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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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September 19, 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: Technical Review Comments on Round 3 Groundwater Monitoring Report for the Area A Landfill at the Naval Submarine Base New London in Groton, Connecticut

Dear Mr. Evans:

EPA reviewed the document entitled *Round 3 Groundwater Monitoring Report for Area A Landfill*, dated August 2000. The report provides a brief review of the site history and documents groundwater analyses based on sampling performed in April 2000. No interpretation of results is attempted; interpretation is deferred until the Year 1 Summary Report, which is scheduled to be prepared following the fourth round of sampling and analysis. EPA reviewed the document with particular attention to conformance to the Groundwater Monitoring Plan [1], completeness of the execution and presentation, any preliminary indications of contaminant trends. Detailed comments are provided in Attachment A.

The field and analytical activities summarized in the Groundwater Monitoring Report (GMR) generally follow the Groundwater Monitoring Plan [1]. Exceptions include the omission of three surface water samples and one seep sample, all because of lack of water at the planned sample locations. In addition, the validity of the water levels read from staff gauges is questioned because some gauges apparently have been moved since installation. The latter problem is easily resolved by re-surveying the staff gauges.

Table 3-1, which summarizes the key results from Round 3, appears to have been carried over from Round 2, rather than showing updated data from Round 3. Please check this important part of the report.

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; all VOCs, pesticides, and PCB analyses were below the method detection limits. Only inorganics (arsenic, chromium, copper, lead, and zinc) exceeded monitoring criteria. Most of these detections are at relatively low levels (*i.e.*, only slightly in excess of monitoring criteria), and most appear to be somewhat sporadic (*i.e.*, not

persistent at a particular monitoring well from round to round). For example, a chromium exceedance at 3MW12S in Round 2 was not reproduced in Round 3, but 2WMW41S and 2WMW46DS showed Cr exceedances in Round 3, while they did not in the previous round. Similarly, copper, lead, and zinc exceedances observed in Round 3 were not found in Round 2. Only arsenic appears to be consistently in exceedance of the primary monitoring criterion in numerous wells for successive sampling rounds.

The prevalence of arsenic at concentrations of tens of parts per billion is associated with very low ORP (*e.g.*, wells 2WMW40DS, 2WMW41DS, and 2WMW42DS, with arsenic concentrations in the range 17-31 μg/L, and all exhibiting ORP less than -300 mV). Arsenic concentrations are likely controlled by the redox conditions, in which case the As in groundwater is likely to persist as long as the reducing conditions prevail. Future assessments of groundwater at the Area A Landfill should address controls on redox conditions. In particular, what is the impact of the fill material itself, as well as the cover, on redox conditions? What is the influence of organic-rich dredge spoil used to fill the area?

The laboratory is not achieving detection limits sufficiently low to evaluate results against the monitoring criteria in many cases. This is a particular problem for arsenic, which may be the most important site contaminant, yet is difficult to analyze accurately by the ICP method used. The reported detection limits for arsenic for a number of analyses are above the primary monitoring criterion of 4 μg/L. Thus, the results (*i.e.*, "undetected" at a detection limit greater than 4 μg/L) cannot be weighed against the regulatory criterion adopted. Specific examples are as follows (data are extracted from the laboratory data sheets provided in Appendix F, as the summary given in Table 3-1 appears to be in error):

2WGW21S-03 at 4.2 μg/L (U);
2WGW38DS-03 at 6.0 μg/L (U);
2WGW40DS-03 at 10.3 μg/L (U);
2WGW43DS-03 at 16.8 μg/L (U);
2WGW43DS-03-F at 13.4 μg/L (U);
2WGW45DS-03 at 11.0 μg/L (U);
2WGW45DS-03-F at 9.6 μg/L (U);
2WGW46DS-03-F at 31.6 μg/L (U);

Any one of these samples may be in exceedance of the primary criterion, but this remains unknown because of the poor resolution of the ICP data. It may be necessary to adopt a different analytical method that is capable of achieving lower detection limits for arsenic, such as graphite-furnace atomic absorption (GFAA) or ICP/MS.

A similar problem is apparent for copper, although its occurrence is less persistent than that of arsenic. The secondary monitoring criterion for copper is 4.8 μg/L, while the detection limit for a number of samples is higher, *e.g.*:

2WGW38DS-03-F at 5.2 μg/L (U);
2WGW43DS-03 at 6.2 μg/L (U);
2WGW46DS-03 at 6.4 μg/L (U);

The secondary criteria for a number of organics (PCBs and pesticides) are also lower than method detection limits (*e.g.*, the Aroclors at 0.014 μg/L; the MDL appears to be 0.021 μg/L).

I look forward to working with you and the Connecticut Department of Environmental Protection to protect the environment 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

Attachment

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

ATTACHMENT A

Page	Comment
p. 2-1, §2.1	The text notes that the water levels measured on the staff gauges are suspect because the gauges were moved after installation. The staff gauges should be re-surveyed in order to bring these data into the water-level data base and make them available to constrain contour maps of water levels.
p. 3-1, §3.0	The summary of results from the analyses is not supported by the numbers in Table 3-1. It appears that Table 3-1 was inadvertently reproduced from Round 2, and has not been updated with the new results. Please check for consistency.
p. 3-1, §3.0	The fourth bullet summarizes results for arsenic in unfiltered and filtered samples. It is noted that for four of the five wells for which the comparison can be made, arsenic was at higher concentration in the filtered sample than in the unfiltered sample (data extracted from the laboratory sheets, Appendix F, rather than from Table 3-1, which appears to show Round 2 data):

	Unfiltered	Filtered
2WMW39DS	2.6 μg/L (U)	3.2 mg/L
2WMW40DS	10.3 μg/L (U)	17.9 μg/L
2WMW41DS	18.4 μg/L	29.0 μg/L
2WMW42DS	6.2 μg/L	30.6 μg/L

In the fifth well (2WMW47DS), the filtered sample (13.0 μg/L) showed arsenic at a concentration slightly less than in the unfiltered sample (16.5 μg/L), as might be expected. This frequent occurrence of "dissolved" (filtered) arsenic *higher* than "total" (unfiltered) arsenic is a clear indication that the uncertainty on the arsenic analyses is significant. This uncertainty introduces difficulties in addressing such important issues as the mobility of arsenic (*e.g.*, what fraction of total As is present in reduced form, As(III)?). Future evaluations of the arsenic data for filtered and unfiltered samples should include an assessment of the precision of the analyses and its implications.

p. 3-2, §3.0	The first and second bullets refer to monitoring well 2WMW41S, but Table 3-1 and Figure 3-1 show only 2WMW41DS. Please check for consistency in the well nomenclature.

p. 3-2, §3.0 The last paragraph refers the reader to Section 1.2. Should this refer to Section 1.1?

Table 3-1 While the title of the table is updated ("Round 3 Groundwater Monitoring ..."), the data entries apparently have not been updated. The data appear to be a carryover from Round 2.

Table 3-1 It is noted that the secondary monitoring criterion for arsenic (based on the federal AWQC) is *higher* than the primary criterion, in contrast to all other analytes. Thus, a detection of arsenic greater than 4 μg/L results in an exceedance of the primary criterion, but not the secondary. Indeed, this is the case for all exceedances of arsenic noted in Round 2 (highlighted in the table). The statement in the table footnote (fourth page of the table only), "There are no exceedances of primary monitoring criteria," is then incorrect; all exceedances for As are above the *primary*, rather than the secondary, criterion. (The text on p. 3-1, §3.0, is correct; it states, "Detections of arsenic ... exceeded the primary monitoring criterion ....")

Figure 3-1 The label on monitoring well 2WMW38DS is omitted on the map. It appears from the sample numbers on the laboratory data sheets that this well was sampled.

REFERENCE

[1] Tetra Tech NUS, Inc., "Groundwater Monitoring Plan for Area A Landfill, Naval Submarine Base, New London, Groton, Connecticut," January 1999.