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**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**
REGION 1
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BOSTON, MASSACHUSETTS 02114-2023

December 21, 2004

Mark Evans, Remedial Project Manager
U.S. Department of the Navy
Naval Facilities Engineering Command
Northern Division
10 Industrial Highway
Code 1823, Mail Stop 82
Lester, PA 19113-2090

Re: Rounds 10 and 11 - Groundwater Monitoring Report for the Goss Cove Landfill

Dear Mr. Evans:

EPA reviewed both of the aforementioned documents, that report results for routine groundwater monitoring sampling events 10 and 11 at the Goss Cove Landfill, Naval Submarine Base New London (NSBNL). Round 10 took place in June 2004, and Round 11 occurred in July 2004. These reports present analytical data obtained in accordance with the requirements for long-term monitoring at this site, with no additional evaluation or interpretation. The reports are identical in format, organization, and content, with the exception of the data presented in the tables and the discussion of the data.

Monitoring wells 8MW8D and 8MW10S, both of which are located upgradient of the landfill, show PCE at concentrations of 2400/2700 micrograms per liter and 1200 micrograms per liter, respectively for this sampling round. During Round 11, PCE was detected in 8MW8D and its duplicate at 2900 micrograms per liter (same concentration in both samples) and in 8MW10S at 340 micrograms per liter. All the expected daughter products (*e.g.*, 1,1-DCE, cis- and trans-1,2-DCE, and vinyl chloride) are reported in Appendix E, "Data Validation Memos and Laboratory Validation Results." None of the degradation products is present above analytical detection limits in the GCL groundwaters that report PCE.

No laboratory-derived results for either total or dissolved iron are reported in the summary data Table 3-1. These results are not required as monitoring criteria but they supplement other information (ORP, additional dissolved trace metals, field $Fe^{2+}$, *etc.*) that is needed to develop a consistent picture of site geochemical conditions. Please include the laboratory iron results in future groundwater analytical results summary tables.

The observed agreement between laboratory measurements of total and dissolved Fe is consistent with the generally reducing conditions in GCL groundwater (please see Fig. 1, attached). However, for sampling at GCL, EPA suggests that you consider the use of field (Hach kit) measurements of $Fe^{2+}$, as well as the laboratory measurements of dissolved Fe (which should be predominantly in the form of $Fe^{2+}$), because of possible loss of aqueous iron through oxidation during sample collection and delivery to the lab. A comparison of the field $Fe^{2+}$ and laboratory dissolved iron results for Monitoring Event 10 (ME10) suggests that the correlation between the two data sets becomes nonlinear when the field-measured $Fe^{2+}$ is around 3 mg/L (see Fig. 1). Although the Hach kit range is given as 0-10 mg/L by the manufacturer, this suggests that its range may be more limited. Given that both the laboratory analysis for dissolved iron and the field analysis for reduced iron may yield spurious results, there is value in continuing to collect both sets of measurements. Comparisons among the three available iron data sets (*i.e.*, total and dissolved from the lab, ferrous from the field) may allow one to draw self-consistent conclusions.

*Specific Comments:*

Round 10 (June 2004):

1. *Table 2-2 and Appendix E.* In 8MW2D, dissolved oxygen (DO) and nitrate are very low (0.26 mg/L and 0.054 mg/L, respectively), as is reported at 15 micrograms per liter, and dissolved and field measurements of Fe are elevated (4.8 and 3 mg/L, respectively), all of which suggest reducing conditions. By contrast, the ORP reported for this round is high (259 mV), suggestive of oxidizing conditions. Some of the GCL wells report ORPs that fluctuate between positive and negative values (*e.g.*, 8MW1). However, 8MW2D has been consistently negative in previous rounds. In monitoring events 1-8, ORPs ranged from –251.5 to –415 mV, and in Round 11, the ORP in this well is -329 mV. Is it possible that the ORP values for 8MW2D were recorded with the wrong sign? Please check.

2. *Tables 3-1 and 3-2.* In Tables 3-1 and 3-2, "U" is defined as an undetected value, according to the table footnotes. In Appendix E, which contains all analytical results, it appears that U is actually the reporting limit, not the method detection limit (MDL). Please make note of this.

Round 11 (July 2004):

1. *Table 2-2.* 8MW1 reports a dissolved oxygen concentration of 22 mg/L. This is approximately twice the expected value for oxygen saturation, at that temperature: Please indicate whether this number is erroneous, or provide another explanation.

2. *Table 2-2 and Appendix E.* Unlike the observations described above, for ME10, the iron data from ME11 show good agreement between field measurements of $Fe^{2+}$ and total Fe, and poor agreement between laboratory results for dissolved Fe and total Fe (see Fig. 2, attached). Most of the laboratory results for dissolved Fe were ND, with only a few results reported at relatively low concentrations. One possible explanation is that reduced iron in the groundwater was oxidized during sample collection, and lost at the filter. Field procedures should be reviewed to minimize opportunities for oxidation (*e.g.*, purge at minimal flow rate), and for consistency from round to round (*i.e.*, Why do the total and dissolved results from ME10 agree fairly well, while those from ME11 do not?)

Also, as noted in ME10, the Hach kit analyses appear to deviate from the laboratory results around 4 mg/L, which should be within the manufacturer's specified range. These discrepancies suggest that, for future monitoring rounds at GCL, the Navy should continue to analyze total and dissolved iron in the laboratory and $Fe^{2+}$ in the field.

I look forward to working with you and the Connecticut Department of Environmental Protection to protect the environs of the Naval Submarine Base. Please do not hesitate to contact me at (617) 918-1385 should you have any questions.

Sincerely,

Kymberlee Keckler, Remedial Project Manager
Federal Facilities Superfund Section

cc: Mark Lewis, CTDEP, Hartford, CT
Melissa Cokas, NSBNL, Groton, CT
Jennifer Stump, Gannett Fleming, Harrisburg, PA

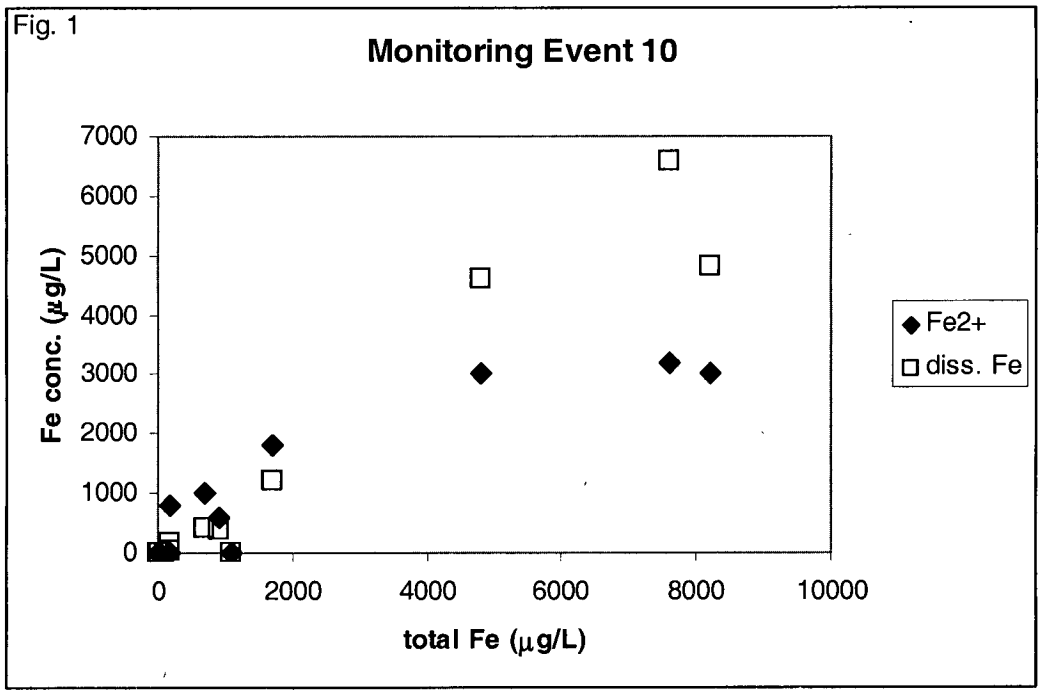


Figure 1. This plot shows the correlation between laboratory results for total Fe and dissolved Fe ( "diss. Fe" shown as open squares), and between laboratory results for total Fe and field results for $Fe^{2+}$ ("Fe2+" shown as filled diamonds), for Monitoring Event 10.

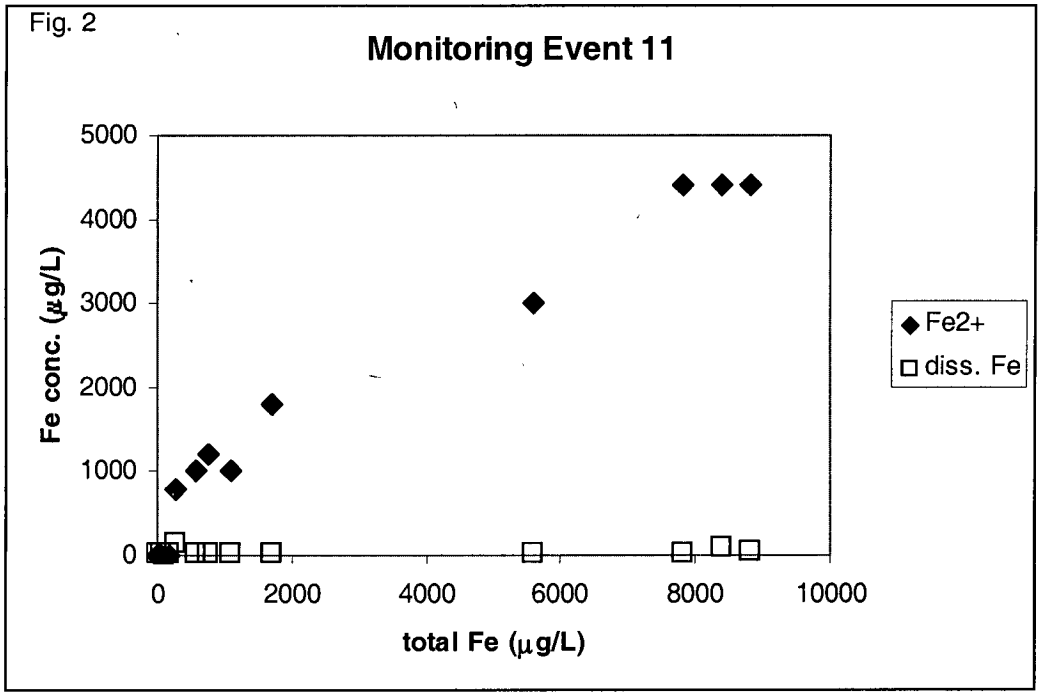


Figure 2. This plot shows the correlation between laboratory results for total Fe and dissolved Fe ("diss. Fe" shown as open squares), and between laboratory results for total Fe and field results for $Fe^{2+}$ ("Fe2+" shown as filled diamonds), for Monitoring Event 11.