topics require a two-thirds majority to pass. He added that this restriction could limit the RAB's ability to act. Mr. Glick responded that most daily RAB operations require only a simple majority and that only significant actions require a two-thirds majority (for example, removal of a member or co-chair). Mr. Smith asked why approval of meeting minutes required a two-thirds majority. Mr. Glick indicated that the charter was a draft document and that Mr. Smith's concerns would be considered. Mr. Lesti stated that the charter was based on a similar document prepared by the Presidio RAB. He indicated that the charter was very detailed because relations among members of the Presidio RAB were antagonistic. Mr. Glick announced that the next meeting of the organizational committee was scheduled for June 20, 1995.

General Announcements

Mr. Lesti announced that the next two RAB meetings were scheduled for July 13 and August 10, 1995 at 7:00 p.m. at the Mountain View police and fire auditorium. Mr. Lesti stated that Ms. Sievers, Mr. Harney, and he had attended a RAB conference at San Francisco State University. Mr. Harney described the conference. He noted that the focus of the conference was on how to become a more effective RAB member and added attendees had come from across the U.S. Mr. Harney stated that the speakers--

including deputy assistant to the secretary of the Air Force, Mr. Thomas McCall, and Reverend James Black--had urged more RAB involvement and described RABs as comprising a key element in protecting the nation's environment. He added that Ms. Byster had spoken during a problem-solving breakout group session. Mr. Harney said that a tape of the conference would be available for \$10. He also offered to share materials from the conference with any interested RAB members. Mr. Harney acknowledged Mr. Lenny Siegel, Pacific Studies Center, for organizing the conference and stated that the Moffett Field RAB is fortunate to have Mr. Siegel as a member.

Mr. Lesti indicated that diversity in RAB membership is important and urged all members to solicit participation from other community groups. He noted that Ms. Susan Jun, California Environmental Protection Agency Department of Toxic Substances Control (DTSC) public participation specialist, was helping in this effort. Ms. Robin Parker, City of Sunnyvale, offered to provide the telephone number of the Lakewood homeowners' association. Ms. Sievers asked why local government representatives were not on the document distribution list. She also asked why the City of Mountain View was not represented on the RAB. Mr. Russ Frazer replied that he was empowered by the Mountain View city council to represent the city on the RAB. Mr. Lesti indicated that he had delivered a copy of the OU1 FS report to the staff of the City of Mountain View. Ms. Sievers added that she had delivered the same document to the City of Sunnyvale staff.

Mr. Lesti continued with announcements. He said that the next RAB caucus was scheduled for June 21, 1995 at San Francisco State University. He also announced that National Aeronautics and Space Administration (NASA) staff were holding a stakeholders meeting in the Plaza Room of the Mountain View City Hall on June 13, 1995 at 8:00 a.m. He added that additional Moffett Field site visits were being planned. Mr. Chao solicited other visit times and invited all interested RAB members to write convenient trip times on the attendance roster. He noted that members should expect the trip to last about 1½ hours and could expect to visit each installation restoration site, in addition to Hangars 1, 2, and 3 and operating source control sites. Mr. Chao added that access to Moffett Field would not be a problem because the group would meet outside the facility and travel in Navy-owned vans. He indicated that the only access requirement was U.S. citizenship.

Mr. Lesti distributed a list of individuals who were available for the technical buddy system. He asked each member to fill in his or her name at the top of the page, circle the person of his or her choice, and return the list to him. Mr. Lesti noted that Ms. Heather Clark, Ms. June Oberdorfer, and Mr. Peter Strauss, all of whom are consultants to the SVTC, should not be on the list and should not be chosen. Mr. Lesti announced that a fact sheet describing Moffett Field was available. Mr. Chao added that Mr. Don Chuck, U.S. Navy, would be available to provide copies of Moffett Field documents or to photocopy RAB-related documents.

Summary of RPM Meeting Agenda

Mr. Chao provided a summary of the agenda for the Moffett Field RPM meeting to be held on June 9, 1995. Recent field activities and documents to be discussed during the RPM meeting included the following:

- Status of Site 5 bioventing pilot test
- Construction of the Site 14 recirculating in situ treatment system
- Quarterly sampling
- Site 12 completion report
- Status of Site 9 source control measure
- Site-wide ecological assessment
 - Final phase I report
 - Progress on phase II field work
- Station-wide remedial investigation issues
 - Status of ammunition bunkers
 - Risk assessment
- Status of OU5 FS
- EPA proposal to eliminate draft final documents
- Update on NASA investigations

Ecological Presentation

Mr. Lesti introduced Mr. Wil Bruhns, public assistance officer for the San Francisco Bay Regional Water Quality Control Board (RWQCB), who presented the first focus topic which concerned ecological receptors in the San Francisco Bay area. Mr. Bruhns noted that, from 1988 to 1992, he was the RWQCB representative working on Moffett Field and that the information he was presenting was only for public education and did not represent official RWQCB policy. He advised that his presentation would be divided into two segments:

1. What is wrong with San Francisco Bay?
2. How does Moffett Field fit into the larger bay ecosystem?

The following summarizes Mr. Bruhns' presentation.

1. What Is Wrong with San Francisco Bay?

San Francisco Bay is losing biological resources and studies are underway to evaluate the public health implications of this loss. There are three primary causes for loss of biological resources: (1) fresh water diversion, (2) habitat (wetlands) losses, and (3) pollution. Two studies have investigated the extent and types of pollution.

One study, which began in 1993, involves a regional monitoring program. This program includes monitoring of water, sediment, and bivalve accumulation at 16 stations throughout San Francisco Bay three times per year. Samples are analyzed for 66 chemicals, none of which are volatile organic compounds (VOCs). Sample results are compared to various available standards. Results from water samples collected in 1993 indicated that all samples exceeded allowable concentrations for polychlorinated biphenyls (PCBs) and some samples exceeded allowable concentrations of pesticides (DDT, dieldrin, and chlordane) and metals (copper, nickel, lead, and chromium). However, toxicity tests conducted using the same water samples

did not indicate any toxicity to fish. Results from sediment samples indicated that only nickel was widespread above acceptable levels. Sediment samples collected from the two monitoring stations in the southern part of San Francisco Bay contained higher concentrations of arsenic, cadmium, copper, silver, nickel, PCBs, and polynuclear aromatic hydrocarbons than did the other samples. There are no standards for bivalve accumulation.

A second pollution-related study, involving fish in San Francisco Bay, was conducted in 1994. The study included collection of sport fish (such as perch, shark, and sturgeon, but not shrimp) from 19 stations throughout the bay. Samples from the fish were analyzed for 100 chemicals (none were VOCs). Of 36 fish tissue samples: all exceeded PCB standards, 80 percent exceeded dioxin standards, and 70 percent exceeded mercury standards (mostly in sharks). Fish tissue samples also indicated the presence of DDT, dieldrin, and chlordane. All other chemicals were below applicable standards. Ms. Byster asked why VOCs had not been analyzed. Mr. Bruhns responded that the budgets for the studies were limited; therefore, only chemicals most likely to be present were chosen. VOCs were not included because they would not be expected to exist in open bay waters, as a result of their volatile nature.

2. How Does Moffett Field Fit into the Larger Bay Ecosystem?

Trichloroethene (TCE) from Moffett Field groundwater could affect the bay ecology. However, TCE concentrations in groundwater near the bay are less than 100 micrograms per liter (mg/L), and levels at which ecological receptors are affected are much higher. For example, acute (96-hour) toxicity effects are not observed in freshwater organisms at TCE concentrations less than 45,000 mg/L. Some marine organisms may be affected at TCE concentrations near 2,000 mg/L; behavioral effects are not observed until concentrations exceed 27,000 mg/L.

Regulatory agencies have calculated theoretical concentrations that could indicate effects in humans assuming TCE accumulates up the food chain into organisms that people eat. The following levels were calculated (all in mg/L): 81 (EPA), 92 (DTSC, Inland Surface Waters Division), and 27 (DTSC, Bay and Estuaries Plan). Mr. Siegel asked whether similar values

were available for vinyl chloride. Mr. Bruhns responded that they were available and that, if Mr. Siegel was interested, he would look them up after the presentation.

Metals are also a concern to potential ecological receptors. Copper and nickel concentrations are highest in the southern part of San Francisco Bay, and concentrations exceed applicable standards at most locations. Any addition of these metals to the bay would be harmful. Copper is found in automobile brake pads and surface water runoff may be the largest source of metals to the bay.

In summary, Moffett Field groundwater may have some potential to harm the bay. Two options available to mitigate this include (1) studying the Moffett Field area more intensely to evaluate the harm, and (2) cleaning up groundwater to avoid potential harm. However, metals (including nickel and copper) are naturally occurring in the rocks surrounding San Francisco Bay. Historically, nickel was mined in Mendocino County, north of San Francisco. Copper is also widely used in tires and by the electronics, semiconductor, and plating industries.

Following Mr. Bruhns presentation, Mr. Robert Strena asked whether there was a current source of DDT. Mr. Bruhns replied that, although DDT is no longer used in the U.S., it is still manufactured in the U.S. for export to other countries (such as Mexico). He added that some DDT may be transported from Mexico to the U.S. by windblown dust. Ms. Byster asked what the dioxin source might be and whether only the 2,3,7,8-tetrachlorodibenzo-p-dioxin congener had been analyzed. Mr. Bruhns responded that dioxins are a byproduct of PCB manufacturing and are also produced when plastics are burned. He added that some oil refinery wastes contain low levels of dioxins. He indicated that all 17 dioxin congeners had been analyzed.

Mr. Strauss asked about the sources of PCBs. Mr. Bruhns responded that historical use of PCBs (such as in electrical transformers) was the most likely source. He added that the highest PCB measurement was in a sample collected at the Golden Gate and that this location was not expected to contain high PCB levels. Mr. Bruhns noted that the PCB standard used for comparison is in the parts-per-quadrillion (picogram per liter) range, which is very low.

Ms. Sievers asked how bay muds prevent groundwater movement and how groundwater would affect the bay. Mr. Bruhns replied that bay muds do not prevent movement but allow movement of groundwater only very slowly. He added that most groundwater pollution is contained in sediments overlying the bay muds; therefore, the bay muds restrict downward movement of contaminated groundwater except where there are artificial conduits, such as abandoned wells. Mr. Strauss asked about Mr. Bruhns' most serious concern relative to the addition of pollutants to San Francisco Bay. Mr. Bruhns responded that stormwater discharge, not groundwater flow, was his greatest concern. He added that stormwater discharge also would be his main concern for other parts of Santa Clara County.

Ecological Review of OUs 1 and 5

Mr. Chao then introduced Dr. Joseph LeClaire, Montgomery Watson (consultant to the Navy), who presented the second focus topic, which concerned ecological receptors at OUs 1 and 5 at Moffett Field. The following summarizes Dr. LeClaire's presentation.

The types of contaminants present at Moffett Field are similar to those found at other sites around San Francisco Bay. Pesticides, PCBs, and metals are common problems at all sites, especially in stormwater discharge.

At OU5, ecological impacts are possible where groundwater discharges to the surface. There is a potential for groundwater flow to the surface at Marriage Road and Patrol Road ditches, and the Navy Channel. However, significant groundwater discharges have not been observed. Most groundwater is extracted by the runway subdrain system connected to the Building 191 pumping station. This water, in addition to other stormwater flows, is discharged to the Northern Channel, which flows to the Moffett Channel and Guadalupe Slough and, ultimately, to San Francisco Bay. The Navy collected samples from the Navy and Northern Channels. High levels of PCBs, pesticides, and some metals were detected in samples collected from the Northern Channel near the outfall from Building 191 and where an emergency pumping station occasionally discharges water removed from Marriage Road ditch. No VOCs were measured in any of the samples. This

is probably a result of the volatility of VOCs and their rapid degradation by sunlight. Sediment samples were recently collected from 11 stations and analyzed using various toxicity tests. Results of these tests will be discussed with the regulatory agencies at a meeting scheduled for June 19, 1995.

Mr. Strauss asked about the potential for flow beneath the Navy and Northern Channels toward the bay, especially if sand lenses are present within the clays that dominate the lithology at the northern end of Moffett Field. Mr. Timothy Mower, PRC Environmental Management, Inc. (PRC) (consultant to the Navy), responded that groundwater flow northward beneath the Northern and Navy Channels is unlikely mainly because of the denser, saltier water beneath the saltwater evaporation ponds immediately north of the Northern Channel. Water beneath the saltwater evaporation ponds is several times more saline than seawater and more than 100 times more saline than most of the groundwater at Moffett Field. This density difference acts to prevent northward migration of less dense groundwater as it moves toward the Northern Channel and the saltwater evaporation ponds. Furthermore, the existence of sand lenses beneath the Navy and Northern Channels is unlikely based on the lithologic data collected in the northern portion of Moffett Field. Finally, transport of contaminants in groundwater is highly slowed relative to the movement of the water itself because the chemicals preferentially attach themselves, or sorb, to organic material in the clays. For these reasons, movement of chemicals north of the Northern Channel is considered highly unlikely.

Dr. LeClaire continued his presentation by discussing ecological receptors at OU1.

OU1 is a ruderal, or disturbed, habitat. It contains non-native plants, such as thistle, barley, oats, and coyote brush. Animals include voles, shrews, hares, and, at Site 2, a red fox. The red fox is not an indigenous species and may prey on threatened species, such as the burrowing owl, clapper rail, and salt marsh harvest mouse. No burrowing owls are present at either the Site 1 or Site 2 landfills, probably because the owls require a wide field of view around their burrows, and the tall grasses at the landfills prevent such a view.

Installing the caps on the landfills will destroy the current habitat, but the habitat is expected to recovery rapidly (based on historical aerial photographs showing rapid growth from bare soil conditions). In addition, habitat recovery will be encouraged through engineering controls during cap implementation.

Ms. Scott asked whether repopulating the cap would be considered. Dr. LeClaire responded that reestablishing the habitat (for example, transplanting coyote brush) was being considered. He added that, although the habitat is disturbed, it has value. The only species that will not be encouraged are burrowing species. However, the cap will contain a biotic barrier to prevent damage by burrowing animals. Dr. LeClaire added that shrews and voles typically burrow only a few inches below the surface and squirrels burrow only 24 inches deep. The soil cap will be 36 inches thick, at least 1 foot thicker than typical burrows. Pathways to ecological receptors include direct contact, inhalation of gases, and ingestion of soil. The soil cap will prevent these potential exposures. (This concluded Dr. LeClaire's presentation, and discussion turned to general topics of interest for OU1.)

Ms. Sievers asked whether the Navy had discussed landfill issues with the cities of Mountain View and Sunnyvale to exchange information and to learn from previous experiences with landfill closures. Mr. Michael Young, PRC, responded that some contacts had been made and some of the cities' documents had been reviewed. Ms. Mary Vrabel, League of Women Voters, asked whether both caps (soil and multilayer) analyzed in the FS would prevent penetration by burrowing animals. Mr. Chao replied that both would be effective because both would contain a biotic barrier.

Mr. Lesti asked for additional discussion of the characterization of the landfill contents. Mr. Young responded that review of landfill disposal records was the most desirable method to characterize landfill contents, but that no records for the OU1 landfills were available. Instead, reports from individuals using the landfills were used to estimate the landfill contents. Mr. Young added that EPA guidance recommends that landfills not be characterized because of (1) the physical hazards (for example, explosion or puncturing of drums), and (2) the difficulty of accurately characterizing landfill contents as a result of their naturally nonuniform distribution. Instead, EPA guidance recommends use of capping as a presumptive remedy. The Navy investigated landfill contents with a few soil borings. The Navy also

conducted geophysical surveys to locate potential buried drum fields (none were found) and installed wells to monitor for landfill gases. Mr. Young summarized the Navy's investigations by stating that the available data do not support the volumes of wastes that personnel interviews reported to have been placed in the landfills.

Ms. Sievers stated that California landfills are divided into three classes: (1) hazardous, (2) mixed, and (3) nonhazardous. She asked how the Moffett Field landfills would be classified. Mr. Young responded that the Moffett Field landfills would be considered Class III (nonhazardous). This is based on observations that the landfills contain mainly construction debris. Ms. Sievers noted that personnel interviews indicated that large volumes of solvents had been disposed of in the landfills and that such solvents would require classification as Class I or II. Mr. Young replied that, although some solvents had been identified at the landfills, the volumes appeared to be much smaller than the historical interviews indicated. He added that the solvent volumes stated by previous base personnel had probably been overestimated. Ms. Sievers asked where the wastes were placed if the waste solvents were not disposed of in the landfills. Mr. Young responded that liquid wastes may have been disposed to storm drains or sanitary sewers. He added that waste volumes may have been overestimated because accurate recollection of waste volumes over long periods (decades) is difficult.

Mr. Chao stated that a primary difference between hazardous and municipal/solid waste (nonhazardous) landfills is in the liner beneath the landfill, not in the cap above it. He noted that the main difference in requirements relate to constructing new landfills, not to closing existing ones. Capping and monitoring requirements are similar for closure of both hazardous and nonhazardous landfills. Ms. Sievers stated that caps are a primary concern for closure of old landfills around the bay and that these existing landfills must satisfy many regulatory requirements. She added that existing landfills close to Moffett Field must meet strict requirements and that the landfills at Moffett Field should be closed under similarly strict requirements. These nearby landfills are also municipal landfills and, according to the personnel interviews, Moffett Field landfills contained more hazardous materials. Mr. Chao responded it was the responsibility of Mr. Joseph Chou, DTSC, to ensure that the Navy meets all state requirements.

Ms. Sievers asked whether management of methane and leachate were included in the requirements for the OU1 landfills. Mr. Chou responded that the California Integrated Waste Management Board specified Title 14 of the California Code of Regulations as applicable requirements. He added that most solid waste landfills contain some hazardous wastes and closure of these landfills must include a cap, monitoring of the groundwater for 30 years, and control of methane migration. All of these also are considered necessary for the landfills at Moffett Field.

Mr. Chou noted that the primary issue at the OU1 landfills should be whether a soil or multilayer cap is selected. He indicated that the regulatory review of the two types of caps identified no significant difference in the effectiveness of the caps. He also noted that results from the EPA Hydrologic Evaluation of Landfill Performance (HELP) model for OU1 indicated only a 5 percent difference in prevention of infiltration into the landfills. However, the soil and multilayer caps have significantly different costs. He added that, at Site 1, most of the refuse is below the water table; therefore, minimizing infiltration is not a primary concern in cap selection. He also stated that the local rainfall at Moffett Field does not produce significant infiltration. Mr. Chou summarized by indicating that the Moffett base realignment and closure (BRAC) cleanup team (BCT) had thoroughly evaluated the alternatives presented in the OU1 FS report and found that the soil cap was the best cap option.

Ms. Sievers stated that protection of surface water and groundwater is a key item at the OU1 landfills. Mr. Michael Bessette, RWQCB, indicated that the groundwater collection trench at Site 1 addresses the contingency of contaminants migrating via groundwater toward surface water bodies. Ms. Sievers asked whether the requirements for Moffett Field are similar to those for other area landfills. Mr. Bessette responded that requirements depend on the dates on which the landfill received waste. Ms. Sievers asked whether the landfill operator would be exempt from regulations if a landfill closed by a certain date. She noted that rate payers in the area have endured significant cost increases to comply with these regulations and stated that Moffett Field landfills should be held to the same standards. Mr. Young noted that, although the OU1 landfills are inactive, the landfills are not closed and, therefore, are subject to current regulations.

Mr. Strauss noted that no groundwater collection trench was included at Site 2 and that groundwater flows beneath Site 2 to the Navy Channel north of the site. He asked whether the OU1 FS included a contingency to address cessation of pumping at Building 191. Mr. Young responded that the OU1 FS included no provision for this occurrence. Ms. Dierdre O'Dwyer, PRC, added that this potential is addressed as part of the OU5 FS. She noted that, if pumping at Building 191 was stopped, the land surface would become flooded, and existing land uses would change drastically. If Building 191 were deactivated, a study would be required to evaluate the many effects that would result (including effects on buildings, ecological habitats, ammunition bunkers, and subsurface utilities). Ms. O'Dwyer added that groundwater extraction from the runway subdrain system enhances the groundwater flow gradient that, in turn, affects movement of contaminated groundwater. She noted that stopping pumping at Building 191 would result in smaller groundwater flow gradients and slower movement of groundwater. Ms. O'Dwyer indicated that the remedial action objectives in the OU5 FS are based on residential land use, which requires continued pumping.

Mr. Siegel stated that he did not believe that the anecdotal reports based on personnel interviews should be discounted. He indicated that long-term monitoring at the groundwater collection trench may provide the necessary evidence to make this determination, but that available data are not persuasive. Mr. Siegel added that, although there may be adverse effects from discontinuing pumping at Building 191, this possibility should be evaluated. He asked whether NASA had considered no future pumping in the design of new structures in the area affected by pumping at Building 191. Mr. Siegel stated that one reasonable anticipated future use of the area might be restoration of wetlands at Moffett Field.

Mr. John Dufresne, Santa Clara County Department of Public Health, stated that he did not have confidence in the results obtained from the HELP model and that most Class III landfills leak despite a 3-foot clay liner compacted to a hydraulic conductivity of 10^{-6} centimeters per second (cm/sec). He stated that, if the bay muds surrounding the landfills exclude water entering from beneath, then recharge must be from above. Mr. Siegel asked how Mr. Dufresne would change the proposed remedy for OU1. Mr. Dufresne responded that a third cap alternative intermediate between a soil cap and a multilayer cap should be evaluated. This alternative could include a 2-foot base layer over the refuse, a 1-foot clay layer compacted to a hydraulic conductivity of 10^{-6} cm/sec, and a 1- to 2-foot cover layer. He added that

this alternative would be less expensive than Alternative 3 presented in the OUI FS report. Mr. Young stated that the bay muds surrounding the landfills do not stop flow, but only decrease the rate of flow. Therefore, saturated conditions within the refuse do not require significant amounts of infiltration, but probably result from a continuous, if slow, influx of groundwater.

Mr. Chao stopped discussion of OUI so that the third focus topic could be presented. Mr. Lesti added that he had a copy of the OUI FS report that he could lend to an interested member and that two additional copies also were available.

Summary of OU5

Mr. Chao presented the third focus topic, which included a brief summary of the remedial alternatives for OU5. Mr. Chao's presentation used slides from Mr. Mower's presentation at the May 11, 1995 meeting. The following summarizes Mr. Chao's presentation.

Alternatives for cleanup at OU5 include:

1. No action (includes groundwater monitoring)
2. Institutional controls and indirect restoration
3. Institutional controls and future treatment
 - 4a. Permeable reaction cell
 - 4b. Air sparging and soil vapor extraction
 - 5a. Groundwater collection, air stripping, and discharge
 - 5b. Groundwater collection, ultraviolet (UV) oxidation, and discharge

Alternative 1 involves no active engineering controls at OU5 but includes long-term groundwater monitoring. Alternatives 2 and 3 use institutional controls, such as deed restrictions, to prevent exposure to OU5 groundwater. Alternative 2 also includes indirect restoration to the community

by funding a local environmental project. Examples of local projects could include subsidies to promote installation of water conservation devices or enhancement of local water treatment systems. This alternative would maximize the benefit to the community by allowing the community to choose whether cleanup at OUS or some other local environmental program would provide the most community benefit. Alternative 3 also includes institutional controls but adds the option for future construction of a water treatment plant if it becomes necessary to use OUS groundwater before natural attenuation processes reduce contaminant concentrations below maximum contaminant levels (MCLs). Alternatives 2 and 3 also include long-term groundwater monitoring.

Alternatives 4A and 4B use in situ remediation strategies. Alternative 4A includes in situ treatment of groundwater using a permeable reaction cell. VOCs in groundwater are destroyed as they pass through a permeable cell and react with iron particles. This alternative also includes impermeable slurry walls through less permeable (nonchannel) lithologies to funnel groundwater toward the reaction cells. Alternative 4B employs in situ treatment of groundwater using an air sparging and soil vapor extraction system. Air sparging introduces air into the aquifer to volatilize contaminants which are then removed by the vapor extraction system. An air pollution control device is used to treat the extracted vapors. Alternatives 4A and 4B both include deed restrictions to limit groundwater use during remediation and long-term groundwater monitoring.

Alternatives 5A and 5B use groundwater collection and aboveground treatment strategies. Both alternatives include extraction of groundwater through a system of extraction wells and reinjection of treated water into the aquifer. Alternative 5A uses air stripping to remove contaminants from the groundwater after it is extracted. Alternative 5B uses UV oxidation for contaminant treatment. Similar to the in situ alternatives, Alternatives 5A and 5B include deed restrictions to limit groundwater use during remediation and long-term groundwater monitoring.

Ms. Scott asked whether other groundwater discharge options were considered in addition to reinjection.

Ms. O'Dwyer responded that other options, such as discharge to a publicly owned treatment works via the sanitary sewer and discharge to the storm sewer also were considered. However, aquifer reinjection

was preferred to maintain aquifer beneficial uses, such as minimizing saltwater intrusion and land subsidence. Ms. Scott asked whether an effectiveness evaluation had been conducted to investigate the feasibility of reinjection. Ms. O'Dwyer replied that this analysis was done and is included in Appendix E of the OU5 FS report.

Mr. Chao noted that health risks at OU5 are based on residential land use. He added that no risks to ecological receptors have been identified. Mr. Chao stated that chemical concentrations in OU5 groundwater are much lower than the ambient water quality criteria for aquatic life (TCE - 2,000 mg/L; tetrachloroethene - 450 mg/L). He added that higher chemical concentrations were observed historically but that these higher levels are no longer present at OU5. Mr. Chao indicated that the restoration time frame for all alternatives was greater than 50 years.

Mr. Strauss asked whether the connections between the A1- and A2-aquifer zones described in reports by Emcon Associates (Emcon) were evaluated in the OU5 FS report. Mr. Mower responded that the wells in question are located east of Hangar 3 and are screened across three intervals of the A1-aquifer zone as well as the A2-aquifer zone. These intervals correspond to layers 1 through 4 of the OU5 groundwater model. He indicated that additional wells have been installed by the Navy since the initial wells constructed by Emcon. Mr. Mower noted that analysis of water elevations in all the wells east of Hangar 3 indicated varying vertical hydraulic gradients. Gradients between the A1- and A2-aquifer zones were not consistently directed in comparison to gradients between the deeper B and C aquifers which are consistently and strongly upward. Mr. Mower summarized that hydraulic connection between the A1- and A2-aquifer zones is likely and that further information is contained in the groundwater modeling discussion presented in Appendix E of the OU5 FS report.

Dr. McClure asked the regulators whether the BCT prefers Alternatives 2 and 3. He added that these alternatives represent no active remediation and questioned whether such a decision could be viable because other Superfund cleanup sites in the area have already invested large sums of money in an attempt to restore groundwater concentrations to below MCLs. Mr. Michael Gill, EPA, responded that he does not agree that Alternatives 2 and 3 are appropriate and that he prefers active remediation. He added that the type of active remediation has not yet been selected. Mr. Chao noted that slurry walls had

been added to Alternative 4A to provide additional hydraulic control, thereby significantly increasing the cost of the alternative over that of installing permeable reaction cells only in channel lithologies.

Mr. Siegel stated that his impression of the decision process was that the Navy's desire to select an alternative that does not use active remediation was based on funding limitations. He added that the BCT could select a more expensive remedy but delay its implementation until funds were available. This would allow higher priority sites to be cleaned up first. Mr. Chao responded that the Navy wants to spend its funds wisely and none of the cleanup alternatives will meet the remediation goals within 50 years. He continued by emphasizing that the community will realize no real benefit from the cleanup of OU5 groundwater if the water is never used. Mr. Chao noted that Alternatives 2 and 3 provide more tangible benefits that the community can use today. Mr. Gill commented that the estimates of restoration time frames are based only on computer models and cannot be relied upon for precise estimates. He added that, although no known technology will restore OU5 groundwater concentrations to below MCLs, different alternatives may be effective in lowering the chemical concentrations.

Mr. John Young, Emcon Associates, indicated that the policy of the State of California is shifting toward establishing nonattainment areas and that legislation is currently being prepared to set this policy. He asked what immediate risks are posed by OU5 groundwater. Mr. Chao responded that no risks to human health or ecological receptors have been identified, but that there are only potential risks if the groundwater is used as a drinking water source. Ms. O'Dwyer added that naturally occurring levels of inorganic chemicals at OU5 exceed drinking water standards. Mr. Strauss noted that the contaminant plume at OU5 is migrating into an uncontaminated area. Mr. Chao responded that this was correct but that the area at risk was only a narrow (less than 500 feet wide) strip of groundwater between the contaminant plume and the area in which the groundwater total dissolved solids content precludes its use for drinking. He added that pumping groundwater from this narrow area would cause further saltwater intrusion into the area and eliminate its continued use as a drinking water source. Mr. Gill commented that active remediation may decrease contaminant mass and risk even if MCLs are not reached.

Mr. Bessette noted that the state nonattainment policy currently applies mainly to petroleum-contaminated sites. Mr. John Young responded that the nonattainment policy in state Region 2 was

developed for solvent-contaminated sites, especially where dense nonaqueous phase liquids (DNAPLs) are a concern. He indicated that nonattainment areas were acceptable where land use was zoned for industrial use (areas such as Emeryville or San Francisco International Airport).

Mr. Siegel commented that it is important to apply the same standards to all sites in the Santa Clara Valley. Mr. Chao responded that, at Moffett Field, the only comparison is between the east-side and west-side aquifers. He indicated that groundwater in the west-side aquifers contains high contaminant concentrations that could affect the bay. In addition, DNAPLs may provide a continuous chemical source. Mr. Chao noted that groundwater in the east-side aquifers has much lower concentrations and contaminant sources have been removed. Mr. Siegel asked Mr. Bruhns whether Moffett Field is different than other sites in Santa Clara Valley. Mr. Bruhns responded that Moffett Field is different than other sites because it is closer to the bay and, therefore, has a greater potential to affect the bay. He added that all of the other sites have a greater potential for future use of groundwater because the natural water quality is better at the other sites than it is at Moffett Field. Mr. Bruhns noted that the state nonattainment policy for solvent plumes required attempting a cleanup, conducting a residual risk analysis, developing a risk management plan, and then ceasing the cleanup. He added that the nonattainment area at San Francisco International Airport allows jet fuel to remain beneath the runways. Mr. Siegel reiterated that OU5 should be treated in a manner consistent with the treatment of all other sites in Santa Clara Valley.

Mr. Smith asked whether the state nonattainment policy required that action be taken first. Mr. Bruhns replied that this was correct. Mr. Smith noted that state guidelines require compensation for destroying a resource. Mr. Bruhns responded that, although this is part of state policy, requiring such compensation has not yet been applied to any site. He added that such a requirement may be exercised first at the Presidio. Ms. Sievers commented that the federal government has required local communities to become involved in cleanups and that local requirements should be met. Mr. Chao responded that all applicable or relevant and appropriate requirements (ARARs) will be met at Moffett Field as they are at all other sites.

Closing Announcements

Dr. McClure reminded the group that OU1 is the main topic for the next meeting of the THE committee and that the meeting would be held on June 14, 1995 at the Mountain View senior center on Escuela Street.

Mr. Chao advised that the OU1 public meeting would be held on June 15, 1995 and that the public comment period for OU1 would be extended for a minimum of 30 days. Ms. Sievers asked whether the purpose of the public meeting was to present the proposed remedy for OU1 and to receive comments. Mr. Chao indicated that this was correct. Mr. Strauss asked whether a court recorder would attend the OU1 public meeting. Mr. Chao noted that a court recorder would be present. Mr. Gill noted that the OU5 proposed plan, which contains the Navy's preferred alternative, has not yet been completed. Mr. Lesti asked what schedule was envisioned for completion of the OU5 FS report and proposed plan. Mr. Chao responded that these documents probably would be completed during the next 1 to 2 months and that he would keep Mr. Lesti informed of the schedule. Mr. Smith asked when the OU5 public meeting would be held. Mr. Chao replied that the meeting would not be held before the end of July 1995.

Agenda for Next Meeting

Mr. Lesti then concluded the RAB meeting by soliciting comments on the agenda for the next meeting. Agenda items for the next meeting will include the routine overview, minutes approval, committee reports, and RPM meeting report. Focus topics may include continued discussion of OU5 and OU1. Dr. McClure suggested that OU1 be the central topic while the public comment period for OU1 was still open. He asked that one of the regulators attend the next meeting of the THE committee to answer questions. Mr. Lesti reminded the group that the next full RAB meeting would be held on July 13, 1995 at 7:00 p.m. at the same location (City of Mountain View police and fire administration auditorium). Mr. Lesti then adjourned the meeting.