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Plan for Field Investigation

for

**Former Robert E. Derecktor Shipyard
Stillwater Basin**

**Naval Education and Training Center
Newport, Rhode Island**



**Northern Division
Naval Facilities Engineering Command
Contract Number N62472-90-D-1298
Contract Task Order 302**

January 1998

PLAN FOR FIELD INVESTIGATION

FOR

**FORMER ROBERT E. DEREKTOR SHIPYARD
STILLWATER BASIN**

**NAVAL EDUCATION AND TRAINING CENTER
NEWPORT, RHODE ISLAND**

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

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1.0 INTRODUCTION

This work plan has been prepared under the Comprehensive Long Term Environmental Action Navy (CLEAN) Contract No. N62472-90-D-298, Contract Task Order (CTO) 302. The statement of work requires Brown & Root Environmental (B&R Environmental) to provide a Feasibility Study of Former Robert E. Derecktor Shipyard marine sediments at the Naval Education and Training Center (NETC) in Newport, Rhode Island. This plan outlines the requirements and describes the procedures for performing investigations of the Former Robert E. Derecktor Shipyard in the area of the stillwater basin west of Building 42.

The purpose of this plan is to describe a proposed evaluation of the Stillwater Basin southeast of Building 42 at the Derecktor Shipyard. This plan includes additional investigation of Former Derecktor Shipyard marine sediments in this area in order to address questions from the ecorisk advisory board for NETC. The Stillwater Basin Evaluation (SBE) will be performed to investigate the apparent lack of indigenous biota the stillwater basin near Building 42.

1.1 SITE SPECIFIC INVESTIGATION OBJECTIVES

The investigation objectives for this task are to assess, and if possible, determine the cause of the apparent lack of indigenous biota in the stillwater basin near Building 42. The investigation objectives will be achieved through a focused program of investigation that is based on previous investigation findings and site background information.

The marine sediments of the stillwater basin were investigated as part of the Derecktor Shipyard Marine Ecological Risk Assessment Report (SAIC and URI May 1997). The findings of the ERA regarding the area of the stillwater basin were inconclusive: While it appeared that there are no chemical contaminants present, there appeared to be a lack of indigenous biota within the basin.

This investigation will attempt to determine what factor(s) may be influencing the apparent lack of indigenous biota in the stillwater basin. The study will include the placement of synthetic media growth plates (artificial structures) suspended in the water column within and outside the stillwater basin which will provide suitable habitat area for plant and animal colonization. In addition, samples of water from outfalls that discharge into the basin will be analyzed to

determine chemical content. Results from this study may determine if limiting factors within the basin may be responsible for the effect.

Investigation Activities

Four tasks are proposed for the stillwater basin evaluation:

- Task 1: Synthetic Media Samples - Winter
- Task 2: Synthetic Media Samples - Summer
- Task 3: Bottom Imaging Scan
- Task 4: Outfall Sampling

For this project, it is anticipated that a sole source subcontract will be issued to Science Applications International Corporation (SAIC) to support B&R Environmental with the field tasks. It is anticipated that SAIC will perform tasks 1 - 3 listed above. SAIC was part of a team which performed the ecological risk assessment for this site, and has the most experience with these types of field activities, as well as defining contaminant concentrations that would impact receptors at this site. B&R Environmental will perform the outfall water sampling and analysis.

1.2 PROJECT DELIVERABLES

A technical memorandum will be prepared at the conclusion of this investigation. This technical memorandum will include the following materials:

- A Summary of the Synthetic Media Sampling effort (SAIC), including:
 - Summary of site background information
 - Description of field investigation activities
 - Summary of statistical analysis of the data collected from the synthetic media samplers. The analysis will include species present, abundance, and other community structure characteristics. Differences between community growth on the stillwater basin stations and the stations outside the basin will be identified and evaluated.

- An evaluation of outfall discharge water, including:
 - Description of field investigation activities
 - Summary and interpretation of the data
 - Presentation and evaluation of contaminant source investigation (outfalls)
 - Conclusions and recommendations for additional investigation and remedial actions (as required)

- Summary of Bottom Imaging Scan including:
 - Digital photographs of selected areas
 - Photo-Remots survey results
 - Location map of survey track lines and reference points

- Supporting documentation, including:
 - Maps depicting synthetic media sampling points, and other significant features including identified habitat areas
 - Results from laboratory analysis of samples
 - Bottom imaging scan results including digital photographs and Photo-Remots survey results
 - Dissolved oxygen concentration measurements

1.3 CHANGES TO THE PLAN

One submittal of this subject plan is anticipated for the stillwater basin evaluation. Comments from regulatory agencies will be evaluated and addressed in the performance of the work and preparation of the SBE report. However, during the project execution, it may become necessary to modify the plan. If the plan for collecting data needs to be altered, it may be amended through the use of a Request for Field Modification (RFM) form. This form will be prepared by B&R Environmental and to the Navy RPM, who (if necessary) will forward the RFM to the regulatory oversight RPMs. Time limits on acceptance of, or comment to, the field modification requests will be stated.

1.4 SCHEDULE AND REGULATORY OVERSIGHT

A schedule for field investigations has not been prepared but one will be prepared and submitted to the members of the Ecorisk Advisory Board (EAB) at a planning meeting prior to implementation of the field work. This schedule will be updated as necessary to inform oversight personnel when different tasks and activities are scheduled to occur. A 24-hour advance notification of changes in scheduled field activities will be given to the regulatory agencies. However, 24 hour advance notification of the outfall sampling task may not be feasible, since the sampling event will occur during a significant rain event, and may require a quicker response time.

2.0 BACKGROUND INFORMATION

A detailed site history and characterization is provided in the Site Assessment Screening Evaluation Report, Former Robert E. Derecktor Shipyard (B&RE June 1997) and the Derecktor Shipyard Marine Ecological Risk Assessment Report (B&RE May 1997).

2.1 DATA QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT OF DATA

The development of data quality objectives (DQOs) focuses on identifying the end use of the data to be collected and on determining the degree of certainty with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC) necessary to satisfy the intended use of the data.

The data to be collected in this investigation will support the completion of the Feasibility Study (FS) for the site by helping to determine the factors which may be influencing the lack of indigenous biota within the stillwater basin.

Sampling the outfall water during a rain event will be performed to evaluate if the discharges are providing contaminants to the water, and thus the biota within the basin. Analytical parameters were selected based on existing site contaminant data and historical information regarding chemical use in the area. The outfall water samples will be analyzed for TAL metals, PCBs, SVOCs, TSS, TDS, BOD, COD, and fecal pollution indicators. In addition, the temperature, pH, specific conductivity, dissolved oxygen, and salinity of the outfall water will be measured in the field using a portable water quality meter. The rationale for specifying the above analysis is provided below. Refer to Section 3 for details of the analytical methods requirements for the water samples.

Metals, SVOCs and PCBs are contaminants that have been found in both on-shore and off-shore studies previously performed at the shipyard. Biochemical oxygen demand and Chemical oxygen demand (BOD and COD, respectively) analyses provide a measure of oxygen-consuming organic matter being discharged through these outfalls. This organic matter may affect the ecological balance in the basin by depleting available dissolved oxygen.

Total dissolved solids (TDS) is a measure of inorganic salts and nonvolatile organics in a water sample and is closely related to specific conductance. TDS also provides a rough estimate of the amount of major anions and cations present, because researchers have established relationships for estimating the composition of these ions in natural waters. Total suspended solids (TSS) refers to the nonfilterable residue that remains on a glass-fiber disk after a sample of water is filtered. Suspended solids include particles like silt that are not toxic *per se*, but may have other damaging effects on aquatic organisms. Fecal pollution indicators (coliform, streptococci, *Clostridium perfringens*, etc.,) have provided information on sanitary system leakage or failure which may have toxic effects on aquatic organisms. These parameters will be measured in water collected from the outfalls to determine potential input from a sanitary sewer system. Data will be compared with that presented in the ERA report.

3.0 FIELD SAMPLING PLAN

This section presents a description of the field investigation activities that are planned for the site.

3.1 TASK 1 - SYNTHETIC MEDIA SAMPLES - WINTER

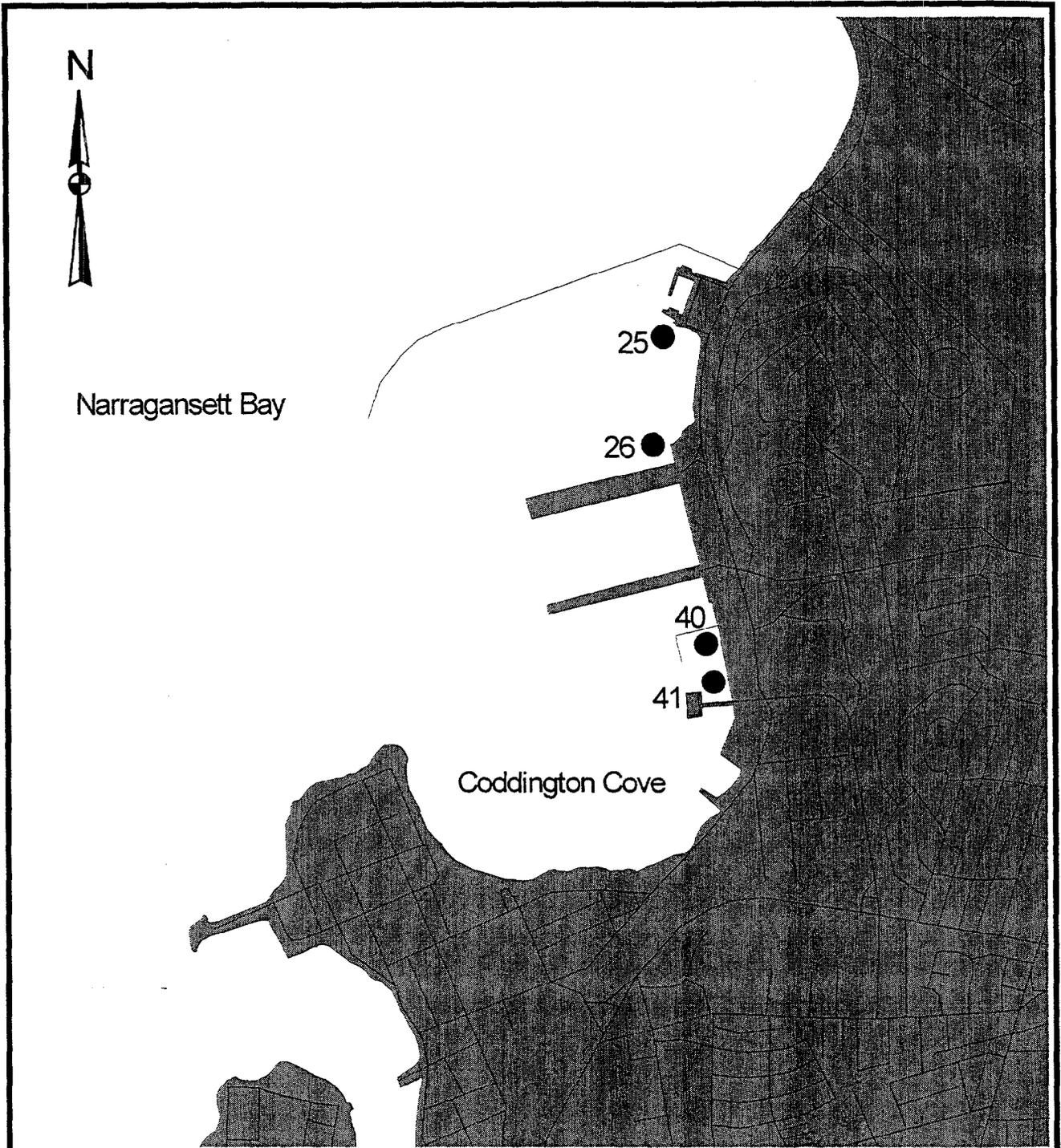
Synthetic media growth plates will be deployed at two stations in the stillwater basin (40 and 41) and at two stations outside the stillwater basin (25 and 26), but within Coddington Cove as presented in Figure 3-1. These stations were selected because the bottom types and depths are similar to stations 40 and 41 and were noted in the ERA to have low toxicity and low concentrations of Derecktor-specific contaminants of concern. Station locations were selected to correspond to locations sampled for the Derecktor Shipyard Marine Ecological Risk Assessment Report (SAIC and URI May, 1997). Each station will consist of "Hester-Dende" disks (or equivalent) which will be suspended in the water column one meter above the bottom. The deployment will be placed in early March and allowed to remain for a sixty day period. Each deployment will consist of five "strings" (replicates) of 10 disks. This number of disks will allow statistical evaluation of differences in growth between the stillwater basin stations and the other stations outside of the basin.

In addition, whole water samples will be (in duplicate) collected for measurement of dissolved oxygen (DO) and salinity at each station. The DO and salinity data will be collected at the time of deployment, once every two weeks during the deployment period, and at the time of final retrieval of the disks (total of 20 samples).

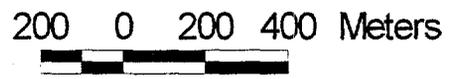
3.2 TASK 2 - SYNTHETIC MEDIA SAMPLES - SUMMER

Synthetic media growth plates will be deployed at the same two stations in the stillwater basin and at the same two stations outside the stillwater basin as will be used under Task 1. This deployment will be placed in mid June and allowed to remain for a sixty day period. Each deployment will consist of five "strings" of 10 disks. This number of disks will allow statistical evaluation of differences in growth between the stillwater basin stations and the other stations.

Continuous dissolved oxygen and measurements will be recorded using electronic data recorders in the vicinity of the stillwater stations and the outer cove stations for the period of deployment. In



NOTE:
 1. All Locations To Be Considered Approximate.
 2. Plan Not To Be Used For Design.



Sample Stations		FIGURE 3-1	
Work plan for Stillwater Basin Evaluation		 Brown & Root Environmental <small>35 Jonsin Road Wilmington, MA 01887</small> <small>(978) 558-7899</small>	
Dereckor Shipyard, RI			
DRAWN BY: J. B. Holden	REVISION: 0		
CHECKED BY: S. Parker	DATE: 13 Jan 98		
SCALE: AS SHOWN	FILE: alBase_map.APR base		

addition, water samples will be collected for analysis of dissolved oxygen to “ground truth” electronic readings.

3.3 TASK 3 - BOTTOM IMAGING SCAN

A laser line scan (or equivalent imaging recorder) and Photo-Remots equipment will be employed to provide a photographic record of the bottom materials in the stillwater basin. The purpose of this task is to make a qualitative determination of the presence or absence of bivalves and other organisms on the sediments and in the water in this area, and compare those images to those from other areas outside the stillwater basin.

Laser line camera technology has been used to survey bottom materials for dredging, recovery and environmental restoration projects. Gravel vs. sand/silt bottom materials can be differentiated, and foreign material (rope, cable, debris, etc.) and macro flora and fauna can be identified. Photo-Remots images are used to evaluate subsurface material by showing a profile image of the sediment to a depth of 15 cm. These images have been used to show zones of bioturbation, macro invertebrate presence, and other strata in the cross-section.

The laser line camera will be used to collect digital images of the bottom materials within the stillwater basin, and the areas outside the stillwater basin where the artificial media disks are deployed. The Photo-Remots camera will further identify bottom materials and epibenthic macroorganisms.

In addition, a similar scan shall be performed along the length of Pier 1 (both north and south sides), and the sheet piling wall along the Derecktor Shipyard study area. This will be performed to quantify and better determine the nature of solid materials which were formerly reported in this area by divers. These solid materials may include bicycles, shopping carts, cable, wire, conduit, piping and other metal debris that would impact the cost or performance of a dredging project in this area.

The imaging scan will be performed in a manner such that navigation and location determination is integrated into the deliverable: The location of the selected images or points along the transect drive lines shall be located on an engineering plan for the site.

In order to determine the presence of macro benthic marine organisms and evidence of bioturbation below the surface of the sediment, a limited Photo-Remots survey is proposed for the four stations where the artificial media are deployed. The Photo-Remots technology provides a photo image of an in-situ sediment profile up to 15 cm below the sediment surface. It is expected that a minimum of five remots images per station will be photographed during the survey.

3.3.1 Analyze Deployment Data

The subcontractor (SAIC) shall analyze the deployments and provide a report to B&R Environmental that will describe a statistical analysis of the data collected from the artificial media deployments. The analysis will include species present, abundance and other community structure characteristics. Differences between growth at the stillwater basin stations and the stations outside the stillwater basin will be identified and evaluated.

Analyses of benthic community responses at Derecktor Shipyard stations will follow procedures developed for the Marine ERA. Community metrics to be derived from the data include Bray-Curtis similarity indices, Shannon-Weiner diversity, evenness, % dominance, species richness, total species and total individuals. Because of sample replication, t-tests and analysis of variance can be used to assess differences among stations using the above metrics as input values. Non-parametric methods such as multi-dimensional scaling (MDS) will also be considered for use as was performed in the Marine ERA. Environmental covariates will include available data on temperature, salinity dissolved oxygen and total suspended solids measured during the deployment period.

3.4 TASK 4 - OUTFALL SAMPLING

B&R Environmental will sample water from seven outfalls that discharge to the stillwater basin at Building 42. The outfalls to be sampled include OF#4 through OF#9 and OF#9A (see Figure 3-2). This effort will be performed during a rain event to determine the nature of potential contaminants being introduced to the stillwater basin through this system. This sample collection event will be performed during the winter deployment (March) of the synthetic media sampling which is also anticipated to be a period of high rains.

The sample collection will be performed during a rain event so that the outfalls will be discharging at an adequate rate to collect water for the tests specified. The outfalls are located in the sheet piling wall above the high tide line. The outfall water samples will be collected in a polyethylene or stainless steel bucket that is lowered by a line to the outfall discharge opening, and is allowed to fill. The bucket is retrieved and the water sample is immediately transferred to the appropriate sample containers and preserved (if necessary). Table 3-1 presents a summary of sample containers, preservative requirements, and sample holding times. In addition, temperature, pH, specific conductivity, dissolved oxygen, and salinity of the outfall water will be measured in the field at each sample location.

Water will be collected for analysis of TAL metals, PCBs, semivolatile organic compounds (SVOCs), fecal pollution indicators, total suspended solids (TSS), total dissolved solids (TDS), biochemical oxygen demand (BOD), and chemical oxygen demand (COD). Fecal Pollution Indicators include: total and fecal coliforms, fecal streptococci and enterococci, and Clostridium perfringens spores analyses. A summary of analytical methods and the number and types of samples to be collected is presented in Table 3-2. A total of seven field samples will be collected, with one duplicate, one MS/MSD, and trip and field blanks as required.

Analysis will be performed by a B&R Environmental Master Agreement Laboratory, and a review of data equivalent to EPA Tier II validation will be performed to assure data quality.

3.4.1 Outfall Discharge Measurements

The discharge flow rate measurements will be collected from each outfall during the sample acquisition task. This data will be used to assess water quality impacts from the outfall discharges to the stillwater basin. Water discharging from the outfalls will be collected into graduated buckets over a recorded period of time. The volume of water collected (gallons) will be divided by the time period of collection (seconds) to determine the flow discharge rate (gallons/second). These measurements will be repeated in triplicate at each sample station.

**TABLE 3-1
 SAMPLE CONTAINER, PRESERVATION AND HOLDING TIME REQUIREMENTS
 STILLWATER BASIN EVALUATION
 FORMER DERECKTOR SHIPYARD
 NEWPORT, RHODE ISLAND**

MEDIA	ANALYSIS	SAMPLE CONTAINER	PRESERVATIVE	HOLDING TIME
WATER - OUTFALL DISCHARGE	TAL Metals	1-liter PE bottle	nitric acid to pH < 2	28 days (1)
	PCBs	80 oz. amber bottle	cool to 4°C	7 days
	SVOCs	80 oz. amber bottle	cool to 4°C	7 days
	TSS/TDS	500 mL PE	cool to 4°C	7 days
	BOD	500 mL PE	cool to 4°C	48 hours
	COD	500 mL PE	sulfuric acid to pH < 2	28 days
	Total and fecal coliform	sterile 1-liter bottle ⁽²⁾	0.008% Na ₂ S ₂ O ₃	6 hours
	Fecal streptococci	sterile 1-liter bottle ⁽²⁾	0.008% Na ₂ S ₂ O ₃	6 hours
	Fecal enterococci	sterile 1-liter bottle ⁽²⁾	0.008% Na ₂ S ₂ O ₃	6 hours
	Clostridium perfringens spores	sterile 500 mL bottle	cool to 4°C	30 hours

- (1) Holding time from date of sample collection to date of sample extraction or analysis based on analyte with shortest holding time.
- (2) Analyses for coliform, streptococci, and enterococci can be combined into one container.

Sample containers shall meet specifications delineated in EPA OSWER Directive No. 9240.0-05A.

**TABLE 3-2
ANALYTICAL METHODS AND SAMPLE SUMMARY
STILLWATER BASIN EVALUATION
FORMER DERECKTOR SHIPYARD
NEWPORT, RHODE ISLAND**

MEDIA	ANALYSIS	METHOD	FIELD SAMPLES	DUPLICATE (1 per 10 field samples)	FIELD BLANK (1 per sampling event)	RINSATE BLANK (1 per day)	TOTAL QUANTITY	
WATER-OUTFALL DISCHARGE	TAL METALS	ILM04.0 ⁽¹⁾	7	1	1	1	10	
	SVOCs	OLM03.1 ⁽²⁾	7	1	1	1	10	
	TSS	160.2 ⁽³⁾	7	1	0	0	8	
	TDS		7	1	0	0	8	
	BOD	5210 ⁽⁴⁾	7	1	0	0	8	
	COD		410.1 ⁽³⁾	7	1	0	0	8
				7	1	0	0	8
	Fecal coliform	9221B ⁽⁵⁾	7	1	0	0	8	
	Total coliform	9221B ⁽⁵⁾	7	1	0	0	8	
	Fecal streptococci	9230B ⁽⁵⁾	7	1	0	0	8	
	Fecal enterococci	9230B ⁽⁵⁾	7	1	0	0	8	
Clostridium perfringens spores	AOAC 976.30 or 974.38 ⁽⁶⁾	7	1	0	0	8		

Notes:

- (1) U.S. EPA Contract Laboratory Program statement of work for inorganic analysis multi-media, multi-concentration. ILM04.0 and revisions
- (2) U.S. EPA Contract Laboratory Program statement of work for organic analysis multi-media, multi-concentration. ILM03.1 and revisions
- (3) "Methods for Chemical Analysis of Water and Wastes." EPA-600/4-70-020.
- (4) "Standard Methods for the Examination of Water and Waste Water." 17th Edition, 1989
- (5) "Standard Methods for the Examination of Water and Waste Water." 19th Edition
- (6) Association of Official Analytical Chemists "Official Methods of Analysis"

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SAIC and the University of Rhode Island May, 1997. Derecktor Shipyard Marine Ecological Risk Assessment Report. Naval Education and Training Center, Newport, Rhode Island. May 1997.

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