— ENVIRONMENTAL PROTECTION AGENCY

NT OF TOXIC SUBSTANCES CONTROL

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N00296.002767
MOFFETT FIELD
SSIC NO. 5090.3.A.

January 24, 1996

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:

DRAFT FINAL STATION WIDE REMEDIAL INVESTIGATION(SWRI) REPORT, MOFFETT FEDERAL AIRFIELD

The Department of Toxic Substances Control (DTSC) and the San Francisco Regional Water Quality Control Board (RWQCB) have reviewed the subject document and prepared the following comments for your consideration. Please respond to all comments prior to the submission of the final report. If you have any questions, please call me at (510) 540-3830.

Sincerely,

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

Enclosures

cc:
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2767

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GENERAL COMMENTS

1. **Appendix E, Sites 21-23:** The document requires revision. It might become acceptable upon adequate responses to our specific comments below. In particular, the treatment of background soil concentrations is not adequate.

2. **Appendix H, Basewide Risk Assessment:** The basewide risk assessment is unacceptable as presented. Major changes are required. The material in Appendix H should be presented as a chapter in the main text immediately following Chapter 6. The assessment fails to quantify or depict risks which overlap between or among operable units and the Navy provides virtually no interpretation of the station-wide assessment. Large areas of known contamination have been ignored. These and other specific comments are detailed below.

3. **Consensus:** It seems clear that the Navy and DTSC do not agree on what constitutes an adequate method for quantifying and depicting risks and hazards across operable units (OUs). DTSC recommends that risk assessors from the Navy and regulatory agencies meet and reach agreement on such a method.

SPECIFIC COMMENTS

1. **West-Side Aquifer, p. ES-2:** It is stated that "the Navy is controlling contaminants in groundwater from Navy sources in conjunction with the MEW groundwater remediation program from the regional VOC plume in the west side aquifer". However, it is still not clear why the potential human health risk from the west-side aquifer (and petroleum sites) were not included in the station wide risk assessment.

2. **Petroleum Sites, p. ES-6:** Please explain how the soil vapor extraction (SVE) and air sparging (AS) system be coordinated with Site 9 source control measure activities.

3. **Human Health Risk Assessment (HHRA), p. ES-10:** A summary of "sample-by-sample" method should be included in this section.

4. **Commingled Plume, Sec. 1.2.4, p. 1-8 and Sec. 6.2.1, p. 6-4:** Please clarify if the commingled petroleum contamination in underground tanks 2 and 43 area were not included in the station wide risk assessment.

5. **Spatial Analyses of Metals in Soil ans Sediment, Sec. 4.22, p. 4-94 to 4-97:**

a. Please clarify what are the criteria to select the soil or sediment samples used in the spatial analyses.

b. Figures 4-49 through 4-54 provide concentration ranges of arsenic, antimony and chromium which is useful to observe the spatial distribution of those inorganics. However, in lack of summary tables or the histograms as presented in Appendix A of OU5 FS, it is still very difficult to review this section.

C. Please explain whether the elevated metal concentrations are evenly distributed in the stormwater retention ponds and the Northern Channel.

6. **HHRA for Sites 21, 22, and 23, Sec. 6.0, p. 6-1:** In the second paragraph of Section 6.0, it is stated that the HHRA for Site 21, 22, and 23 is presented in Appendix E. On the contrary, the Navy's response to DTSC's specific comment No.3 on the Draft SWRI report mentioning that "Screening investigations have found no contamination and there is no reason for a risk assessment". Please explain the inconsistency between these two statements.

7. **Lot Size, Sec. 6.3.2, p. 6-19:** It is correct that a standard single family house lot size is 50' x 100' (5,000 square feet) in City Mountain View or Sunnyvale. However, it is not conservative or appropriate to use one-half acre (21,780 square feet) as an average lot size for exposure area scenario.

8. **Section E.3.2.3, Background Chemicals and Tables E-4 and E-5:** The treatment of background is inadequate. The locations of the reference background samples listed in Table E-4 should be described. The Navy should respond to the following several questions. Where were the Hetch-Hetchy, Wahler, and USGS samples taken and why are those samples appropriate for use in estimating

background metals concentrations at MFA? What is the nature of the values presented as "background" values in Tables E-4 and E-5? Are they average, maximum, minimum, upper 95th percentile values?

We have attached a set of useful recommendations (Attachment A) from DTSC on how to define ambient concentrations of metals for the purpose of defining constituents of potential concern (COPC). These guidelines were used by PRC's office in San Francisco as they recently completed an excellent study of background concentrations at Mare Island Naval Shipyard, a base with similar problems in background determination to MFA, i.e. soil from multiple sources. Although this method is preferable, we realize that time constraints might preclude its use at this base.

Although Mare Island is located some distance from MFA and may not have similar soil types, it is still located in the San Francisco Bay Area. Therefore, we have provided for comparison as Attachment B a compilation of values used to define ambient conditions at Mare Island. Some of these values are simple parametric estimates of the 95th quantile (mean+zs), while others are the lower 80% confidence limit on the 95th quantile, estimated either parametrically or non-parametrically, depending on the type of distribution encountered. Please contact Dr. John Christopher of DTSC (916-327-2491) with any questions on the use of this method.

Also, the Navy should provide data on sampling results for hexavalent chromium.

9. **Section E.4.4.4, Inhalation of Vapors and Table E-9:** Please provide more detail concerning the estimation of the concentrations of volatile organic chemicals.

10. **Table E-3:** Review of this table suggests that just two samples were taken for Site 23 and that analyses for lead were not conducted. If this is so, site characterization might not have been adequate. The Navy must provide either an explanation of why these data are adequate or how more samples will be collected and analyzed, including analyses for lead.

11. **Table E-7:** Departmental guidance requires the use of 1.0 mg/cm^2 as the default value for adherence of soil to skin for the reasonable maximum exposure (RME). The value employed by the Navy, 0.2 mg/cm^2, is not congruent with this guidance and is unacceptable to DTSC. The correct value of 1.0 mg/cm^2 is used in Table E-7. We have informed the Navy and its contractor of the correct value to use for this parameter in a number of previous memoranda.

12. **Purpose of a Basewide Risk Assessment:** In both the Executive Summary and Appendix H, the Navy fails to state a purpose for constructing a basewide risk assessment, other than to meet a requirement of the Department and USEPA. Other risk assessments presented for MFA have been focused on individual operable units (OUs), some of which were created by artificially separating environmental media or areas of the base. In fact, current and future users of the base can be exposed to all sections of the base and to all environmental media. Somewhere, somehow, the Navy must show the full picture to the stakeholders. The purpose of a basewide risk assessment is then twofold: first, to quantify and depict any risks which might overlap between or among OUs, and second, to act as a vehicle for communicating risk to the public.

Overlapping risks can exist now or might come to pass in the future. For instance, future users of the base might be exposed to both soils and groundwater. Remedial alternatives have been or will be selected for these environmental media for their health-protectiveness, at least in part. If no exposure setting is ever constructed in which humans come into contact with both media, then those selecting the remedial alternatives might never have occasion to consider that adverse health effects can be additive across media. Thus, an adequate level of health protection might be selected for each medium, but the summed exposure might not be acceptable.

At Sacramento Army Depot, a closed base in Sacramento County, the Department, USEPA, and the Army learned the value of isopleths of risk for depicting the magnitude and location of risks for the public. The Army's contractor constructed isopleths of risk by environmental medium for a beginning

condition, for the present, and for the future or cleaned up condition. Isopleths of risk were easily understood and accepted by the public. The Army was pleased that the value of their cleanup was effectively conveyed by showing the amount of risk reduction. The Department and USEPA were satisfied that all risks were taken into consideration in selecting final remedies. The "sample-by-sample" method suggested to the Navy was the one used to such good effect at Sacramento Army Depot. However, without figures showing the isopleths of risk, the effort is incomplete.

13. **Uncertainties in the Exposure Assessment:** Because COPC varied greatly from one area of the base to another and from soil to groundwater, expressions of chemical concentrations cannot be added to produce estimates of risk in different samples. Therefore, it is necessary to convert concentrations of COPC to the common denominators of risk and hazard via defined exposure settings. This method of quantification of risk and hazard for each sample carries the implicit assumption that a receptor will be exposed to exactly those concentrations for the entire length of the chosen duration of exposure. If concentrations of a chemical are high in one area and low in another, actual risks will be correspondingly overestimated in one sample and underestimated in another. Thus, isopleths of risk constructed from a data base do not represent the exposure of any one receptor. This uncertainty is balanced by the fact that the isopleth of risk is a rubric which allows the potential adverse health effects of all contaminants to be displayed at once.

The Navy states that depiction of any of the "high values" violates USEPA's concept of selecting the RME for quantification of risks. We note that the Navy fails to point out that the "sample-by-sample" method underestimates risks in some areas. DTSC recommends that the Navy present a more balanced discussion of the uncertainties inherent in this method of assessing exposure. Until the Department is presented with an alternative method for simultaneous depiction of risks from several OUs, we must reject the Navy's complaint about overestimates of risks.

14. **Isopleths vs. "Area Risk":** Isopleths of risk are not necessarily the only rubric acceptable to the Department. As an

alternative, we have stated we will accept estimates of risk for the residential setting based on averages over areas of 1,000 ft^2, the recommended default for the size of a backyard in California. As another alternative, we stated we would accept estimates based on the average lot size for Mountain View, California, the local community near MFA.

The Navy has presented in Chapter 6 of the current document a construction based on average chemical concentrations over 0.5 acre (21,780 ft^2), including the groundwater beneath those areas. The Department has repeatedly rejected this as inadequate. We agreed that if the Navy desired to present their "half-acre" assessment, it could be placed side-by-side with estimates based on methods of which we approve. The Navy chose instead to display prominently the assessment we rejected, while placing in an appendix another assessment of no value.

It seems that the Navy and the agencies have not yet agreed on a method of estimating and displaying these risks which is acceptable to all parties. DTSC urges the Navy, in the strongest possible terms, to have its risk assessors meet with their counterparts from the Department and USEPA to resolve this technical issue. At other bases, additional sampling and chemical analysis has not been required as a result of such consensus-building; existing data bases have proved adequate.

15. **Sample-by-Sample Approach, Appendix H, Figure H-1:** Please explain why there are 2 to 3 orders of magnitude difference of risk for the same location presented in Figure H-1 through H-8 and Plate 6-3 through Plate 6-10. If it is simply caused by different database, all figures need to be corrected accordingly. Otherwise, more discussion should be presented in the document.

16. **Metals in Surface Water, Sec. H.1.2, p. H-2:** In the absence of relevant data on ambient concentrations of metals in surface water, the Navy may not eliminate antimony, arsenic, beryllium, and chromium as COPC in surface water at MFA.

17. **Risk Characterization, Sec. H.4, p. H-8:** The Navy's interpretation of station-wide risks and hazards amounts to three sentences. No mention is made of risk drivers, affected media,

overlapping risks among OUs, *etc.* This presentation is inadequate, and essentially ineffective. We suggest that the Navy meet with risk assessors from the Department and USEPA to define what is required in an assessment of this type.

18. **"Expediency", Sec. H.4.1, p. H-7:** Please strike the word "expediency" and substitute "convenience".

19. **Supporting Data:** The Navy presents some 128 pages of tables which we presume are intended to support the figures which follow. We find no reference to these data in the text. We find no key for understanding how these tables are arranged or how they can be read. We find no summed risks or hazards within or across media for each sample location. These data must be organized into tables in a fashion that the public might be expected to understand.

20. **Figures H-1 through H-8:** These figures do not convey risks which overlap between OUs. They are not acceptable, because they defy interpretation. This situation is not improved by the lack of such interpretation offered by the Navy. Without a presentation of isopleths of risk, the figures are simply maps of uninterpretable dots. The best way to communicate station-wide risk is with contours, separated by environmental medium, although other constructions might be equally acceptable (see Comment 7 above).

The colors selected by the Navy to delineate different levels of risk or hazard are much too similar. For instance, finding a difference between Figures H-2 and H-4 requires extremely close examination. What subtle differences may be found will certainly vanish if these pages were to be photocopied. Does the Navy wish risks and hazards before and after cleanup to appear identical? Contour lines showing isopleths of risk or hazard would remove the ambiguity of color schemes and we recommend they be employed.

21. **Fuels and Trichloroethene, Figures H-1 through H-8:** During the course of the various remedial investigations at MFA, the Navy discovered significant contamination of groundwater which is not depicted anywhere in the "station-wide" risk assessment. We refer to trichloroethene in groundwater west of

the runways and to sizable leakage of fuels from tanks east of the runways. The Navy chose to use cross-hatching to show special treatment of the landfills. Something similar should be done for these other two, quite large areas of contamination. To label these figures "station-wide" while including only a fraction of the contamination is inadequate.

22. Missing Values, Fig. H-1 *et seq.*: We find that risks and hazards depicted for some samples in the areas of the landfills for current exposures are missing from future exposures. Volumes of soil which show hazard indices between 1 and 10 for current exposures must either increase or stay the same upon remediation, which is the future exposure condition. It is not possible for points to disappear. Please correct this.

Conclusions and Recommendations

The risk assessments for Sites 21, 22, and 23, in Appendix E require revision. They might become acceptable upon appropriate responses to our comments. The station-wide risk assessment in Appendix H is very seriously flawed. We strongly urge that the Navy meet with risk assessors from the regulatory agencies to clarify the purpose and necessary components of this assessment.

ATTACHMENT A

Determining Ambient Concentrations of Metals

For the Baseline Human Health risk Assessment we recommend the elimination of metals (where indicated) as COPCs early in the risk assessment. This is most easily accomplished by comparing the highest concentration detected to a value which represents the upper range of the ambient concentrations for that metal. For this purpose we recommend a procedure which we have previously recommended at several Navy bases. The crux of the method is the use of plots of the log of concentration vs. cumulative probability. The following steps should be followed:

a. **Expand the data set.** The largest data set possible is desirable for describing ambient conditions. If the background data set is not sufficiently large, the population size for "background analysis" can be expanded by the use of a technique used successfully at several other sites. Samples of soil collected because of suspected contamination with petroleum products often are found negative for these mixtures upon assay. If these same samples were assayed for metals, the basewide data set can be augmented. This method worked well for Marine Corps Air Ground Combat Center Twentynine Palms. At Naval Station Long Beach, data sets from several investigations were combined to good effect. None of this however should exclude the collection of an appropriate number of "genuine" background samples.

b. **Display summary statistics for the expanded data set.** Construct a table showing the following for each metal: frequency of detection, range of detected values, range of sample quantitation limits, arithmetic means and standard deviations, and coefficients of variation (CV). Data from contaminated samples might be present if ranges of values for a metal exceed two orders of magnitude or if the coefficient of variation exceeds 1.00.

c. **Plot logarithm of concentration vs. cumulative probability.** Sort concentration data for a metal from the lowest to the highest value, using one-half the sample quantitation limit for non-detects. Assume that ambient concentrations of metals are lognormally distributed. Our experience at other Navy facilities in California has shown lognormality to be a robust and useful assumption for the distributions of ambient concentrations of metals, even at frequencies of detection much less than 100%. Construct a plot of cumulative probability vs. log of concentration. Equal distances on the probability axis represent equal numbers of standard deviations. If the sample population numbers 100, then the cumulative probability is 0.05 when the lowest five values have been plotted.

d. **Define ambient conditions as the population with the lowest concentrations.** If data are drawn from just one population, then the log-probability plot will be a straight line. Inflection points suggest multiple populations, possibly as a result of differing soil types or anthropogenic influences (contamination). For the purpose of identifying COPC for risk assessment, we recommend defining ambient conditions as the range of concentrations associated with the population nearest the origin in the plot. This definition may be performed by inspection or via commercially available computer software. The population with the lowest range is selected to minimize the chance of erroneously eliminating a metal whose concentrations are actually due to contamination. The population with the highest range of concentrations might represent contamination, especially if the summary statistics show that the range of detected values exceeds two orders of magnitude and/or if the CV exceeds 1.00. Professional judgment is sometimes required to conclude that some portion of the data intended to represent ambient conditions actually represents contamination.

e. **Calculate a value to represent the upper range of ambient conditions.** Using only the data from the population with the lowest concentrations (with one-half sample quantitation

limits substituting for non-detects), calculate the 80% lower confidence limit on the 95th quantile. A lower confidence limit on a quantile is used in preference to an upper confidence limit, because it is self-correcting with respect to sample size. By this is meant that small sample sizes will yield restrictive comparators (lower values) and metals will tend to retained as COPC, while larger sample populations will yield less restrictive comparators and COPC may be eliminated more easily. Statistical tables for calculating lower confidence limits on quantiles may be obtained from DTSC. If the sample size of the "background" samples exceeds 50, the 95th quantile may be used rather than a lower limit on the 95th quantile.

f. **Include or exclude metals as COPC.** If the highest concentration of a metal detected at a site is less than the comparator selected to represent the upper range of ambient conditions, then eliminate the metal as a COPC. If concentrations higher than the comparator are found, then include the metal in the risk assessment as a COPC. For those metals retained, it is often useful to examine the spatial distribution of the highest values to determine if a "hot spot" is present.

ATTACHMENT B

AMBIENT CONCENTRATIONS OF METALS

AT MARE ISLAND NAVAL SHIPYARD

TABLE 1
AMBIENT METAL CONCENTRATIONS IN ORIGINAL ISLAND SOILS
MARE ISLAND NAVAL SHIPYARD

Metal	Number of Detections/ Samples Analyzed	Values Excluded		Ambient Data Set Size[a]	Ambient Data Set Distribution	Soil Metal Concentration Statistics for Ambient Data Sets (mg/kg)						U.S. EPA PRG[g] (mg/kg)	RWQCB Sediment Screening Criterion[l]
		Too Low	Too High			Minimum Detected[b]	Maximum Detected[c]	Mean	Standard Deviation	Coefficient of Variance	80% LCL on 95th p^* (Ambient Limit)		
Aluminum	30/30[CLP]	0	0	30	Lognormal	3,890.00	32,000.00	13,315.76	8,131.57	0.06	**26,000**	77,000	N/A
Antimony	10/23[CLP]	2	3	18	Lognormal	0.40	1.40	0.51	0.34	0.70	**1.3**	31	N/A
Arsenic	28/30[CLP]	0	0	30	Normal	2.10	21.10	8.22	4.47	0.54	**16**	0.38	33
Beryllium	21/30[CLP]	0	0	30	Lognormal	0.19	2.00	0.76	1.03	1.3	**1.8**	0.14	N/A
Cadmium	11/30[CLP]	0	0	30	Nonparam.	0.36	3.60	0.26[d]	N/A	N/A	**3.5**	9.0[h]/38	5
Chromium	92/93	0	56	37	Normal	7.60	59.22	31.66	15.24	0.48	**56**	210[i]	220
Copper	90/93	3	3	87	Lognormal	10.20	275.49	71.09	60.88	0.19	**210**	2,800	90
Lead	86/93	11	11	71	Lognormal	5.51	43.59	16.67	8.86	0.19	**33**	130[h]/400	50
Manganese	93/93	12	12	69	Lognormal	156.01	628.31	300.52	115.15	0.07	**560**	380	N/A
Mercury	4/30[CLP]	0	0	30	Nonparam.	0.09	0.17	0.06[d]	N/A	N/A	**DL[f]**	23[j]	0.35
Nickel	85/93	0	0	93	Lognormal	11.10	137.91	35.64	29.18	0.22	**70**	150[h]/1500	140
Thallium	1/30[CLP]	0	4	26	Nonparam.	0.83	0.83	0.25[d]	N/A	N/A	**DL[f]**	5.4[k]	N/A
Vanadium	91/93	10	10	73	Normal	30.60	132.62	79.67	29.47	0.37	**130**	540	N/A
Zinc	92/93	0	12	81	Normal	29.61	121.00	69.66	22.63	0.32	**100**	23,000	160

TABLE 1
AMBIENT METAL CONCENTRATIONS IN ORIGINAL ISLAND SOILS
MARE ISLAND NAVAL SHIPYARD

Metal	Number of Detections/ Samples Analyzed	Values Excluded		Ambient Data Set Size[a]	Ambient Data Set Distribution	Soil Metal Concentration Statistics for Ambient Data Sets (mg/kg)						U.S. EPA PRG[g] (mg/kg)	RWQCB Sediment Screening Criterion[i]
		Too Low	Too High			Minimum Detected[b]	Maximum Detected[c]	Mean	Standard Deviation	Coefficient of Variance	80% LCL on 95th p^e (Ambient Limit)		
Aluminum	30/30[CLP]	0	0	30	Lognormal	3,890.00	32,000.00	13,315.76	8,131.57	0.06	26,000	77,000	N/A
Antimony	10/23[CLP]	2	3	18	Lognormal	0.40	1.40	0.51	0.34	0.70	1.3	31	N/A
Arsenic	28/30[CLP]	0	0	30	Normal	2.10	21.10	8.22	4.47	0.54	16	0.38	33
Beryllium	21/30[CLP]	0	0	30	Lognormal	0.19	2.00	0.76	1.03	1.3	1.8	0.14	N/A
Cadmium	11/30[CLP]	0	0	30	Nonparam.	0.36	3.60	0.26[d]	N/A	N/A	3.5	9.0[h]/38	5
Chromium	92/93	0	56	37	Normal	7.60	59.22	31.66	15.24	0.48	56	210[i]	220
Copper	90/93	3	3	87	Lognormal	10.20	275.49	71.09	60.88	0.19	210	2,800	90
Lead	86/93	11	11	71	Lognormal	5.51	43.59	16.67	8.86	0.19	33	130[h]/400	50
Manganese	93/93	12	12	69	Lognormal	156.01	628.31	300.52	115.15	0.07	560	380	N/A
Mercury	4/30[CLP]	0	0	30	Nonparam.	0.09	0.17	0.06[d]	N/A	N/A	DL[f]	23[j]	0.35
Nickel	85/93	0	0	93	Lognormal	11.10	137.91	35.64	29.18	0.22	70	150[h]/1500	140
Thallium	1/30[CLP]	0	4	26	Nonparam.	0.83	0.83	0.25[d]	N/A	N/A	DL[f]	5.4[k]	N/A
Vanadium	[illegible]/93	10	10	73	Normal	30.60	132.62	79.67	29.47	0.37	130	540	N/A
Zinc	92/93	0	12	81	Normal	29.61	121.00	69.66	22.63	0.32	100	23,000	160

TABLE 2
AMBIENT METAL CONCENTRATIONS IN ARTIFICIAL FILL SOILS
MARE ISLAND NAVAL SHIPYARD

Metal	Number of Detections/ Samples Analyzed	Values Excluded		Ambient Data Set Size[a]	Ambient Data Set Distribution	Soil Metal Concentration Statistics for Ambient Data Sets (mg/kg)						U.S. EPA PRG[h] (mg/kg)	RWQCB Sediment Screening Criterion[m]
		Too Low	Too High			Minimum Detected[b]	Maximum Detected[c]	Mean	Standard Deviation	Coefficient of Variance	95th Percentile[e] (Ambient Limit)		
Aluminum	376/376[CLP]	0	0	376	Normal	1,170.00	47,400.00	18,529.65	10,055.48	0.54	**35,000**	77,000	N/A
Antimony	90/323[CLP]	8	9	306	Nonparam.	0.35	16.50	0.85[d]	N/A	N/A	**8.5**	31	N/A
Arsenic	327/373[CLP]	5	5	363	Lognormal	0.72	48.80	13.35	12.87	0.36	**36**	0.38	33
Beryllium	340/376[CLP]	0	116	260	Normal	0.10	0.90	0.55	0.24	0.43	**0.90[f]**	0.14	N/A
Cadmium	200/376[CLP]	0	26	350	Nonparam.	0.05	5.7	0.68[d]	N/A	N/A	**5.2**	9.0[i]/38	5
Chromium	3,113/3,123	0	1,236	1,887	Normal	5.30	148.41	85.49	33.26	0.39	**140**	210[j]	220
Copper	3,102/3,123	0	656	2,467	Normal	5.70	148.00	67.33	31.95	0.47	**120**	2,800	90
Lead	2,619/2,671	0	676	1,995	Lognormal	2.10	60.26	25.20	17.99	0.21	**59**	130[j]/400	50
Manganese	3,123/3,123	0	0	3,123	Lognormal	27.10	13,559.44	707.33	472.53	0.10	**1,600**	380	N/A
Mercury	228/375[CLP]	0	0	375	Nonparam.	0.02	69.70	0.24[d]	N/A	N/A	**2.0**	23[k]	0.35
Nickel	3,033/3,123	0	200	2,923	Normal	7.00	148.21	66.80	35.73	0.53	**130**	150[j]/1,500	140
Thallium	33/372[CLP]	0	3	369	Nonparam.	0.22	8.40	0.27[d]	N/A	N/A	**DL[g]**	5.4[l]	N/A
Vanadium	3,080/3,123	0	53	3,070	Normal	4.40	220.32	119.99	44.59	0.37	**190**	540	N/A
Zinc	3,094/3,123	0	589	2,534	Normal	12.21	289.89	129.71	59.89	0.46	**230**	23,000	160

TABLE 2
AMBIENT METAL CONCENTRATIONS IN ARTIFICIAL FILL SOILS
MARE ISLAND NAVAL SHIPYARD
(CONTINUED)

Notes:

a The ambient data set consists of both detected and nondetected results. Nondetected results are represented by values of one half the detection limit. The data set excludes anomalously low and high values. For chromium, copper, nickel, vanadium, and zinc, values above an identified threshold were excluded. Except where indicated, the ambient data set includes both on-site and off-site laboratory data.

b Minimum detected concentration in ambient data set, after exclusion of anomalously low values.

c Maximum detected concentration in ambient data set, after exclusion of anomalously high values.

d Mean values for nonparametric distributions were estimated as the 50th percentile of the distribution.

e Results were rounded to two significant figures.

f Ambient limit for beryllium was set at the maximum detected value in the ambient data set, because a parametric estimate of the 95th percentile would have exceeded that value.

g At the request of the regulatory agencies, the ambient limit was set at the detection limit.

h U.S. Environmental Protection Agency (EPA) preliminary remediation goals (PRG) for residential use (September 1995).

i Cal-Modified PRG (EPA 1995).

j This is the total chromium PRG, which assumes a 1/6 ratio of chromium VI/chromium III.

k This is the mercuric chloride PRG.

l This is the thallic oxide PRG.

m Sediment Screening Criteria for Wetlands Creation Cover, from "Sediment Screening Criteria and Testing Requirements for Wetland Creation and Upland Beneficial Reuse" (Regional Water Quality Control Board [RWQCB] 1992).

CLP Only the off-site laboratory, Contract Laboratory Program (CLP) data were used.

DL Detection limit.

N/A Not available.