CITY OF SUNNYVALE CALIFORNIA

June 14, 1995

Steven Chao, 1843
Commanding Officer
Department of the Navy
Engineering Field Activites West
900 Commodore Dr.
San Bruno CA 94066-5006

Subject: Moffett Field Base Closure

Dear Mr. Chao:

Recently the City of Sunnyvale Public Works Department Solid Waste Division reviewed a copy of the Operable Unit 1 (OU1) Final Feasibility Study Report. This review followed a public notice that was printed in the San Jose Mercury News that indicated that the Navy is planning to close two landfills, the runway landfill (Site 1) and the golf course landfill (Site 2), with a three foot soil cap. Our review of the report and knowledge of state and federal solid waste regulations for municipal solid waste landfills has led to the conclusion that the proposed method of closing the two landfills does not meet the most minimal standards of the state and federal governments. The proposed closure method is far less protective of the environment and the public health and safety than the methods recently used to close the Sunnyvale Landfill, a nonhazardous municipal solid waste site. Sites 1 and 2, which are known to have received significant quantities of hazardous waste, should be closed to a higher, not lower, standard than the Sunnyvale Landfill and other recently closed Landfills.

The following questions and comments follow your report numerically.

1.3.2 Site 1 Hydrogeology

The report states that landfill liners typically have a conductivity of 1E-06 cm/sec and that native soils under the site have an average conductivity of 1E-08 cm/sec. There are also areas under the site with very high permeabilities (ie. sand lenses). From the limited data on hand the report presumes that an uninterrupted layer of low permeability soil underlies the site. However, it is common in the south bay for high permeability sand lenses to disrupt the continuity of such a layer. These sand lenses are found only after exhaustive study or actual excavation of the site. The report implies that the natural soils beneath the site exceed standards for landfill liners. To

use the conductivity for naturally occurring soils is unreliable, and it is unreasonable to assume that native unengineered soils are superior to properly engineered and constructed liners.

Perched leachate in the landfill is said to be caused by placing refuse in lifts. Common landfill practice is to build landfills in lifts and most landfills do not develop perched groundwater or leachate. Those that do, do not generally attribute the perched leachate to placing the waste in lifts. Thus, your conclusion regarding the cause of the perched leachate at these sites does not appear to be well supported.

The description of groundwater "barriers" is misleading and not consistent with previous groundwater work in the south San Francisco Bay. Generally in the south bay there are a number of transmissive zones and naturally occurring "groundwater barriers" are not believed to exist close to the surface.

1.3.3.1 Summary of Data Collected

The report states that W1-04 was damaged and will be abandoned properly during the RA. It is generally accepted practice that damaged wells are abandoned as soon as practical to avoid groundwater contamination.

While a limited amount of data on detections is provided in the appendices it would be helpful to identify what tests were done and will be done and at what frequency.

1.3.3.5 Groundwater Surrounding the Landfill

"... as a conservative approach, all perimeter A1 aquifer wells at site 1 ... are considered downgradient." This assumption may not be conservative, has a very high likelihood of leading to incorrect conclusions, and may allow a plan that will do more harm than good. It is possible that the site is being affected by other sources or that the site has a single hot spot that is contaminating all other areas of the site. Applying this simple assumption to a possibly complex situation will not allow proper analysis of these and other possibilities.

In addition, this assumption has led to lumping all "downgradient wells" together and has artificially made the number of detections of contaminates seem small. Upon review of individual wells for organic contaminates it is very likely that some wells will show consistent contamination while others are consistently "clean".

From the limited information present it appears that groundwater is flowing beneath the site and that contamination is occurring, but there is insufficient information

presented in an acceptable manner to reach the same conclusions as in the report. It is also alarming to see the number of references to laboratory error and inaccurate data analysis in the report. The report does not speak well of the reliability of the groundwater data, while on the other hand it uses that same data to draw broad conclusions and to gamble on a skimpy closure method.

Conclusions

The conclusion section does not consider seasonal variability of groundwater and leachate elevations. Groundwater and leachate levels generally play a role when considering "consecutive" detections. Without accounting for seasonal variations, the analysis is incomplete and fails to justify the stated conclusions.

Analysis of groundwater required by title 23 of the California Code of Regulations (CCR) should be reviewed. The statement "... requires that two consecutive detections above a water quality protection standard (WQPS) (typically background concentrations) ..." is not necessarily true. The selection of WQPS requires a scientific analysis of existing conditions as well as potential long term goals and uses of water at the site. There must be a justification for the WQPS that is identified. There is no justification presented. Until WQPS are established the conclusion drawn is not appropriate.

The statement that "however, the landfill is the likely source of organic leachate chemicals that have been infrequently detected in groundwater samples." argues that the landfill is a source of groundwater contamination. If the site is a source of groundwater contamination the site should have a corrective action plan to mitigate any adverse environmental impacts.

Based on the landfill cross sections provided (figures 5,6 and 7) well W1-06 is the only well shown with a screened interval that is in a high permeability lens. Other wells are generally screened in bay muds. This greatly limits these wells' ability to be used as monitoring wells. New wells should be constructed in highly permeable layers so that accurate data can be obtained and analyzed. All boring logs should be made part of the report.

Under the inorganic constituent discussion it is stated that there is a potential for flow from the leachate zone to the aquifer zone. The immediately preceding paragraph implies that it is highly unlikely that there is a potential for flow from the landfill to groundwater. These statements are highly contradictory and should be reviewed for consistency.

The next paragraph describes that wells with high TDS are used for comparison to

determine groundwater contamination. The reason for using the high TDS wells is clear; these wells are most obviously from the area around site. The wells are typed, either up or down gradient, and then the well's contaminate analyses are compared to determine the extent of contamination. Earlier in the report discussion was centered on samples with high matrix interference that could likely lead to erroneous results. Matrix interference is often caused by high TDS in the samples. These statements therefore also seem contradictory and should be reviewed for consistency.

The North Base Wells that were chosen for background comparison are not identified. Their locations and boring logs should be provided.

The conclusion that the source of TPH in Jagel slough is not a result of Site 1 may be in error. It is true that wells W1-01 and W1-16 are between Jagel Slough and Site 1, but both are screened through clay. Clay is not a very permeable material and contamination from Site 1 may be reaching the slough through a sand lens that is not currently being monitored.

Section 1.3.5 Site 2 Hydrogeology

Figure 20 shows that the site is being dewatered by the drainage pumping house Bldg. 191. The pump discharge should be analyzed for contamination.

1.3.6.1 Summary of Data Collected

W2-12 is not considered an upgradient well, but it seems that it should be based on its location and screened interval.

The conclusions drawn for Site 2 are the same as for Site 1. The conclusions are drawn partly from a peculiar analysis of Title 23 CCR and the conclusions are based on monitoring data that are not presented in the report. As with Site 1, the conclusions are based on monitoring data that has been obtained from groundwater wells that appear to be screened primarily in clay.

Inorganic Constituents

The conclusions drawn for Site 2 are nearly identical to Site 1 and are subject to the same potential flaws as discussed for Site 1.

1.3.6.6 Surface Water

Samples were collected, but there is no description of how many samples were taken,

how often the samples were taken and what tests were done on each sample.

The conclusion that Site 2 is not leaking into surface water because contaminates should be consistently detected should be reviewed. Leakage from a landfill can be based on many variables, but in general landfills are most likely to leak after major storm events. The data on leakage should be reviewed to determine if detections of surface water contaminates are occurring at some regular interval or if leakage is related to some physical phenomenon.

1.3.6.7 Landfill Gas

The frequency of testing should be discussed and should conform to Title 14 CCR. Physical structures within 1,000 feet of a landfill should be monitored.

1.3.7.3 Leachate Migration into Surrounding Groundwater

Areas around the margin of South San Francisco Bay exhibit highly variable permeability, with areas of bay mud (low permeability) containing lenses of other materials such as sand (high permeability) in a highly unpredictable fashion. These sand lenses often act as conduits for movement of leachate and landfill gas. Therefore, using the average K values for bay mud beneath the site is questionable. By using the K values presented the higher permeability of portions of the strata beneath the sites is ignored. Further, the sample preparation that was used to find the stated K values in the laboratory probably does not replicate the condition of the clay beneath the sites when the sites were first used.

Section 1.5 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

This report does not appear to take into account the requirements of Title 14 CCR for closure of a landfill. Most of the discussion seems to be ignorant of Title 14. The report should also consider Title 23's requirements for groundwater monitoring and leachate management. Specifically the report does not address the "five foot separation criteria" for waste and groundwater and does not adequately address Chapter 15, Article 5 monitoring requirements.

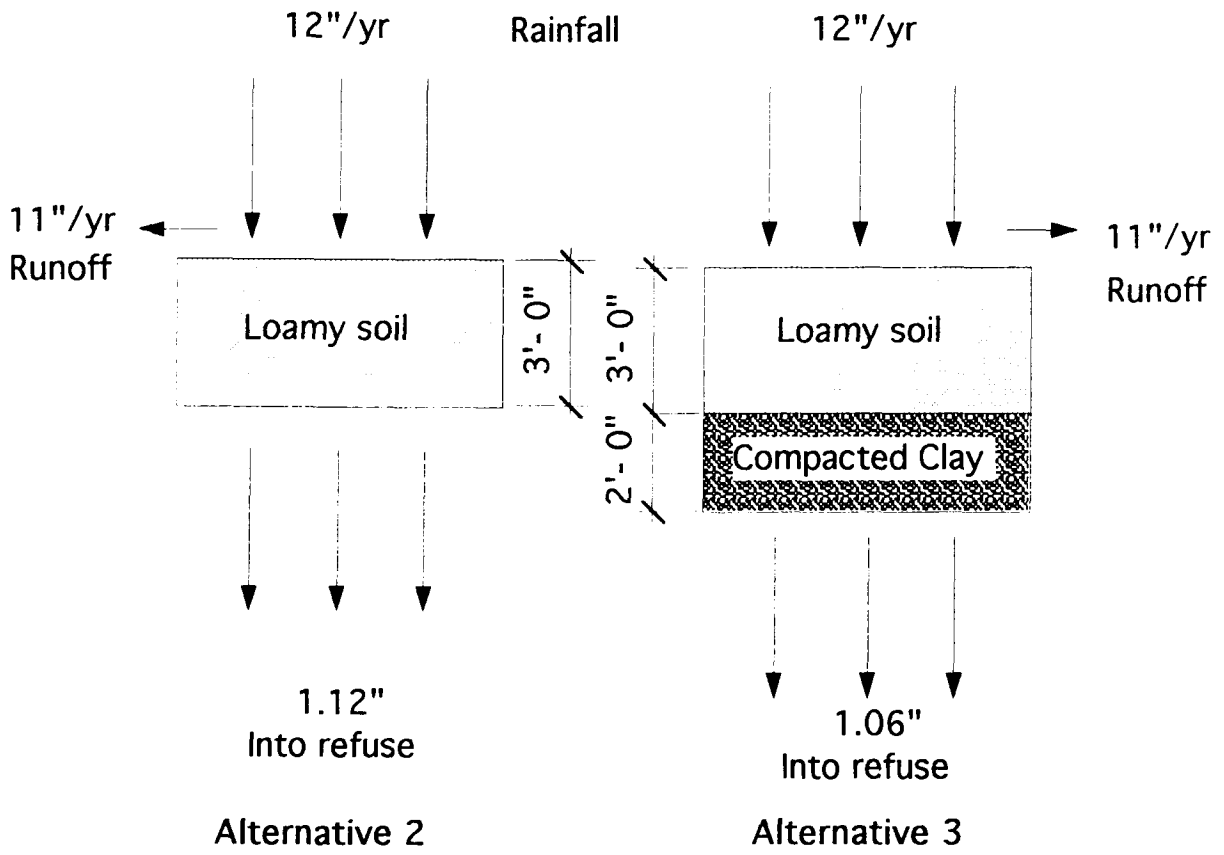
It is true that these regulations apply to nonhazardous municipal landfills and that Sites 1 and 2 are hazardous waste sites, but it seems logical that Sites 1 and 2 should not be held to a lesser standard than sites that have never knowingly received hazardous waste.

Table 9 states that Title 14 closure requirements are applicable. Title 14 requires that a landfill be closed according to Title 23, Chapter 15. This chapter specifically

requires a minimum of 12 inches of low permeability clay as well as two feet of foundation soil beneath the clay and one foot of vegetative cover to protect the clay layer.

Conclusions:

The HELP Model results seem flawed. Intuitively a site with 3 feet of loamy soil should allow much greater stormwater infiltration than a site with 3 feet of loamy soil over 2 feet of clay. To assist in explaining this concept the following sketch illustrating the report's comparison of Alternatives 2 and 3 is provided.



It is likely that one or more of the assumptions fed into the HELP model, such as soil characteristics, plant characteristics or evaporative zone/climateological data is flawed. These should be reviewed.

The report seems flawed in its consideration of closure by alternatives 1 and 2.

Alternatives 1 and 2 would not even be considered by regulatory agencies under ordinary circumstances (ie. if the site were not on the Superfund list and subject to CERCLA).

The report does not address leachate management as required by Title 23. It seems appropriate to at least review the concept of pumping and treating existing leachate. The report indicates that the waste mass is hydraulically separated from groundwater by a very low permeability natural clay liner. If this is truly the case, it seems that pumping the leachate from the waste mound should be a very easy and effective procedure. Combining pumping with the very low intrusion of surface water that is predicted by the HELP model (if it has been correctly applied in this report) after the site is closed should result in very little leachate being generated in the future.

All current regulations for municipal solid waste landfills have requirements for post closure maintenance funds and for long term monitoring. The OU1 report may not be the proper forum to address these issues, but these issues should be discussed before any final closure method is chosen. A postclosure maintenance plan should be prepared prior to closure of the sites.

The location of the two sites, adjacent to the bay and possibly upgradient of the Sunnyvale Landfill, is a concern because if the Moffett sites are not closed properly contaminate plumes could cause environmental degradation to a large area. In addition, by not properly closing these sites today, future problems that could have been reduced or prevented may occur. I urge you to reevaluate the report and existing regulations to confirm that your plan is both feasible and proper given the existing conditions.

If you have questions or comments I can be reached at (408) 730-7718.

Sincerely;
Marvin A. Rose
Director of Public Works

Paul Fisher P.E.
Environmental Engineering Coordinator

cc: Councilmember Robin Parker
Marvin Rose
Karen Davis