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

3-20-2000

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: Round 1 Groundwater Monitoring Report for the Area A Landfill

Dear Mr. Evans:

EPA reviewed the *Round 1 Groundwater Monitoring Report for Area A Landfill*, dated February 2000. The report briefly reviews site history and previous environmental investigations; provides a detailed description of new well installation associated with the groundwater monitoring program; and an archive of groundwater, surface water, and soils analyses based on sampling performed in October 1999. No interpretation of results is attempted. EPA reviewed the report in light of its conformance to the Groundwater Monitoring Plan and completeness of the execution and presentation, as well as for preliminary indications of contaminant trends. Detailed comments are provided in Attachment A.

The field and analytical activities summarized in the Groundwater Monitoring Report (GMR) adhere closely to those outlined in the Groundwater Monitoring Plan. The monitoring program appears to be proceeding routinely.

The GMR is thorough and complete; it provides archival reporting of the boring logs for new well installation (Appendix B), field parameters (Appendix G) and the laboratory data sheets (Appendix J).

As stated in the report (p. 1-1, §1.1), there is no interpretation of the data offered in this report, as it is intended to be a data report only. Furthermore, being the first round of the monitoring program, there are no previous data to examine with respect to temporal trends, even in a preliminary fashion. This is the appropriate perspective for first-round data.

A qualitative review of the data raises no significant concerns with respect to contaminants from the site that may have impacted groundwater. There are no exceedances of the primary or secondary monitoring criteria for organics, and all VOCs, pesticides, and PCB analyses were below the method detection limits. Only inorganics (arsenic, chromium, copper, and zinc) exceeded monitoring criteria. Arsenic is the most widespread COC, with numerous detections

falling between the primary criterion (4 μg/L, the Connecticut SWPC for groundwater) and the secondary criterion (150 μg/L, the federal AWQC for protection of aquatic life). See Specific Comment below for further discussion of arsenic.

I look forward to working with you and the Connecticut Department of Environmental Protection to protect the downgradient areas of the Area A landfill. 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

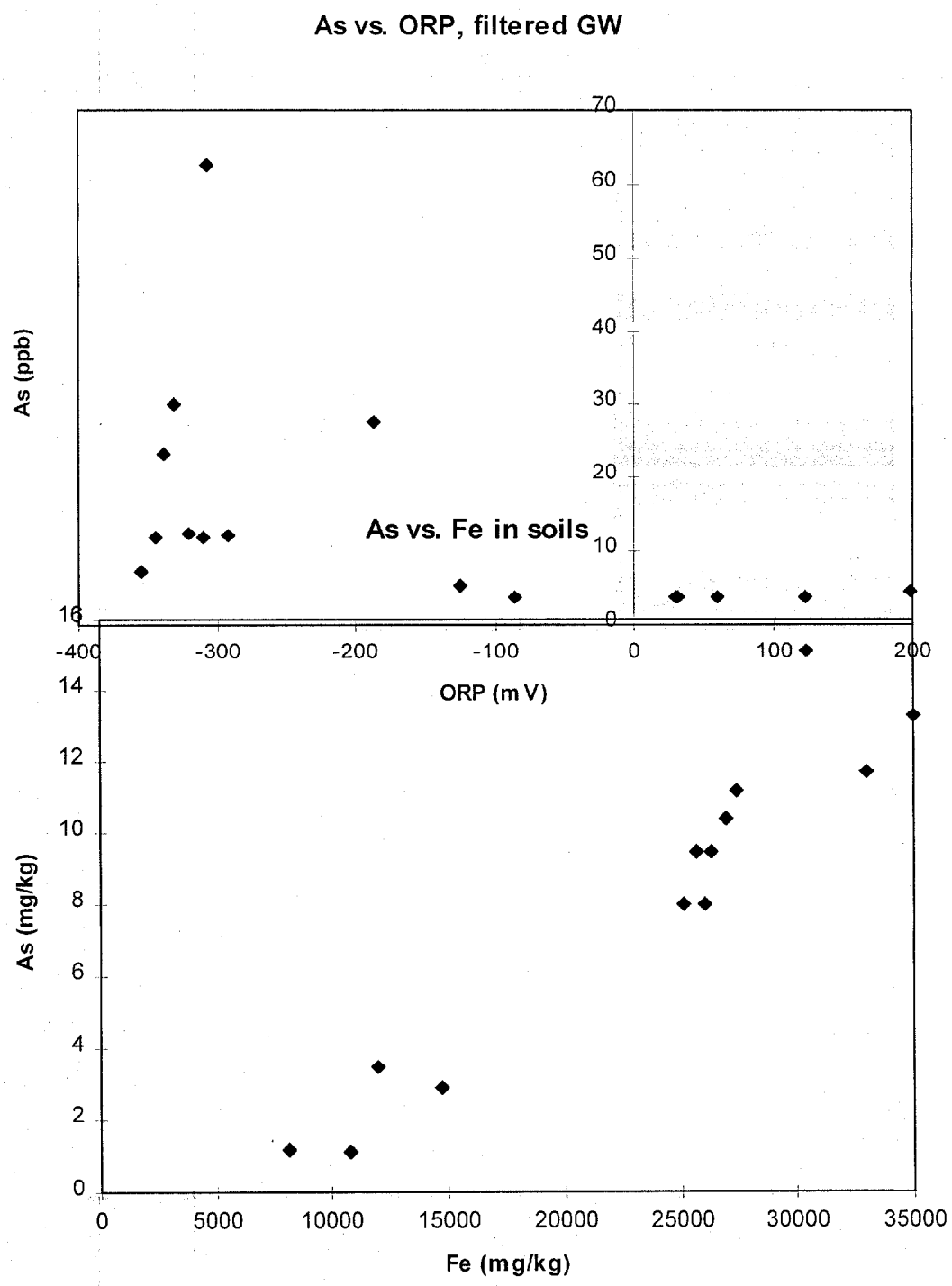
Attachment

cc: Mark Lewis, CTDEP, Hartford, CT
Darlene Ward, NSBNL, Groton, CT
Patti Lynne Tyler, USEPA, Lexington, MA
Jennifer Stump, Gannett Fleming, Harrisburg, PA
Mark Mengel, Tetra Tech-NUS, Pittsburgh, PA

ATTACHMENT A

Page	Comment
p. 2-1, §2.0	typo: "... one existing monitoring well ... was over drilled ... and re-installed ~~due~~."
p. 2-3, §2.3	typo: "... analyses from each new monitoring well ..."
p. 3-1, §3.0	It is interesting to note that arsenic is present in most of the soil samples taken in conjunction with installation of new monitoring wells. Arsenic concentrations in soil samples range from 1.1 to 13.3 mg/kg. These concentrations appear to correlate very strongly with iron and manganese concentrations in the bulk soils (see attached figure). While the affinity of arsenic for iron oxides is well known, it is curious that the correlation should be so well developed when iron is present at some three orders of magnitude higher concentration than is arsenic in this system. With iron ubiquitous and abundant, there is no particular reason to expect arsenic to be present in proportion (here, at about 0.0005 times the concentration of iron). A possible explanation is that the arsenic and iron are both present in the organic silts that comprise the dredge spoil, and were well homogenized by the physical and chemical transport processes that affected them from their source in weathering of rock within the Thames drainage basin to their deposition in the estuary. The particulates are likely to have iron oxide coatings with associated arsenic. This scenario, if valid, tends to support a natural origin for the arsenic in soils at Area A.
p. 3-1, §3.0	Dissolved arsenic in (filtered) groundwater is fairly well correlated (see attached figure) with the oxidation-reduction potential (ORP) measured as part of the "low-flow" sampling procedure. This is to be expected, as reducing conditions due to the presence of abundant organics (both in the dredge spoil and in the landfill materials themselves) will tend to mobilize arsenic from the iron oxides with which they are associated. The plot shows that in oxidizing groundwater (positive ORP), As is not detected (reported at the method detection limit of 3.8 μg/L), while all higher arsenic detections are for samples showing highly reducing conditions (strongly negative ORP). Arsenic detections in groundwater can be expected to persist in this environment.
p. 3-2, §3.0	Chromium was detected in unfiltered and filtered samples from 2WMW46DS and from the unfiltered surface water sample at SG-22. It is noted that the pH of these waters is near neutral (6.83 and 6.39, respectively), and the redox conditions are reducing (Eh -331 and -50 mV, respectively). Under these conditions, the chromium may be present in its trivalent state, rather than the hexavalent state that is often assumed to comprise any dissolved chromium. The reduced chromium may be derived from iron oxyhydroxide (FeOOH) dissolved by the reducing

groundwater. (Cr(III) substitutes for Fe(III) in the FeOOH structure, or sorbs onto the FeOOH surface.) It can be anticipated that the Cr(III) will not be very mobile in surface or shallow subsurface water when oxidizing conditions have been reestablished. The abundant iron in this system will quickly oxidize and chromium will be removed from solution by sorption and/or co-precipitation with the iron.


As vs. ORP, filtered GW
As (ppb)
70
60
50
40
30
20
10
0
16
-400
-300
-200
-100
0
100
200
ORP (mV)
As vs. Fe in soils
As (mg/kg)
14
12
10
8
6
4
2
0
0
5000
10000
15000
20000
25000
30000
35000
Fe (mg/kg)