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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

November 15, 1994

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 Comments on the *Ecological Meeting Minutes, September 27, 1994* and the *Letter Work Plan for Area A Landfill/Wetland Interface and Downstream/OBDA Sampling* for Naval Submarine Base, New London, Groton, CT

Dear Mr. Evans:

Thank you for the opportunity to review and provide technical comments on the items listed above. This letter discusses EPA's comments and recommendations on the *Ecological Meeting Minutes* from September 27, 1994, *Letter Work Plan for Area A Landfill/Wetland Interface and Downstream/OBDA Sampling* and notes from the November 9, 1994 site visit concerning the selection of 20 soil/sediment sampling locations for additional chemical analysis at the Area A Landfill. Additionally, I will discuss recommended PCB screening levels and the suggested level of taxonomic identification for the quantitative macroinvertebrate survey. Other ecological risk issues concerning the evaluation of environmental risk from the discharge of surface water from the area surrounding the DRMO and accepted regional approaches for ecological risk calculations will be addressed separately.

I. ECOLOGICAL MEETING MINUTES

A. Ecological Cleanup Criteria

The title of this particular discussion topic should be changed to Ecological PCB Screening Levels. There needs to be a clear distinction between screening levels and cleanup levels. Screening levels are proposed chemical concentrations that are based on laboratory toxicological effects data. These levels are generally based on ecologically protective levels that do not result in an adverse effect from a specific chemical concentration. This is often referred to as the No Observed Effect Level. If site-specific contaminant concentrations are below that level, then there is a low probability that an adverse ecological impact will result. However, the exceedance of any screening levels supports the need for increased site-specific information.

In comparison, a site-specific cleanup level can be determined based on a specific exposure pathway to a targeted receptor. The meeting minutes confuse the terms cleanup levels and screening criteria and this should be modified to reflect the correct terminology and application of those terms.

Charlie Menzie raised this issue during the meeting when he questioned a PCB screening level for the Area A Landfill/Wetland Area soils/sediments. EPA had previously questioned the protectiveness of a proposed 10 mg/kg screening level. Charlie discussed some of the past PCB sediment cleanup levels that have been documented in the Record of Decision for Resolve, South Municipal and Sullivan's Ledge. In general, the PCB sediment cleanup level was close to 1 mg/kg. He also discussed an EPA exit criteria. Patti Tyler stated that she could not decide upon a sediment PCB screening level at that point and would need to look into the matter further. The following information and recommendations concerning a PCB soil/sediment screening level should prove helpful.

During the selection of sampling locations at the toe of the Area A landfill, it was apparent that many of the wetland boundary sampling locations were wetland soils and not technically sediments. This makes a difference when selecting a screening criteria because of the variable habitat within this area. Therefore, PCB screening values should be evaluated for both wetland soils/sediments. We are distinguishing sediments as "*comprised of all detrital, inorganic, or organic particles eventually settling on the bottom of a body of water*" (Burton, 1992). In other words, sediments are typically covered with water. Although most of the wetland boundary sampling locations would be considered wetland soils, the samples collected along transects 8, 9, and 10 are most likely sediments. The determination of whether the medium is soils or sediments is important in determining what environmental receptors should be protected and at what concentration. Few screening levels are available for PCBs in soils.

Currently, the Office of Emergency and Remedial Response has developed draft ecotox thresholds for 44 chemicals in surface water, sediment and soil. Ecotox thresholds are used for screening purposes only. If the chemical concentration is below the toxicological benchmark, the chemical will not be considered as a contaminant of ecological concern during any further ecological risk investigation. The chemical will not cause significant ecological impact or risk. On the other hand, the exceedance of these benchmarks does not determine the significance or magnitude of the risk. As part of the Tier II PCB ecotox thresholds in soils, there is suggestion of 40 mg/kg based on thresholds developed by Suter *et al.* (1993) at the Oak Ridge National Laboratory.

For sediment samples, the site-specific data should be compared to a calculated sediment quality guideline, such as the National Oceanic and Atmospheric Administration's ("NOAA") Effects Range Low ("ER-L") and Effects Range Medium ("ER-M") values and Provincial Sediment Quality Guidelines (Persaud *et al.*, 1992) for PCBs described as the Lowest Effect Level ("LEL") and the Severe Effect Level ("SEL"). In determining a calculated sediment quality guideline, EPA recommends the use of the equilibrium partitioning approach as

described in EPA's "Technical Basis for Deriving Sediment Quality Criteria for Nonionic Organic Contaminants for the Protection of Benthic Organisms by Using Equilibrium Partitioning." When deriving the Sediment Quality Guideline, the following equation should be calculated:

$$SQG\ (mg/kg) = TWC\ (mg/L) * K_{oc}\ (L/kg) * \%OC$$

SQG = calculated sediment quality guideline
TWC = threshold water concentration, EPA Ambient Water Criteria
K_{oc} = sediment-water partitioning coefficient
%OC = percent organic carbon in sediment

K_{oc} can be calculated from K_{ow} by:

$$\log_{10} K_{oc} = 0.00028 + (0.9983 * \log_{10} K_{ow})$$

The calculated SQG for PCB normalized to 1% organic carbon would be 0.045 mg/kg. There should be a comparison of the site-specific PCB data to the NOAA's ER-L and ER-M Values (1990). The ER-L for PCB is 0.0227 mg/kg and the ER-M is 0.18 mg/kg. The Provincial Sediment Quality Guidelines for PCBs is 0.07 mg/kg for the LEL and 530 mg/kg for the SEL. The SEL is normalized by multiplying by the site-specific percent total organic carbon ("TOC") to achieve the final SEL. These latter sediment guidelines are specific to freshwater numbers while the NOAA ER-L and ER-M are based primarily on biological effects information from estuarine and marine sediments.

For an example of how a site-specific cleanup concentration was calculated for another site within EPA-New England I have provided the following specifics from the Middle Marsh Superfund Site. A written discussion of this case study is provided in Maughan's Ecological Assessment of Hazardous Waste Sites (1993). In the Middle Marsh ecological risk assessment, site-specific media cleanup levels were calculated by dividing the dietary lowest observed effect level by the bioaccumulation factor ("BAF"). In this example, the soil cleanup levels for carnivorous birds were based on the protective dietary level of 5 mg/kg PCB and a BAF of 0.29 for earthworms. This exposure scenario resulted in a soil cleanup level of 25.5 mg/kg.

EPA has investigated the EPA exit criteria that Charlie mentioned during the September 27th meeting and found it to be a project developed in the Office of Solid Waste. These criteria are currently in draft status and have not been adopted by EPA Region I. Consequently, I do support use of these criteria at this time.

B. Oyster Sampling

The title of this topic should be changed to Review of Oyster Data. At the September 27th meeting, Ken Finkelstein mentioned his uncertainty concerning elevated concentrations of

zinc and associated ecological impacts. He also mentioned his uncertainty with respect to the relationship of high concentrations of zinc and ecological effects to oysters. At some place in these notes, there should a statement that the original objective in collecting shellfish from the Thames River was based on evaluating the potential human health risk from consumption of contaminated shellfish. The slightly elevated levels of VOCs and PAHs in deployed mussels in comparison to indigenous mussels should also be mentioned.

C. Area A Downstream/OBDA Investigation

The minutes should reflect that Dave McDonald recommended a habitat survey.

The units corresponding to the high levels of pesticides (1600) should be specified.

The discussion of collecting samples that cover an anticipated wide range of concentrations should include analysis of total organic carbon.

Please replace the word "indicated" following Dave McDonald's name to "suggested" or "recommended."

II. LETTER WORK PLAN FOR AREA A LANDFILL/WETLAND INTERFACE AND DOWNSTREAM/OBDA SAMPLING

Section 2.2 Area A Downstream/OBDA

Page 2: Please revise the second to last sentence in this paragraph to read, "However, the nature and extent of contamination requires better definition, as well as the potential for ecological exposure and effects to environmental receptors, needs to be determined."

Section 3.1 Summary

Page 3: Please include TOC and grain size in the list of analysis for sediments. The addition of grain size is recommended because grain size can influence contaminant bioavailability. This will also verify selected sample locations at the Area A Landfill and can be used as one of the physical characteristics for comparison between site-specific streams and ponds and reference streams and ponds.

"*Hyallella*" should be "*Hyalella.*"

Will hardness be analyzed as one of the field water quality parameters? If not, it should be included as a few of the Ambient Water Quality Criteria for metals (*i.e.*, lead and copper) are hardness dependent.

Section 3.4.1 Area A Landfill/Wetland Interface

Page 4: This section will need to be modified based on the selection of sampling locations made in the field on November 9th. A wetlands soil sample will be collected from the wetlands boundary and a second soil/sediment sample will be collected 20 feet into the wetlands area. The soil/sediment samples may need to be collected with a petite ponar at transect locations T8, T9, and T10. As discussed above, TOC and grain size should be analyzed as part of both the sediment and soil analyses.

Section 3.4.2 Area A Downstream/OBDA

Page 5: Reference locations will be located away from known sources of contamination to provide adequate data on background concentrations of contaminants and baseline information on benthic community structure.

Section 3.4.2.1. Macroinvertebrate Sampling

Page 5: At each of the twenty seven sampling stations, one sample will be collected by compositing three separate subsamples at each station location. The use of the following reference should be helpful: U.S. EPA. 1990. Macroinvertebrate Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters. Office of Research and Development, Washington, D.C. EPA/600/4-90/030.

Section 3.4.2.3. Toxicity Tests for *Chironomus tentans* and *Hyalella azteca*

Page 7: The review of the following ASTM references may be useful prior to the collection of sediments for toxicity testing.

ASTM. 1991. Standard Guide for Collection, Storage, Characterization and Manipulation of Sediments for Toxicological Testing. No. E1391.

ASTM. 1991. Standard Guide for Conducting Sediment Toxicity Tests with Freshwater Invertebrates. E 1383-90, In Annual Book of ASTM Standards, Vol. 11.04. Philadelphia, PA, pp 1116-1138.

ASTM. 1992. Standard Guide for Conducting the Frog Embryo Teratogenesis Assay -Xenopus (FETAX) E 1439-91. In Annual Book of ASTM Standards Vol. 11.04 Philadelphia, PA, pp 1199-1209

Bantle, J.A., J.N. Dumont, R.A. Finch and G. Linder. 1991. Atlas of Abnormalities: A Guide for the Performance of FETAX. Oklahoma State Publications Department, Stillwater, OK.

The test methodology should be listed within the sections with their corresponding toxicity tests. *H. azteca* and *C. tentans* were not primarily selected as indicator species because they are present in these natural systems. These benthic invertebrates are the best overall indicators of toxic sediments owing to their contact, knowledge of their sensitivity, and proven effectiveness of assays. These organisms are both common and widely distributed within aquatic systems.

III. NOTES ON SELECTION OF ADDITIONAL SAMPLING LOCATIONS AT THE AREA A LANDFILL (November 9, 1994 site visit)

The following comments refer to Plate I, entitled, "Wetland Boundary and Landfill Boundary Area A."

Transect Location	Wetland Flag	Sampling Locations
T1	178	T1-A at wetland boundary T1-B 20' NE in wetland
T2	179	T2-A at wetland boundary T2-B 20' NE in wetland
T3*	180	T3-A at wetland boundary T3-B 20' NE in wetland
T4*	181	T4-A at wetland boundary T4-B 20' NE in wetland
T5*	182	T5-A at wetland boundary T5-B 20' NE in wetland
T6	183	T6-A at wetland boundary T6-B 20' NE in wetland (leachate) NOTE: 45' from 182
T7*	184	T7-A at wetland boundary T7-B 20' NE in wetland
T8	between 189&190	T8-A in stream under water T8-B 20' NE in wetland
T9	between 192&193	T9-A in stream under water[A] T9-B 20' NE in wetland

T10	196	T10-A at wetland boundary[B] T10-B 20'Ne in wetland

*indicates that landfill material has already encroached upon wetlands in these areas

[A] On November 9, 1994, the team decided to review 2WSD35 sediment data and determine whether TOC had been analyzed. If TOC was analyzed, that data would represent information for the wetland boundary and another sample would be collected 20 feet into the wetland. If TOC was not analyzed, two sediment samples would be collected, one at the wetland boundary and one 20 feet into the wetland.

[B] On November 9, 1994, the team decided that a wetland boundary sample needs to be collected. However, former sampling locations 2WSD39, 2WSD40 can be used as sampling data for locations within the wetland. If TOC was not analyzed for then this location will need to be resampled.

Caution should be applied while collecting the soils/sediments so that the majority of the sample does not consist of sand. It would be unlikely to detect PCBS in sand because of the lack of sand's contaminant binding capacity. While we were out in the field, a soil auger was used to verify that the sampling locations consisted of fines. If the sampling crew encounters a location where the sample would consist entirely of sand, they should relocate the sample horizontally to avoid collecting sand. The sampling crew should also avoid sampling vegetation (*Phragmites australis*) and pour any overlying water off the sediment samples collected from transects T8, T9, & T10.

IV. ADDITIONAL COMMENTS

We recommend that figure were developed to include the following components: Area A landfill present day cap boundary, proposed cap boundary, wetland boundary, and transect sampling locations.

At the September 27th meeting, there was some discussion regarding the recommended level for macroinvertebrate taxonomic identification. At that time it was decided that samples would be preserved and identified to genus level and if we found the need to identify some of the chironomids to species level we would have them preserved. Patti Tyler has spoken with a few colleagues and researched various information in the literature and present the following information. It appears that taxonomic identification to the generic level is widely used, but identification to the species level will yield an increase in metric and greater statistical power. We recognize, however, that this would result in greater time and cost. At this point, the Letter Work Plan recommends taxonomic identification to the genus level and I believe this will be appropriate for our purposes. If not, we will have preserved samples also.

I look forward to discussing these issues with you during our conference call this Thursday. I understand that we will be confirming the boundary of the Area A wetland and establishing the locations of reference areas for the Area A Downstream/OBDA in the field on December 1, 1994. We will also confirm the date to take samples at the Area A Wetland/Landfill interface. Please do not hesitate to contact either me at (617) 573-5777 or Patti Tyler at (617) 860-4342 should you have any questions regarding this review.

Sincerely,

Kymberlee Keckler, Remedial Project Manager
Federal Facilities Superfund Section

cc: Andy Stackpole, NSBNL, Groton, CT
Dan Winograd, USEPA, Boston, MA
Patti Tyler, USEPA, Boston, MA
Dale Weiss, TRC, Lowell, MA
Mark Lewis, CT DEP, Hartford, CT
Matthew Cochran, HNUS, Pittsburgh, PA

REFERENCES

Burton, G.A. Jr. (ed) 1992. Sediment Toxicity Assessment. Lewis Publishers, Boca Raton, FL.

Maughan, J.T. 1993. Ecological Assessment of Hazardous Waste Sites. Van Nostrand Reinhold, New York.

Persaud, D., R. Jaagumagi and A. Hayton. 1992. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario.

Suter, G.W.,II, M.E. Will and C. Evans. 1993 Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Terrestrial Plants. Oak Ridge National Laboratory, Oak Ridge, TN. ES/ER/TM-85.

U.S. EPA. 1993. Technical Basis for Deriving Sediment Quality Criteria for Nonionic Organic Contaminants for the Protection of benthic Organisms by Using Equilibrium Partitioning. EPA-822-R-93-011.