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HUNTERS POINT
SSIC NO. 5090.3

April 5, 2001

Commanding Officer
Department of the Navy
Naval Facilities Engineering Command
Southwest Division
1220 Pacific Highway
San Diego, CA 92132-5190
Attention:Richard Mach

CALCULATION AND IMPLEMENTATION OF SUPPLEMENTAL MANGANESE AMBIENT LEVELS, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

Dear Mr. Mach:

California Department of Toxic Substances Control has completed the review of Calculation and Implementation of Supplemental Manganese Ambient Levels, Hunters Point Shipyard, San Francisco, California TC.0201.10860 (TM). The TM, dated February 28, 2001, was prepared for the Department of the Navy, Naval Facilities Engineering Command, Southwest Division (Navy) by Tetra Tech EM Inc.

General Comments

1. DTSC feels strongly that the Navy should delineate the boundary of Manganese contaminations. Regardless the outcome of this study, the extent of the contaminations will have to be defined either for further excavation or institute control.

2. DTSC is considering whether Manganese contained in chert and basalt fragments or dusts which was altered from its original natural form should be considered a release of hazardous substances. We are searching internal policies and directives in order to be consistent with Department's practices. At this point, DTSC reserves its right to make such determination until further notice.

3. Please demonstrate the normalcy of the selected chert and basalt bearing sample data set before using its statistical characteristics.

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4. Please present a spacial distribution (preferably a map) of the chert and basalt bearing samples used in this study.

All following comments are based on the assumption that manganese containing chert and basalt are natural occurring and, whether its in bedrock formation or in altered fragments or dust, they would not be considered to be a hazardous substance.

Specific Comments

1. Residential vs. Industrial areas. The introduction implies that the TM applies to all of Hunters Point, when in fact it is relevant only to residential areas as designated in the City's Re-Use Plan. The introductory text should distinguish between Mn exceedences in proposed residential areas and in proposed industrial areas. That is, please explains that since samples taken from residential areas have exceeded residential cleanup goals, Mn excavations have been proposed in residential areas. The text should further note that samples collected in industrial areas have not exceeded industrial cleanup goals, to ten feet below the ground surface (fbgs), and so no excavations have been proposed in industrial areas. In addition, please cite USEPA's preliminary remedial goals (PRGs) for residential and industrial scenarios.

2. Risks. What are the cancer and non-cancer risks associated with the proposed bedrock (30,000 mg/kg) and fill (10,000 mg/kg) supplemental manganese ambient levels, for both industrial and residential scenarios? If revised values are proposed in the next version of the TM, please supply risks for the revised values. Include a description of the health effects.

3. Ambient vs background. The Mn proposal is an "ambient" proposal not a "background" proposal since SMALs are proposed for areas which are not pristine--that is, not excluded from site operations. Anthropogenic and naturally occurring Mn are not distinguished.

4. Predictive Tool. Some sites with elevated nickel concentrations were excluded from cleanup based on point-by-point ambient determinations. In a few samples, industrial releases of nickel were identified. Therefore, the nickel approach was a useful predictive tool. How useful is this Mn proposal as a predictive tool? It is clear that there may be some sites at Hunters Point where Mn is an industrial contaminant (e.g., the battery reconditioning area). Does this approach identify any sites at all where Mn is an industrial contaminant?

The Navy is reluctant (see the response to comments) to provide

site-specific information in this TM. However, this is an "implementation" plan, and as regulators, it is necessary to have a sense of how the rule will actually work on the sites. To facilitate this analysis, please provide site-specific data and information as requested by the agencies and demonstrate how the approach will apply for each Mn site.

5. Data quality objectives (DQOs). Please include a DQO section in this plan.

6. Decision Flow Chart and Recommendations Several concerns regarding the decision flow chart are discussed in the following paragraphs.

The text proposes an "industrial use screening" for Mn as part of the decision flow chart (Figure 12). The flow chart indicates two industrial use criteria (in addition to the presence of chert or basalt). These are: 1) lack of visual evidence of contamination and 2) lack of chemical evidence of contamination as indicated by low concentrations of arsenic, cadmium, lead, or zinc. 1) and 2) are discussed in the next two paragraphs. Historical use is discussed in the third paragraph. Collocated samples are discussed in the final paragraph.

6.1 Visual evidence. Visual evidence is described (page 5), as follows:

> "Metal shavings are recognized both by their metallic nature and by oxidation (rusting), welding flux has a metallic appearance, sandblast grit is composed of loose sand with paint chips (it was used to blast the paint off ships or ship parts), and any slag disposed of from a foundry (Building 241) would also be visually obvious in a sample."

These criterions rely heavily on descriptions on boring logs: the absence of notes is taken as evidence that no Mn related industrial activities had been there. However, it is not known whether such notes were routinely made on boring logs, since Mn was not an especial topic of interest during most of the remedial investigation, and debris of various kinds is common in soil at Hunters Point. Please include a table noting all samples which failed this test--that is include a table listing all samples excluded based on notes on boring logs, and include the boring logs in an appendix.

6.2 Chemical assemblages. With respect to chemical signatures of industrial use, the text states that improperly disposed intact dry cell batteries (which contain up to 50% manganese oxide) would have been noted on logs. The contents of the batteries, when separately disposed, would be associated with arsenic, cadmium, lead or zinc. Please clarify what

is meant by "low" concentrations of metals. Please include screening criteria for each metal. Please list all samples excluded because of chemical assemblages. Please provide a reference for the association of dry cell batteries with metals other than manganese.

Chemicals associated with sandblast grit should also be discussed, and included as an industrial use screening criteria on Figure 12, and as analytes for subsequent sampling. Similarly, what metals are associated with slag?

Potassium permanganate and manganese phosphate are associated with pickling and other metal finishing operations. Has the data been evaluated to determine if elevated potassium or phosphate is associated with elevated Mn? Similarly, has the groundwater data been scanned for this association?

6.3 Historical uses. Historical uses that may potentially result in manganese contamination are *not* included as "industrial use screening criteria." As noted above, visual evidence on boring logs and metal assemblages are the criteria used for industrial use screening. The text describes activities that may produce manganese wastes on page 4. However, records of documented activities are not included, instead the text cites the environmental baseline study (EBS).

Also, with regard to undocumented activities (including about ten years of Triple A activities), for which no records exist. The Navy's approach relies only on visual evidence and chemical associations (discussed above).

For each Mn site, please include a description of potential industrial use or release of manganese waste, based on historic activities, visual screening, and chemical assemblages. A table is the preferred format. EBS information should be summarized, as well as other contaminants of potential concern (COPCs), and maximum concentrations.

Include a site-wide figure which indicates areas of potential manganese use and release. Symbols may be used to designate various uses or releases (e.g., potassium permanganate, welding, slag). Please include Triple A sites on the figure and in the text.

The text on page 12, second paragraph suggests that site history will be considered for each sample. However, this text goes on to describe the visual screening, so it is ambiguous. If it is intended that site history is part of the screening process, please include site history on Figure 12 and clarify the approach to be used in the text.

6.4 Rock fraction. The data presented is persuasive that where chert and basalt clasts are noted on logs, the ambient values for this subset are higher than the HPAL for the entire data set. Some concerns are noted in the following paragraphs.

The first screening criterion (Figure 12) is the presence or absence of chert or basalt. That is, for a sample that has *any* chert or basalt noted (and passes the other criteria), the SMAL will supersede the HPAL. One concern is: if the Navy's proposed approach is accepted, the search for clasts will be intensified. One small piece of chert or basalt could result in a no further action proposal. That is, the utility of the approach as a predictive tool could be compromised by the bias of the investigator.

This issue is further complicated by the fact that a bias was intentionally built into the RI data set with respect to clasts. Since only fine-grained matrix is pertinent to risk assessments (since it can be inhaled, ingested, etc.), the rock fraction was removed from samples prior to analyses. Therefore, RI results represent the concentration of Mn in the matrix--not in the clasts.

Another bias may have built into the RI data set. For example, rock types of clasts may have been noted on boring logs only when the rock fraction was high. This, however, is purely speculative and indeterminate.

The data presented is persuasive that for chert and basalt bedrock, the ambient values for this subset are higher than the HPAL for the entire data set. Therefore, application of a higher value (e.g., SMAL) is logically more defensible when a sampling location contains a high fraction of either chert or basalt. However, neither the rock fraction nor the concentrations of Mn in the rock fraction are known for samples which have already been collected.

Please clarify whether clasts were pulverized during chemical analyses for bedrock samples, or whether the Mn concentration in bedrock samples also represents the matrix.

If whole rock was used for analyses of bedrock samples, then the higher ambient values in bedrock samples, compared to fill samples, suggest that Mn is not enriched in the matrix when compared to concentrations of clasts.

It is recommended that the rock fraction of rock types be estimated and recorded for currently opened excavations and for all future logs and excavations.

6.5 <u>Collocated samples</u>. The decision flow chart proposes that when a sample fails screening criteria, a collocated sample is to be collected. Then, based on concentration of Mn in the collocated sample, either no further action will be proposed or the higher criteria will apply. DTSC disagrees with this decision rule. If the sample fails the screening criteria, delineation and excavation should apply.

6.6 The hexagon that says "delineate and evaluate" should be changed to"delineate and excavate."

7. Statistical analyses

A test for outliers should be used. Describe the test and indicate samples eliminated.

Discuss why the approach used is appropriate for the data set. For example, the approach is similar to that used for other metals at the site, but the data set for the ambient bedrock is much smaller (39) than other data sets. Perhaps the 80% LCL of the 95 percentile would be more appropriate for bedrock ambient, given the smaller data set.

Please provide standard statistical descriptors for each of the probability distributions, including: range, standard deviation, variance, mean, median, % c.v., skewness, kurtosis, 25% (in mg/kg), 75% (in mg/kg), strict 95%, UCL and LCL. For the convenience of the reader, it is customary to show these values adjacent to the plots. Discuss the statistical results. Provide example calculations. Include a figure showing the frequency distribution (normal, lognormal). Indicate which test for normalcy was applied. Discuss any breakpoints in the distribution or threshold values.

Were there adequate detection limits for all samples used? Please indicate on the plots any values that are non-detects. In order to control "noise" in the data, it is recommended that a dummy value be used for non-detects, at or below the lowest detected value, prior to plotting.

8. No further action. Section 3, last paragraph. The text notes a preliminary evaluation of all 43 Mn-only sites indicated that all 43 Mn-only sites passed the screening criteria. That is, no further action would be proposed by the Navy for the 43 Mn-only sites since the SMAL criteria of 10,000 mg/kg (or 30,000 mg/kg) would be applied (in lieu of the current HPAL of 1432 mg/kg), and no samples are in exceedence of the SMAL criteria at the 43 Mn-only sites.

Are any of the 43 Mn-only sites bedrock sites?

What are the preliminary results--with respect to Mn--for the 31 sites that have other contaminants in addition to Mn? When all contaminants (except Mn) have been excavated, is the site re-designated as a "Mn-only" site? If so, then the presence/absence of other chemicals is moot, with respect to the decision flow chart.

For a site that is partially in bedrock, do criteria change from the bedrock portion to the fill portion? Are there any such sites? Similarly, are there any sites that both pass and fail the criteria (which is applied on a point-by-point basis)?

9. Introduction and elsewhere. To be consistent with the approach elsewhere on the site, and for other compounds, the HPAL (1431 mg/kg) for manganese should be used to define "high" manganese (not 1400 mg/kg).

10. Section 3, page 4, number 3. Please include battery contents and disposal of waste battery contents.

Page 4, last paragraph, the sentence "Only the industrial landfill . . . " What is meant by "surface soil"? That is, how deep is "surface soil?" Any disposal in the top ten feet may be significant. For example, sandblast grit and other wastes may have been used in trench and tank backfill, etc. all over the site (not just in Parcel B).

11. Section 4.4 and Table 1. For the benefit of the non-geologist reader, explain why diabase, basaltic tuff, and shale/chert are included in chert/basalt bedrock ambient calculations. Why not exclude shale/chert samples?

The references to Figure 1 in the first paragraph are in error.

12. Section 5: Conclusions, fourth bullet and following paragraph. As discussed above, the relationship between Mn distribution and site geology should be compared to Mn concentrations not to the Mn excavations in residential areas. For example, the cluster of high Mn in Parcel E is neither shown nor discussed in this TM.

13. Section 5: Conclusions, fifth bullet. Please include a list of samples examined. Did the samples without high Mn concentrations also have chert or basalt clasts?

14. Section 5, page 11. The statement that manganese excavations may expand to 128,000 cubic yards is speculative.

15. Section 5, page 11, second paragraph. The combined bedrock/fill ambient level is not appropriate for either bedrock or fill and should be deleted.

16. Figure 2: Manganese Excavations and Site Geology. This figure illustrates the manganese exceedences of residential criteria only, and as such does not provide a realistic depiction of the relationship between Mn concentrations and site geology. Please include a figure illustrating basewide Mn distribution (residential and industrial, including Parcel E) and site geology. The figure should distinguish (by the use of symbols) Mn results that were used for the calculation of bedrock ambient levels, fill ambient levels, and excluded data.

Please explain why depth to bedrock is indicated for only a small portion of the site on this figure. If depth to bedrock contours are to be used, they should be applied to the entire area of the figure.

17. Please include a figure showing the locations of the samples used to

calculate the regional ambient levels.

18. Figure 3: Manganese Excavations Point Density. This figure is not fully discussed in the text. Since manganese *excavations* were used, instead of manganese *samples*, this figure is potentially misleading. For example, high concentrations of manganese in industrial areas are not even shown (whether or not associated with shallow bedrock) since no excavations in industrial areas are required. It is recommended that this figure be deleted. Instead, please include a figure illustrating point density for all Mn samples (not just selected excavation samples).

Figure 6 and Table 1

19. Figure 6: Manganese Regional Ambient Based on Samples from Chert or Basalt Bedrock from Published Analyses, California Coast Ranges. The very high concentrations (up to 64%) associated with ore bodies dominate the regional bedrock ambient values. Prospecting for manganese to support the second world war effort was conducted in the California Coast Ranges, and several mines were productive. Regional samples were collected by a variety of investigators for a variety of reasons, including prospecting. They were not collected, however, in order to determine a regional ambient value, hence may reflect unknown biases.

However, since ore bodies were not found at Hunters Point during site construction (and are not suspected at Hunters Point), a more appropriate comparison for regional ambient values would exclude ore bodies. It is recommended that the regional bedrock ambient values be re-calculated, excluding the "manganese lens" entries on Table 1.

Please note on the figure and the table where concentrations of MnO in the original publications have been converted to Mn by Dr. Wakabayashi. Provide a sample calculation in an explanatory footnote.

Figure 7 and Table 2

20. Figure 7: Supplemental Manganese Ambient Level Based on Samples from Chert or Basalt Bedrock . Figure 7 is associated with Tables 2A and 2B: Manganese Concentrations in Chert or Basalt Logged in Bedrock and Fill Screened for Industrial Use (Used for Ambient Level Methods 4.4, 4.5, and 4.6)...

Table 2A consists of samples from borings and Figure 2B consists of surface samples. Please note on Figure 2A any samples for which the rock type has been reinterpreted from rock type on the boring logs by Dr. Wakabayashi. Provide all such boring logs in an appendix, with annotations showing where changes made.

On Figure 2B, the surface sample designations (GN-SW-1, GN/CH1, GN-1, etc.) are in unfamiliar formats. Are these remedial investigation (RI)

samples? If not, please provide a reference for the samples.

21. Table 3, New Data Addition. The n (1603) cited in this table is different from the n on Figure 4 (3750) and Figure 10 (7489). Comments on the disadvantages sections are not repeated here since they are provided elsewhere in these comments. For example, see the next comment.

22. Figure 8: Supplemental Manganese Ambient Level Based on Samples from Chert or Basalt Bedrock and Chert or Basalt Bearing Fill. Since samples have been collected from either bedrock or from fill, it is not clear why this figure is relevant. It is not appropriate to combine the bedrock and fill data sets. It is recommended that this figure be deleted.

23. Figure 11: Cross-Section A-A', Excavation 290102. This excavation is not discussed in the text. Is this a proposed excavation? Are there any other proposed excavations?

Appendix B: Boring Logs

24. Please include hard copies of the boring logs. Hard copies are needed for the administrative record--the CD does not suffice.

Please identify all logs that were re-interpreted, provide an explanation of the re-interpretation in the text and indicate the changes as annotations on the boring logs.

Please provide boring logs of samples excluded because they failed the industrial screen, based on review of visual descriptions in the logs. Include chemical concentration data for samples that failed the screen.

Appendix C: Response to Comments (RTC)

25. DTSC Comment 6. DTSC repeats the observation that the Navy has crushed and pulverized rocks containing elevated manganese during site development. As such, manganese in the fine fraction of soil has become available for exposure.

26. DTSC comment 8. DTSC repeats the observation that no explanation has been provided for the Mn cluster in Parcel E. Whereas the Parcel C cluster is arguably the most impressive cluster, the unexplained cluster in Parcel E is also significant.

27. DTSC Comment 11. DTSC repeats the comment that more than one sample may be needed to determine the extent of an Mn exceedence or to determine if the exceedence in associated with industrial use. Such sites will need to be reviewed on a case-by-case basis.

28. DTSC Comment 12. DTSC disagrees with the Navy's comment that the question regarding imported fill is not relevant. For example, if the Sierra foothills granitic fill in IR07 (page C-3) extends over a wide area, then appropriate ambient values for that area may also be different.

If you have any questions, Please contact me at (510) 540-3822.

Sincerely,

Chein Ping Kao, P.E.
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