TRC

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July 17, 1991

Mr. Francisco A. La Greca
Remedial Project Manager
U.S. Department of the Navy
Northern Division
Naval Facilities Engineering Command
U.S. Naval Base, Building 77-L
Philadelphia, PA 19112

RE: Additional Details on the Proposed
Biota/Sediment Modified Scope of Work for the
Remedial Investigation at the
Naval Education and Training Center (NETC)
Newport, Rhode Island
TRC Project No. 6760-N81

Dear Mr. La Greca:

This letter provides additional details on the proposed modified Scope of Work (SOW) for the biota/sediment sampling planned under the current NETC remedial investigations (RI). Proposed modifications to the biota/sediment sampling and analyses SOW were presented in a July 1, 1991 letter to your office. The additional details were discussed at the Technical Review Committee (TRC) meeting on July 11, 1991 at the NETC in Newport, Rhode Island. The marine studies subcontractor proposed for this work is Battelle Ocean Sciences (Battelle) of Duxbury, Massachusetts. Attachement I to this letter is a full copy of the proposed Battelle SOW which was attached to the July 1st letter.

Additional issues regarding the biota/sediment sampling and analysis which were not presented in the July letter, but were discussed at the TRC meeting include the following: laboratory holding times for the analyses of the marine samples, a proposed abbreviated list of metal analytes for the marine sample analyses, and the proposed deep sediment sample locations adjacent to McAllister Point Landfill. A discussion of each of the issues is presented below.

* The EPA Region I holding time requirements for polynuclear aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) soil/water matrices is 7 days from sample collection and 40 days from extraction to analysis. The use of these holding times for the water (only field and trip blanks being analyzed) and sediment samples is acceptable; however, the use of these holding times for the tissue analysis is not considered applicable. Based on the fact that the holding times were not developed for marine tissue analysis and that there are established tissue analysis holding times, we are requesting that these established holding times be allowed for the tissue analysis. The

established holding times were developed by the EPA and US Army Corp of Engineers and are presented in the document titled "Evaluation of Dredged Material Proposed for Ocean Disposal" (commonly referred to as the "Green Book" or "testing manual"). An excerpt from this document which addresses the tissue holding times is attached to this letter (Attachment II). The holding times listed in the Green Book are those which are currently being applied under methods used for the NOAA Mussel Watch Program. The associated analytical methods have also previously been validated and accepted by NOAA, EPA, and the scientific community for analyses of contaminants in marine environments. The established PAH and PCB tissue analysis holding times specify a 10-day period for extraction and 40-day period from extraction for analysis. Given the established tissue holding times and that the proposed analytical methods are time-consuming and require a great deal of effort to achieve the superior level of data quality, we are requesting that these tissue holding times be accepted for the marine tissue samples being collected and analyzed under this program. An approval for such a variance in the holding times should be recieved in writing from EPA Region I. As a part of receiving authorization to this holding time variance, we are also requesting an exception to the applicable Region I functional guidelines for data validation. This would allow for the data validator to validate the tissue data based upon the 10-day holding time and not the 7-day holding time.

* We are proposing that the EPA Contract Laboratory Program target analyte list (TAL) of metals planned for the tissue and sediment samples be reduced to a list of metals more appropriate for marine samples. Based upon information received from Battelle and presented in their proposed SOW, an analysis of several elements on the TAL is unnecessary and some of the analytes are inappropriate for marine samples. For example, the elements sodium, potassium, calcium, and magnesium are naturally enriched in seawater, marine sediments, and biological tissues. Thus, an analysis of these elements will not yield any useful information with respect to the RI/FS. In addition, the elements barium, beryllium, boron, and cobalt are rarely important in marine systems with respect to environmental degradation, and there appears to be no evidence that these metals are of concern for any of the site studies (based upon a review of site data). Provided as Attachment III are two tables, Table 1 and Table 3, which were prepared by Battelle and included in the July 1st letter. These tables present the proposed reduced list of metals and the entire list of TAL metals with comments on the applicability of each of the TAL metals. The proposed reduced list of metals not only takes into account those metals appropriate

for marine samples, but also includes those toxic metals which were found to be present on the sites.

* Sediment samples are planned for collection from those locations specified in the Field Sampling Plan (FSP) for the RI activities. As presented in the FSP, sediment and biota samples will be collected for analyses from 20 locations adjacent to Site 01 - McAllister Point Landfill, 7 locations adjacent to Site 02 - Melville North Landfill, and 8 locations adjacent to Site 09 - Old Fire Fighting Training Center site. In the FSP, one sediment sample was proposed for collection and analysis from each of the locations at Sites 02 and 09, and two sediment samples were proposed for collection and analysis from each location at Site 01. As is presented in the July 1st letter, we are now proposing that only 7 of the locations at Site 01 - McAllister Point Landfill have two sediment samples submitted for analysis. Included with this letter is a map (Attachment IV) showing the proposed locations for the 7 deeper sediment samples. The proposed locations will provide deeper sediment contaminant information adjacent to the site and in areas where previous investigations showed sediment contamination. The rationale for the proposed reduced number of deeper sediment samples is presented in the July 1st letter.

We believe the proposed changes still address the objectives of the planned marine studies and will provide useful, defensible data. We trust this provides you with the information you require to consider these proposed changes. As was discussed at the July 11th TRC meeting, our goal is to perform the biota/sediment sampling by the end of August. Thus, if there is any additional information we can provide you which will aid us in meeting this goal, please call me.

Sincerely,

TRC ENVIRONMENTAL CONSULTANTS, INC.

Jim Peronto, P.E.
Project Manager

cc: R. Smith/TRC-ECI
G. McKenney/ TRC-ECI

ATTACHMENTS

TRC

-ATTACHMENT I-

BATTELLE
SCOPE OF WORK

TRC

April 8, 1991

Battelle
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Dear Jim,

Please find enclosed a letter proposal and a Scope of Work (SOW) for the Naval Education Training Center Remedial Investigation/Feasibility Study in Newport, Rhode Island. The enclosed documents were prepared in response to your SOW received at Battelle Ocean Sciences (BOS) on March 19, 1991. As per our earlier discussions, we have made several additional recommendations concerning this proposed study.

Organic and trace-metal analysis of marine sediment and tissue samples requires specialized methodologies due to the complexity of the sample matrices and the low reporting requirements. The methodologies listed in the BOS SOW for the PAH and PCB analysis are derived from the NOAA Mussel Watch Program and have been validated and accepted by NOAA, EPA, and the scientific community for analyses of trace organic and inorganic contaminants in marine environments. The rigorous quality control program of procedural and field blanks, matrix spike samples, duplicate samples, and National Institute of Standards & Technology standard reference materials ensures that only quality, defensible data will be reported.

Sample collection

We believe that more information regarding recent contaminant inputs will be obtained by processing the top 4 cm of the core rather than the top 12 in. recommended in the TRC SOW and have written the SOW with this strategy. A separate layer 20-24 cm below the region of bioturbation will be used for determining historical contaminant levels. The entire remaining lower half of core (approximately 1- to 2-ft depth) will be stored for additional analysis if dredging becomes a viable option for this area. We recommend that a sediment sample be collected from a relatively unimpacted area (control area) for the purpose of collecting comparative data.

Based on our existing bivalve data, we suggest that only one bivalve species be monitored in this study. Therefore, for this study we have proposed that only one primary species of bivalve be collected and analyzed. If two biota composite samples are required per site, then the analytical costs associated with the biota analysis would be multiplied by a factor of 2. Biological tissue from a control area is recommended for comparative information.

Organic analysis

Alkylated PAH compounds can assist in determining the source of the PAH compounds to the marine environment. These compounds provide information that can be used to discriminate between pyrogenic and petrogenic PAH sources, and in many cases can also discern the class of petroleum or coal product present in the samples (e.g., lubricating oil versus diesel fuel). Although not reported, data for alkylated PAH will be acquired on our GC/MS system, and will be available in the future if they are needed. This

data collection step will not add any additional costs to the project.

The quantification of PCBs as total Aroclors in environmental samples is at best a crude estimate because of congener weathering, congener and pesticide coelution during analysis, and the fact that commercial mixtures of Aroclors differ from those observed in environmental samples (Duinker et al., 1988, enclosed). The mixture of PCB congeners comprising Aroclor formulations changes due to physical, chemical, and/or biological processes, altering the distribution of individual congeners in the environment after release. The Battelle/NOAA method quantifies individual PCB congeners, which will be related to the specific Aroclor formulations on the TCL. In this way, the data can be compared to the Aroclor data from previous studies, and the individual congeners can be compared to the National Status and Trends database. The use of specific congener analysis has been endorsed in the Environmental Protection Agency/United States Army Corps of Engineers document "Evaluation of Proposed Discharge of Dredged Material into Ocean Waters" (EPA/ACE 1991).

We have included the normalization parameters total organic carbon (TOC) and grain-size analysis in the SOW for sediment analysis. Contaminants are often associated with fine-grained sediments with relatively high organic carbon content. Fine grain-sediments have a high surface area to mass ratio, allowing for a higher surface adsorption than coarse grained-sediments. Also organic contaminants have a high affinity for organic carbon. Fine-grained sediments often have higher TOC loadings and settle in low-energy depositional areas. Therefore, observed distributions of contaminants may be due to coastal depositional processes rather than to differences in chemical input. Thus, to observe true differences among sites, the data should be normalized to TOC and/or grain size.

The TCL-VOC analysis will be performed according to the EPA Contract Laboratory Program Statement of Work (February 22, 1991). Battelle Ocean Sciences has the experienced personnel and equipment to analyze these samples. However, this is not a routine analysis at BOS and it may be more cost-effective to sub contract this work to a TRC-approved laboratory.

The value of sediment VOC analysis for the RI/FS is questionable due to the high water solubility of these compounds. VOC associated with runoff particles will quickly partition into seawater; there will be little VOC in sediments associated with runoff. VOC analysis has provided some useful information in oil spill situations. However, we have found that the half-life of VOC compounds in subtidal marine sediments directly off oil spill-impacted beaches is relatively short (days, weeks).

There is the possibility that subsurface groundwater percolating upwards through nearshore sediments could release VOC compounds to the sediments. However, based on VOC concentrations observed at the McAllister Point Landfill, spring 07, if there were a subsurface source of spring water to the subtidal sediments, the low concentrations observed in the spring would be diluted in the pore waters of the sediments and probably not be detectable using current analytical methods.

The current EPA Region I holding time requirements for PAH, PCB, and VOC sediment/tissue matrices is 7 days from sample collection to extraction and 40 days from extraction to analysis. Unfortunately, these requirements are based on studies of analyte stability in water, and are not relevant to marine sediment analysis. There are no strong data to suggest that sediment VOC and/or semivolatile PAH and PCB compounds would be degraded during storage at —4 °C for greater than 7 days. Note: The NIST biological tissue reference material is frozen wet tissue homogenate. Concentrations of organic contaminants in this SRM have been monitored for over 2 years, and have not changed. The methods proposed are time-consuming, and require a great deal of effort to achieve the level of quality required for this program. The 7-day holding time appears to be at odds with the effort required. We are willing to work with EPA to resolve this technical issue. Sediment metals holding times are acceptable.

Trace-metal analysis

Analysis of several elements on the TCL (see Table 3 of the BOS statement of work) is unnecessary, and some of these are clearly inappropriate for marine samples. For example, the elements sodium, potassium, calcium, and magnesium are naturally enriched in seawater, marine sediments, and biological tissues. Analysis of these elements will not yield any useful information with respect to the RI/FS. In addition, the elements antimony, arsenic, barium, beryllium, boron, cobalt, selenium, and thallium are rarely important in marine systems with respect to environmental degradation, and there appears (from the data provided to Battelle) to be no evidence that these metals are of concern for this study. Thus, we recommend that a reduced set of metals be analyzed in the sediment and tissue samples as shown in Table 1. All of this work would be performed at Battelle Ocean Sciences in Duxbury, Massachusetts, using FAAS and/or GFAAS, and would result in a significant cost savings while maintaining sufficient data for a thorough RI/FS.

Biological effects

There is increasing evidence that contaminants in sediments may be responsible for a number of pathological occurrences in fish and invertebrates. In fish, liver and epidermal neoplasms, or tumors, appear to be caused or strongly influenced by environmental contaminants. In some infaunal mollusks collected for the NOAA Mussel Watch Project, blood neoplasms occur more frequently at sites where certain contaminant levels are elevated than at sites where the levels are not above background. This difference in tumor incidence does not imply a cause-and-effect relationship between contaminant levels and tumors in the mollusks, but suggests a starting point for further investigation. There are, however, strong indications that elevated contaminant levels in sediments cause abnormal reproductive organ development, as well as other pathological conditions such as inflammation, alteration of the architecture of cells (metaplasia) in many tissues and organs, and the rapid, but benign, proliferation of cells (hyperplasia). There is also evidence that the resistance to parasites and disease might be lowered in many animals exposed to sublethal levels of contaminants. These biological studies are currently incorporated in the NOAA Mussel Watch and Benthic Surveillance programs and are being considered for the Coastal Oceans Program. Should environmental effects of the contamination become an issue for this project in the future, Battelle Ocean Sciences has the recognized capability to perform the pathological studies on the bivalves.

Cost savings

The cost for the analysis of the reduced element list is $450.00/sample for sediment or tissue. Therefore, a cost savings of $13,100 could be achieved by analyzing for only those environmentally significant metals presented in Table 1. The TCL-VOC analysis in marine sediments is of limited value due to the water solubility of these compounds. A savings of $25,875 could be achieved by eliminating this analysis from the program. An additional $2,475 can be saved by eliminating the analysis of cyanide in tissue samples. Cyanide is rarely found in tissue samples due to its water solubility and rapid metabolism in organisms.

If you have any additional questions concerning our proposal, please do not hesitate to call.

Sincerely

Gregory S. Douglas, Ph.D.
Senior Research Scientist

REFERENCES

Battelle, 1990. Phase 5 National Status and Trends Mussel Watch Mussel Watch Program Work Plan.

National Institute of Standards and Technology, 1990. Certificate of Analysis — Standard Reference Material 1974, Organics in Mussel Tissue. Gaithersburg, MD.

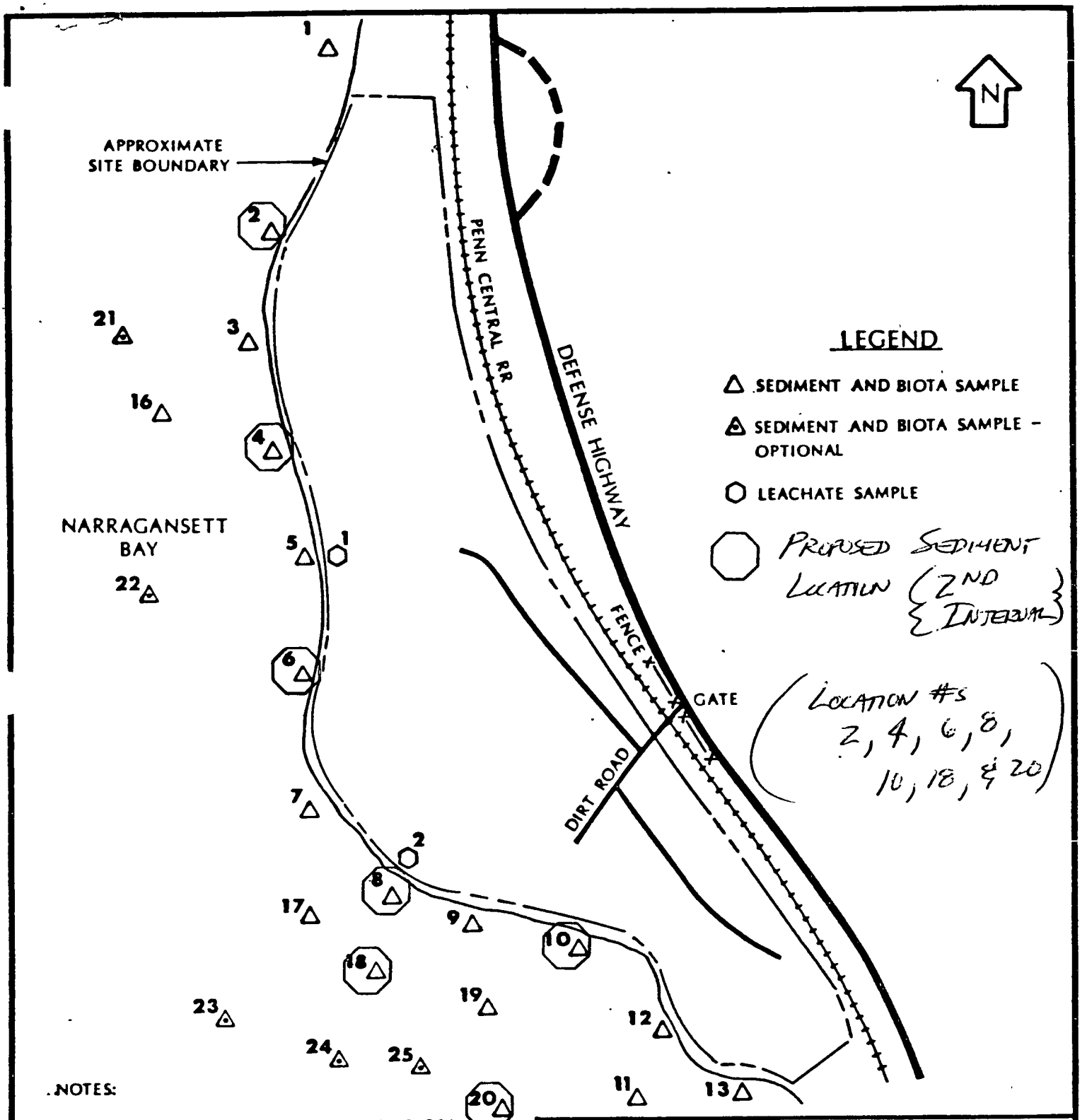
Duinker, J.C., A.H. Knap, K.C. Binkley, G.H. Van Dam, A. Darrel-Rew, and M.T.J. Hillerbrand. 1988. Method to Represent the Qualitative and Quantitative Characteristics of PCB Mixtures-Marine Mammal Tissues and Commercial Mixtures as Examples. Mar. Pollut. Bull. 19(2):74-79.

Schantz, M.M., B.A. Benner, S.N. Chesler, B.J. Koster, K.E. Hehn, S.F. Stone, W.R. Kelly, R. Zeisler, and S.A. Wise. 1990. Preparation and Analysis of a Marine Sediment Reference Material for the Determination of Trace Organic Constituents. Fresenius Z. Anal. Chem. 338:501-514.

Evaluation of Proposed Discharge of Dredged Material into Ocean Waters. 1991. Jointly authored by the Environmental Protection Agency and the United States Army Corps of Engineers. Office of Marine and Estuarine Protection, Washington, DC. EPA-503-8-90/002. Battelle Ocean Sciences was the prime contractor responsible for the review of this document.

Table 1. Recommended Reduced Target Compound List for Trace Metals

	Detection Limit (μg/g)		Comments
	FAAS	GFAAS	
Aluminum	250	2.5	Sediment only
Cadmium	3	0.05	Sediment and tissue
Chromium	5	0.25	Sediment and tissue
Copper	2	0.25	Sediment and tissue
Iron	5	0.5	Sediment only
Lead	6	0.25	Sediment and tissue
Manganese	4	0.25	Sediment only, could also be eliminated.
Mercury	0.01	-	Sediment and tissue
Nickel	2.5	0.25	Sediment and tissue
Silver	4	0.05	Could also be eliminated, useful if sewage input is significant.
Vanadium	25	0.5	Measure only if petroleum inputs are likely.
Zinc	12	0.25	Common pollutant, moderate toxicity



NOTES:

(1) SEDIMENT/BIOTA SAMPLE LOCATIONS #14 AND #15 ARE 100 FT. AND 200 FT. ALONG THE SHORELINE SOUTH OF LOCATION #13.

(2) SEDIMENT/ BIOTA SAMPLES WILL BE COLLECTED FROM TWO OTHER AREAS IN THE BAY REPRESENTATIVE OF BACKGROUND CONDITIONS.

0 300 FT

SCALE

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NAVAL EDUCATION TRAINING CENTER NEWPORT, RI

SITE 01 - McALLISTER POINT LANDFILL

FIGURE 11.
SEDIMENT, BIOTA, AND LEACHATE SAMPLE LOCATIONS