STATE OF CALIFORNIA - ENVIRONMENTAL PROTECTION AGENCY

DEPARTMENT OF TOXIC SUBSTANCES CONTROL
400 P STREET, 4TH FLOOR
SACRAMENTO, CA 95814

N00296.002349
MOFFETT FIELD
SSIC NO. 5090.3

August 23, 1995

Commander
Department of the Navy
Engineering Field Activity, West
Naval Facilities Engineering Command
Attn: Mr. Stephen Chao, Project Manager
900 Commodore Drive, Bldg. 101
San Bruno, California 94066-2402

Dear Mr. Chao:

FINAL FEASIBILITY REPORT, PROPOSED PLAN, AND AIR QUALITY SOLID WASTE ASSESSMENT TESTING REPORT, OPERABLE UNIT 1, MOFFETT FEDERAL AIRFIELD

Enclosed please find comments prepared by the California Integrated Waste Management Board (CIWMB) presented in the OU1 meeting on August 9, 1995. To our understanding, the Navy agreed to submit a Field Work Plan by September 14 to address the proposal of future long term groundwater monitoring network. After the end of current comment period (August 31,1995), the Navy will then prepare a responsiveness summary and a Revised Proposed Plan for public review prior to submitting the Draft OU1 Record of Decision. In the mean time, a public meeting will be held during the public comment period of the Revised Proposed Plan. If you have any questions, please contact me at (510) 540-3830.

Sincerely,

C. Joseph Chou
Remedial Project Manager
Base Closure Unit
Office of Military Facilities

Enclosure

cc:
Mr. Michael Bessette
Regional Water Quality Control Board
2101 Webster Street, Suite 500
Oakland, California 94612

Mr. Michael D. Gill
U.S. Environmental Protection Agency
Region IX, Mail Stop H-9-2
75 Hawthorne St.
San Francisco, California 94105

Ms. Sandy Olliges
Assistant chief
Safety, Health and Environmental Services
National Aeronautics and Space Administration
Ames Research Center
Moffett Field, CA 94035-1000

Mr. Peter Strauss
MHB Technical Associates
1723 Hamilton Avenue, Suite K
San Jose CA 95125

Ms. Tamara Zielinski
Closure and Remediation Branch
California Integrated Waste Management Board
8800 Cal Center Drive
Sacramento, California 95826

Mr. John Dufresne, R.E.H.S.
Department of Environmental Health
Hazardous Material Compliance Division
P.O. Box 28070
San Jose, 95159-8070

Mr. Steven S. Chin
Enforcement Division
Bay Area Air Quality Management District
939 Ellis Street
San Francisco, California 94109

Mr. James G. McClure, Ph.D.
Harding Lawson Associates
P.O. Box 6107
Novato, California 94948

STATE OF CALIFORNIA

Pete Wilson, Governor

CALIFORNIA INTEGRATED WASTE MANAGEMENT BOARD
8800 Cal Center Drive
Sacramento, California 95826

DEPARTMENT OF TOXIC SUBSTANCES CONTROL
REGION 2
AUG 22 1995
STATE OF CALIFORNIA, EPA
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AUG 18 1995

Mr. Joseph Chou
Remedial Project Manager
Department of Toxic Substances Control
Region No. 2, Office of Military Facilities
700 Heinz Ave., Suite 200
Berkeley, CA 94710-2737

Subject: August 9, 1995, Meeting Summary for Moffett Federal Airfield, Operable Unit 1, Landfill Final Feasibility Study Report, Proposed Plan and Air Quality Solid Waste Assessment Testing Report Comments.

Dear Mr. Chou:

Pursuant to our discussion I have prepared a summary of our concerns that were presented on our August 9, 1995 meeting. California Integrated Waste Management Board (CIWMB) staff has concerns that the vegetative soil cap that was presented as the selected remedy in the Proposed Plan did not meet the final cover standards of California Code of Regulations, Title 14 (14 CCR), section 17773. Since this standard was identified as an Applicable Requirement in the Feasibility Study (FS), the National Contingency Plan (NCP) threshold criteria for meeting Applicable, Relevant and Appropriate Requirements (ARARs) was not met.

The FS proposed the soil cap as an engineered alternative to the prescriptive standards of 14 CCR 17773, then compared its feasibility and performance against a multi-layered cap and concluded that the soil cap was more feasible and performed similarly to the multi-layered cap, therefore it met the criteria for an engineered alternative pursuant to 14 CCR 17773. CIWMB staff can not concur with these findings because the multi-layered cap exceeds the prescriptive standards, therefore a comparison of the vegetative cap to the prescriptive standards was not performed. To assist the Navy in making an appropriate determination regarding the type of soil cap to use on the landfills CIWMB staff is providing the following guidance.

Pursuant to an interpretation by CIWMB legal cancel, two criteria need to be met before an engineered alternative can be used in lieu of the prescriptive standards, (1) the prescriptive standard is not feasible, and (2) the specified engineered alternative performance is consistence with the performance of the prescriptive standards in limiting infiltration to the grates extent possible, controlling landfill gas emissions and compatibility with future reuse of the site.

During the August 9, 1995, meeting CIWMB staff provided a unit cost comparison of the multi-layered cap and prescriptive standard caps for landfills in the vicinity of Moffett Field, Table 1. This comparison shows that the final cover cost per acre for the prescriptive standard cap ranged between $82,981 and $20,185 while the multi-layer cap cost $200,051. The multi-layer cap costs were much higher because the cap design included many layers that were not required by the prescriptive standard as shown on Table 2. Table 2 also provides a comparison of cost estimates for the soil and multi-layered caps with the prescriptive standard cap. Unit costs provided in the FS were used to developed the costs for the prescriptive standard cap. Table 2 shows that closure of Site 1 pursuant to the prescriptive standards would save the Navy $1,000. Therefore, based on the information provided in FS, the prescriptive standards are more feasible than the proposed alternative of the vegetative cover.

According to CIWMB legal councel's interpretation the feasibility issue alone is enough to require the prescriptive standards, however, CIWMB staff is providing additional comments on the performance of the caps to assist the Navy in their decision making process. The Hydrologic Evaluation of Landfill Performance (HELP) Model was used in the FS to evaluate the performance of the soil cap verses the multi-layered cap. The FS concluded that the two caps were similar in their ability to limit infiltration. After evaluating the input parameters used in the HELP Model comparison, CIWMB staff can not concur with these findings for the following reasons.

The HELP Model is a useful tool in determining the amount of leachate that a landfill is likely to produce because it assumes that any head that builds up on a barrier layer will infiltrate. In addition if infiltration occurs in one location it is applied evenly over the entire site. This is a conservative estimate for determining the amounts of leachate produced at a site but not for a comparison of infiltration rates for landfill caps. State landfill design standards prohibit the buildup of hydraulic head on a liner system. Therefore, when using the HELP model for cap performance evaluation purposes a barrier layer cap should have an adequate drainage system.

The drainage design for the multi-layer cap used a drainage path length of 450 feet at a 5 percent slope. Since the HELP model incorporates infiltration while the precipitation is flowing along the drainage path it is doubtful that any of the precipitation will run off. The model shows that only 0.02 percent of the precipitation runs off. Generally landfill slopes are constructed at a 3:1 ratio or 33 percent slope with benches that include collector drains every 50 feet. Therefore, the maximum drainage path that should be used is 50 feet with a slope of approximately 33 percent. The multi-layer cap design could

also be improved by lowering the permeability of the drainage layer to the 1 x 10^{-1} centimeters per second range which would be appropriate for a gravel drainage layer and choosing a barrier layer soil. The model considers barrier layer soils highly compacted, the soil that was used was considered moderately compacted.

For the vegetative cap a 32 inch evaporative zone depth was used for the grass on the vegetative cover. Table 3 shows several types of grasses used for landfill covers in California. Their root zones ranged between 6 and 12 inches. An appropriate grass for the vegetative cover model might be the native Costal Range Melic with a root zone of 10 inches. If capillary action of the grass roots is considered the total evaporative zone should be approximately 12 inches.

CIWMB staff have conducted several runs of the HELP Model Version 3.03 using drought weather conditions from a San Francisco weather station with an average annual precipitation of 12.99 inches which is similar to the synthetically produced 12.5 inches used in the FS comparison. After making the adjustments stated above to the HELP Model input parameters staff found that the performance of the barrier layer cap significantly exceeded the performance of the soil cap in limiting infiltration. The HELP evaluation in the FS should be adjusted to reflect the above comments.

During the August 9, 1995 meeting PRC staff stated that it was not necessary to reduce infiltration because the waste is in ground water and was not migrating from the site. Title 14, section 17709 prohibits the disposal of waste in ground water, except as approved by the Regional Water Quality Control Board. Pursuant to discussions with the Regional Board it is not a matter of the leachate migrating from the site but if ground water impairment has occurred, see Title 23,, section 2510. Since ground water monitoring wells located in the waste show ground water impairment and there is a significant amount of waste above the ground water table, at a minimum a corrective action of source control (i.e. capping) must be taken. Staff can not concur with the statement that leachate is not migrating from the site, because adequate down gradient ground water monitoring has not been provided.

The second performance goal considers the need to limit landfill gas emissions. Landfill gas characterization test results in the Air Quality Solid Waste Assessment Test (AIR SWAT) show that the landfill decomposition gasses consists of 52 percent menthane and carcinogenic trance gasses such as Vinyl Chloride at 210 parts per billion. The FS states that the landfill gas is not a potential health threat and calculations for Non Methane Organic

Compounds (NMOC) show that landfill gas emissions do not need to be controlled. CIWMB staff can not concur with these findings because the AIR SWAT was never approved by the Bay Area Air Quality Management District, and the potential health risk of the 210 ppb of Vinyl Chloride, a Class A carcinogen, were never evaluated.

The FS states that the Air SWAT data was used to determine a potential carcinogenic risks of less than 1E-07 from landfill gas emissions. Staff found that the Air SWAT proposed integrated surface sampling to determine if methane or carcinogenic trace gasses were emitting from the site but only a surface emissions screening with a flame ionization detector was conducted at 39 degrees fahrenheit and 3 to 4 mile per hour wind speed. It is not likely than much methane gas was being produced at 39 degrees and a flame ionization detector is not designed to detect trace gases such as vinyl chloride. The landfill gas characterization data that shows 210 ppb of vinyl chloride should be used to determine the potential health risks posed by the landfill gas.

The FS states that calculations for NMOC emissions show that landfill gas does not need to be controlled. Staff can not concur that landfill gas does not need to be controlled. Calculations for NMOC emissions are used to determine if the landfill is producing enough NMOCs to impact the ozone layer. These calculations do not consider the need to control landfill gas emissions to prevent a potential health or explosive threat as required by 14 CCR 17783.

Since the intended postclosure land use of the site is a firing range which provides potential receptors and ignition sources it is unlikely that landfill gas emissions will not require control. The landfill cap design should be evaluated with consideration of the performance goals of 14 CCR 17783, Landfill Gas Monitoring and Control and the prescriptive standards in 14 CCR 17796, Postclosure Land Use.

The above discussion has shown that adequate proof has not been provided to show that the vegetative cap is more feasible than the prescriptive standard. In addition, it does not show that the vegetative cap provides infiltration protection to the greatest extent possible, controls landfill gas surface emissions, or is compatible with the intended postclosure land use. Additional monitoring, modeling, and risk assessment will be necessary to justify the vegetative cover. Staff is concerned that additional time and money may be spent by the Navy and will not provide results that will justify the soil cap. Therefore, staff recommends Alternative 2, the vegetative cover, be modified by replacing the lower two feet of vegetative soil with a less

expensive foundation and barrier layer material, and if necessary have a drainage layer installed.

If you have any question regarding the items discussed in this correspondence please contact me at (916) 255-1197.

Sincerely,

Tamara Zielinski
Waste Management Engineer
Closure and Remediation Branch

Enclosures: Table 1 Unit Cost Comparison
Table 2 Cover Cost Comparisons
Table 3 California Vegetation for Landfills

cc: Mr. Michael Bessette, Regional Water Quality Control Board
Mr. John Dufresne, R.E.H.S., Santa Clara County Local Enforcement Agency

Table 1

UNIT COST COMPARISON
MOFFETT FEDERAL AIRFIELD OU1

Solid Waste Disposal Site	Moffett - Site 1	Sunnyvale	All Purpose	Mountain View	Crittenden	Geer Road
Initial Grading (lump sum)	$12,745	$360,000	Included	$160,000	$9,150	Included
Material ($/cy) - Foundation	$7.58	$8.00	$1.60*#	$5.00*	$3.38*	$4.00
Material ($/cy) - Clay	$11.53	$11.00	$2.35#	$8.00	$8.78	$17.15
Material ($/cy) - Top Soil	$5.52	$9.00	$2.60	$5.00	$4.72	$6.00
Geosynthetic (sq. ft.)	N/A	N/A	N/A	N/A	N/A	$0.47
CQA (lump sum)	$69,280	$290,000	$198,700	$500,000	$125,000	$525,000
Mobilization (lump sum)	$2,688	Included	Included	Included	$121,000	Included
Construction Management	?	$220,000	Included	$250,000	$147,900	Included
Final cover cost per acre	**$200,051**	**$82,981**	**$20,185**	**$53,810**	**$81,361**	**$52,002**

*Sites with portion of foundation layer in place prior to closure.
#Soils are on-site.

Table 2

MOFFETT FEDERAL AIRFIELD OU1-SITE 1
COVER COST COMPARISONS

Description	Soil Cap (Alternative 2)			Multi-Layered Cap (Alternative 3)			Title 14 Alternative		
	Quantity	Unit Cost	Total Cost	Quantity	Unit Cost	Total Cost	Quantity	Unit Cost	Total Cost
Mobilization & Demob	1 each	$896	$896	3 each	$896	$2,688	3 each	$896	$2,688
Precontouring	8,554 cy	$1.49	$12,745	8,554 cy	$1.49	$12,745	8,554 cy	$1.49	$12,745
1' Gravel Gas Venting Layer	N/A	N/A	N/A	22,586 cy	$20.78	$469,337	N/A	N/A	N/A
Filter	N/A	N/A	N/A	609,840 sy	$0.13	$79,279	N/A	N/A	N/A
1' Foundation Layer	N/A	N/A	N/A	22,586 cy	$7.58	$171,201	22,586 cy	$7.58	$171,201
2' Clay Layer	N/A	N/A	N/A	45,173 cy	$11.53	$520,845	N/A	N/A	N/A
1' Clay Layer	N/A	N/A	N/A	N/A	N/A	N/A	22,586 cy	$11.53	$260,417
1' Drainage Layer	N/A	N/A	N/A	22,586 cy	$20.78	$469,337	N/A	N/A	N/A
Filter	N/A	N/A	N/A	609,840 sf	$0.13	$79,279	N/A	N/A	N/A
3' Vegetative Layer	67,760 cy	$11.15	$755,524	67,760 cy	$11.15	$755,524	N/A	N/A	N/A
1' Vegetative Layer	N/A	N/A	N/A	N/A	N/A	N/A	22,587 cy	$11.15	$251,841
Grading	67,760 sy	$0.44	$29,814	67,760 sy	$0.44	$29,814	67,760 sy	$0.44	$29,814
Erosion Control Matting	4,444sy	$4.30	$19,109	4,444 sy	$4.30	$19,109	4,444 sy	$4.30	$19,109
Vegetation	67,760 sy	$0.32	$21,683	67,760 sy	$0.32	$21,683	67,760 sy	$0.32	$21,683
Quality Assurance	N/A	N/A	N/A	12 weeks	$2,440	$29,280	12 weeks	$2,440	$29,280
Quality Control Testing	N/A	N/A	N/A	215 tests	$186.05	$40,000	215 tests	$186.05	$40,000
Total Cover Costs			**$839,771**			**$2,700,121**			**$838,778**

TABLE 3

PLANT MATERIAL REFERENCE MATRIX

BOTANICAL/COMMON NAME	PLANT TYPE	ROOT DEPTH	GROWTH RATE	ESTABLISH RATE	DROUGHT TOLER	FIRE TOLER	NATURAL RAINFALL	IRRIGATION	SOIL TYPE	LONGEVITY	FERTIL REQ	NATURALIZE	ZONE DISTRIB	CALIFORNIA NATIVE	SOURCE	PLANTING SEASON	PLANT HEIGHT	SHORT TERM PROT	SALT TOLER	EROSION PROTECT	MAINTEN REQ	NURSE CROP			
GRASSES		INCHES		YEARS			INCHES			YEARS															
Lolium rigidum *"Wimmera" 62*	1	6	F	0-1	M		>10	F	C	2	L	1	1,2		S	F	36	●	H	E	M				
Melica californica *California Melic*	2	10	M	1-2	G		>10	L	C	4	L	2	1,2,4	●	S	F	24		M	M	L				
* **Melica imperfecta** *Coast Range Melic*	2	10	M	1-2	G		>10	L		4	L	2	1,2,4	●	S	F	24		M	M	L				
Poa scabrella *Pine Bluegrass*	2	10	F	0-1	G		>4	L	C	4	L	2	ALL	●	S	F,W,S	12		M	G	L				
Sitanion hystrix *Bottlebrush Squirreltail*	2	10	F	0-1	E		>4	L	C	1	L		ALL	●	S	F	18	●	H	G	L	●			
Sitanion jubatum *Big Squirreltail*	2	12	F	0-1	E		>4	L	C	1	L		1,2,3	●	S	F	36	●	H	G	L	●			
Stipa cernua *Nodding Stipa*	2	12	S	2	G		>10	F	S	>5	L	3	3,4	●	S	F	36		M	M	L				
Stipa coronata *Giant Stipa*	2	12	S	2	G		>10	F	S	>5	L	3	1,2	●	S	F	48		M	M	L				
Stipa lepida *Foothill Needlegrass*	2	12	S	2	G		>10	F	S	>5	L	3	1,2	●	S	F	24		M	M	L				
Stipa pulchra *Purple Needlegrass*	2	12	S	2	G		>10	F	C	>5	L	3	1,2,4	●	S	F	36		M	M	L				
Vulpia myuros *Zorro Fescue*	1	6	F	0-1	E		>4	L	C	3	L	1	ALL	●	S	F,S	20	●	H	E	L				
Vulpia microstachys *Small Fescue*	1	6	F	0-1	E		>10	L	S	1	L	1	1,2,3	●	S	F	18	●	H	G	L				