08-0124
SDMS: 160515

United States Environmental Protection Agency
EPA New England
One Congress Street, Suite 1100
Boston, MA 02114-2023

August 26, 2002

Mr. Andrew T. Silfer, P.E.
Corporate Environmental Programs
General Electric Company
100 Woodlawn Avenue
Pittsfield, Massachusetts 01201

RE: Isolation Layer Material
Upper ½-Mile Reach Removal Action
General Electric-Pittsfield/Housatonic River Site, Pittsfield, Massachusetts

Dear Mr. Silfer:

As you know, EPA has raised numerous concerns about the amount of total organic carbon (TOC) contained in the isolation layer material that was used in the Upper ½-Mile Reach Removal Action. EPA has also raised concerns regarding the initial laboratory, their analytical method and their laboratory procedures used to measure the TOC. This letter briefly summarizes EPA's concerns and identifies actions that need to be taken.

Performance Standard #2 of the Removal Action Work Plan — Upper ½-Mile Reach of Housatonic River (August 1999) (the "Work Plan") states the following, "GE shall replace the removed sediments with a cap and armor system that will consist of geotextile bottom layer, a silty sand isolation layer, a geotextile filter layer, a filter protection layer (i.e., GeoGrid), and an erosion protection stone layer. This cap and armor system shall be installed using the materials and approaches described in Section 7.4.2 of this Work Plan."

Section 7.4.2 of the Work Plan includes the following requirements:

". . .a layer of silty sand containing at least 0.5% total organic carbon (TOC) will be installed to act as an isolation layer . . ." (page 7-9, 3rd paragraph), and

"Based on the conservative cap and armor system design calculations presented in Appendix G, a 12-inch thick silty sand layer with 0.5 percent TOC concentration is proposed . . ." (Page 7-9, 7th paragraph).

In accordance with the Work Plan, GE performed pre-placement sampling of the isolation material at a frequency of one sample for every 500 cubic yards. GE's remediation contractor

subcontracted a laboratory to perform the TOC analysis on the isolation layer material. The laboratory initially selected to perform this pre-placement testing was Spectrum Analytical. In a series of submittals referencing data from Spectrum Analytical, GE provided EPA data indicating that the isolation layer material met or exceeded the 0.5% minimum requirement for TOC.

However, based on initial post-placement sampling results of the isolation material required under Section 11.5.1 of the Work Plan, EPA raised concerns that GE's procedures for measuring TOC were not appropriate and/or the isolation material placed did not have the required minimum percent TOC. See letter from D. Tagliaferro to A. Silfer dated September 24, 2001, RE: September 24, 2001 Weekly Meeting.

Subsequent to September 24, 2001, GE proposed changing laboratories from Spectrum Analytical to Northeast Analytical Laboratories (NEA) for all TOC analysis. GE also increased the testing frequency to one sample per 250 cubic yards. NEA submitted a proposed Standard Operating Procedure (SOP) for the TOC analysis. In October 2001, EPA approved the SOP and the use of NEA.

Since October 2001, GE, through NEA, has performed 30 post-placement analyses of TOC on the isolation material placed before October 2001 (i.e., through Cell 11). 26 of these samples failed to meet the 0.5% minimum TOC required by the ½-Mile Work Plan (See Table 1).

EPA also requested that GE provide all the laboratory analytical raw data and supporting documentation for the TOC analysis performed by Spectrum Analytical. GE provided this information between January and April of 2002. Andy Beliveau, an EPA quality Assurance Chemist, reviewed the Spectrum Analytical Data and concluded that ". . . the Spectrum TOC analytical results for pre-placement backfill samples are suspect and may not accurately represent the actual concentration of TOC due to the variability of the sample media, poor analytical precision in the latter runs, problems noted in excessive IC [inorganic carbon] concentrations, and inconsistencies in the data presented as the final analytical result." (See attached memorandum from A.F. Beliveau, EPA, to D. Tagliaferro, EPA, April 24, 2002). Based on this assessment of the Spectrum data, EPA believes that all of the Spectrum data are unreliable and should not be used and that the NEA data is the data that should be used in both the model referenced in Appendix G of the Work Plan and to determine compliance with Performance Standard #2.

Based on post-placement isolation samples analyzed by NEA, it appears that some of the isolation material placed by GE did not meet the minimum requirement of 0.5% TOC.

As described in the Work Plan, the post-placement sampling of the isolation layer material is limited to eight locations, some of which are located in the same general area. Five of these locations are in areas where material was placed prior to GE revising their TOC analytical testing procedures. These five locations are insufficient to characterize the percent TOC in the isolation

layer material that was placed in the ½-Mile from the beginning of the project through October 2001 (i.e., through Cell I1). Accordingly, GE shall complete the following actions.

GE shall perform additional sampling to characterize the amount of TOC in all of the isolation layer material placed from the beginning of the project through October 2001. This additional sampling shall consist of sampling the isolation layer material placed in the river from the Newell Street Bridge through Cell I1 at approximately 18 locations. GE shall collect one sample from Cell A and two samples each from Cells B, C, F1, F2, F3, G1, G2, G3, H1, H2 and I1. GE can use the existing in-place TOC data for locations Cap-Mon1 through 5 to assist in meeting the sampling requirements. At each location, sampling shall consist of the collection of a discrete sample of the isolation layer material for TOC analysis. GE shall provide EPA with five days notice prior to sampling to allow EPA to observe the sampling and collect split samples. GE shall collect the samples during low flow conditions.

Following the receipt of the analytical results, GE shall submit to EPA, for approval, the following:

- A summary of all analytical results and a full data package for the TOC analysis.
- A figure or figures indicating the TOC levels in the isolation layer including a delineation of any areas of the isolation material cap that have TOC levels less than 0.5%.
- The sediment cap model output (e.g., breakthrough curve) using the measured f_{oc} (fraction of organic carbon) in areas where the isolation material cap was found to be less than 0.5% TOC. All other parameters should be the same as those used in Appendix G of the Work Plan.
- A discussion of the differences and implications between the model results contained in Appendix G-1 of the Work plan and models results using the measured f_{oc}.

GE may also propose to collect additional site specific data that relates the PCB transport model parameters referenced in Appendix G of the Work Plan or justify the use of alternate parameters based on existing data collected by EPA or GE. Where practical, EPA recommends that GE collect additional data within the ½-Mile Reach to justify the use of alternate values for certain parameters (e.g., the seepage rate).

With regard to the required submittal, GE may also submit any additional information, model runs with alternate values for certain parameters, supporting documentation etc. that relate to the transport of PCBs through the cap. However, these model runs, if any, shall be in addition to the modeling output required above.

Schedule

Within 14 days of receipt of this letter, GE shall submit to EPA for approval a brief plan that contains the following:

- A figure with proposed sample locations for the isolation layer material.
- A proposal to collect additional site specific data, if any.
- A schedule for sampling and report submittal.

Based on the results of this submittal, EPA may require GE to perform additional investigative, monitoring and/or response actions to address this issue. Moreover, EPA also reserves all its enforcement rights to address any noncompliance in this regard.

If you have any questions, please contact me at (413) 236-0969.

Sincerely,

Dean Tagliaferro

Attachments

cc: Tim Conway, EPA
Bryan Olson, EPA
Mike Nalipinski, EPA
Rose Howell, EPA
Holly Inglis, EPA Records Center
K.C. Mitkevicius, USACE
M. Palermo, USACE-WES
Sue Steenstrup, DEP (two copies)
Mark Gravelding, BBL
Dawn Jamros, Weston
Mayor S. Hathaway, City of Pittsfield
Public Information Repositories
Site File

TABLE 1
GENERAL ELECTRIC COMPANY
PITTSFIELD, MASSACHUSETTS

GE Isolation Layer Total Organic Carbon (TOC) Sampling Results
Upper 1/2-Mile Reach Removal Action

Sample ID:	CAP-MON-1	CAP-MON-1	CAP-MON-1	CAP-MON-1	CAP-MON-1	CAP-MON-1
Sample Depth:	2"-4"	4"-6"	6"-8"	0-0.6'	0-0.7'	0-0.6'
Sample Date:	11/5/01	11/5/01	11/5/01	1/22/02	1/22/02	1/22/02
Percent TOC:	0.1040	0.1450	0.1350	0.0703	0.1850	0.1190
Sample ID:	CAP-MON-2	CAP-MON-2	CAP-MON-2	CAP-MON-2	CAP-MON-2	CAP-MON-2
Sample Depth:	2"-4"	4"-6"	6"-8"	0-2'	0-2.5'	0-1.7'
Sample Date:	11/5/01	11/5/01	11/5/01	1/22/02	1/22/02	1/22/02
Percent TOC:	0.1490 [0.1010]	0.0897	0.0844	0.0788	0.1220 [0.0910]	0.0798
Sample ID:	CAP-MON-3	CAP-MON-3	CAP-MON-3	CAP-MON-3	CAP-MON-3	CAP-MON-3
Sample Depth:	2"-4"	4"-6"	6"-8"	0-1.5'	0-1'	0-0.9'
Sample Date:	11/5/02	11/5/02	11/5/02	1/22/02	1/22/02	1/22/02
Percent TOC:	0.0699	0.0946	0.1090	0.1060	0.1270	0.1180
Sample ID:	CAP-MON-4	CAP-MON-4	CAP-MON-4	CAP-MON-4	CAP-MON-4	CAP-MON-4
Sample Depth:	2"-4"	4"-6"	6"-8"	0-9"	0-10"	0-8"
Sample Date:	2/27/02	2/27/02	2/27/02	2/27/02	2/27/02	2/27/02
Percent TOC:	0.4630	0.3640	0.3610 [0.3450]	0.5040	0.3530	0.3240
Sample ID:	CAP-MON-5	CAP-MON-5	CAP-MON-5	CAP-MON-5	CAP-MON-5	CAP-MON-5
Sample Depth:	2"-4"	4"-6"	6"-8"	0-11"	0-7"	0-6"
Sample Date:	7/3/02	7/3/02	7/3/02	7/3/02	7/3/02	7/3/02
Percent TOC:	0.6320 [0.5040]	0.4560	0.5140	0.4980	0.5130	0.2630

1. Analysis performed by Northeast Analytical
2. Duplicate sample results are presented in brackets

Attachment

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
Office of Environmental Measurement and Evaluation
11 Technology Drive, N. Chelmsford MA 01863-2431

MEMORANDUM

DATE: April 24, 2002

SUBJ: Review of GE/BBL/Spectrum Analytical TOC data for pre-placement backfill materials in the GE Housatonic River Half-Mile Remediation project.

FROM: A.F.Beliveau, Quality Assurance Chemist
Quality Assurance Document Review Assistance Team

TO: Dean Tagliaferro
On scene Coordinator

Objectives of the data review: To determine whether the data produced by Spectrum Analytical Laboratories for total organic carbon (TOC) levels in backfill layers is usable.

TOC analysis:

It has been EPA Region1 experience that the most accurate and precise method for determining TOC concentrations in solid/soil matrices was the Lloyd Kahn Method. The Lloyd Kahn method eliminates the inorganic carbon (IC) component using acidification prior to the analysis of the organic carbon. Due to the inherent variability of soil matrices due to inhomogeneity, EPA will normally run all samples in duplicate or triplicate when the duplicate results do not match within 20% RSD on a single sample aliquot. As the concentration of TOC rises in the samples the analytical method and instrumentation require the analyst to use less and less sample to ensure that the sample result is bracketed by the calibration curve. Smaller and smaller sample aliquots mean less representative samples. Running duplicates and triplicates to determine sample homogeneity and precision is a must to be able to have valid results.

Spectrum Analytical Laboratories analysis:

Spectrum's analysis data was examined in detail package by package and the following was found:

1. Earlier packages did not contain the percent moisture results so that the final TOC results could not be reconstructed.

2. Only singlecate analyses were performed in most cases for inorganic carbon. Total carbon(TC) analyses appear to be run on single samples but not the same sample as the IC analyses. Later data that contained the raw data run showed duplicate sample runs. Early data packages did not contain the raw data printouts and only one of the results was reported. Later analysis results show some raw data. Some raw data results have results deleted/ crossed out with no explanation of why that result was not used. Many times a low result is rejected possibly due to the TC result being smaller than the IC result. When any result is reported and not used, there needs to be an explanation by the analyst.

3. There was a series of results run on 12/13/00 for samples 7532-7536 showing less than detections limit data as well divergent replicates apparently for the same sample. This fact indicates that replicates were not very precise.

4. The measurements from batch to batch for IC show levels ranging from < 100 mg/KG to 20,000 mg/KG. The variation in overall IC results is higher than the required amount of TOC (5000 mg/Kg) in the backfill material. Not having duplicate results to determine how precise any of the IC or TC data is very problematic when determining the validity of the data.

5. Sample #4521 shows a wide range of TC concentrations(2753-28,161) but only one IC result(19,811) was reported. Which TC result was determined to be the correct is not noted. If the IC result were deducted from the TC results individually there would be negative results. How the correct TC number was determined is not noted.

6. Sample #4796 results could not be reconstructed from the raw data presented. How the result was calculated cannot be validated.

7. All of the data packages for samples that failed required TOC concentration were finally made available for review and many of the problems discussed above were also found.

North East Analytical (NEA)Laboratories results:

1. NEA's SOP was reviewed and EPA's comments were addressed so that the QA/QC for the Lloyd Kahn method was up to Region1 specifications. NEA runs all the TOC analyses in triplicate and documents the precision (usually less than 30%)between the three runs. If the triplicate precision limits are not met the sample is run in quadruplicate

2. NEA's results on pre-placement triplicate samples indicated that some of the backfill materials failed. Post placement sample results from cell areas that were tested within criteria by Spectrum Analytical pre-placement indicate that many samples are below the required 0.5% TOC(5000 mg/Kg).

Conclusions:

It is this reviewer's opinion that the Spectrum TOC analytical results for pre-placement backfill samples are suspect and may not accurately represent the actual concentration of TOC.

After reviewing all the above facts from each of the pre-placement data sets and packages and reviewing the post placement data, this reviewer's conclusion is that the Spectrum TOC data for pre-placement samples is suspect and may not indicate the accurate concentration of TOC due to the variability of the sample media, poor analytical precision in the latter runs, problems noted in the excessive IC concentrations, and inconsistences in the data presented as the final analytical result. There are uncertainties in the Spectrum data that are not in the NEA data produced using the Lloyd Kahn method in triplicate. Post placement data performed by NEA appears to show that there may have been very little TOC (i.e. less than 0.5 percent TOC)in the backfill.

If you have any further questions please call me at (617)-918-8607.