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Consultants on Energy & the Environment

August 29, 1995

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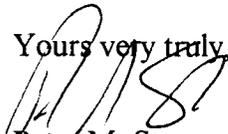
SUBJECT: Comments on the OUI Final Feasibility Study

Dear Steve:

Enclosed are my comments, on behalf of the Silicon Valley Toxics Coalition that address the Navy's OUI Final Feasibility Study (FS). Please note that I serve as Technical Advisor to the Silicon Valley Toxics Coalition (SVTC), recipient of a Technical Assistance Grant from the U.S. EPA. I have commented on the Draft Feasibility Study (December 1993) and the Draft Final Feasibility Study (April 14, 1994), and provided verbal comments at the Public Meeting on June 15, 1995. In addition, Dr. June Oberdorfer and I have met with the Navy and its consultants about SVTC's concerns with the proposed remedy on July 25, 1994.

As a result of concerns raised by the Technical and Educational Committee of the Restoration Advisory Board and the regulatory agencies, I have reviewed previous comments SVTC and the Navy's response and its commitments. Below, I have elaborated on some of our earlier concerns, my understanding of the Navy's commitments, and issues that still need to be addressed. Additionally, following discussions with the DTSC and RAB on August 9 and 10, 1995, respectively, I have included a framework for developing a contingency plan should the Navy find that leachate is migrating from the Site 1.

The attached comments contain some passages which are underlined, some passages in ***bold italics***, and some which are *italicized*. Underlined passages are meant to highlight previous SVTC comments. A date of the comment follows the passage. ***Bold-italicized passages are SVTC's recommendations and action items***. *Italicized passages or words represent what we believe was a Navy commitment*.

Yours very truly

Peter M. Strauss

cc: Ted Smith/Leslie Byster
Lenny Siegel
Mike Gill, US EPA
Michael Bessette, RWQCB
Joseph Chou, DTSC
Paul Lesti, RAB

COMMENTS REGARDING THE
FEASIBILITY STUDY FOR OU1
(LANDFILLS)

BY

PETER STRAUSS - MHB TECHNICAL ASSOCIATES

FOR

THE SILICON VALLEY TOXICS COALITION

August 29, 1995

1. "It is inappropriate to develop a remediation strategy which does not take full account of existing and potential communication between the leachate in landfill material and the groundwater under and around the landfills". (December 1993)

The original remediation strategy articulated in the OU1 Draft FS did not take account of groundwater at all. After regulatory pressure, the Navy agreed to consider both soils and groundwater at the landfills, which makes common sense. In 1993, we requested that the Navy provide information on the "the radius [and] or depth of groundwater that is going to be considered".

Based on recent discussions at RAB meetings and meetings with regulators, it is unclear that the radius and depth of groundwater that was considered was adequate. Refer to comments about potential groundwater flow on the southern boundary of the Runway Landfill, and anecdotal information that the waste was buried 21 feet below ground surface. If the depth of waste is in fact 21 feet, then existing monitoring wells within the landfill, and those surrounding the landfill would be sufficient to detect the migration of potentially contaminated groundwater.

2. Minimizing infiltration should be a remedial action objective. (December 1993) There is no reason to believe that leachate from the landfills will not eventually migrate. One may hypothesize that it may be minimal and retarded by surrounding clays, but there is little doubt that it will eventually migrate. *what basis?* Therefore, we have argued that a strategic objective of the remediation at the site should be to minimize infiltration, to slow migration of leachate.

On July 25, 1994, after a technical meeting with Dr. Oberdorfer and me, the Navy committed to add minimizing infiltration as a Remedial Action Objective (RAO) 1/. Yet, the Navy has several times failed to mention this is later reports and presentations. First, in a response to DTSC Comment 105, dated April 10, 1995, the Navy stated that "minimizing infiltration is not a primary cap function." Second, this was re-iterated at the August 10 RAB meeting. Third, during the public hearing, the Navy's consultant failed to include minimizing infiltration as an RAO.

There is nothing in the Remedial Action Plan that would limit infiltration, but for the cap. *Although minimizing infiltration is included in the final FS as an RAO, it is important that it be fully considered in the design of the remedy.* It is not clear from the response to DTSC's comments cited above whether this has been done, or whether the Navy intends to do this.

3. There is a disconnect between the amounts of hazardous materials detected in the OU1 RI\ draft FS and the tons of liquid and solid hazardous materials that were reported in the Initial Assessment (IA). (December 1993)

Although we recognize that the IA was based on anecdotal information, we recommended that the Navy reconcile this disparate information in the FS. It is

1/ See draft response to SVTC Comments, July 20, 1994, Comment 2.

difficult to dismiss these anecdotal reports merely because a few borings and wells have not shown heavy contamination. Other explanations could exist, including that these contaminants are now in the Bay or groundwater, that they have degraded, that they weren't located by the borings, or that they were disposed of at another landfill on the base. In fact, there is a third landfill located within the Golf Course that was identified by IT in 1988. (December 1993). (Subsequently, it was discovered that there is actually a fourth landfill).

With respect to the Navy's first response to this comment, (i.e. "The Navy does not agree that reconciliation of the past fate of landfill refuse is needed. These data...would be based on speculation."), we responded that it is incumbent upon the Navy to prove that the IA was incorrect. (April 14, 1994). *Disagree*

On July 20, 1994, the Navy described the reasons why it believes that IA may be incorrect, and *committed to a strategy of enhancing containment by evaluating a vertical barrier at the northern boundary of Site 1, and corrective action should drummed waste begin to be detected migrating from the site.* It is not clear that the Navy has followed through with this *commitment*. For example, although the Navy proposed that a vertical leachate collection trench be installed at the North side of Site 1, the plan does not offer any concrete remedy should drummed waste begin to migrate to the south. *In light of the A1-aquifer gradients travelling north to south, the location of additional vertical barriers needs to be re-evaluated.* (See Comment 6, below).

Additionally, although many reasons were given by the Navy for not adopting the information from the IA, it seems that enough questions have been raised by the RAB, that the issue of what is in the landfills requires some re-evaluation and explanation, with public review before the RAB. *We recommend that the Navy begin with the July 20, 1994 response to SVTC comments as a starting point, as we believe that this was a good first effort to attempt to address this issue.*

4. The Solid Waste Assessment Test (SWAT) concluded that leachate contained elevated levels of organic compounds and metals, and that seepage could enter surface waters. It also concluded that the A-1 aquifer was contaminated at this location, (i.e. Site 1), but suggested that contamination may be from another source. (December 1993)

The Navy responded that corrective action strategies appropriate for OU1 landfills include hydraulically controlling gradients through leachate extraction and treatment, or combining extraction with vertical barriers. Additionally, disparities between leachate contaminants and the A-aquifer contaminants suggest a source other than the landfills. The Navy responded that the SWAT stated that "upgradient sources have not been fully evaluated, [and] the concentrations of metals found in the A-aquifer are not considered definitive of landfill leakage."

First, the final plan and the ROD should describe in detail the additional enhancements to the containment strategy that may include vertical barriers and hydraulic control through leachate extraction. (See comment 9 below). *not a part of ROD, a part of IA*
Also, has further analysis of upgradient sources led to any change of opinion, or has shed new light on this subject? Please identify possible upgradient sources of heavy metals and organics.

5. The design [e.g. base materials of the old landfills] needs to be better understood before a remedy is proposed. (December 1993)

Based on the data presented, it appears that the Navy does not know much about the initial design of these landfills. There is not an adequate description of the base material or the sides of the landfill to make a reasonable judgement pertaining to how these may contain the fill materials for long durations. In order to contain the landfill contents, it is essential that design characteristics of the existing landfill be well understood. (December 1993)

The Navy responded to this comment by stating that the conductivity of "surrounding" soils has been tested and evaluated. Since the remediation strategy is one of containment, it is crucial that the Navy be as certain as possible that base materials won't leak, and that waste is not deposited below a clay layer, as suggested at the July 13, 1995 RAB meeting. *Based on the present knowledge of the lithology of the landfills, we recommend that this issue be re-evaluated.*

Additionally, it appears that groundwater is flowing into the landfill, with a downward gradient from North to South. This exacerbates our concerns about the need to understand the containment (or lack thereof) of the fill before developing a remedial plan, and importantly, and raises the question of whether the remediation strategy of containment can be successful with only a cap. *There may have to be several other elements to the remedial action plan before it can be designed to successfully contain leachate and groundwater. Therefore, the final plan should state that additional remedies may be needed if contamination outside the landfill is found. This statement should be as specific as possible.*

6. We noted (December 1993) that groundwater at Site 1 flows in the south-southeast direction, towards Building 191. It appeared, however, based on Figures 3, 4 and 5, that most soil sample points and groundwater wells located outside of Site 1 were found on the north side of the landfill. Plate 1 and page 18 (of Draft FS) indicated that no samples were collected or analyzed from the borings and wells to the south-southeast of Site 1. We also asked whether the Navy believed that there are enough monitoring points on the south-southeast side of Site 1? (December 1993)

The Navy's response (dated February 4, 1994) to these two comments stated that the OU1 Technical Memorandum and the additional field work plan describe groundwater flow patterns in detail and the adequacy of the monitoring network. At that point in time, there were four monitoring wells south and southeast of Site 1. The OU1 Additional Field Investigation, Technical Memorandum of December 29, 1993, shows the locations of four new monitoring wells at Site 1: one at the west-southwest perimeter; one at the southeastern perimeter; and another on the southern perimeter (the fourth is located at the northern perimeter). The location of the new well on the southern perimeter was screened to monitor "shallow concentrations of contaminants" migrating towards the Building 191 pump house. At this point in time, it was not apparent to Navy consultants (although it was suspected) that mounding of groundwater was occurring in Site 1. There are a number of problems with this response which have been brought to our attention through the excellent work of the RAB.

First, there are very different potentiometric surfaces described in the Technical Memorandum (Figures 10 and 11) from those described in the Final FS (Figures 12 and 13). There is not an explanation of why the potentiometric surfaces changed from the Technical Memorandum, based on fourth quarter 1993 data, and the FS, based on February 1994 data. Assuming that there are perched water zones within the landfill, Figure 11 of the Technical Memorandum depicts yet

another elevation and gradient. ***As a result, we believe that the Navy must explain and reconcile these differences. In addition, it must make clear any assumptions that went into the models used to map the elevations. With relatively few data points inside the perimeter of the landfill, it is difficult to realistically depict leachate or groundwater contour levels.***

A second problem is that it has never been clear how the Navy has differentiated between leachate and the shallow groundwater in the A1-aquifer. Since the wells inside the landfill are drilled to the base of the landfill, one cannot differentiate between leachate and groundwater within the aquifer. The Technical Memorandum treats leachate and groundwater as one in the same, and it would appear that this would be a rationale explanation if the bathtub model of the landfill is correct, as implied in the Technical Memorandum. In contrast, the FS conceptual model, however, depicts a semi-confined A1-aquifer that is below the base of the landfill (see Figure 11 of the FS). However, the measured depth of this A1-aquifer is 0.7 to 1.0 feet below the leachate levels (at approximately W1-11, see Figures 12 and 13 of the FS). Since the elevation of leachate level at this monitoring point is approximately 8 feet above the base of the landfill (see Figure 7), then it must be concluded that A1-aquifer is flowing through the landfill. We do not believe that this fact is in dispute; however, we are concerned that there may have been conclusions drawn based on a reliance on models of groundwater movement as depicted by the FS conceptual model. I draw two conclusions from this.

- a) There appears to be an imaginary line between leachate and groundwater, for they both will mix in the landfill. Therefore, this conceptual model is incorrect. ***Because of the apparent contradiction (conceptual model versus actual results), we ask whether the hydrogeology of the site is understood enough to develop a remediation strategy, and that the conceptual model be modified. Potentiometric surfaces are developed by relatively few number of data points for the size of the area, and we feel strongly that the Navy must gather more information before it develops a remedial design.*** *Waste Management Board disagrees*
- b) ***Because of the concern that the Navy may have relied on an incorrect conceptual model, we recommend that past assumptions and conclusions related to the framework that a semi-confined A1-aquifer beneath the landfill (Site 1) be revisited, and adjusted if need be.*** *INDIRECT*
- c) ***The remedial investigations and strategies cannot and should not be locked in time as new techniques or new information is developed.*** OU1 appears to be a case-in-point where the results of an investigation were frozen in time, without regard to changing information. Apparently there have been changes of assumptions between the Technical Memorandum and the OU1 draft-final FS, in which the potentiometric surfaces based on February 1994 data were first presented. Because of this apparent change, the monitoring well data gap to the south, as brought to your attention by the RAB, is very evident. Despite SVTC's early concerns raised in December 1993 about the sufficiency of the monitoring well system on the south side of Site 1, the Navy does not appear to have adjusted the monitoring well system to account for new information. ***We strongly believe that the remediation plan needs to be flexible as new information is developed.*** *will be...*

7. The FS is incomplete in that the Remedial Actions (RA) evaluated assume that the facility will continue to be used at levels similar to current use. Some community members are opposed to having Moffett Field continue long-term operations under NASA, almost as if there had not been a change in stewardship. (April 14, 1994)

"The remedial action (RA) should not foreclose future options, such as reducing or eliminating flights, and significantly scaling back industrial activity. The RA should account for, wherever possible, a reduced use scenario where pumping from Building 191 no longer occurs. Elimination of pumping would create a stronger horizontal force on landfill contents and may affect groundwater levels, and will likely change groundwater flow patterns and direction in some areas."
Consequently, migration of constituents via groundwater leachate transport is more likely to occur. (April 14, 1994)

As federal commitments to the facility seem to be in flux, we think that there is a strong need to look ahead at the possibility of the drain system being turned off. We were pleased to hear that the Navy, based on the meeting at DTSC and the RAB in August 1995, also thinks that this is enough of a possibility that it will discuss potential remedies and contingencies as part of the response to the public hearing and comments. *We believe that more investigation should take place, including: 1) an evaluation of expected environmental effects on the landfills should the drain system be turned off; and, 2) an investigation and description of low cost techniques that could be installed now which would mitigate some or all of the negative environmental effects identified in 1) above. We also ask that maintaining the drain system become an integral part of the remedy, or that a very specific contingency plan be described which would alleviate the effects of turning off the drain, which cannot be avoided by low cost techniques described in 2) above.*

8. "I believe that efforts should be made to protect, and wherever possible, enhance existing wetlands, including the storm water retention pond to the north of Site 1. In the context of the Ecological Assessment, I think it is important to recognize that this is a somewhat degraded wetland that is potentially habitat for endangered species (salt harvest mouse). By enhancing the wetland, possibly by removing or creasing the levees to allow for more tidal flushing, pickleweed communities which are essential for the salt harvest mouse may become established." (April 14, 1994)

We are pleased that the Navy has agreed to install a leachate collection trench on the north side of Site 1 to protect this potentially fragile ecosystem. We also believe that prior to remedial design, it is important that the Navy take an independent look at possibilities for enhancing the existing wetlands. *We therefore recommend that an independent evaluation of ways to enhance the wetlands be made a formal commitment.*

9. The remedial proposal is based on the assumption that should leachate migrate from the landfills, it will be detected and appropriate remedies can be installed, as required. This concept is insufficient unless the FS contains a contingency plan that establishes action levels that will require action, and what those actions are likely to be. I propose that action levels be set at a fairly low percentage of the MCL, in combination with an increase in the level detected at existing wells. For example, if the TCE MCL is 5 ppb, I would propose that remedial action (in this instance, likely to be leachate collection and treatment) be triggered when TCE is detected at 25 percent of the MCL, and concentrations have increased over two

quarters. (The above is an example of how a triggering mechanism could work, not a proposed standard.) (April 14, 1994)

We have since revised the proposed action levels. Our current proposal is that action levels be set at 25 percent of the Water Quality Criteria, triggered when concentrations of contaminants increase over two consecutive quarters. This would at the very least give the Navy time to plan a remedy and a treatment for contaminated leachate. *We strongly recommend that the Navy adopt this criteria for the leachate collection trench north of Site 1.*

With regards to potential leachate migration south of Site 1, a detailed contingency plan should be developed and included as part of the ROD. *Below, we have suggested the following framework on how to develop this plan.*

- a) *The plan should be detailed enough to provide the public and the regulators with sufficient information and criteria for action so that it will act as a verifiable commitment in the ROD;*
 - b) *Because we don't know what will be found by additional wells on the southern edge of Site 1, several scenarios should be included in developing the plan. For example, the following presents a range of findings: 1) no detectable finding of leachate migration; 2) migration of heavy metals, VOCs and SVOCs, above the MCL but below the WQC; and, 3) migration of heavy metals, VOCs and SVOCs, above the WQC.*
 - c) *For each scenario, a plan should be articulated. For example, if scenario 1 is found, the contingency may commit to further monitoring; if scenario 3 is found, the plan may commit to a leachate extraction and treatment system either within, or on the edge of the landfill.*
10. Because wells inside of landfill are screened to the bottom of the landfill, leachate is not truly characterized. Rather, the leachate wells reveal a mixture of leachate and groundwater. *While we are not suggesting that you remedy this, this fact should be taken into consideration in future testing and modeling. For example, we are concerned that low detects found in areas outside the landfills are not discounted, and do not become a rationale for saying that no leachate is migrating. When low detects are found, we believe that it is the Navy's burden of proof to demonstrate that it is not due to a leak in the landfill.*