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Letter Work Plan

for

Area A Landfill/Wetland Interface and Downstream/OBDA Sampling

for

Naval Submarine Base New London

Groton, Connecticut

Northern Division

Naval Facilities Engineering Command

Contract Number N62472-90-D-1298

Contract Task Order 0129

November 1994

Halliburton NUS
CORPORATION

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LETTER WORK PLAN
FOR
AREA A LANDFILL/WETLAND INTERFACE AND DOWNSTREAM/OBDA SAMPLING
FOR
NAVAL SUBMARINE BASE - NEW LONDON
GROTON, CONNECTICUT

COMPREHENSIVE LONG-TERM ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Northern Division
Environmental Branch, Code 18
Naval Facilities Engineering Command
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1.0 INTRODUCTION

The Northern Division (NORTHDIV) of the Naval Facilities Engineering Command (NAVFAC) has issued a unilateral Contract Task Order (CTO) Number 129 to Halliburton NUS Corporation (Halliburton NUS), under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract No. N62472-90-D-1298. CTO 129 covers the Installation Restoration (IR) studies being conducted at the Naval Submarine Base - New London (NSB-NLON) located in Groton, Connecticut. A scope change memo directed Halliburton NUS to perform investigation activities at the Area A Landfill/Wetland interface and the Downstream/OBDA. This Letter Work Plan details the initial investigation and subsequent field work necessary to adequately assess these areas.

Section 1.0 of this Work Plan contains the Introduction. Section 2.0 describes the task objectives and rationale. Section 3.0 contains the Scope of Work. Detailed procedures for decontamination, sample collection, preparation, packaging, shipping, and analyses will follow the Phase II RI Work Plan, Field Sampling Plan, and Quality Assurance Project Plan (Atlantic, May 1993); and associated Addenda for NSB-NLON (Halliburton NUS, October 1993a). The Health and Safety Plan (Halliburton NUS, October 1993b) and associated addenda (Halliburton NUS, October 1994) for NSB-NLON will also be referenced regarding health and safety issues during the course of the field work. Tables 1 and 2 located at the end of this plan summarize sampling and analyses, preservation requirements, and holding times; and sample locations are shown on Plate 1 located in the back pocket. Comments received from the USEPA on the draft version of this document are included in Appendix A.

2.0 TASK OBJECTIVES AND RATIONALE

2.1 Area A Landfill/Wetland Interface

The Area A Wetland is located adjacent to the Area A landfill (see Plate 1). Based on the results of a Phase I Remedial Investigation (RI) performed by Atlantic Environmental (Atlantic, August 1992), the Area A landfill has been contaminated with polychlorinated biphenyls (PCBs). The results of the Phase I RI have prompted the implementation of a Interim Remedial Action (IRA) for the Area A landfill. The IRA at the Area A landfill will include capping the landfill area to minimize the future potential for the migration of PCBs.

During the initial phases of the IRA, concerns were raised about whether the proposed extent of the capped area would cover all the contaminated area in the vicinity of the Area A landfill/wetland interface. Therefore, additional sampling in this area is necessary to address this question.

A wetland delineation study (Atlantic, July 1994) that was recently conducted by Atlantic Environmental as part of the IRA showed that a portion of the landfill lies within a "wetland", as defined by state and Federal classification guidelines (see Plate 1 for boundaries). Therefore, mitigation of these wetlands may be required in the event that construction activities during capping would impact the wetland areas. As a result of this finding, the scenario of reducing the cap size to avoid wetlands mitigation is also being explored. Under this scenario, there may be a zone of residual contamination along the Area A landfill/wetland interface that would not be capped. Additional sampling of this area is needed to effectively address this question.

2.2 Area A Downstream/OBDA

The Phase I RI indicated that the Area A Downstream/OBDA is contaminated (particularly pesticide contamination) at concentrations that could potentially impact species and biological communities. However, the nature and extent of the contamination requires better definition, and the potential for ecological exposure and effects to environmental receptors needs to be determined. A review of existing data in conjunction with additional sampling and analyses are needed to achieve these goals.

3.0 SCOPE OF WORK

3.1 Mobilization/Demobilization

Following approval and finalization of the Work Plan, Halliburton NUS will begin mobilization activities. All field team members will review the Work Plan and all associated reference documents. In addition, a field team orientation meeting will be held to familiarize personnel with the scope of the field activities and health and safety concerns and requirements. The Field Operations Leader (FOL) will coordinate the mobilization activities upon arrival at the facility. The FOL will also make any equipment purchases required to conduct the field investigation. The majority of equipment required for the field activities are currently on site and additional equipment required will be sent to the site.

3.2 Sampling Activities

3.2.1 Area A Landfill/Wetland Interface

Twenty sediment or soil samples (sample type will be determined in the field) will be collected from 10 transects straddling the Area A landfill/wetlands boundary. The locations of the transects are illustrated on Plate 1. Two samples will be collected from each transect: one sample will be collected from the wetlands boundary, and a second sample will be collected 20 feet from the wetlands boundary in the wetlands area. The samples will be identified in the field as being either a soil or sediment, depending on whether the collected material is covered by water. If so, it will be identified as a sediment; otherwise, it will be considered a soil.

Analytical results from these samples will determine the lateral extent of contamination along each of the 10 transects. Sample locations along the transects are illustrated on Plate 1. Seven sample transects will be located along the northwest section of the Area A Landfill/Wetland interface between the dike and the deployed parking area. Three additional sample transects will be located along the southern part of the Area A Landfill/Wetland interface. Samples will be collected at depths of 0 to 12 inches using a hand auger. Samples collected at Transects T8, T9, and T10 may need to be collected with a petite ponar sampler. Samples will not consist of sand or coarse materials. If sand or coarse materials are encountered, the sampling location will be horizontally relocated in an area of finer material and resampled. Also, no vegetation (*Phragmites australis*) or water should be collected with the sample. Samples will be collected starting with the farthest downstream sample followed by the sample at Transect T1 and then at subsequent upstream transects, ending at Transect T10. All samples will be analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL metals, cyanide, TOC, and grain size.

Sediment and soil characteristics (texture, lithology, color, moisture content, grain size, and classification) shall be noted on a sample log form for each sample.

During Phase II RI Investigations, sediment samples were collected in the vicinity of transects T8, T9, and T10 but were not analyzed for all compounds of interest, particularly TOC and grain size.

3.2.2 Area A Downstream/OBDA

A total of nine water bodies will be sampled in the Area A downstream/OBDA and reference areas. Samples will be taken from the following water bodies: Upper Pond, Lower Pond, OBDA Pond, a reference pond, a reference stream, the stream that enters the Upper Pond, and three separate streams below the ponds and OBDA. Water body locations are illustrated on Plate 1 (except reference locations).

The reference stream and reference pond will be selected based on their similarity to the ponds and streams in Area A. At a minimum they should have similar substrate, morphology, vegetation, current velocity, water temperature, pH, dissolved oxygen (DO) levels, and TSS levels. 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 communities. The reference locations will be determined between the Navy, EPA, and Halliburton NUS during the week of November 28, 1994. Once the reference locations are agreed upon as Area A Downstream/OBDA analogs, an addendum discussing sample locations will be generated and attached to this work plan.

Samples collected from the nine surface water bodies will be analyzed for four different sets of parameters: macroinvertebrate taxonomy; chemical analysis for TCL VOCs, TCL SVOCs, TCL pesticides/PCBs, TAL total and dissolved metals, cyanide, and boron (surface water and sediment samples), and hardness (surface water only); *Chironomus tentans* and *Hyalella azteca* toxicity tests, and TOC and grain size (sediment samples); and frog embryo/larval toxicity tests (sediment samples). The macroinvertebrate taxonomy sampling will be conducted from each location during 4 evenly spaced sampling rounds, beginning the first week of March 1995 and ending the last week of June 1995. The remaining activities will be conducted once during the second round of macroinvertebrate taxonomy sampling in April 1995, at the same sample locations.

3.2.2.1 Macroinvertebrate Sampling and Taxonomy

In order to characterize the macroinvertebrate community, a quantitative macroinvertebrate survey will be conducted at the nine water bodies. Samples will be collected from three station locations within each water

body (one near the upstream portion, one from the center of the water body, and one from the downstream portion). Approximate locations are shown on Plate 1. Exact locations will be determined based on a review of the Phase I and Phase II RI sediment sample results with the intent of collecting samples that would cover an anticipated wide range of contaminant concentrations and be physically similar in supporting similar macroinvertebrate communities. Four rounds of macroinvertebrate sampling will be conducted. Samples will be taken during 4 evenly spaced sampling rounds, beginning the first week of March 1995 and continuing through the last week of June 1995. A total of 108 samples will be collected for the macroinvertebrate sampling (9 water bodies x 3 locations = 27 sampling stations x 4 rounds = 108 total samples).

At each of the 27 sampling stations, one sample will be collected by compositing 3 separate subsamples at each station location. Macroinvertebrate Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Water (USEPA, 1990) will be reviewed and serve as a basis for sampling activities for the macroinvertebrate taxonomy sampling. In the ponds, samples will be collected from as many of the following substrate types as possible: sediments, representative vegetation, and cobbles. If not all of these substrate types are present, the additional samples required to bring the monthly total at each location to three will be collected from sediment substrates. Additional sediment samples will be located in a different area of the pond from the first sample. Each stream will be sampled approximately in mid-channel. Sediment characteristics (texture, lithology, color, moisture content, grain size and classification) shall be noted on a sample log form for each sediment sample.

Benthic sampling and processing will follow ASTM (1985). The macroinvertebrate samples will be collected with a petite ponar sampler, surber sampler, kick net, or dip net, depending on the substrate. Kick-net and dip-net samples will be collected for 10 man-minutes. Samples will be sieved (cobble and larger detritus such as rock and leaves will be examined for clinging organisms) and the invertebrates placed in a sample container with 10 percent formalin stained with rose bengal for preservation. Sample bottles will be labeled and sent to the laboratory, where organisms will be identified to genus level. The samples will be stored for future reference in the event that future identification to the species level is required.

Macroinvertebrate data will be presented as density, numerical dominance, genus evenness, and genus richness. Data from the Area A aquatic system will be compared with data from the reference locations and all data will be compared with data in the literature for similar systems in New England.

Surface water quality parameters samples will also be recorded at the same 27 sampling stations during each sample round prior to disturbing the sediment (108 samples total). The surface water will be in-situ field analyzed for temperature, pH, DO, specific conductivity, and turbidity using a multi-parameter water

quality meter. Additionally, a TSS sample will be collected for laboratory analysis. The field measurements will be taken by directly submerging the probe in the surface water at the sample location, and the sample for TSS analysis will be collected by directly submerging the sample container in the surface water. Surface water samples will be collected prior to the sediment samples, and collection will start at the farthest downstream location then move upstream.

3.2.2.2 Chemical Analysis

To determine the level of contaminants present in each water body, one round of sediment and surface water samples will be collected for laboratory chemical analysis from each of the 27 sampling stations. A total of 27 surface water and 27 sediment samples will be collected. Samples will be taken during the second round of the macroinvertebrate sampling to be conducted in April 1995. All 27 surface water and sediment samples will be analyzed for TCL pesticides. Nine of the surface water and sediment samples (one from each water body) will be analyzed for TCL VOCs, TCL SVOCs, TCL PCBs, TAL total and dissolved metals, cyanide, boron, TOC, grain size (sediment only), and hardness (surface water only), in addition to TCL pesticides. The sediment samples will be collected using a ponar sampler. Three subsamples collected from the same sample location will be composited to produce a sample. Surface water samples will be collected by directly submerging the sample bottles in the surface water. The surface water sample will be collected prior to the sediment sample at each station location starting downstream and moving upstream.

3.2.2.3 Toxicity Tests for *Chironomus Tentans* and *Hyalella Azteca*

To evaluate any adverse impacts of contaminants associated with Area A downstream/OBDA sediments, samples of sediment collected from each water body will be collected for toxicity tests on *Chironomus tentans* and *Hyalella azteca*. These organisms were selected because they are the best overall indicators of toxic sediments owing to their contact, knowledge of their sensitivity, and proven effectiveness of assays. Each sediment sample will be composited from the three sample stations used for chemical analysis from each of the nine water bodies. A total of 9 sediment samples will be collected. Samples will be taken during the second round of the macroinvertebrate sampling in April 1995, when samples for chemical analysis are to be collected. ASTM Methods EB83-90 and E1391 will be reviewed prior to the collection of samples and will serve as the basis for methodologies used to perform these tests, unless otherwise stated.

3.2.2.4 Frog Embryo/Larval Toxicity Tests

To evaluate any adverse impacts of contaminants associated with Area A downstream/OBDA sediments on this sensitive amphibian life stage, samples of sediment will be collected for frog embryo/larval toxicity tests

from each water body. These organisms were selected because they are most likely to be representative of indigenous species present in these systems. One sample will be composited from the three sample stations used for chemical analysis, from each of the nine water bodies. A total of 9 sediment samples will be collected. Samples will be taken during the second (April) round of the macroinvertebrate sampling when samples for chemical analysis are collected. ASTM Methods 1439-91 and Bantle et at., 1991 will be reviewed prior to the collection of samples and will serve as the basis for methodologies used to perform these tests, unless otherwise stated.

3.3 Existing Data Review

Additional information will be gathered from existing data for the Area A downstream aquatic habitat in order to characterize the terrestrial and freshwater habitats in Area A that may be impacted by site-related contamination and determine whether rare, threatened, and endangered species occupy the area of concern. Appropriate NEPA documents will be referenced and the CDEP, Connecticut Natural Heritage Program, and the U.S. Fish and Wildlife Service will be contacted. If rare, threatened, or endangered species are identified in the area of concern or if their critical habitats are present in Area A, natural histories of the species will be developed through discussions with the previously mentioned agencies to establish potential impacts from contaminants and the proposed remediation.

3.4 Surveying

All sampling locations will be marked with a marking staff during the field reconnaissance to allow later surveying for elevation and location. Horizontal locations will be determined during surveying for all sample locations. A total of 20 locations at the Area A landfill/wetland interface and 27 locations at the Area A downstream/OBDA will be surveyed. Existing survey monuments within SUBASE New London may be utilized as reference points.

REFERENCES

Atlantic Environmental Services, Inc., August 1992. "Phase I Remedial Investigation, Naval Submarine Base - New London, Groton, Connecticut."

Atlantic Environmental Services, Inc., May 1993. "Work Plan, Field Sampling Plan and Quality Assurance Quality Control and Data Management Plans Phase II Remedial Investigation."

Atlantic Environmental Services, Inc., July 26, 1994. "Wetland Delineation, Area A."

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, Oklahoma.

Halliburton NUS, October 1993a. "Final Addenda to Phase II Remedial Investigation Planning Documents."

Halliburton NUS, October 1993b. "Health and Safety Plan for Phase II Remedial Investigation."

Halliburton NUS, October 1994. "Health and Safety Plan Addendum for Phase II Remedial Investigation."

US 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.

TABLE 1

SUMMARY OF ENVIRONMENTAL SAMPLING AND ANALYSIS
AREA A LANDFILL/WETLAND INTERFACE AND DOWNSTREAM/OBDA
SUBASE NEW LONDON, GROTON, CONNECTICUT

Analysis	Media	QA/QC Samples			
	Soil or Sediment	Trip Blank [1]	Equipment Rinsate [2]	Duplicates [3]	Field Blank [4]
AREA A LANDFILL/WETLAND INTERFACE					
TCL VOCs	20	3	2	2	1
TCL SVOCs	20	-	2	2	1
TCL Pesticides/PCBs	20	-	2	2	1
TAL Metals/CN + Boron	20	-	2	2	1
TOC	20	-	-	2	-
Grain Size	20	-	-	2	-

Analysis	Media		QA/QC Samples			
	Surface Water[6]	Sediment	Trip Blank [1]	Equipment Rinsate [2]	Duplicates [3]	Field Blank [4]
AREA A DOWNSTREAM/OBDA						
Macroinvertebrate Study [5]	-	108	-	-	-	-
TSS	108	-	-	-	-	-
TCL VOCs	9	9	3	2	1	1
TCL Semivolatiles + PCBs	9	9	-	2	1	1

TABLE 1 (C ntinued)
SUMMARY OF ENVIRONMENTAL SAMPLING AND ANALYSIS
AREA A LANDFILL/WETLAND INTERFACE AND DOWNSTREAM/OBDA
SUBASE NEW LONDON, GROTON, CONNECTICUT

Analysis	Media		QA/QC Samples			
	Surface Water[8]	Sediment	Trip Blank [1]	Equipment Rinsate [2]	Duplicates [3]	Field Blank [4]
AREA A DOWNSTREAM/OBDA						
TCL Pesticides	27	27	-	2	3	1
TAL Metals/CN + Boron - Total	9	9	-	2	1	1
TAL Metals/CN + Boron - Dissolved + Hardness	9	-	-	2	1	-
Sediment Insect Toxicity Test [6]	-	9	-	-	-	-
Frog Embryo Toxicity Test [7]	-	9	-	-	-	-
TOC	-	9	-	-	-	-
Grain size	-	9	-	-	-	-

TABLE 1 (Continued)
SUMMARY OF ENVIRONMENTAL SAMPLING AND ANALYSIS
AREA A LANDFILL/WETLAND INTERFACE AND DOWNSTREAM/OBDA
SUBASE NEW LONDON, GROTON, CONNECTICUT

(1) Trip Blanks - Samples which originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile organic compound (VOC) samples. One trip blank per cooler containing VOCs.

(2) Equipment Rinsates - Samples obtained by pouring analyte-free water over sample collection equipment (hand auger, etc.) after decontamination. Assesses the effectiveness of field decontamination procedures. Obtained at a frequency of 1/day/media/analysis. Number of samples reflects the number of actual laboratory analyses performed. Only samples from every other day will be analyzed.

(3) Duplicates - a single sample split into two portions during a single act of sampling. Assesses the overall precision of the sampling and analysis program. Obtained at a frequency of 10 percent of the number of samples.

(4) Field Blank - Samples consisting of the source water used in decontamination. Obtained at frequency of 1/event/media.

(5) Macroinvertebrate sampling will be performed at each of the 27 sampling stations once per month for four months. TSS samples will be collected during each of the four sampling rounds.

(6) Sediment collected for the toxicity test for insects will be collected from 3 sampling stations located in each water body. Samples will be collected at the same time as samples for chemical analysis. Duplicate samples will be split during lab procedures. Reference samples may be used as laboratory control samples.

(7) Sediment collected for the frog embryo/larval toxicity test will be collected from 3 sampling stations located in each water body. Samples will be collected at the same time as samples for chemical analysis. Duplicate samples will be split during lab procedures. Reference samples may be used as laboratory control samples.

(8) All surface will have the following field parameters measured using multi-parameter quality meter: pH, DO, specific conductivity, and turbidity.

TABLE 2

SUMMARY OF ANALYSIS, BOTTLE REQUIREMENTS, PRESERVATION REQUIREMENTS AND HOLDING TIMES AREA A LANDFILL/WETLAND INTERFACE AND DOWNSTREAM/OBDA SUBASE, NEW LONDON, GROTON, CONNECTICUT

Analysis	Analytical Method	No. of Containers Per Sample	Container Type	Preservation Requirements	Holding Times
SURFACE WATER					
TCL VOC	CLP SOW OLM01.8	3	40-mL VOA vial	HCl, pH < 2; 4°C	14 days
TCL SVOCs	CLP SOW OLM01.8	1	1/2-gallon amber glass jug	4°C	7 days to extract; 40 days to analyze
TCL Pesticides/PCBs	CLP SOW OLM01.8	1	1/2-gallon glass jug	4°C	7 days to extract; 40 days to analyze
TAL Metals/CN/Boron + Hardness	CLP SOW ILM02.1	1	1-L polyethylene bottle	HNO_3, pH < 2; 4°C	180 days; Hg 28 days; CN 14 days
TSS	E 160.1	1	1-L polyethylene bottle	4°C	7 days
SOIL/SEDIMENT					
TCL VOC	CLP SOW OLM01.8	1	60-mL glass VOA vial	4°C	14 days
TCL SVOC	CLP SOW OLM01.8	1	8-oz. clear wide-mouth glass jar	4°C	7 days to extract; 40 days to analyze
TCL Pesticides/PCBs	CLP SOW OLM01.8	1	8-oz. clear wide-mouth glass jar	4°C	7 days to extract; 40 days to analyze
TAL Metals/CN	CLP SOW ILM02.1	1	4-oz. clear wide-mouth glass jar	4°C	180 days; Hg 28 days; CN 14 days
TOC	Walkley-Black Determination	1	8-oz. clear wide-mouth jar	4°C	28 days
Grain Size	ASTM D422	1	8-oz. clear wide-mouth jar	None	None
Macroinvertebrate Study	ASTM (1985)	TBA	TBA	TBA	TBA
Insect Toxicity	EPA 600/R-94/024	TBA	TBA	TBA	TBA
Frog Embryo Toxicity	EPA or ASTM	TBA	TBA	TBA	TBA

TBA Indicates To Be Arranged with laboratory selected to perform analysis.

APPENDIX A
EPA COMMENT LETTER

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

November 15, 1994

OPTIONAL FORM 99 (7-90)
FAX TRANSMITTAL
# of pages ▶ 9

To MATT COCHRAN	From KIMBERLEE KECKLER
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NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

Mark Evans, Remedial Project Manager
U.S. Department of the Navy
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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.

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.

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^ 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.

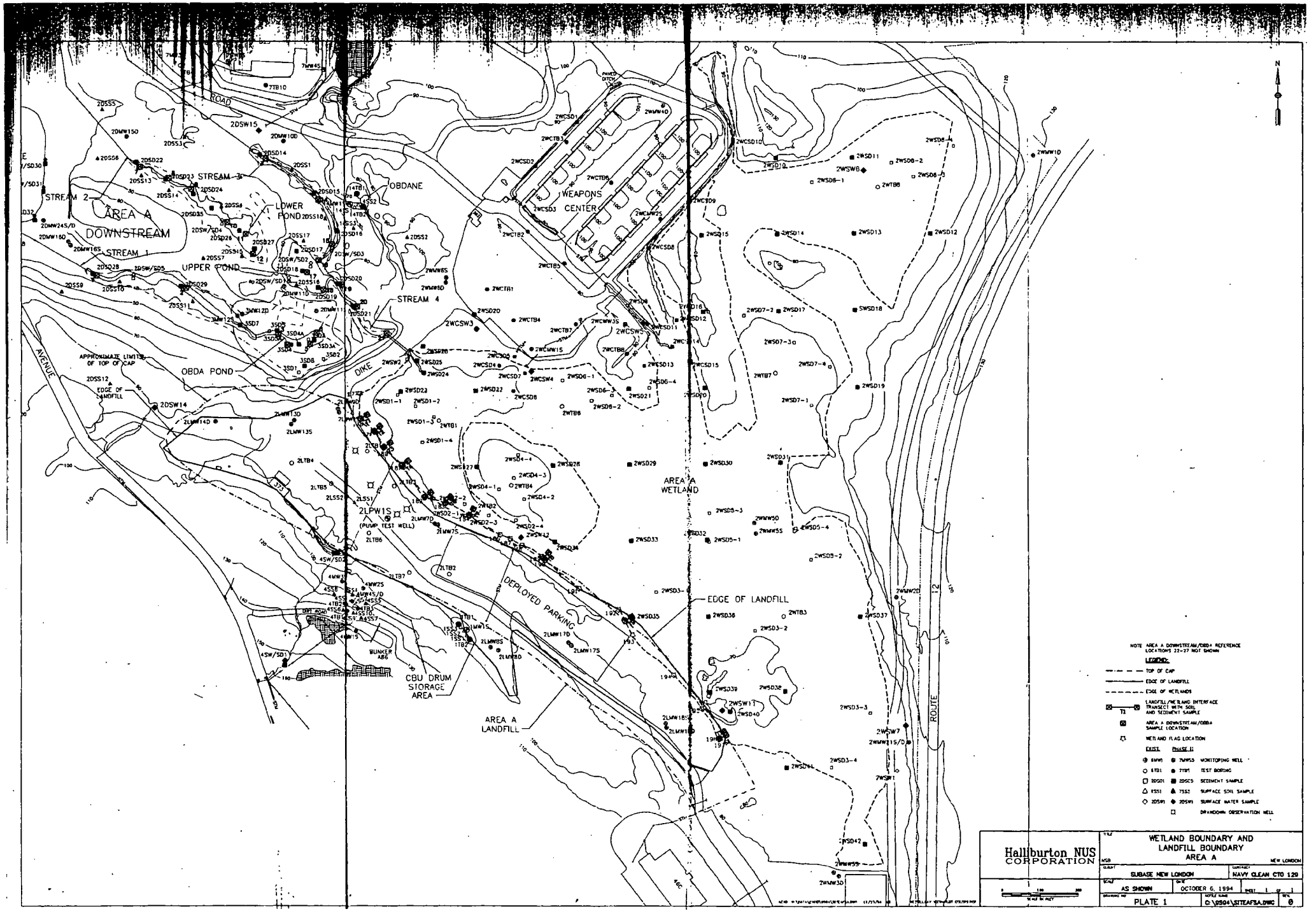
At the September 27th meeting, there was some discussion regarding the recommended level for macroinvertebrate taxonomic identification. At that time it was decided that samples would be preserved and identified to genus level and if we found the need to identify some of the chironomids to species level 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


AREA A
DOWNSTREAM
STREAM 1
STREAM 2
STREAM 3
STREAM 4
UPPER POND
LOWER POND
OBDANE
OBDA POND
DIKE
AVENUE
ROAD
WEAPONS CENTER
AREA A WETLAND
AREA A LANDFILL
EDGE OF LANDFILL
DEPLOYED PARKING
CBU DRUM STORAGE AREA
BUNKER A86
2LPW1S
(PUMP TEST WELL)
APPROXIMATE LIMITS OF TOP OF CAP
EDGE OF LANDFILL
ROUTE 12
NOTE AREA A DOWNSTREAM/OBDA REFERENCE LOCATIONS 22-27 NOT SHOWN
LEGEND:
TOP OF CAP
EDGE OF LANDFILL
EDGE OF WETLANDS
LANDFILL/WETLAND INTERFACE TRANSECT WITH SOIL AND SEDIMENT SAMPLE
AREA A DOWNSTREAM/OBDA SAMPLE LOCATION
WETLAND FLAG LOCATION
EXIST. PHASE II
MONITORING WELL
TEST BORING
SEDIMENT SAMPLE
SURFACE SOIL SAMPLE
SURFACE WATER SAMPLE
DRAWDOWN OBSERVATION WELL
Halliburton NUS CORPORATION
WETLAND BOUNDARY AND LANDFILL BOUNDARY AREA A
NEW LONDON
SUBASE NEW LONDON
NAVY CLEAN CTO 129
AS SHOWN
OCTOBER 6, 1994
PLATE 1
C:\0504\SITEAFSA.DWG