CCNPP3COLA PEmails

From: Lutchenkov, Dimitri [dimitri.lutchenkov@unistarnuclear.com]
Sent: Thursday, November 11, 2010 9:04 AM
To: 'Kathy.Anderson@usace.army.mil'; 'Butch.Jim@epamail.epa.gov'; 'WOODY.FRANCIS@usace.army.mil'; 'GGOLDEN@dnr.state.md.us'; 'SGray@dnr.state.md.us'; Imboden, Stacey; 'Roy.Kropp@pnl.gov'; 'RLIMPERT@dnr.state.md.us'; 'Mansolino.Michael@epamail.epa.gov'; Nash, Harriet; 'John.Nichols@noaa.gov'; 'maryann.parkhurst@pnl.gov'; Quinn, Laura; 'BSadzinski@dnr.state.md.us'; ' (Bob_Zepp@fws.gov)'
Cc: Burkman, Jim; Logan, Carla; Miller, Edward A
Subject: FW: Proposed e-mail for forwarding UN#10-282 Today
Attachments: UN#10-282 - Updated Dredging Work Descriptions.pdf

Importance: High

Attached please find an advance electronic copy of UniStar letter UN#10-282 which was issued today. The advance copy is being forwarded to facilitate discussions in our teleconference schedule for this Friday afternoon, 11/12/10, to discuss NMFS comments and Tidal mitigation.

Regards,

Dimitri Lutchenkov

Director | Environmental Affairs |
UniStar Nuclear Energy
410-470-5524 | m 410-370-9090

>>> This e-mail and any attachments are confidential, may contain legal, professional or other privileged information, and are intended solely for the
addressee. If you are not the intended recipient, do not use the information
in this e-mail in any way, delete this e-mail and notify the sender. CEG-IP2

Hearing Identifier: CalvertCliffs_Unit3Cola_Public_EX
Email Number: 1524

Mail Envelope Properties (504D53289D6FF74399F75CAA2BD2693301028B64F823)

Subject: FW: Proposed e-mail for forwarding UN#10-282 Today
Sent Date: 11/11/2010 9:04:26 AM
Received Date: 11/11/2010 9:05:25 AM
From: Lutchenkov, Dimitri

Created By: dimitri.lutchenkov@unistarnuclear.com

Recipients:
"Burkman, Jim" <Jim.Burkman@constellation.com>
Tracking Status: None
"Logan, Carla" <Carla.Logan@constellation.com>
Tracking Status: None
"Miller, Edward A" <Edward.Miller@constellation.com>
Tracking Status: None
"'Kathy.Anderson@usace.army.mil'" <Kathy.Anderson@usace.army.mil>
Tracking Status: None
"'Butch.Jim@epamail.epa.gov'" <Butch.Jim@epamail.epa.gov>
Tracking Status: None
"'WOODY.FRANCIS@usace.army.mil'" <WOODY.FRANCIS@usace.army.mil>
Tracking Status: None
"'GGOLDEN@dnr.state.md.us'" <GGOLDEN@dnr.state.md.us>
Tracking Status: None
"'SGray@dnr.state.md.us'" <SGray@dnr.state.md.us>
Tracking Status: None
"Imboden, Stacey" <Stacey.Imboden@nrc.gov>
Tracking Status: None
"'Roy.Kropp@pnl.gov'" <Roy.Kropp@pnl.gov>
Tracking Status: None
"'RLIMPERT@dnr.state.md.us'" <RLIMPERT@dnr.state.md.us>
Tracking Status: None
"'Mansolino.Michael@epamail.epa.gov'" <Mansolino.Michael@epamail.epa.gov>
Tracking Status: None
"Nash, Harriet" <Harriet.Nash@nrc.gov>
Tracking Status: None
"'John.Nichols@noaa.gov'" <John.Nichols@noaa.gov>
Tracking Status: None
"'maryann.parkhurst@pnl.gov'" <maryann.parkhurst@pnl.gov>
Tracking Status: None
"Quinn, Laura" <Laura.Quinn@nrc.gov>
Tracking Status: None
"'BSadzinski@dnr.state.md.us'" <BSadzinski@dnr.state.md.us>
Tracking Status: None
"' (Bob_Zepp@fws.gov)'" <Bob_Zepp@fws.gov>
Tracking Status: None

Post Office: EXM-MSW-07.Ceg.Corp.Net

Files	**Size**	**Date & Time**
MESSAGE	718	11/11/2010 9:05:25 AM

UN#10-282 - Updated Dredging Work Descriptions.pdf 3181601

Options
Priority: High
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Greg Gibson
Vice President, Regulatory Affairs

750 East Pratt Street, Suite 1600
Baltimore, Maryland 21202

UniStar NUCLEAR ENERGY

November 11, 2010

UN#10-282

Jonathan Stewart
Tidal Section - Wetlands and Waterways Division
Maryland Department of the Environment
Water Management Administration
1800 Washington Boulevard
Baltimore, Maryland 21230

Woody Francis, Project Manager
U.S. Army Corps of Engineers – Baltimore District
10 S. Howard Street
Baltimore, Maryland 21201

Subject: Updated Work Description for Tidal Impacts and Dredge Area Sediment Sampling Test Results for Calvert Cliffs Nuclear Power Plant, Unit 3 in Calvert County, Maryland, MDE Project Number 08-WL-1462 (T), 09-NT-0191 (NT), USACE Tracking No. NAB-2007-08123-M05

Enclosure 1 contains updated work descriptions associated with the Joint Federal/State Wetland Permit Application dated 5/16/2008. The updated work descriptions are for tidal impacts only and reflect updated dredge material quantities, a change in pipe cover material for the discharge pipe and fish return, and additional information on the amount of shoreline revetment being impacted by construction.

The dredge material quantity has increased from 58,400 to a total of 66,600 cubic yards which in part reflects the decision not to use dredge material as pipe cover for the fish return and discharge pipe. The amount of material also reflects an increase in dredge material resulting from restoring the barge dock. A breakdown of the dredged material by impact area is as follows:

Intake Area – 1,000 cubic yards

Fish Return – 100 cubic yards

Discharge Pipe – 5,500 cubic yards

Restoration of Barge Unloading Facility – 60,000 cubic yards

Total – 66,600 cubic yards

The area of tidal impact stated in the Joint Federal/State Wetland Permit Application remains the same at 5.7 acres.

Enclosure 2 contains the sediment characterization final report. Physical and chemical analyses of the sediment to be dredged were conducted to evaluate potential placement options.

If you have any questions concerning the attached document, please call Mr. Jim Burkman at (410) 470-5130.

Sincerely,

Greg Gibson

Enclosures – 1) Updated Work Descriptions for Tidal Impact, October 2010
2) Calvert Cliffs Nuclear Power Plant, Unit 3 Project, Sediment Characterization Final Report, EA Engineering, Science, and Technology, Inc., October 2010

cc: Jim Butch - EPA
Susan Gray – Power Plant Research Program
Cheryl Kerr – MDE
John Nichols - NMFS
Laura Quinn – NRC
Bob Zepp – USFWS
Greg Golden - MDNR
Kathy Anderson - USACE
Bob Sadzinski - MDNR
Roland Limpert - MDNR
Michael Mansolino - EPA
Harriet Nash - NRC
Mary Ann Parkhurst - PNL
Roy Kropp - PNL

Enclosure 1

Updated Work Descriptions for Tidal Impact
October 2010

Work in Tidal Areas:

Work in tidal areas will be restricted to four major areas. The following paragraphs will describe the scope of work in each of these areas.

1. Unit 3 Intake Area

The work in the Unit 3 Intake area will include two major components: a) installation of a permanent sheet pile wall and b) installation of temporary sheet pile wall. The details of the work are shown on Figure 3.

a) Permanent Sheet Pile Wall: A new sheet pile wall will be installed to construct Unit 3 intake area. The sheet pile wall will extend approximately 180 feet from the existing shoreline to the existing baffle wall. The sheet pile wall will be located approximately 90 feet channelward of the approximate mean high water shoreline. The new sheet pile wall along with the existing baffle wall and the shoreline will create a 9,000 square foot wedge-shaped pool. To facilitate installation of the permanent sheet pile wall, approximately 50 feet of the existing shoreline armor protection will be removed. A new armor protection, approximately 75 feet long, will be installed adjacent to the new sheet pile wall. The armor protection, consisting of imported coarse sand / stone, will extend approximately 95 feet channelward.

b) Temporary Sheet Pile Wall: To facilitate the installation of the intake pipes, a temporary sheet pile wall will be installed after removal of the existing (approximately 60 feet along the shoreline) armor protection. The temporary sheet pile wall will extend approximately 35 feet (average) into the wedge-shaped pool. The area within the sheet piling will be dewatered and mechanically dredged to create an approximately 30-feet wide by 35-feet long by 25-feet deep area. Subsequently, extending approximately 20 feet channelward, two 60-inch diameter intake pipes (with trash rack and associated structures) will be installed with the bottom elevation at -25 feet mean low water. Shoreline armor protection (about 10 feet channelward) will be restored as required. The temporary sheet pile wall will then be removed to flood and submerge the intake pipes. The sand and gravel removed by dredging (approximately 1000 cubic yards) will be deposited onsite at an existing upland (non-wetland) environmentally controlled Lake Davies laydown area.

2. Unit 3 Fish Return

A fish return system similar to the existing Unit 1/Unit 2 fish return will be installed as part of the intake structures. The work related to the fish return system in the tidal areas includes installation of a discharge pipe and a rip-rap apron along with associated dredging.

The discharge pipe will consist of an 18-inch diameter high density polyethylene (HDPE) pipe which will be installed approximately 4 feet below the bay bottom in a mechanically excavated trench. The pipe will outfall about 40 feet channelwards from the existing shoreline. The location of the outfall will be protected with a riprap apron. To facilitate installation of the pipe, existing shoreline revetment (approximately 65 feet along the shoreline) will be removed and replaced. This dredging will temporarily impact approximately 100 cubic yards of material. The pipe trench will be filled with imported coarse sand/stone fill. The existing shoreline revetment will be restored to its original configuration after installation of the pipe. Turbidity curtains will be utilized during construction to contain suspended sediments. The sand and gravel removed by dredging will be deposited onsite at an existing upland (non-wetland) environmentally controlled Lake

Davies laydown area.

3. Discharge Outfall Pipe

A 30-inch diameter HDPE pipe with three single port diffusers will be installed in a mechanically excavated trench. The discharge point at the diffusers will be elevated approximately 3 feet above the bay bottom. The pipe will extend approximately 550 feet channelward and will be buried approximately 4 feet below the bay bottom. This burial depth will prevent damage of the pipe from storms and small boat anchors. To facilitate installation of the pipe, existing shoreline revetment (approximately 70 feet along the shoreline) will be removed and replaced. This installation will temporarily impact approximately 38,500 square feet (approximately 0.9 acres) area at the bay bottom. Additionally, a riprap scour pad will be installed at the diffuser outfall permanently impacting 800 square feet area at the bay bottom. The excavated trench will be filled with approximately 5,500 cubic yards of imported coarse sand/stone material. The dredged material (5,500 cubic yards) will be deposited onsite at an existing upland (non-wetland) environmentally controlled Lake Davies laydown area. Turbidity curtains will be utilized during construction to contain suspended sediments.

4. Restoration of Barge Unloading Facility including Maintenance and New Dredging

The existing barge unloading facility is intended to be utilized to receive equipment and materials for the construction of the Unit 3. The existing barge slip will be restored and extended to re-establish use of an approximately 1,500 feet long and 130 feet wide (average) channel. The channel area (about 195,000 square feet) will be dredged to a bottom elevation of -16 feet mean low water. The initial 1,065 feet length of the dredging is considered maintenance dredging. The remaining 435 feet is considered an extension beyond the original dredging limits to reach the bottom elevation of -16 feet mean low water. Of 60,000 cubic yards of total estimated dredging, 57,000 cubic yards are considered maintenance dredging and 3,000 cubic yards are considered new dredging. The two existing pile cap crane supports and one mooring bollard located in the channel will also be removed.

The dredged material will be deposited at existing onsite upland (non-wetland) environmentally controlled Lake Davies laydown area. Turbidity curtains will be utilized during construction to contain the suspended sediments.

The scope of work in this area will also include maintenance dredging near the shoreline to remove sediments which have mounded up over the past 30 years and restoration of an existing culvert outfall. Due to silt build up over the years, the discharge from this outfall meanders in a north-south direction prior to discharging into the barge slip area. The restoration activities in this area will include the installation of a riprap apron (Figure 6J) in front the existing outfall allowing the discharge to flow directly in the bay as originally designed. The riprap apron will extend approximately 40 feet channelward.

Additionally, a new sheet pile wall will be installed along the shore line in front of the existing bulk head which was built as part of the original design. On the land side of the new sheet pile, a concrete apron will be placed along with a gravel apron to allow equipment to be off-loaded from barges with wheel mounted transporters.

UN#10-282

Enclosure 2

Calvert Cliffs Nuclear Power Plant
Unit 3 Project
Sediment Characterization Final Report
EA Engineering, Science, and Technology, Inc.
October 2010

CALVERT CLIFFS NUCLEAR POWER PLANT
UNIT 3 PROJECT

SEDIMENT CHARACTERIZATION

FINAL REPORT

Prepared for

UniStar Nuclear Energy
Calvert Cliffs Nuclear Power Plant
1650 Calvert Cliffs Parkway
Lusby, Maryland 20657

Prepared by

EA Engineering, Science, and Technology, Inc.
15 Loveton Circle
Sparks, Maryland 21152

October 2010

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF FIGURES

LIST OF TABLES

1. PROJECT DESCRIPTION

EA Engineering, Science, and Technology, Inc. (EA) was contracted by UniStar Nuclear Energy (UniStar) to collect sediment samples offshore of Calvert Cliffs Nuclear Power Plant (CCNPP) in Calvert County, Maryland (Figure 1). Physical and chemical analyses of the sediment to be dredged were conducted to evaluate potential placement options.

The proposed dredging project is part of a UniStar's proposal to develop a third unit at CCNPP. UniStar would be bringing supplies and equipment to the facility via an existing barge unloading facility. Dredging is needed to restore the existing barge dock. UniStar also needs to dredge small areas associated with other infrastructure upgrades and installations. These include installation of a discharge pipe and installation of a fish return. UniStar estimates that 66,000 cubic yards of material will be dredged from the following four areas (Figure 2):

- Barge Unloading Facility
- Wedge Shaped Pool (Intake Area)
- Discharge Pipe
- Fish Return

The objective of the sampling effort was to obtain and analyze sediment and water samples representative of material proposed for dredging as part of the proposed dredging areas. The resulting geotechnical and analytical data were used to characterize the sediments and to determine the suitability of different types of placement options.

1.1 Project Location

CCNPP is located in the mid-Chesapeake Bay, north of the confluence of the Patuxent River with the Chesapeake Bay. Dredging activities will occur adjacent to the shoreline of the CCNPP site, which is in Calvert County, Maryland, near Lusby, Maryland.

1.2 Project Background and Scope

UniStar, on behalf of Calvert Cliffs 3 Nuclear Project, LLC, has applied for a license from the Nuclear Regulatory Commission (NRC) to construct a third unit at the existing CCNPP. Unit 3 would be constructed adjacent to Units 1 and 2. Unit 3 is proposed to help meet long-term energy demands within the region and would provide 1,600 megawatts of additional power to the grid. UniStar is proposing to use an existing barge unloading facility to bring equipment and supplies to support construction of the proposed Unit 3. Use of the existing barge unloading facility and pier, requires dredging the access channel to a depth of -16 feet MLW to allow sufficient under-keel clearance to accommodate anticipated barge traffic. To support operation of Unit 3, UniStar plans to install a new discharge pipe and a new fish return, both of which would also require dredging during installation. A fourth area, the wedge shaped pool (intake area), would be dredged to support installation of new intake piping.

The removal of approximately 66,000 cubic yards of material over 5.7 acres of Chesapeake Bay bottom is proposed. Sediment quality analyses were conducted to assess the suitability of the material for various placement options. UniStar has identified the upland placement facility at Port Tobacco at Weanack, better known as Shirley Plantation as one of the potential placement options and requested testing to determine the suitability of the material for placement at the site. Other placement options, such as wetland creation and confined disposal, may be evaluated based on the results of the sediment quality analyses.

The testing protocols used for the sediment quality investigation were determined using the general screening requirements for beneficial use, innovative reuse, and upland placement, as well as the specific requirements for placement Shirley Plantation (Section 1.3). The list of target detection limits, sampling methodologies, and sample holding times for the sediment samples were derived from *QA/QC Guidance for Sampling and Analysis of Sediments, Water, and Tissues for Dredged Material Evaluations* (USEPA/USACE 1995). Based on the data collected, the suitability of the material for various placement options was evaluated.

1.3 Technical Approach

This investigation was designed to identify, analyze, and evaluate the physical and chemical characteristics of sediment, site water, and elutriate samples that are representative of the areas proposed for dredging. The sampling and analytical components for this evaluation were derived from the following guidance documents:

- USEPA/USACE, 1998 (EPA-823-B-98-004). *Evaluation of Dredged Material Proposed for Discharge in Waters of the U.S>-Testing Manual [Inland Testing Manual (ITM)]*

- USEPA/USACE, 1995 (EPA-823-B-95-001). *QA/QC Guidance for Sampling and Analysis of Sediments, Water, and Tissues for Dredged Material Evaluations.*

- Toxicity Characteristic Leaching Procedure (TCLP) Regulatory Guidelines 40 CFR 261.24

A separate investigation was designed and implemented to determine the quantity of oyster shell within the sediment in the proposed dredging footprint. This study was completed by Dr. Kennedy Paynter at the University of Maryland and has been appended to this document as Appendix A.

1.3.1 Field Sampling Program

The field sampling and sample processing program included the following:

- Collecting sediment samples to project depth using a virbracorer from a total of nine locations in project dredging areas (Figure 2)

- Collecting samples from specified locations with positioning accuracy appropriate for project objectives

- Homogenizing sediment samples from multiple locations into composite samples that were submitted for bulk sediment, standard elutriate, and effluent elutriate preparation

- Collecting a site water sample using a peristaltic pump
- Collecting and transferring sediment and site water to appropriate, laboratory-prepared containers and preserving/holding samples for analysis according to protocols that ensure sample integrity

- Collecting and recording *in Situ* water quality (temperature, pH, dissolved oxygen, and salinity) for each sampling location at the time of sample collection

The sample compositing for each channel is summarized below and in Table 1:

- For the barge dock area, a total of four locations were sampled. Two composite samples (CCU3-BAR-SED-1/2 and CCU3-BAR-SED-3/4), each consisting of sediment from two locations, were created and used for the physical and chemical analyses.

- For the discharge pipe area, one location was sampled. The sample (CCU3-DIS-SED) was homogenized and used for physical and chemical analyses.

- One sample was planned for the wedge shaped pool, but was unable to be sampled because of riprap on the sediment surface.

Field sampling is described further in Section 2. Note that the fish return area was not sampled because at the time of sampling, this area was going to be returned to the excavation area after installation of the fish return. This material will now be placed with the rest of the project dredged material.

The oyster shell survey program (Appendix A) included the following:

- Characterizing bottom type within the dredging area

- Determining shell coverage within the dredging area

- Counting live and dead oysters within the dredging area

1.3.2 Analytical Testing

Analytical testing of the bulk sediments, site water, standard elutriates, and effluent elutriates was conducted by TestAmerica located in Pittsburgh, Pennsylvania. Standard elutriates simulate the release of metals and organic constituents in the water column during open water/ocean placement of material. Effluent elutriates simulate the quality of effluent discharged from confined dredged material disposal area during dredging operations. Methodology for the standard and effluent elutriate preparation is provided in the *Inland Testing Manual* (USEPA/USACE 1998). The analytical program included the following tasks:

- Physical analyses (grain size and percent solids) of sediment from two composite sediment samples, created from four channel locations, and one individual sediment sample;
- Preparation of three standard elutriates from two composite sediment samples and one individual sediment sample;
- Preparation of three effluent elutriates from two composite sediment samples and one individual sediment sample;
- Chemical analysis of bulk sediment for the following project-specific target analytes: ammonia, nitrate-nitrite, total cyanide, total Kjeldahl nitrogen (TKN), total organic carbon (TOC), total phosphorus, total sulfide, total petroleum hydrocarbon (TPH) – diesel range organics (DRO), TPH – gasoline range organics (GRO), metals, polyaromatic hydrocarbons (PAHs), polychlorinated biphenyl (PCB) aroclors, PCB congeners, chlorinated pesticides, semivolatile organic compounds (SVOCs), butyltins, and 2,3,7,8-TCDD;
- Chemical analysis of site water, standard elutriates, and effluent elutriates for the following project-specific target analytes: ammonia as nitrogen, dissolved cyanide, dissolved organic carbon, total Kjeldahl nitrogen, TPH – DRO, TPH – GRO, metals, PAHs, PCB congeners, PCB aroclors, chlorinated pesticides, SVOCs, 2,3,7,8-TCDD, butyltins (site water only), total nitrate/nitrite (site water and standard elutriates only), total sulfide (site water and standard elutriates only), phosphorous as orthophosphate (site water and standard elutriates only), dissolved nitrate/nitrite (site water and effluent elutriates only), dissolved sulfide (site water and effluent elutriates only), and total phosphorus (site water and effluent elutriates only).

In addition to sediment, water, and elutriate samples, quality control (QC) samples were submitted to the laboratory. Matrix spike/matrix spike duplicate (MS/MSD) samples were analyzed. Analytical methods, target analytes, holding times, reporting limits, and laboratory quality assurance/quality control (QA/QC) protocols are described in Chapter 3 of this report.

1.3.3. Data Analysis

Data analysis included the following tasks:

- Chemical concentrations in sediment samples were compared to Sediment Quality Guidelines (SQGs) (Long et al. 1995) and the TCLP screening criteria.

- Chemical concentrations in sediment samples were compared to Shirley Plantation screening criteria.

- Chemical concentrations in site water, standard elutriates, and effluent elutriate samples were compared to U.S. Environmental Protection Agency (USEPA) and the State of Maryland saltwater acute and chronic water quality criteria (WQC) for aquatic life.

Analysis of oyster data was completed by Dr. Paynter at the University of Maryland and his report is included as Appendix A.

2. SAMPLING PROCEDURES

Field activities consisted of sediment and water sampling offshore of CCNPP within the proposed dredging areas. Sampling was conducted at four locations adjacent to the barge dock and one location within the proposed discharge pipe area (Figure 2). An additional sample location was proposed within the wedge shaped pool, but could not be sampled because of the riprap covering the bottom of the dredging area. Site water was collected from one sample location within the dredging area. A sufficient volume of sediment was collected for chemical analysis, physical analysis, standard and effluent elutriate generation, and TCLP preparation and testing. Upon completion of field activities, the sediment and water samples were submitted to TestAmerica for physical and chemical analysis. Sediment collection occurred on July 20 and 21, 2010, and site water collection occurred on July 21, 2010. Sediment samples were processed at EA's warehouse in Sparks, Maryland, on July 22, 2010.

The oyster survey sampling procedures are provided in Appendix A.

2.1 Sampling Locations

Sampling locations were chosen by EA in consultation with UniStar prior to the start of sampling. Coordinates for sediment samples (Maryland State Plane NAD83, feet) are provided in Table 1 and sampling locations are shown in Figure 2. Positioning was determined in the field using a differential global positioning system (DGPS).

2.2 *In Situ* Water Quality Measurements

Water quality measurements were recorded *in situ* at the surface, mid-depth, and bottom of the water column at each sampling location using a YSI water quality probe. The following parameters were measured (Table 2):

- Temperature
- pH
- Dissolved oxygen
- Conductivity
- Salinity
- Turbidity

Date and time, sampling location, and water depth were recorded at each sampling location.

2.3 Site Water and Elutriate Water

Approximately 24 gallons of site water and elutriate preparation water were collected from one location on July 21, 2010 (Figure 2). Water was collected from mid-depth of the water column using ISCO pumps with dedicated Tygon tubing. Site water for analytical testing was pumped directly into laboratory-prepared sample containers and shipped from the field on the day of collection via overnight delivery to TestAmerica in Pittsburgh, Pennsylvania. The elutriate preparation water was placed in 1-gallon certified cleaned, amber glass bottles, stored on ice in coolers after collection, and transported to EA's Sparks, Maryland, office where it was stored in

a walk-in cooler refrigerated at 4 degrees Celsius (ºC). Elutriate preparation water was hand delivered with the sediment samples to TestAmerica. Holding times for water samples began when the water was collected and transferred into the appropriate sample containers. Sample containers, preservation techniques, and holding requirements for water samples for chemical analyses are provided in Table 3.

2.4 Sediment Sampling

Sediment samples were collected at five of the six target sediment sample locations in the proposed dredging area (Figure 2 and Table 1). These five locations represented two of the dredging areas: the barge unloading facility and the discharge pipe. Because of rip rap and rock on the sediment surface, samples could not be collected at the wedge shaped pool sample location. No sampling was conducted at the fish return dredging area because at the time sampling was conducted, material excavated from this area was expected to be returned to the area of excavation after installation of the fish return. This material will now be placed with the rest of the project dredged material. Sampling was conducted from Athena Technologies' 24-foot pontoon boat outfitted with a sampling platform and vibracoring system. A vibracorer outfitted with cellulose acetate butyrate (CAB) plastic liners (2.8-inch inner diameter) was used to collect the sediment samples. The stainless steel core barrel was fitted with a one-way valve at the top to retain sediment within the liner during retrieval. The core barrel was also fitted with a stainless steel nose cone to facilitate sediment penetration.

To obtain sediment cores, a dedicated, decontaminated core liner was loaded into the core barrel. The barrel was fitted with the nose cone and deployed through a moon pool in the center of the pontoon boat. The vibracore was lowered into the water until the nose cone was in contact with the sediment surface. The vibrating mechanism was started, causing the core barrel to shake, disturbing the sediment that is in contact with the sample barrel, reducing friction, and increasing the penetration of the core barrel into sediment.

After the desired sediment depth was reached or refusal occurred, the vibracorer was retrieved and brought aboard the pontoon boat. The core liner was removed from the steel barrel, and excess liner was cut to the sediment interface with a decontaminated hacksaw/blade. The core was capped at both ends, sealed, and labeled. Cores were kept on-board the boat on ice until the end of each work day and stored in a secured area at the landside staging area on ice until the sediment sampling was completed. At the completion of the sampling effort, the cores were transferred to a refrigeration unit cooled to 4ºC at EA's office in Sparks, Maryland, and stored until processing. Core sample numbers, dates and times were recorded on a Chain-of-Custody (COC) form. The number of cores from each location, day and time collected, penetration depth, and recovery depth is reported in Table 1.

2.5 Sample Processing and Compositing

The sediment cores were processed in a designated area at EA's warehouse in Sparks, Maryland, on July 22, 2010. Prior to processing, cores were sorted and checked against the COC form. Multiple cores from each sampling location were composited and sub-sampled for physical and chemical analysis. Sediments were extracted from each core section using a stainless steel

extrusion rod and each section was homogenized in a stainless steel buckets or tubs until the sediment was thoroughly mixed and of uniform consistency. Sample processing equipment that came into direct contact with the sediment was decontaminated according to protocols specified in Section 2.6.

Composite samples were prepared for the samples collected in the vicinity of the barge unloading facility. The following compositing scheme was used:

Location				Sample ID
CCU3-Barge1	+	CCU3-Barge2	=	CCU3-BAR-1/2
CCU3-Barge3	+	CCU3-Barge4	=	CCU3-BAR-3/4

After the samples were homogenized and composited, samples of the sediment were removed for target analyses, placed into pre-cleaned glass jars using stainless steel spoons, and labeled. Sample containers, preservation techniques, and holding requirements for sediment and TCLP samples for chemical analyses are provided in Table 4. Holding times for the sediment samples began when the sediment was removed from the core liner, composited, homogenized, and placed in the appropriate sample containers.

2.6 Equipment Decontamination Procedures

Equipment that came into direct contact with sediment during sampling was decontaminated prior to deployment in the field to minimize cross-contamination. This included CAB core liners, core caps, stainless steel cutters, stainless steel catchers, and stainless steel processing equipment (spoons, knives, bowls, extruder, etc.). Any equipment that was reused in the field was decontaminated on-board the sampling boat between locations. While performing the decontamination procedure, phthalate-free nitrile gloves were used to prevent phthalate contamination of the sampling equipment or the samples.

The decontamination procedure is described below:

- Rinse equipment using clean tap or site water
- Rinse with 10 percent nitric acid (HNO_3)
- Rinse with distilled or de-ionized water
- Rinse with methanol followed by hexane
- Rinse with distilled or de-ionized water
- Air dry (in area not adjacent to the decontamination area)

Waste liquids produced during decontamination procedures were contained at the areas of decontamination. Decontamination waste liquid produced on-board the vessel was collected in 5-gallon buckets with lids and transferred to a 55-gallon secure drum at EA's warehouse in Sparks, Maryland, at the end of the project. Decontamination waste liquid generated at the sample processing area was contained directly in the secure drum at the warehouse. The liquid contained in the drums will be tested, characterized, and disposed of by a subcontractor.

2.7 Equipment Blank

Equipment blanks are collected to determine the extent of contamination, if any, from the sampling equipment used as part of the project. One equipment blank was collected on July 21, 2010. The equipment blank was collected by pouring de-ionized water through unused CAB liner from the supply that was used for sampling. The water was collected in appropriate containers and submitted for analysis.

The equipment blank was shipped via overnight delivery to TestAmerica on the day of collection. The sample containers, preservatives, and holding time requirements for the equipment blank are provided in Table 3. Holding times for the equipment blank began when the samples were collected and placed into the appropriate sample containers.

2.8 Documentation

Field notes were recorded in a permanently bound, dedicated field logbook. A log of coring activities, sampling locations, water depths, and core recoveries were recorded in the log. Coordinates and approximate water depth was recorded for each sampling location. Personnel names, local weather conditions, and other information that may impact the field sampling program were also recorded. Each page of the logbook was dated by the personnel entering the information. Copies of the logbooks were filed at EA's office in Sparks, Maryland, and are provided in Appendix B.

2.8.1 Numbering System

The sample numbering system was used to communicate between the field crew and the analytical laboratory, and indicates which samples were collected from each location.

Samples were labeled as follows:

Example:	CCU3-DIS	Sediment sample from one location
	CCU3-BAR-1/2	Sediment sample composite of multiple locations

The first two letters denoted the site designation (CCU3 = Calvert Cliffs), the next two digits denoted the project at the site (U3 = Unit 3), and the next three digits denoted the sampling area (DIS = discharge pipe area, BAR = barge dock area). For areas where multiple samples were collected from within the sampling area, one or more digits were added to identify the sampling location number. The sample identification was followed by one of the suffixes according to sample type:

- SED – sediment sample to be submitted for chemical and physical analyses
- SW – site water to be submitted for chemical analyses or elutriate preparation
- EET – effluent elutriate sample
- SET – standard elutriate sample

One sediment sample and one site water sample were designated for matrix spike (MS) / matrix spike duplicate (MSD) analysis by adding –MS or –MSD at the end of the sample name.

2.8.2 Sample Documentation

Both the individual sediment cores and the processed sediment samples were labeled. Sediment cores collected in the field were labeled with the sampling location number, core orientation (top and bottom), and date of collection. Sample containers for the processed sediment and water samples were labeled with the following information:

- Client name
- Project number
- Sample ID
- Sampling location
- Date and time of collection
- Sampler's initials
- Type of analyses required

2.8.3 Chain-of-Custody Records

Sediment, site water, and elutriate water samples were documented on a COC form. The COC form indicated the date and time of sample collection and was signed by the appropriate personnel. The COC form accompanied the samples to the analytical laboratory (Appendix C).

3. ANALYTICAL METHODS AND DATA EVALUATION

The majority of the analytical testing of site water, sediment, and elutriates for this characterization was conducted by TestAmerica – Pittsburgh, located in Pittsburgh, Pennsylvania. Additional services were provided by TestAmerica's laboratories in Burlington, Vermont (geotechnical parameters); North Canton, Ohio (total Kjeldahl nitrogen); and Knoxville, Tennessee (2,3,7,8-TCDD); and by a soil laboratory at Virginia Tech [calcium carbonate exchange (CCE), potential peroxide acidity (PPA), concentrated paste pH, and electrical conductivity.

3.1 Analytical Methods

All inorganic and organic compounds for these projects were determined using the methods listed in Table 5 as described in the laboratory's analytical SOPs. To meet program-specific regulatory requirements for chemicals of concern, all methods/SOPs were followed as stated with some specific requirements noted below:

Total Organic Carbon (TOC)
TOC in sediments was determined using the 1988 EPA Region II combustion oxidation procedure (the Lloyd Kahn procedure).

Polynuclear Aromatic Hydrocarbons – PAHs
To achieve the target detection limits (TDLs) referenced in QA/QC Guidance for Sampling and Analysis of Sediments, Water, and Tissues for Dredged Material Evaluations - Chemical Evaluations (EPA 823-B-95-001, April 1995), the PAHs were determined utilizing SW846 Method 8270C using Selective Ion Monitoring (SIM). For those samples where both semivolatiles by SW846 Method 8270C and PAHs by SW846 Method 8270C SIM were requested, both analyses were performed on the same extract. For those samples, the evaluation of method performance was based on the determined recoveries of surrogates and control analytes (in the LCS and MS/MSDs) from the semivolatiles by 8270C (full scan GC/MS) analyses because the spiked concentrations exceeded the calibration range for the PAH by GC/MS SIM analyses.

Standard Elutriate Test
The Standard Elutriate Test (SET) was used to predict the release of contaminants to the water column resulting from open water placement of dredged material. The SET was performed following the procedures in the *ITM* (USEPA/USACE 1998). For the SET, the laboratory creates the elutriate based on a sediment-to-water ratio of 1:4, on a volume basis. The sediment and site water volume requirements needed for the SET was dependent on the number and type of analytical tests to be performed on the elutriate.

Standard elutriates were prepared by using the site water collected onsite and sediment composites or individual sample locations (see Section 2.5). A sediment/water mixture was thoroughly mixed for 30 minutes. The mixture was then allowed to settle, and the supernatant was siphoned off, filtered to remove particulates, and then analyzed for the dissolved chemical constituents specified in Table 5. The reported results from the SET included a "dissolved"

value for each of the target parameters to be determined. Quantitation limits were the same as aqueous samples (Appendix D)

Effluent Elutriate Test

The Effluent Elutriate Test (EET) was used to predict the quality of effluent discharged from confined dredged material disposal area during dredging operations. The EET was performed following the procedures in the ITM, Appendix B, June 1998 (USEPA/USACE 1998). Effluent elutriates were prepared by using the site water collected onsite and sediment composites or individual sample locations (see Section 2.5).

The sediment and site water were mixed in a ratio equal to the average inflow concentration, and the mixture was manually mixed and aerated for one hour. That mixture was then allowed to settle for a time period equal to the anticipated field mean retention time, up to a period of 24 hours. The supernatant was then siphoned off and filtered to remove particulates, then analyzed for the dissolved chemical constituents specified in Table 5. For the EET, TestAmerica - Pittsburgh used the method default values of 120 g/L for the average field inflow concentration and 24 hours for the field mean retention time, respectively. The sediment and site water volume requirements needed for the EET was dependent on the number and type of analytical tests to be performed on the elutriate. Quantitation limits were the same as aqueous samples (Appendix D).

Toxicity Characteristic Leaching Procedure

TCLPs, which are routinely required for material placement at landfills and upland locations, are used to identify the potential for toxicity and to determine if the dredged material would be classified as a hazardous waste. TCLPs were prepared by using the site water from one location and sediment composites created from multiple locations (see Section 2.5). The sediment composites were extracted following the TCLP procedures specified in SW-846 Method 1311, and the resultant leachates were analyzed for the parameters specified in Table 5.

3.2 Detection Limits

Target detection limits (TDLs) for sediment, TCLP, and site water/elutriate samples are provided in Appendix D. The detection limit is a statistical concept that corresponds to the minimum concentration of an analyte above which the net analyte signal can be distinguished with a specified probability from the signal because of the noise inherent in the analytical system. The method detection limit concept (MDL) was developed by USEPA, and is defined as "the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero" (40 CFR 136, Appendix B). Laboratory-specific target MDLs applicable to this project are provided in Appendix D. All analytical parameters, except wet chemistry parameters, butyltins, and 2,3,7,8-TCDD were quantitated to the MDL. All detected values quantified as greater than/equal to the MDL but less than the laboratory reporting limit (RL) were qualified as estimated. The laboratory RL is the lowest concentration at which an analyte can be detected in a sample and can be reported with a reasonable degree of accuracy and precision.

For sediment analyses, sample weight was adjusted for percent moisture (up to 50 percent moisture), prior to analysis, where appropriate to achieve the lowest possible reporting limits.

3.3 Laboratory Quality Control Samples

Internal laboratory quality assurance/quality control samples (including method blanks, laboratory control samples, surrogates, MS, and MSD) were analyzed.

- The **method (reagent) blank** is used to monitor laboratory contamination. The method blank is usually a sample of laboratory reagent water processed through the same analytical procedure as the sample (i.e., digested, extracted, distilled). One method blank was analyzed, at a frequency of one per every analytical preparation batch of 20 or fewer samples.

- The **Laboratory Control Sample (LCS)** is a fortified method blank consisting of reagent water or solid fortified with the analytes of interest for single-analyte methods or selected analytes for multi-analyte methods according to the appropriate analytical method. LCS's were prepared and analyzed with each analytical batch, and analyte recoveries are used to monitor analytical accuracy and precision.

- **Surrogates** are organic compounds that are similar to analytes of interest in chemical composition, extraction, and chromatography, but are not normally found in environmental samples. These compounds were spiked into all blanks, standards, samples, and spiked samples prior to analysis for organic parameters. Generally, surrogates are not used for inorganic analyses. Percent recoveries were calculated for each surrogate. Surrogates were spiked into samples according to the requirements of the reference analytical method. Surrogate spike recoveries were evaluated against the standard laboratory acceptance criteria limits, and were used to assess method performance and sample measurement bias. (If sample dilution caused the surrogate concentration to fall below the quantitation limit, surrogate recoveries were not calculated.)

- A **sample duplicate** is a second aliquot of a field sample that is analyzed to monitor analytical precision associated with that particular sample. Sample duplicates were performed for every batch of 20 or fewer samples.

- A **MS** is a field sample to which a known amount of analyte is added before sample preparation and analysis to evaluate the potential effects of matrix interference. Analyte concentrations in the spiked and unspiked sample were used to calculate percent recovery as a measure of matrix interference. A **MSD** is a duplicate of the MS sample.

3.4 Data Analysis

3.4.1 Calculations for Total PCBs and Total PAHs

For each sample, total PCB concentrations were determined by summing the concentrations of the 18 summation congeners [as specified in Table 9-3 of the Inland Testing Manual (ITM) (USEPA/USACE 1998)] and multiplying the total by a factor of two. Multiplying by a factor of

two estimated the total PCB concentration and accounted for additional congeners that were not tested as part of this program. These determinations were based upon testing of specific congeners recommended in the ITM and upon the National Oceanic and Atmospheric Administration (NOAA) (NOAA 1993) approach for total PCB determinations.

Total PAH concentrations were determined for each sample by summing the concentrations of the individual PAHs. To calculate the total PCB and total PAH concentrations, non-detects (ND) were assumed to be present at the MDL.

Substituting the MDL for non-detects (ND=MDL) provides a conservative estimate of the concentration. This method, however, tends to produce results that are biased high, especially in data sets where the majority of samples are non-detects. This overestimation is important to consider when comparing the calculated total values to criteria values.

3.4.2 Comparison to Sediment Quality Guidelines

Concentrations of detected analytes in sediment samples were compared to sediment quality guidelines (SQGs) for marine sediments, where available (Long et al. 1995). SQGs are tools which relate the concentrations of contaminants in sediment to predicted frequency or intensity of biological effects (Batley et al. 2005), and are intended to be either protective of biological resources or predictive of adverse effects to those resources, or both (Wenning and Ingersoll 2002). SQGs were developed as informal (non-regulatory) guidelines for use in interpreting chemical data from analyses of sediments. SQGs can be used to classify sediment samples with regard to their potential toxicity, to identify contaminants of concern, and to prioritize areas of concern based on the frequency and magnitude by which the values are exceeded (Long and MacDonald 1998).

Several biological-effects approaches have been used to assess marine/estuarine sediment quality relative to the potential for adverse effects on benthic organisms, including the Effects Range-Low (ERL) / Effects Range-Median (ERM) (Long et al. 1995) (Table 6). For dredged material evaluations, SQGs are used as a tool to assist with identification of constituents of potential concern (COPCs) and to provide additional weight of evidence in the evaluation (USACE–WES 1998).

Because they are based on environmental samples, ERLs and ERMs implicitly deal with contaminant mixtures, and the measured biological effects reflect the cumulative interactions of all chemicals in the mixture (Batley et al. 2005). The ERL and ERM values were derived by evaluating published measures of adverse biological effects, including field surveys of benthic and fish communities, Median Effective Concentrations (EC_{50}) and Lethal Concentration 50 (LC_{50}) values determined in laboratory bioassays, and toxicity predicted by equilibrium partitioning (Long et al. 1995). ERLs were established at the lower 10^{th} percentile of the effects data distribution and typically represent concentrations below which adverse biological effects are unlikely (Long et al. 1995). ERMs were established at the lower 50^{th} percentile of the effects data distribution, and represent concentrations above which adverse biological effects are probable (Long et al. 1995). Concentrations that are between the ERL and ERM represent the

concentrations at which adverse biological effects might occur. ERL and ERM benchmarks for marine/estuarine sediments are provided in Table 6.

3.4.3 Comparison to USEPA/State of Maryland Water Quality Criteria

Analytes detected in the site water and standard elutriate samples were compared to United States Environmental Protection Agency (USEPA) and State of Maryland saltwater acute and chronic water quality criteria for aquatic life (Table 7). Criteria were derived from USEPA's *National Recommended Water Quality Criteria (2010)* and the Code of Maryland Regulations (COMAR) (COMAR 26.08.02.03-2). The USEPA's acute criteria are based on 1-hour average exposure concentrations. The USEPA's chronic criteria are based on 4-day average exposure concentrations, with the exception of ammonia which is applied as a 30-day average exposure concentration.

The State of Maryland's saltwater acute and chronic water quality criteria for aquatic life are the same as the USEPA's. The USEPA and State of Maryland acute and chronic saltwater quality criteria for metals were developed for dissolved metal concentrations, but they are compared to total metals concentrations in this study as a conservative evaluation of the analytical results.

3.4.4 Calculation of Acute and Chronic Ammonia (NH_3-N) Criteria

The USEPA acute and chronic criteria for determining the toxicity of ammonia (NH_3-N) to aquatic life are variable, depending on temperature, pH, and salinity of the waterbody. The acute and chronic ammonia criteria for this analysis were based on the temperature, salinity, and pH measured at the site when the site water was collected (Table 2). The calculated acute ammonia criterion was 3.0 mg/L, and the calculated chronic ammonia criterion was 0.45 mg/L.

3.4.5 Evaluation of TCLP Data

To provide the information needed to determine if material could be placed in an upland beneficial use site or upland placement facility, concentrations of chemical constituents in the TCLP leachate were compared to maximum concentrations of contaminants for toxicity characteristics (Table 8). The toxicity characteristics are used to determine if a material should be classified as hazardous waste (40 CFR 261.24). The TCLP test is routinely required for dredged material placement at landfills and upland locations.

3.4.6 Comparison to Shirley Plantation Screening Criteria

Sediment results were also compared to values on Shirley Plantation's screening table (Table 9) to determine whether the sediment would be acceptable for placement at Shirley. This table is maintained by staff at Shirley Plantation in coordination with soil scientists at Virginia Tech.

4. ANALYTICAL RESULTS

The physical and chemical characteristics of sediment samples from the Calvert Cliffs dredging area were determined to assess the sediment quality of the material proposed for dredging. This chapter presents the results of the bulk sediment, site water, standard elutriate, and effluent elutriate chemical and TCLP analyses. The results are compared to the applicable guidelines or criteria.

Results of the sediment analyses were compared to sediment quality guidelines (ERLs/ERMs) and are shown in Tables 10 through 18. Results of the standard and effluent elutriate analyses and site water analyses are shown in Tables 19 through 26. Results of the TCLP analysis are presented in Table 39. Definitions of organic and inorganic data qualifiers are provided on the data results tables. Values for detected chemical constituents are shaded and bolded in the data tables. MDLs or RLs are presented for non-detected chemical constituents.

The results of the oyster survey are provided in Appendix A and summarized in Section 5.3.

4.1 Bulk Sediment Results

Sample weights were adjusted for percent moisture (up to 50 percent moisture) prior to analysis to achieve the lowest possible detection limits, and analytical results are reported on a dry weight basis. Copies of final raw data sheets (Form I's) and analytical narratives that include an evaluation of laboratory quality assurance/quality control results are available from EA upon request. The COC forms are provided in Appendix C.

4.1.1 Physical Analyses

Results of the grain size analyzes for sediment samples are shown in Table 16. The grain size analysis indicated that the Calvert Cliffs sediments are predominantly comprised of sand, ranging from 65.0 (CCU3-DIS-SED) to 82.1 percent (CCU3-BAR-3/4-SED) sand in the three sediment samples (Table 10).

4.1.2 General Chemistry Analyses

Results of the general chemistry analyses for sediment samples are shown in Table 11. Concentrations of total organic carbon (TOC) ranged from 0.17 percent to 1.51 percent.

Concentrations of ammonia as nitrogen ranged from 16.6 milligrams (mg)/kilogram (kg) to 137 mg/kg, nitrate-nitrite concentrations ranged from 0.61 to 5.5 mg/kg, and concentrations of total Kjeldahl nitrogen ranged from 319 to 749 mg/kg. Total phosphorus ranged from 215 to 841 mg/kg and total sulfide ranged from 39.4 to 354 mg/kg. Cyanide was not detected in the Calvert Cliffs sediment samples.

Two fractions of total petroleum hydrocarbons (TPH) were analyzed – diesel range organics (DRO) and gasoline range organics (GRO). TPH - DRO was detected in the two samples from the vicinity of the barge dock at concentrations of 40 and 370 μg/kg (Table 11). TPH – GRO

was not detected in any of the sediment samples. There are no SQGs for TPH, but the Maryland Department of the Environment (MDE) has set generic cleanup standards for TPH for residential and non-residential soils. The residential cleanup standard (diesel+gasoline fractions) is 230,000 µg/kg and the non-residential cleanup standard is 620,000 µg/kg (MDE 2008). Concentrations of TPH-DRO detected in the Calvert Cliffs sediments were below the cleanup standard.

4.1.3 Inorganic Constituents

Of the 24 tested metals, 23 were detected in at least one of the sediment samples and the remaining metal (mercury) was detected in one of the three sediment samples (Table 12). No metals were detected in concentrations above the SQGs.

4.1.4 Organic Constituents

Results of the analysis of organic constituents in the Calvert Cliffs sediments are presented in Tables 13 to 18. Twelve PAHs, 16 PCB congeners, one PCB aroclor, five chlorinated pesticides, and two SVOCs were detected in the sediment samples. Only one constituent, total PCBs, exceed the SQGs. Total PCBs were detected at 1.25 times the ERL value, but at a concentration less than one fifth of the ERM value.

4.2 Site Water and Elutriate Results

Three effluent and three standard elutriates were prepared using the sediment samples. Chemical analyses for target analytes were conducted for each of the elutriate samples and the site water (Tables 19 through 26). Results of the analyses were compared to USEPA and State of Maryland acute and chronic saltwater criteria for the protection of aquatic life (Table 7). Values for detected constituents are shaded and bold in the data tables. Detection limits are presented for non-detected chemical constituents.

4.2.1 General Chemistry Analyses

Concentrations of general chemistry constituents in site water and elutriate samples are presented in Table 19. Chronic criteria exist for total sulfide and chronic and acute criteria ammonia. Acute and chronic ammonia criteria were calculated based on the temperature, pH, and the salinity in the water column at the time of site water collection. Ammonia concentrations exceeded the calculated chronic and acute criteria for the all the standard and effluent elutriate samples and the site water sample. Total sulfide was not detected in the effluent elutriate samples and dissolved sulfide was not detected in the standard elutriate samples.

TPH - DRO was detected in all of the site water, effluent elutriate, and standard elutriate samples. TPH - GRO was not detected in the site water, effluent elutriate, and standard elutriate samples. While there are no water quality standards for TPH, MDE has set a residential cleanup standard of 47 µg/L for TPH (DRO + GRO fractions) in groundwater. All concentrations of TPH – DRO were above the residential cleanup standards for groundwater. The highest detected concentration of TPH – DRO was 230 µg/L, which is 4.9 times the cleanup standard.

4.2.2 Inorganic Constituents

Concentrations of inorganic constituents tested in site water and elutriate samples are presented in Table 20. Eighteen of the 24 tested metals were detected in the site water sample. Concentrations of detected metals were low in site water, and did not exceed the acute or chronic water quality standards for aquatic life. Eighteen of the 24 tested metals were detected in the standard elutriate samples and 20 of the 24 tested metals were detected in the effluent elutriate samples. Detected concentrations of metals were generally low in all elutriate samples. Two of the constituents (copper, nickel) were detected at concentrations that exceeded water quality standards. Copper was detected in a concentration the two times the acute water quality criterion in one standard elutriate sample and 1.2 times the acute water quality standard in one effluent elutriate sample. Copper was detected in a concentration 1.2 times the chronic water quality criterion in one standard elutriate and at 1.5 and 1.03 times the chronic criterion in two effluent elutriate samples. Nickel was detected in a concentration 1.2 times the chronic criterion in one standard elutriate sample.

4.2.3 Organic Constituents

Detected concentrations of organic constituents in site water and elutriate samples are presented in Tables 21 through 26. Six PAHs were detected in the site water sample, three PAHs were detected in the standard elutriates, and 15 PAHs were detected in the effluent elutriates. All detected concentrations in the site water and standard elutriates were below the reporting limit. Ten of the PAHs detected in the effluent elutriates were detected at concentrations below the reporting limit.

There were no PCB congeners or PCB aroclors detected in the site water sample. Four PCB congeners were detected in the standard elutriate samples and 1 PCB congener was detected in the effluent elutriate samples. Concentrations of detected PCBs were low in standard and effluent elutriate samples. PCB aroclors were not detected in the effluent and standard elutriate samples.

None of the tested chlorinated pesticides were detected in the site water sample. Only one of the tested chlorinated pesticides was detected in the standard elutriate samples. Five chlorinated pesticides were detected in the effluent elutriate samples. One chlorinated pesticide, heptachlor, was detected at concentrations up to 2.8 times the chronic criterion in the effluent elutriate samples.

Only one SVOC was detected in the site water sample and it was detected below the reporting limit. Three SVOCs were detected in the standard elutriate samples and one SVOC was detected in the effluent elutriate samples. There are no water quality criteria for the SVOCs detected in the standard and effluent elutriates.

Butyltins were only analyzed for the site water sample and were not detected. One dioxin congener (2,3,7,8-TCDD) was analyzed and was not detected in the site water or elutriate samples.

4.3 TCLP Results

The sediment composites were extracted following the TCLP procedures specified in SW-846 Method 1311. TCLPs were prepared using the sediment composites created from two sample locations within the dredging area. Results of the TCLP analysis are presented in Table 27. The samples were not ignitable and pH ranged from 7.9 to 8.8. Five of the metals (arsenic, barium, cadmium, mercury, and selenium) were detected at low concentrations that were below the TCLP screening value. None of the herbicides, pesticides, SVOCs, or volatile organic compounds (VOCs) were detected in the TCLP samples.

4.4 Shirley Plantation Screening

The Shirley Plantation Screening Table (Table 9) was populated with the results of the sediment sampling. The screening table instructions use the Proposed Virginia Clean Upland Fill Criteria and Exclusion Criteria to determine suitability for placement at the site. This table includes the results of four analyses used by staff at Shirley Plantation to make decisions related to the placement and management of the material onsite. These tests were to determine saturated paste pH, electrical conductivity, potential peroxide acidity, and calcium carbonate equivalency. Results are included in Table 28. None of the average concentrations of constituents exceed the Virginia Clean Upland Fill and Exclusion Criteria.

5. SUMMARY AND CONCLUSIONS

This study was conducted to characterize the material proposed for dredging offshore of CCNPP as part of the proposed Unit 3 project. This characterization includes determining whether or not the material would be suitable for placement at Shirley Plantation and whether or not a more detailed analysis of other placement options, such as beneficial use and innovative reuse, would be appropriate based on the quality of the material.

5.1 Physical Analyses

The results of the grain size analysis indicate that the material is predominantly sand, with concentrations of fine material (silts and clays) up to 26.7 percent. Grain size affects many beneficial use and innovative reuse projects. Examples of project types suitable for sandy material include: beach nourishment, island restoration, and wetland creation. Some options, such as oyster reef creation, are not viable for sandy material. The grain size of the material would not preclude confined disposal or landfill placement options.

5.2 Chemical Analyses

Only one constituent, total PCBs, was detected above the sediment quality guideline (ERL). The elutriate testing indicated that PCB congeners are tightly bound to the sediments and are not likely to be released into the water column during dredging or placement. The sediment data were integrated into the Shirley Plantation screening table and the mean concentrations of each constituent on the table was compared to the placement criteria. None of the results exceeded the Proposed Virginia Upland Clean Fill and Exclusion Criteria provided by staff at Shirley Plantation.

Three constituents (ammonia, copper, and nickel) exceed chronic water quality criteria in standard elutriate samples. Three constituents (ammonia, copper, and heptachlor) exceeded chronic water quality criteria in effluent elutriate samples. Copper concentrations exceed the acute water quality criteria in one standard elutriate sample and one effluent elutriate sample. Concentrations of nickel were above the chronic water quality criteria in one of the standard elutriate samples. Ammonia is a natural degradation product of organic matter in anoxic sediments which may be released to the water column during dredging and placement of material. However, ammonia concentrations would be expected to dissipate quickly in the water column to concentrations below the calculated criteria. Heptachlor only exceeded the chronic criterion in one of the effluent elutriate samples and was only slightly above the water quality criterion.

None of the TCLP analysis constituents exceeded maximum concentrations of contaminants for toxicity characteristics (40 CFR 261.24). Concentrations of detected constituents were well below the toxicity characteristic criteria, and the results also indicated that the materials were not corrosive or ignitable. The sediments within the dredging area would not be identified as hazardous waste per USEPA criteria.

Based on the results of the chemical analyses, there would be no anticipated restrictions on the use of the material for beneficial use, innovative reuse, confined disposal, upland placement, or placement in a landfill. Comparison to SQGs and water quality criteria indicated that the material would be suitable for use in restoration and habitat development activities, which tend to have the most stringent criteria for use. The material is suitable for placement at Shirley Plantation based on the screening criteria provided by staff at the site. The TCLP analysis indicated that the material is not hazardous and would be acceptable for landfill cover or upland placement.

5.3 Oyster Survey

The oyster survey results are presented in greater detail in Appendix A. The bottom type at the survey sites was either hard bottom (sandstone, rock or shell hash) or sand. Most of the bottom surveyed in the barge slip area could potentially serve as oyster habitat, but the discharge pipe area had a sand substrate, which is not considered oyster habitat. Shell coverage in the proposed dredging area was low, with only 21 percent of the sites sampled containing shell hash and at those sites, only a low to moderate amount of shell was found. Three live oysters and no dead oysters were collected during the survey and they were all found in a single grab in one of the samples collected furthest from shore.

5.4 Conclusions

Based on the analyses conducted, the sediments proposed for dredging offshore of CCNPP in the Chesapeake Bay are composed predominantly of sand and would be viable, based on grain size, for use in a variety of beneficial use or innovative reuse projects. Although three constituents had concentrations that exceeded the sediment guidelines for one or more of the sediment samples, average concentrations of these constituents would be low and would likely be acceptable for any type of placement option. The grain size and quality of the CCNPP sediment would be acceptable for confined placement, beneficial use, innovative reuse, and landfill options. Sediment quality data were specifically compared to placement criteria for the Shirley Plantation placement site, which is an innovative reuse site where dredged material is being used for pit mine reclamation. CCNPP sediments would be acceptable for placement at Shirley Plantation. The sediment would be suitable for a range of beneficial use and innovative reuse options and further analysis could be done to consider additional specific beneficial use and innovative reuse options based on site specific placement criteria, available site capacity, and relative placement cost.

The results of the oyster survey indicate that the material dredged would is unlikely to have enough shell content to make recovery of oyster shell during dredging worthwhile. The amount of shell recovered would not be sufficient on its own for use for an oyster restoration project.

6. REFERENCES

Batley, G.E., R.G. Stahl, M.C. Babut, T.L. Bott, J.R. Clark, L.J. Field, K.T. Ho, D.R. Mount, R.C. Swartz, and A. Tessier. 2005. *Scientific Underpinnings of Sediment Quality Guidelines*. In: *Use of Sediment Quality Guidelines and Related Tools for the Assessment of Contaminated Sediments, RJ Wenning, GE Batley, CG Ingersoll, DW Moore, eds.* Society of Toxicology and Chemistry (SETAC).

Long, E.R., D.D. MacDonald, S.L. Smith, and E.D. Calder. 1995. *Incidence of Adverse Biological Effects Within Ranges of Chemical Concentrations in Marine and Estuarine Sediments.* Environmental Management. Volume 19, no. 1.

Long, E.R. and D.D. MacDonald. 1998. *Recommended uses of empirically derived sediment quality guidelines for marine and estuarine ecosystems*. Human and Ecological Risk Assessment 4 (5): 1019-1039.

Maryland Department of the Environment. 2008. *Cleanup Standards for Soil and Groundwater*. Interim Final Guidance (Update No. 2). March.

National Oceanic and Atmospheric Administration (NOAA). 1993. *Sampling and Analytical Methods of the National Status and Trends Program: National Benthic Surveillance and Mussel Watch Projects 1984-1992. Vol 1: Overview and Summary of Methods*. NOAA Tech. Memo. NOS ORCA 71. Silver Spring, MD.

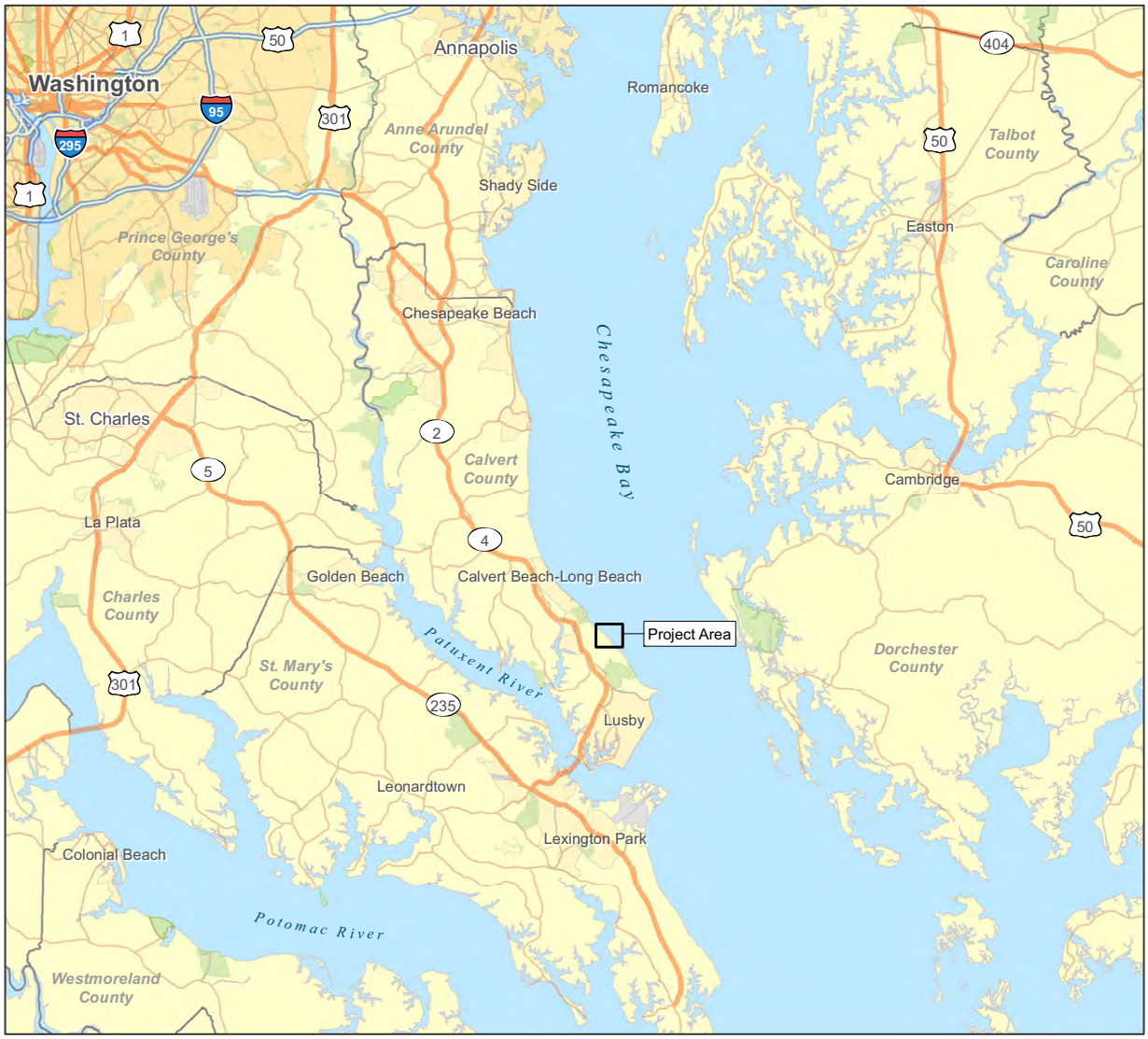
Wenning, R.J. and C.G. Ingersoll. 2002. *Summary of the SETAC Pellston Workshop on Use of Sediment Quality Guidelines and Related Tools for the Assessment of Contaminated Sediments*; 17-22 August 2002. Fairmount, Montana, USA. Society of Toxicology and Chemistry (SETAC). Pensacola, FL, USA.

U.S. Army Corps of Engineers (USACE), Waterways Experiment Station (WES). 1998. *Use of Sediment Quality Guidelines (SQGs) in Dredged Material Management*. Dredging Research Technical Note EEDP-04-29.

U.S. Environmental Protection Agency (USEPA) / U.S. Army Corps of Engineers (USACE). 1998. *Evaluation of Dredged Material for Discharge in Waters of the U.S.–Testing Manual (Inland Testing Manual–ITM)*. EPA-823-B-98-004.

U.S. Environmental Protection Agency (USEPA) / U.S. Army Corps of Engineers (USACE). 1995. *QA/QC Guidance for Sampling and Analysis of Sediment, Water, and Tissue for Dredged Material Evaluations*. EPA-823-B-95-001.

U.S. Environmental Protection Agency. 2008. *Human Health Risk Assessment*. Website: http://www.epa.gov/reg3hwmd/risk/human/index.htm. Accessed 26 September 2008.

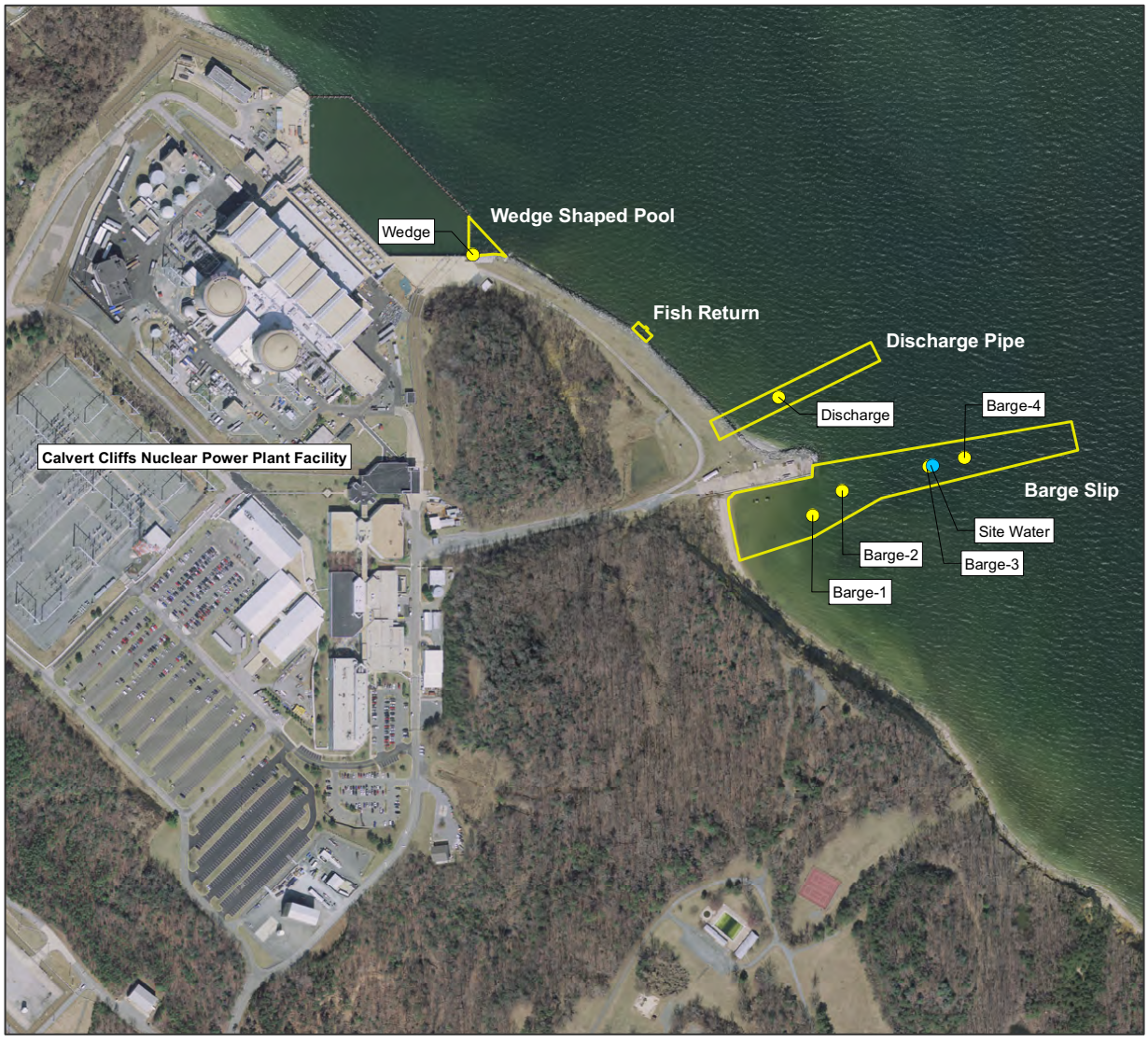


Calvert Cliffs Nuclear Power Plant
Sediment Characterization
2010

Figure 1
Project Location Map

0 5 10
Miles

H:\projects\1462107\MXD\Vicinity



Calvert Cliffs Nuclear Power Plant
Sediment Characterization
2010

Figure 2
Proposed Dredging Areas and
Project Sampling Locations

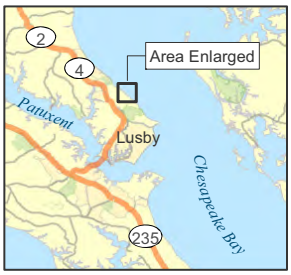
Legend

- Sediment Sample Location
- Surface Water Sample Location
- Proposed Dredging Area

N

0 250 500

Feet



H:\projects\146210\7\MXD\Samples

TABLE 1. SAMPLING LOCATIONS AND CORING SUMMARY
Calvert Cliffs Sediment Characterization (2010)

Location	Northing (MD State Plane NAD 83, feet)	Easting (MD State Plane NAD 83, feet)	Date	Water Depth (feet)	Recovery (feet)	Sediment Volume of Recovery
Barge-1	279440.79	1474090.46	7/20/2010	5.33	7.5	2.4
					8.33	2.7
Barge-2	279525.34	1474191.54	7/20/2010	9.25	7.25	2.3
					7.25	2.3
					6.08	1.9
Barge-3	279610.35	1474482.89	7/20/2010	14.5	2.66	0.9
					3.33	1.1
					3	1.0
Barge-4	279639.62	1474605.49	7/20/2010	15.83	1.92	0.6
					1.75	0.6
					1.42	0.5
					1.17	0.4
					2.17	0.7
					2.5	0.8
Wedge	280347.59	1472953.99	7/20/2010	19.58	--	--
	280359.55	1472952.36		21.42	--	--
Discharge	279842.88	1473973.72	7/20/2010	6.17	5.75	1.8
			7/20/2010		4.58	1.5
	279847.23	1473970.33	7/21/2010	7.42	4.08	1.3
			7/21/2010		6.5	2.1
Surface Water Sample	279612.66	1474490.36	7/21/2010	--	--	--

TABLE 2. IN SITU WATER QUALITY DATA
Calvert Cliffs Sediment Characterization (2010)

Location	Date & Time Sampled	Water Depth (ft)	Weather Conditions	Sample Depth	Water Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Conductivity	Salinity (ppt)	Turbidity (NTU)
Barge-1	7/20/10 0820	5.3	Clear, 75 to 95ºC, winds SW <5 knots	Surface	27.8	7.9	5.0	23.7	14.3	1.8
				Middle	27.9	7.9	4.9	23.8	14.3	1.8
				Bottom	27.9	7.9	4.8	23.8	14.4	3.0
Barge-2	7/20/10 0925	9.3	Clear, 75 to 95ºC, winds SW <5 knots	Surface	28.1	8.0	5.4	23.5	14.2	1.2
				Middle	28.1	8.0	5.3	23.6	14.2	1.1
				Bottom	28.1	7.9	5.1	23.7	14.3	1.6
Barge-3	7/20/2010 1205	14.5	Clear, 75 to 95ºC, winds SW <5 knots	Surface	28.7	8.1	6.4	23.6	14.2	1.7
				Middle	28.6	8.0	5.9	23.8	14.3	1.4
				Bottom	28.4	7.9	4.8	23.8	14.4	2.2
Barge-4	7/20/10 1310	15.8	Clear, 75 to 95ºC, winds SW <5 knots	Surface	28.9	8.1	6.9	23.3	14.0	2.2
				Middle	28.6	8.0	5.8	23.6	14.2	1.5
				Bottom	28.3	8.0	5.3	23.6	14.2	1.7
Wedge	7/20/10 1114	19.6	Clear, 75 to 95ºC, winds SW <5 knots	Surface	28.4	7.9	5.4	23.8	14.3	1.6
				Middle	28.3	7.9	5.3	23.8	14.3	1.6
				Bottom	28.2	7.9	4.8	23.8	14.4	3.0
Discharge	7/20/10 1535	6.2	Clear, 75 to 95ºC, winds SW <5 knots	Surface	29.5	8.4	8.0	23.4	14.1	3.6
				Middle	29.2	8.4	8.3	22.9	13.8	2.5
				Bottom	29.2	8.4	8.4	22.9	13.7	1.9
Site Water (Barge 3)	7/21/10 1100	15.0	Overcast, 70 to 95ºC, winds S <5 knots	Surface	28.1	8.1	6.4	22.8	13.7	1.4
				Middle	27.7	8.0	5.6	22.9	13.8	1.1
				Bottom	28.3	7.9	4.5	23.5	14.1	1.0

TABLE 3. REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES FOR AQUEOUS SAMPLES [(a)]
Calvert Cliffs Sediment Characterization (2010)

Parameter	Volume Required [(b)]	Container[(c)]	Preservative	Holding Time
Inorganics				
Metals (including Mercury)	1 Liter	P	pH <2 with HNO_3 Cool, 4°C	6 months (28 days for Hg)
Sulfide	500 mLs	P,G	NaOH to pH >9 Zinc Acetate Cool, 4°C	7 days
Nitrogen (Ammonia, Nitrate + Nitrite)	250 mLs	P,G	H_2SO_4 to pH <2 Cool, 4°C	28 days
Nitrogen (Total Kjeldahl), Total Phosphorus	500 mLs	P,G	H_2SO_4 to pH <2 Cool, 4°C	28 days
Physical Parameters				
Site Water for Standard Elutriate Test	5 gallons	G	Cool, 4°C	None specified
Site Water for Effluent Elutriate Test	5 gallons	G	Cool, 4°C	None specified
Organics				
Total Petroleum Hydrocarbons (TPH) Gas Range Organics (GRO)	2-40 mL	G, teflon-lined, septa cap	HCl, Cool, 4°C	14 days
Total Petroleum Hydrocarbons (TPH) Diesel Range Organics (DRO)	2 liters	G, teflon-lined cap	Cool, 4°C	7 days until extraction, 40 days after extraction
Total Organic Carbon	3-40 mLs	G, teflon-lined, septa cap	H_2SO_4 or HCl to pH <2; Cool, 4°C	28 days
Chlorinated Pesticides, Polynuclear Aromatic Hydrocarbons, PCB Congeners, PCB Aroclors, Semivolatile Organic Compounds	6 Liters	G, teflon-lined cap	Cool, 4°C	7 days until extraction, 40 days after extraction
Dioxins (2, 3, 7, 8 TCDD only) / Furans	2-1Liters	G	4ºC	7 days until extraction, 40 days after extraction

(a) From time of sample collection.
(b) Additional volume will need to be provided for samples designated as MS/MSDs
(c) P = plastic; G = glass.

TABLE 4. REQUIRED CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES FOR SEDIMENT SAMPLES [a]

Calvert Cliffs Sediment Characterization (2010)

Parameter	Volume Required [b]	Container[c]	Preservative	Holding Time
Inorganics				
Metals (including Mercury)	4 oz.	P,G	4°C	6 months (28 days for Hg)
Nitrogen (Ammonia, Nitrate + Nitrite)	4 oz	P,G	4°C	28 days
Nitrogen (Total Kjeldahl), Total Phosphorus	4 oz	P,G	4°C	28 days
Sulfide	4 oz	P,G	4°C	7 days
Physical Parameters				
Grain Size and Percent Solids	32 oz	P,G	4°C	6 months
Sediment for Standard Elutriate Test	1-2 gallons	G	4°C	14 days
Sediment for Effluent Elutriate Test	3-4 gallons	G	4°C	14 days
Sediment for TCLP	4-4 oz 1-32oz	G	4°C	14 days to TCLP extraction, 7 days after extraction
Sediment for Virginia Tech Analyses	1-8 oz	G	4°C	--
Organics				
Total Organic Carbon	4 oz	G	4°C	14 days
PAHs, PCB Congeners, Chlorinated Pesticides, Semivolatile Organic Compunds (SVOC)	32 oz	G	4°C	14 days until extraction, 40 days from extraction to analysis
Butyltins	8 oz	G	4°C	14 days until extraction, 40 days from extraction to analysis
Dioxins (2, 3, 7, 8 TCDD only)	4 oz	G	4°C	1 year until extraction, 50 days after extraction
Total Petroleum Hydrocarbons (TPH) Diesel Range Organics (DRO)	4 oz.	G	4°C	14 days until extraction, 40 days after extraction
Total Petroleum Hydrocarbons (TPH) Gas Range Organics (GRO)	4 oz.	G	4°C	14 days until analysis

(a) From time of sample collection.
(b) Additional volume will need to be provided for samples designated as MS/MSD/MDs.
(c) P = plastic; G = glass.

TABLE 5. ANALYTICAL METHODS
Calvert Cliffs Sediment Characterization (2010)

Analyte	Analytical Method
Sediment and Elutriates	
Metals (ITM list)	SW846 6020
Mercury	SW846 7471A
Polynuclear Aromatic Hydrocarbons (PAHs)	SW846 8270C SIM
Polychlorinated Biphenyl (PCB Congeners)	SW846 8082
Polychlorinated Biphenyl (PCB Aroclors)	SW846 8082
Chlorinated Pesticides	SW846 8081A
2,3,7,8-TCDD	EPA-5 1613B
Ammonia	EPA 350.1
Nitrate+Nitrite	EPA 353.2
Total Kjeldahl Nitrogen	EPA 351.2
Total Phosphorus	EPA 365.2
Total Sulfides	SW846 9034
Total Organic Carbon	Lloyd Khan / 415.1
Grain Size (sediment only)	ASTM D422
Percent Solids (sediment only)	SM 2540B
Total Petroleum Hydrocarbons (THP) Gas Range Organics (GRO)	SW846 8015
Total Petroleum Hydrocarbons (THP) Diesel Range Organics (DRO)	SW846 8015
Semivolatile Organic Compounds (SVOCs)	SW846 8270C LL
Calcium Carbonate Equivalence (CCE) (sediment only)	Virginia Tech Soil Lab – Sediment Only
Potential Peroxide Acidity (PPA) (sediment only)	Virginia Tech Soil Lab – Sediment Only
Saturated paste pH (sediment only)	Virginia Tech Soil Lab – Sediment Only
Electrical Conductivity (EC) (sediment only)	Virginia Tech Soil Lab – Sediment Only
Toxicity Characteristic Leaching Procedure (TCLP) (sediment only)	
TCLP Volatiles	SW846 8260B
TCLP Pesticides	SW846 8081A
TCLP Semivolatiles	SW846 8270C
TCLP Herbicides	SW846 8151A
TCLP Metals	SW846 6010B
TCLP Mercury	SW846 7471A
Ignitability	SW846 1010
Leaching Procedure	EPA 1311

TABLE 6. MARINE SEDIMENT BENCHMARKS
Calvert Cliffs Sediment Characterization (2010)

Constituent	Units	Effects Range Low (ERL)*	Effects Range Median (ERM)*
METALS			
ARSENIC	MG/KG	8.2	70
CADMIUM	MG/KG	1.2	9.6
CHROMIUM	MG/KG	81	370
COPPER	MG/KG	34	270
LEAD	MG/KG	46.7	218
MERCURY	MG/KG	0.15	0.71
NICKEL	MG/KG	20.9	51.6
SILVER	MG/KG	1	3.7
ZINC	MG/KG	150	410
CHLORINATED PESTICIDES			
CHLORDANE	UG/KG	0.5	6
4,4-DDD	UG/KG	2	20
4,4-DDE	UG/KG	2.2	27
4,4-DDT	UG/KG	1	7
DIELDRIN	UG/KG	0.02	8
GAMMA-BHC (LINDANE)	UG/KG	--	--
PAHs			
2-METHYLNAPHTHALENE	UG/KG	70	670
ACENAPHTHENE	UG/KG	16	500
ACENAPHTHYLENE	UG/KG	44	640
ANTHRACENE	UG/KG	85.3	1,100
BENZO[A]ANTHRACENE	UG/KG	261	1,600
BENZO(A)PYRENE	UG/KG	430	1,600
CHRYSENE	UG/KG	384	2,800
DIBENZ(A,H)ANTHRACENE	UG/KG	63.4	260
FLUORANTHENE	UG/KG	600	5,100
FLUORENE	UG/KG	19	540
NAPHTHALENE	UG/KG	160	2,100
PHENANTHRENE	UG/KG	240	1,500
PYRENE	UG/KG	665	2,600
PAHs, TOTAL	UG/KG	4,022	44,792
PCBs			
PCBs, TOTAL	UG/KG	22.7	180
SEMIVOLATILE ORGANIC COMPOUNDS			
BIS(2-ETHYLHEXYL) PHTHLATE	UG/KG	--	--

**Sources*: Long et al. 1995 and MacDonald et al. 1996

TABLE 7. USEPA AND STATE OF MARYLAND ACUTE AND CHRONIC SALTWATER QUALITY CRITERIA FOR AQUATIC LIFE*

Calvert Cliffs Sediment Characterization (2010)

ANALYTE	UNITS	SALTWATER CRITERIA (1)	
		USEPA/MARYLAND ACUTE [a]	USEPA/MARYLAND CHRONIC[b]
NUTRIENTS			
AMMONIA	MG/L	0.37 [c]	0.06 [c]
DISSOLVED SULFIDE	MG/L	--	0.002
TOTAL SULFIDE	MG/L	--	0.002
METALS**			
ARSENIC	UG/L	69 [e]	36 [e]
CADMIUM	UG/L	40 [e]	8.8 [e]
CHROMIUM	UG/L	1,100 [e]	50 [e]
COPPER (2)	UG/L	4.8 [e] / 6.1	3.1 [e]
LEAD	UG/L	210 [e]	8.1 [e]
MERCURY	UG/L	1.8 [e]	0.94 [e]
NICKEL	UG/L	74 [e]	8.2 [e]
SELENIUM	UG/L	290 [e]	71 [e]
SILVER	UG/L	1.9 [e,f]	--
ZINC	UG/L	90 [e]	81 [e]
CHLORINATED PESTICIDES			
4,4'-DDT	UG/L	0.13 [f]	0.001 [f]
ALDRIN	UG/L	1.3 [f]	--
CHLORDANE (TECHNICAL)	UG/L	0.09 [f]	0.004 [f]
DIELDRIN	UG/L	0.71 [f]	0.0019 [f]
ENDOSULFAN I	UG/L	0.034 [f,g]	0.0087 [f,g]
ENDOSULFAN II	UG/L	0.034 [f,g]	0.0087 [f,g]
ENDRIN	UG/L	0.037 [f]	0.0023 [f]
GAMMA-BHC (LINDANE)	UG/L	0.16 [f]	--
HEPTACHLOR	UG/L	0.053 [f]	0.0036 [f]
HEPTACHLOR EPOXIDE	UG/L	0.053 [f]	0.0036 [f]
METHOXYCHLOR	UG/L	--	0.03
MIREX	UG/L	--	0.001
TOXAPHENE	UG/L	0.21	0.002

**Source* : USEPA 2008. *National Recommended Water Quality Criteria;* Code of Maryland Regulations (COMAR 26.08.02.03-2)

**Water quality criteria for the metals are based on dissolved concentrations.

(1) The State of Maryland's saltwater acute and chronic water quality criteria for the protection of aquatic life are equivalent to the USEPA criteria for each tested analyte

(2) The State of Maryland has an estuarine acute copper criterion of 6.1 µg/L that applies to waters in Baltimore Harbor and the Upper Chesapeake Bay

Superscripts:

a = acute aquatic life criteria based on 1-hour average exposure concentrations

b = chronic aquatic life criterion based on 4-day average exposure concentrations

c = total ammonia as nitrogen, calculated based on site specific conditions

d = free cyanide as mg CN/L

e = saltwater criteria for metals are expressed in terms of the dissolved metal in the water column

f = instantaneous maximum

g = value for endosulfan I + endosulfan II

TABLE 8. TCLP REGULATORY GUIDELINES
Calvert Cliffs Sediment Characterization (2010)

(Maximum Concentration of Contaminants for Toxicity Characteristics)

CHEMICAL NAME	REGULATORY LEVEL (MG/L)
METALS	
ARSENIC	5
BARIUM	100
CADMIUM	1
CHROMIUM	5
LEAD	5
MERCURY	0.2
SELENIUM	1
SILVER	5
PESTICIDES AND HERBICIDES	
2, 4, 5-TP (SILVEX)	1
2, 4-D	10
CHLORDANE	0.03
ENDRIN	0.02
HEPTACHLOR (AND ITS EPOXIDE)	0.008
GAMMA-BHC (LINDANE)	0.4
METHOXYCHLOR	10
TOXAPHENE	0.5
SEMIVOLATILE ORGANIC COMPOUNDS (SVOCs)	
o-CRESOL*	200
m-CRESOL*	200
p-CRESOL*	200
CRESOL	200
1, 4 DICHLOROBENZENE	7.5
2,4 DINITROTOLUENE	0.13
HEXACHLOROBENZENE	0.13
HEXACHLOROBUTADIENE	0.5
HEXACHLOROETHANE	3
NITROBENZENE	2
PENTACHLOROPHENOL	100
2, 4, 5-TRICHOROPHENOL	400
2, 4, 6-TRICHOROPHENOL	2
PYRIDINE	5
VOLATILE ORGANIC COMPOUNDS (VOCs)	
BENZENE	0.5
CARBON TETRACHLORIDE	0.5
CHLOROBENZENE	100
CHLOROFORM	6
1, 2 DICHLOROETHANE	0.5
1, 1 DICHLOROETHYLENE	0.7
2-BUTANONE	200
TETRACHLOROETHYLENE	0.7
TRICHLOROETHYLENE	0.5
VINYL CHLORIDE	0.2

*If o-, m-, p-Cresol concentration cannot be differentiated, the total cresol concentration is used. The regulatory level of total cresol is 200 mg/L.

Source: 40 CFR 261.24 (1993)

TABLE 9. SHIRLEY PLANTATION SCREENING TABLE
Calvert Cliffs Sediment Characterization (2010)

Values from your sample analyses go here				Criteria						
See notes 1 and 2 below for directions				NJDEP (1997) Residential Soil Cleanup Criteria[3]	EPA Region 3 Screening Levels (EPA, 2008)[4]		EPA Part 503 Biosolids	USGS soil background metals[5]	Proposed VA Exclusion Criteria[6]	Proposed VA Clean Upland Fill Criteria[7]
Sample ID	Date	Average Value[1,2]	PARAMETER		Industrial Soil	Residential Soil	Exceptional Quality	VA background metal levels		
			Metals (mg kg^{-1})							
CCU3	Jul-10	2,023	Aluminum	NA	990,000	77,000			NA	NA
CCU3	Jul-10	0.07	Antimony	14	410	31			410	14
CCU3	Jul-10	2.3	Arsenic	20	1.6	0.39	41	5	41	20
CCU3	Jul-10	12.8	Barium	700	19,000	15,000		244	19,000	700
CCU3	Jul-10	0.15	Beryllium	1	2,000	160		<1	2,000	160
CCU3	Jul-10	0.35	Cadmium	39	810	70	39	<0.1	810	39
CCU3	Jul-10	50,333	Calcium	NA	NA	NA			NA	NA
CCU3	Jul-10	10.6	Chromium	NA	200	39		23	1,200	200
CCU3	Jul-10	1.17	Cobalt	NA	300	23			300	NA
CCU3	Jul-10	2.8	Copper	600	41,000	3,100	1,500	9	4,300	1,500
CCU3	Jul-10	4,220	Iron	NA	720,000	55,000			150,000	150,000
CCU3	Jul-10	3.7	Lead	400	800	400	300	26	800	300
CCU3	Jul-10	1,787	Magnesium	NA	NA	NA			NA	NA
CCU3	Jul-10	67.0	Manganese	NA	NA	NA		295	NA	NA
CCU3	Jul-10	*0.02*	Mercury	14	100	7.8	17	0.06	100	14
CCU3	Jul-10	5.6	Nickel	250	69,000	14,000	420	9	1,000	250
CCU3	Jul-10	597	Potassium	NA	NA	NA			NA	NA
CCU3	Jul-10	0.36	Selenium	63	5,100	390	100		5,100	63
CCU3	Jul-10	0.03	Silver	110	5,100	390			5,100	110
CCU3	Jul-10	2,003	Sodium	NA	NA	NA			NA	NA
CCU3	Jul-10	0.16	Thallium	2	NA	NA			10	2
CCU3	Jul-10	7.4	Vanadium	370	5,200	390			5,200	370
CCU3	Jul-10	18	Zinc	1,500	310,000	23,000	2,800	41	7,500	1,500
CCU3	Jul-10	*0.34*	Cyanide, Total	1,100	20,000	1,600			20,000	1,100
			PCBS (mg kg^{-1})							
CCU3	Jul-10	*0.00083*	Aroclor 1016	NA	21	3.9			21	NA
CCU3	Jul-10	*0.00108*	Aroclor 1221	NA	0.62	0.17			0.62	NA
CCU3	Jul-10	*0.00097*	Aroclor 1232	NA	0.62	0.17			0.62	NA
CCU3	Jul-10	*0.00092*	Aroclor 1242	NA	0.74	0.22			0.74	NA
CCU3	Jul-10	*0.00053*	Aroclor 1248	NA	0.74	0.22			0.74	NA
CCU3	Jul-10	*0.00783*	Aroclor 1254	NA	0.74	0.22			0.74	NA
CCU3	Jul-10	*0.00082*	Aroclor 1260	NA	0.74	0.22			0.74	NA
CCU3	Jul-10	*0.01298*	Total Aroclor[8]	0.49	25.2	5.1			25.2	0.49
			Pesticides (mg kg^{-1})							
CCU3	Jul-10	*0.00008*	4,4'-DDD	3	7.2	2			7.2	3
CCU3	Jul-10	*0.00009*	4,4'-DDE	2	5.1	1.4			5.1	2
CCU3	Jul-10	*0.00009*	4,4'-DDT	2	7	1.7			7	2
CCU3	Jul-10	*0.00010*	Aldrin	0.04	0.11	0.029			0.11	0.04
CCU3	Jul-10	*0.00015*	alpha-BHC	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.00015*	beta-BHC	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.00011*	alpha-Chlordane	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.00011*	gamma-Chlordane	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.00009*	delta-BHC	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.00010*	Dieldrin	0.042	0.11	0.03			0.11	0.042
CCU3	Jul-10	*0.00011*	Endosulfan I	NA	3,700	370			3,700	NA
CCU3	Jul-10	*0.00036*	Endosulfan II	NA	3,700	370			3,700	NA
CCU3	Jul-10	*0.00006*	Endosulfan Sulfate	NA	3,700	370			3,700	NA
CCU3	Jul-10	*0.00043*	Endrin	17	180	18			180	17
CCU3	Jul-10	*0.00011*	Endrin aldehyde	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.00009*	Endrin ketone	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.00041*	gamma-BHC (Lindane)	0.52	NA	NA			0.52	0.52
CCU3	Jul-10	*0.00034*	Heptachlor	0.15	0.38	0.11			0.38	0.15
CCU3	Jul-10	*0.00011*	Heptachlor epoxide	NA	0.19	0.053			0.19	NA
CCU3	Jul-10	*0.00012*	Methoxychlor	280	3,100	310			3,100	280
CCU3	Jul-10	*0.00377*	Toxaphene	0.1	1.6	0.44			1.6	0.1
			Semivolatiles (mg kg^{-1})							
CCU3	Jul-10	*0.0053*	Acenaphthene	3,400	33,000	3,400			33,000	3,400
CCU3	Jul-10	*0.0020*	Acenaphthylene	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.0037*	Anthracene	10,000	170,000	17,000			170,000	10,000
CCU3	Jul-10	*0.0055*	Benzo(a)anthracene	0.9	2.1	0.15			2.1	0.9
CCU3	Jul-10	*0.0064*	Benzo(b)fluoranthene	0.9	2.1	0.15			2.1	0.9
CCU3	Jul-10	*0.0047*	Benzo(k)fluoranthene	0.9	21	1.5			21	0.9
CCU3	Jul-10	*0.0011*	Benzo(ghi)perylene	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.0011*	Benzo(a)pyrene	0.66	0.21	0.015			0.66	0.21
CCU3	Jul-10	*0.0037*	bis(2-Chloroethoxy)methane	NA	1800	180			1,800	NA
CCU3	Jul-10	*0.0015*	bis(2-Chloroethyl) ether	0.66	0.9	0.19			0.9	0.66
CCU3	Jul-10	*0.028*	bis(2-Ethylhexyl) phthalate	49	120	35			120	49
CCU3	Jul-10	*0.0049*	4-Bromophenyl phenyl ether	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.0077*	Butyl benzyl phthalate	1,100	910	260			1,100	910
CCU3	Jul-10	*0.0010*	Carbazole	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.0045*	4-Chloroaniline	230	NA	NA			230	230
CCU3	Jul-10	*0.0052*	4-Chloro-3-methylphenol	10,000	NA	NA			10,000	10,000
CCU3	Jul-10	*0.0012*	2-Chloronaphthalene	NA	NA	NA			NA	NA

TABLE 9. SHIRLEY PLANTATION SCREENING TABLE
Calvert Cliffs Sediment Characterization (2010)

Values from your sample analyses go here				Criteria						
See notes 1 and 2 below for directions				NJDEP (1997) Residential Soil Cleanup Criteria[3]	EPA Region 3 Screening Levels (EPA, 2008)[4]		EPA Part 503 Biosolids	USGS soil background metals[5]	Proposed VA Exclusion Criteria[6]	Proposed VA Clean Upland Fill Criteria[7]
Sample ID	Date	Average Value[1,2]	PARAMETER		Industrial Soil	Residential Soil	Exceptional Quality	VA background metal levels		
CCU3	Jul-10	*0.0047*	2-Chlorophenol	280	5,100	390			5,100	280
CCU3	Jul-10	*0.0065*	4-Chlorophenyl phenyl ether	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.0058*	Chrysene	9	210	15			210	9
CCU3	Jul-10	*0.0013*	Dibenz(a,h)anthracene	0.66	0.21	0.015			0.66	0.21
CCU3	Jul-10	*0.0055*	Dibenzofuran	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.0070*	Di-n-butyl phthalate	5,700	NA	NA			5,700	5,700
CCU3	Jul-10	*0.0060*	1,2-Dichlorobenzene	5,100	10,000	2,000			10,000	5,100
CCU3	Jul-10	*0.0044*	1,3-Dichlorobenzene	5,100	NA	NA			5,100	5,100
CCU3	Jul-10	*0.0041*	1,4-Dichlorobenzene	570	13	2.6			570	13
CCU3	Jul-10	*0.0060*	3,3'-Dichlorobenzidine	2	3.8	1.1			3.8	2
CCU3	Jul-10	*0.0011*	2,4-Dichlorophenol	170	1,800	180			1,800	170
CCU3	Jul-10	*0.0060*	Diethyl phthalate	10,000	490,000	49,000			490,000	10,000
CCU3	Jul-10	*0.0087*	2,4-Dimethylphenol	1,100	12,000	1,200			12,000	1,100
CCU3	Jul-10	*0.0060*	Dimethyl phthalate	10,000	NA	NA			10,000	10,000
CCU3	Jul-10	*0.0060*	Di-n-octyl phthalate	1,100	NA	NA			1,100	1,100
CCU3	Jul-10	*0.023*	4,6-Dinitro-2-methylphenol	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.068*	2,4-Dinitrophenol	110	1,200	120			1,200	110
CCU3	Jul-10	*0.0047*	2,4-Dinitrotoluene	NA	1,200	120			1,200	NA
CCU3	Jul-10	*0.0058*	2,6-Dinitrotoluene	1	620	61			620	61
CCU3	Jul-10	*0.015*	Fluoranthene	2,300	22,000	2,300			22,000	2,300
CCU3	Jul-10	*0.0063*	Fluorene	2,300	22,000	2,300			22,000	2,300
CCU3	Jul-10	*0.0012*	Hexachlorobenzene	0.66	1.1	0.3			1.1	0.66
CCU3	Jul-10	*0.0013*	Hexachlorobutadiene	1	22	6.2			22	1
CCU3	Jul-10	*0.0060*	Hexachlorocyclopentadiene	400	3,700	370			3,700	400
CCU3	Jul-10	*0.0041*	Hexachloroethane	6	120	35			120	6
CCU3	Jul-10	*0.0012*	Indeno(1,2,3-cd)pyrene	0.9	2.1	0.15			2.1	0.9
CCU3	Jul-10	*0.0043*	Isophorone	1,100	1,800	510			1,800	1,100
CCU3	Jul-10	*0.0037*	2-Methylnaphthalene	NA	4,100	310			4,100	NA
CCU3	Jul-10	*0.0040*	2-Methylphenol	2,800	NA	NA			2,800	2,800
CCU3	Jul-10	*0.0055*	4-Methylphenol	2,800	NA	NA			2,800	2,800
CCU3	Jul-10	*0.0010*	Naphthalene	230	20	3.9			230	20
CCU3	Jul-10	*0.026*	2-Nitroaniline	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.023*	3-Nitroaniline	NA	82	18			82	NA
CCU3	Jul-10	*0.023*	4-Nitroaniline	NA	82	23			82	NA
CCU3	Jul-10	*0.0048*	Nitrobenzene	28	280	31			280	28
CCU3	Jul-10	*0.006*	2-Nitrophenol	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.020*	4-Nitrophenol	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.0014*	N-Nitroso-di-N-propylamine	0.66	0.25	0.069			0.66	0.25
CCU3	Jul-10	*0.0052*	N-Nitrosodiphenylamine	140	350	99			350	140
CCU3	Jul-10	*0.0051*	Pentachlorophenol	6	9	3			9	6
CCU3	Jul-10	*0.016*	Phenanthrene	NA	NA	NA			NA	NA
CCU3	Jul-10	*0.029*	Phenol	10,000	180,000	18,000			180,000	10,000
CCU3	Jul-10	*0.013*	Pyrene	1,700	17,000	1,700			17,000	1,700
CCU3	Jul-10	*0.0031*	1,2,4-Trichlorobenzene	68	400	87			400	68
CCU3	Jul-10	*0.0060*	2,4,5-Trichlorophenol	5,600	62,000	6,100			62,000	5,600
CCU3	Jul-10	*0.0087*	2,4,6-Trichlorophenol	62	160	44			160	62
			Dioxin and Furans (ng kg^{-1})							
CCU3	Jul-10	*0.13*	2,3,7,8-TCDD	NA	18	4.3			18	4.3
			Tributyltin (mg kg^{-1})							
CCU3	Jul-10	*0.0063*	Tributyltin Compounds		180	18				
			Petroleum (mg kg^{-1})							
CCU3	40381	*0.16*	TPH-DRO							

TABLE 9. SHIRLEY PLANTATION SCREENING TABLE
Calvert Cliffs Sediment Characterization (2010)

Values from your sample analyses go here			Additional Analyses[9]	Units and Reporting convention	Method	Proposed VA Exclusion Criteria[6]	Proposed VA Clean Fill Criteria[7]
Sample ID	Date	Average Value[1,2]					
CCU3	Jul-10	None Detected	Acid-Base Accounting (all samples > 0.25% total S) or H2O2 Potential Acidity	Tons CCE acid demand per 1000 Tons Material	EPA 600-2-78-054	-15 unless under water table	-5
			Pyritic S	% or g kg^{-1}		2.00	0.25
CCU3	Jul-10	12.18	Calcium Carbonate	%CCE	AOAC 955.01	NA	NA
CCU3	Jul-10	15.86	Soluble Salts	mmhos cm^{-1} or dS m^{-1}	Saturated paste extract	NA	4.0 after leaching
CCU3	Jul-10	7.3	Total Organic Carbon	% or g kg^{-1}		NA	NA
CCU3	Jul-10	72.8	Particle Size Analysis (<2 mm)	%Sand	<2 mm samples	NA	NA
CCU3	Jul-10	12.1		% Silt		NA	NA
CCU3	Jul-10	7.1		% Clay		NA	NA
CCU3	40381	8.0	Coarse fragments (>2 mm)		>2 mm samples	NA	NA

NA= Indicates that criteria are not available.

1. For samples <RL, use 50% of RL for data entry column. One-half the RL is assumed for chemicals reported as non-detect or < RL; however, these values will not be used for exclusionary purposes unless other evidence indicates such. Values in *italics* are not "real" values, but an arbitrary entry.

2. Use **bold highlight** for all individual samples entered in working area and average sample values that exceed the "proposed VA upland fill criteria" in far right column. Highlight all values exceeding proposed VA exclusion criteria in **bold highlight red**. Put arbitrary values calculated as 50% the RL in *italics*. Tip: when copying numbers from your lab analytical results spreadsheets to this spreadsheet, samples with a "<" in front of them are typically at the RL and should reported as 50% RL and put in *italics*.

3. New Jersey Department of Environmental Protection, The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters. 1997. http://www.njstatelib.org/digit/r588/r5881997.html

4. EPA Region 3 SSLs have been merged into a regional document developed with input from Regions III, VI, and IX. Values from September 12, 2008 version. Values listed for: antimony (metallic), arsenic (inorganic), chromium VI (particulates), lead and compounds, manganese and cadmium values are for diet, methyl mercury, nickel refinery dust, vanadium and compounds. Website: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm

5. Background metal levels specific to the state of Virginia based on Smith, D.B. et al. 2005. Major- and Trace-Element Concentrations in Soils from Two Continental-Scale Transects of the United States and Canada. USGS Open File Report 2005-1253.http://pubs.usgs.gov/of/2005/1253/pdf/OFR1253.pdf

6. The proposed Virginia exclusion standards generally represent the higher of EPA RBC Industrial, NJDEP or EPA 503 EQ levels for a given parameter. Values exceeding these limits are questionable for acceptance.

7. Proposed VA clean fill criteria are based primarily on NJDEP residential cleanup criteria and manually adjusted for known issues with agricultural production/bioavailability. Values between the clean fill and exclusion criteria require a variation of the current management strategy.

8. Total Aroclor concentrations are reported as sum of seven individual aroclors.

9. Additional analyses for these basic properties are essential for determining the management or acceptance of dredge material.

Note: Minimum sampling is one composite sample per 50,000 yards of material in situ. A minimum of three samples per material is required regardless of volume. Specific information on sampling procedures should go into the brief descriptions box at the top of the spreadsheet.

TABLE 10. PHYSICAL CHARACTERISTICS OF SEDIMENT

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

ANALYTE	UNITS	Average RL	CALVERT CLIFFS NUCLEAR POWER PLANT		
			CCU3-BAR-1/2-SED	CCU3-BAR-3/4-SED	CCU3-DIS-SED
GRAVEL	%	---	2.1	2.4	19.6
SAND	%	---	71.2	82.1	65
SILT	%	---	18.6	9.3	8.5
CLAY	%	---	8.1	6.2	6.9
SILT+CLAY	%	---	26.7	15.5	15.4
PERCENT SOLIDS	%	1	63.8	79.2	79.3

There are no sediment quality guidelines for the physical characteristics parameters

NOTES:

RL = average reporting limit

TABLE 11. GENERAL CHEMISTRY CONCENTRATIONS IN SEDIMENT

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

				CALVERT CLIFFS NUCLEAR POWER PLANT		
ANALYTE	UNITS	VCP Standard	Average RL	CCU3-BAR-1/2-SED	CCU3-BAR-3/4-SED	CCU3-DIS-SED
AMMONIA AS NITROGEN	MG/KG	--	6.8	**137**	**24**	**16.6**
NITRATE-NITRITE	MG/KG	--	1.4	**0.76 B J**	**5.5 J**	**0.61 B J**
PH	---	--	---	**7.9**	**8.2**	**8.8**
TOTAL CYANIDE	MG/KG	--	0.68	0.78 U	0.63 U	0.63 U
TOTAL KJELDAHL NITROGEN	MG/KG	--	204	**749 J**	**426 J**	**319**
TOTAL ORGANIC CARBON	%	--	0.13	**1.51**	**0.17**	**0.52**
TOTAL PHOSPHORUS	MG/KG	--	94	**841**	**481**	**215**
TOTAL SULFIDE	MG/KG	--	41	**354**	**39.4**	**41.4**
TOTAL PETROLEUM HYDROCARBON - DRO	UG/KG	230,000	140	**370**	**40 J**	130 U
TOTAL PETROLEUM HYDROCARBON - GRO	UG/KG	230,000	140	160 U	130 U	130 U

There are no sediment quality guidelines for the general chemistry parameters

NOTES: Bold values represent detected concentrations.

RL is reported for non-detected constituents.

RL = average reporting limit

B (inorganic) = compound was detected, but below the reporting limit (value is estimated)

J (inorganic) = detected in the laboratory method blank

J (organic) = compound was detected, but below the reporting limit (value is estimated)

U = compound was analyzed, but not detected

TABLE 12. METAL CONCENTRATIONS (MG/KG) IN SEDIMENT

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

					CALVERT CLIFFS NUCLEAR POWER PLANT		
ANALYTE	UNITS	Average MDL	ERL*	ERM*	CCU3-BAR-1/2-SED	CCU3-BAR-3/4-SED	CCU3-DIS-SED
ALUMINUM	MG/KG	0.193	---	---	**3,850**	**1,310**	**909**
ANTIMONY	MG/KG	0.002	---	---	**0.084 B J**	**0.047 B J**	**0.067 B J**
ARSENIC	MG/KG	0.012	8.2	70.0	**3.7**	**0.95**	**2.1**
BARIUM	MG/KG	0.007	---	---	**16**	**6.6**	**15.8**
BERYLLIUM	MG/KG	0.005			**0.26**	**0.11**	**0.065**
CADMIUM	MG/KG	0.005	1.2	9.6	**0.38**	**0.22**	**0.45**
CALCIUM	MG/KG	0.893	---	---	**31,100**	**30,600**	**89,300**
CHROMIUM	MG/KG	0.004	81	370	**12.1 J**	**10.2 J**	**9.4 J**
COBALT	MG/KG	0.001	---	---	**2.4**	**0.72**	**0.39**
COPPER	MG/KG	0.023	34	270	**5.6**	**1.5**	**1.4**
IRON	MG/KG	0.240	---	---	**8,140 J**	**2,570 J**	**1,950 J**
LEAD	MG/KG	0.003	47	218	**7.4**	**2.4**	**1.3**
MAGNESIUM	MG/KG	0.130	---	---	**3,050**	**1,170**	**1,140**
MANGANESE	MG/KG	0.007	---	---	**143 J**	**44.5 J**	**13.6 J**
MERCURY	MG/KG	0.007	0.150	0.710	**0.046**	0.0069 U	0.0069 U
NICKEL	MG/KG	0.008	20.9	51.6	**9.6**	**3.7**	**3.4**
POTASSIUM	MG/KG	0.940	---	---	**961**	**471**	**359**
SELENIUM	MG/KG	0.034	---	---	**0.45**	**0.21 B**	**0.42**
SILVER	MG/KG	0.003	1.00	3.70	**0.046 B**	**0.02 B**	**0.014 B**
SODIUM	MG/KG	0.940	---	---	**2,760**	**1,410**	**1,840**
THALLIUM	MG/KG	0.001	---	---	**0.15**	**0.13**	**0.2**
TIN	MG/KG	0.040	---	---	**0.91 J**	**0.88 J**	**0.59 J**
VANADIUM	MG/KG	0.005	---	---	**11.2 J**	**3.9 J**	**7.2 J**
ZINC	MG/KG	0.044	150	410	**29.4**	**16.6**	**7.2**

**Source* : MacDonald et al. 1996. Ecotoxicology 5: 253-278.

NOTES: Bold values represent detected concentrations.

MDL is reported for non-detected constituents.

MDL = average method detection limit

B (inorganic) = compound was detected, but below the reporting limit (value is estimated)

J (inorganic) = detected in the laboratory method blank

U = compound was analyzed, but not detected

TABLE 13. PAH CONCENTRATIONS (UG/KG) IN SEDIMENT

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

ANALYTE	UNITS	Average MDL	ERL*	ERM*	CALVERT CLIFFS NUCLEAR POWER PLANT		
					CCU3-BAR-1/2-SED	CCU3-BAR-3/4-SED	CCU3-DIS-SED
2-METHYLNAPHTHALENE	UG/KG	2.07	70.00	670	**9.2 J**	1.9 U	1.9 U
ACENAPHTHENE	UG/KG	2.17	16.00	500	**14 J**	2 U	2 U
ACENAPHTHYLENE	UG/KG	2.60	44.00	640	**3.5 J**	2.4 U	2.4 U
ANTHRACENE	UG/KG	2.23	85.30	1,100	**8.9 J**	2 U	2.1 U
BENZO(A)ANTHRACENE	UG/KG	2.83	261	1,600	**14 J**	2.6 U	2.6 U
BENZO(A)PYRENE	UG/KG	2.27	430	1,600	2.6 U	2.1 U	2.1 U
BENZO(B)FLUORANTHENE	UG/KG	3.57	---	---	**16 J**	3.3 U	3.3 U
BENZO(GHI)PERYLENE	UG/KG	2.27	---	---	2.6 U	2.1 U	2.1 U
BENZO(K)FLUORANTHENE	UG/KG	4.60	---	---	**9.8 J**	4.2 U	4.3 U
CHRYSENE	UG/KG	2.70	384	2,800	**15 J**	2.5 U	2.5 U
DIBENZ(A,H)ANTHRACENE	UG/KG	2.50	63.4	260	2.9 U	2.3 U	2.3 U
FLUORANTHENE	UG/KG	2.40	600	5,100	**43**	2.2 U	2.2 U
FLUORENE	UG/KG	3.00	19	540	**16 J**	2.8 U	2.8 U
INDENO(1,2,3-CD)PYRENE	UG/KG	2.37	---	---	2.7 U	2.2 U	2.2 U
NAPHTHALENE	UG/KG	1.97	160	2,100	2.3 U	1.8 U	1.8 U
PHENANTHRENE	UG/KG	3.60	240	1,500	**44**	3.3 U	3.3 U
PYRENE	UG/KG	2.27	665	2,600	**37**	2.1 U	2.1 U
TOTAL PAHs (ND=MDL)	UG/KG	--	4,022	44,792	237	21	21

**Source* : MacDonald et al. 1996. Ecotoxicology 5: 253-278.

NOTES: Bold values represent detected concentrations. Shaded concentrations exceed sediment quality guidelines.
MDL is reported for non-detected constituents.

MDL = average method detection limit

J (organic) = compound was detected, but below the reporting limit (value is estimated)

U = compound was analyzed, but not detected

TABLE 14. PCB CONGENER CONCENTRATIONS (UG/KG) IN SEDIMENT

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

ANALYTE	UNITS	Average MDL	ERL**	ERM**	CALVERT CLIFFS NUCLEAR POWER PLANT		
					CCU3-BAR-1/2-SED	CCU3-BAR-3/4-SED	CCU3-DIS-SED
PCB 8 (BZ)	UG/KG	0.04	---	---	**0.99 PG**	0.044 U	**0.082 J PG**
PCB 18 (BZ)	UG/KG	0.03	---	---	0.036 U	0.029 U	0.029 U
PCB 28 (BZ)	UG/KG	0.05	---	---	**0.38 PG**	0.047 U	0.047 U
PCB 44 (BZ)	UG/KG	0.04	---	---	**0.73**	0.043 U	0.043 U
PCB 49 (BZ)	UG/KG	0.05	---	---	**0.87**	0.045 U	0.045 U
PCB 52 (BZ)	UG/KG	0.04	---	---	**1.4**	0.042 U	0.042 U
PCB 66 (BZ)	UG/KG	0.04	---	---	0.043 U	0.035 U	0.034 U
PCB 77 (BZ)	UG/KG	0.05	---	---	0.057 U	0.046 U	0.046 U
PCB 87 (BZ)	UG/KG	0.04	---	---	**1.4 PG**	0.039 U	0.039 U
PCB 90 (BZ)	UG/KG	0.03	---	---	0.04 U	0.032 U	0.032 U
PCB 101 (BZ)	UG/KG	0.04	---	---	**2.3**	0.043 U	0.043 U
PCB 105 (BZ)	UG/KG	0.05	---	---	0.055 U	0.044 U	0.044 U
PCB 118 (BZ)	UG/KG	0.04	---	---	**1.6 PG**	0.043 U	0.043 U
PCB 126 (BZ)	UG/KG	0.06	---	---	0.069 U	0.055 U	0.055 U
PCB 128 (BZ)	UG/KG	0.04	---	---	**0.86**	0.043 U	0.043 U
PCB 138 (BZ)	UG/KG	0.05	---	---	**3**	0.045 U	0.045 U
PCB 153 (BZ)	UG/KG	0.04	---	---	**2.2**	0.044 U	0.044 U
PCB 156 (BZ)	UG/KG	0.04	---	---	**0.45**	0.043 U	0.043 U
PCB 169 (BZ)	UG/KG	0.05	---	---	0.052 U	0.042 U	0.042 U
PCB 170 (BZ)	UG/KG	0.04	---	---	**0.43**	0.043 U	0.043 U
PCB 180 (BZ)	UG/KG	0.05	---	---	0.054 U	0.043 U	0.043 U
PCB 183 (BZ)	UG/KG	0.04	---	---	**0.19 J PG**	0.042 U	0.042 U
PCB 184 (BZ)	UG/KG	0.04	---	---	0.045 U	0.036 U	0.036 U
PCB 187 (BZ)	UG/KG	0.05	---	---	**0.28**	0.045 U	0.045 U
PCB 195 (BZ)	UG/KG	0.05	---	---	0.053 U	0.043 U	0.043 U
PCB 206 (BZ)	UG/KG	0.05	---	---	0.052 U	0.042 U	0.042 U
PCB 209 (BZ)	UG/KG	0.05	---	---	**0.11 J**	0.045 U	0.045 U
TOTAL PCBS (ND=1/2MDL)	UG/KG	---	22.7	180	**28.38**	**0.08**	**0.24**
TOTAL PCBS (ND=MDL)	UG/KG	---	22.7	180	**29.07**	**1.55**	**1.63**

* PCB congeners used for Total PCB summation, as per Table 9-3 of the ITM (USEPA/USACE 1998)

Source : MacDonald et al. 1996. Ecotoxicology 5: 253-278.

NOTES: Bold values represent detected concentrations. Shaded concentrations exceed sediment quality guidelines.
MDL is reported for non-detected constituents.

MDL = average method detection limit

U = compound was analyzed, but not detected

TABLE 15. PCB AROCLOR CONCENTRATIONS (UG/KG) IN SEDIMENT

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

			CALVERT CLIFFS NUCLEAR POWER PLANT		
ANALYTE	UNITS	Average MDL	CCU3-BAR-1/2-SED	CCU3-BAR-3/4-SED	CCU3-DIS-SED
AROCLOR 1016	UG/KG	1.7	1.9 U	1.5 U	1.6 U
AROCLOR 1221	UG/KG	2.2	2.5 U	2 U	2 U
AROCLOR 1232	UG/KG	1.9	2.2 U	1.8 U	1.8 U
AROCLOR 1242	UG/KG	1.8	2.1 U	1.7 U	1.7 U
AROCLOR 1248	UG/KG	1.1	1.2 U	0.98 U	0.99 U
AROCLOR 1254	UG/KG	1.6	**22**	1.5 U	1.5 U
AROCLOR 1260	UG/KG	1.6	1.9 U	1.5 U	1.5 U

There are no sediment quality guidelines for PCB Aroclors

NOTES: MDL is reported for non-detected constituents.

MDL = average method detection limit

U = compound was analyzed, but not detected

TABLE 16. CHLORINATED PESTICIDE CONCENTRATIONS (UG/KG) IN SEDIMENT

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

ANALYTE	UNITS	Average MDL	ERL*	ERM*	CALVERT CLIFFS NUCLEAR POWER PLANT		
					CCU3-BAR-1/2-SED	CCU3-BAR-3/4-SED	CCU3-DIS-SED
4,4'-DDD	UG/KG	0.15	2	20	0.17 U	0.14 U	0.14 U
4,4'-DDE	UG/KG	0.17	2.2	27	0.2 U	0.16 U	0.16 U
4,4'-DDT	UG/KG	0.17	1	7	0.2 U	0.15 U	0.16 U
ALDRIN	UG/KG	0.20	---	---	0.23 U	0.18 U	0.19 U
ALPHA-BHC	UG/KG	0.18	---	---	**0.29 J PG**	0.17 U	0.17 U
ALPHA-CHLORDANE	UG/KG	0.22	63.4	260	0.26 U	0.2 U	0.21 U
BETA-BHC	UG/KG	0.29	---	---	0.34 U	0.27 U	0.27 U
CHLORDANE (TECHNICAL)	UG/KG	0.50	---	---	0.58 U	0.45 U	0.46 U
CHLOROBENSIDE	UG/KG	0.59	---	---	0.68 U	0.54 U	0.55 U
DCPA	UG/KG	0.30	---	---	0.35 U	0.28 U	0.28 U
DELTA-BHC	UG/KG	0.17	---	---	0.2 U	0.16 U	0.16 U
DIELDRIN	UG/KG	0.19	0.02	8	0.22 U	0.17 U	0.18 U
ENDOSULFAN I	UG/KG	0.21	---	---	0.25 U	0.19 U	0.2 U
ENDOSULFAN II	UG/KG	0.20	---	---	0.23 U	**0.49 J**	**0.48 J**
ENDOSULFAN SULFATE	UG/KG	0.12	---	---	0.14 U	0.11 U	0.11 U
ENDRIN	UG/KG	0.22	---	---	**1.1 J**	0.2 U	0.2 U
ENDRIN ALDEHYDE	UG/KG	0.22	---	---	0.25 U	0.2 U	0.2 U
ENDRIN KETONE	UG/KG	0.17	---	---	0.2 U	0.16 U	0.16 U
GAMMA-BHC (LINDANE)	UG/KG	0.20	---	---	**0.41 J PG**	**0.38 J PG**	**0.45 J**
GAMMA-CHLORDANE	UG/KG	0.22	---	---	0.26 U	0.2 U	0.21 U
HEPTACHLOR	UG/KG	0.25	---	---	**0.37 J PG**	0.23 U	**0.54 J PG**
HEPTACHLOR EPOXIDE	UG/KG	0.22	---	---	0.25 U	0.2 U	0.2 U
METHOXYCHLOR	UG/KG	0.24	---	---	0.27 U	0.22 U	0.22 U
MIREX	UG/KG	0.10	---	---	0.12 U	0.095 U	0.097 U
TOXAPHENE	UG/KG	7.53	---	---	8.7 U	6.9 U	7 U

**Source* : MacDonald et al. 1996. Ecotoxicology 5: 253-278.

NOTES: Bold values represent detected concentrations. Shaded concentrations exceed sediment quality guidelines.
MDL is reported for non-detected constituents.

MDL = average method detection limit

J (organic) = compound was detected, but below the reporting limit (value is estimated)

PG = the percent difference between the original and confirmation analysis is greater than 40%

U = compound was analyzed, but not detected

TABLE 17. SVOC CONCENTRATIONS (UG/KG) IN SEDIMENT

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

			CALVERT CLIFFS NUCLEAR POWER PLANT		
ANALYTE	UNITS	Average MDL	CCU3-BAR-1/2-SED	CCU3-BAR-3/4-SED	CCU3-DIS-SED
1,2,4-TRICHLOROBENZENE	UG/KG	6.3	7.2 U	5.8 U	5.8 U
1,2-DICHLOROBENZENE	UG/KG	12.0	14 U	11 U	11 U
1,3-DICHLOROBENZENE	UG/KG	8.8	10 U	8.1 U	8.2 U
1,4-DICHLOROBENZENE	UG/KG	8.1	9.4 U	7.5 U	7.5 U
2,4,5-TRICHLOROPHENOL	UG/KG	12.0	14 U	11 U	11 U
2,4,6-TRICHLOROPHENOL	UG/KG	17.3	20 U	16 U	16 U
2,4-DICHLOROPHENOL	UG/KG	2.3	2.6 U	2.1 U	2.1 U
2,4-DIMETHYLPHENOL	UG/KG	17.3	20 U	16 U	16 U
2,4-DINITROPHENOL	UG/KG	136.7	160 U	120 U	130 U
2,4-DINITROTOLUENE	UG/KG	9.3	11 U	8.4 U	8.5 U
2,6-DINITROTOLUENE	UG/KG	11.7	13 U	11 U	11 U
2-CHLORONAPHTHALENE	UG/KG	2.4	2.7 U	2.2 U	2.2 U
2-CHLOROPHENOL	UG/KG	9.4	11 U	8.5 U	8.6 U
2-METHYLPHENOL	UG/KG	7.9	9.1 U	7.3 U	7.4 U
2-NITROANILINE	UG/KG	51.0	59 U	47 U	47 U
2-NITROPHENOL	UG/KG	12.7	14 U	12 U	12 U
3,3'-DICHLOROBENZIDINE	UG/KG	12.0	14 U	11 U	11 U
3-NITROANILINE	UG/KG	46.7	54 U	43 U	43 U
4,6-DINITRO-2-METHYLPHENOL	UG/KG	45.7	53 U	42 U	42 U
4-BROMOPHENYL PHENYL ETHER	UG/KG	9.8	11 U	9.1 U	9.2 U
4-CHLORO-3-METHYLPHENOL	UG/KG	10.4	12 U	9.6 U	9.7 U
4-CHLOROANILINE	UG/KG	8.9	10 U	8.4 U	8.4 U
4-CHLOROPHENYL PHENYL ETHER	UG/KG	13.0	15 U	12 U	12 U
4-METHYLPHENOL	UG/KG	11.0	13 U	10 U	10 U
4-NITROANILINE	UG/KG	46.0	53 U	42 U	43 U
4-NITROPHENOL	UG/KG	39.0	45 U	36 U	36 U
BIS(2-CHLOROETHOXY)METHANE	UG/KG	7.5	8.6 U	6.9 U	6.9 U
BIS(2-CHLOROETHYL) ETHER	UG/KG	3.0	3.5 U	2.8 U	2.8 U
BIS(2-CHLOROISOPROPYL) ETHER	UG/KG	2.5	2.8 U	2.3 U	2.3 U
BIS(2-ETHYLHEXYL) PHTHALATE	UG/KG	18.3	**43 J**	17 U	**32 J**
BUTYL BENZYL PHTHALATE	UG/KG	15.3	18 U	14 U	14 U
CARBAZOLE	UG/KG	2.1	2.4 U	1.9 U	1.9 U
DIBENZOFURAN	UG/KG	11.0	13 U	10 U	10 U
DIETHYL PHTHALATE	UG/KG	12.0	14 U	11 U	11 U
DIMETHYL PHTHALATE	UG/KG	12.0	14 U	11 U	11 U
DI-N-BUTYL PHTHALATE	UG/KG	14.0	16 U	13 U	13 U
DI-N-OCTYL PHTHALATE	UG/KG	12.0	14 U	11 U	11 U
HEXACHLOROBENZENE	UG/KG	2.4	2.8 U	2.2 U	2.2 U
HEXACHLOROBUTADIENE	UG/KG	2.5	2.9 U	2.3 U	2.4 U
HEXACHLOROCYCLOPENTADIENE	UG/KG	12.0	14 U	11 U	11 U
HEXACHLOROETHANE	UG/KG	8.2	9.4 U	7.5 U	7.6 U
ISOPHORONE	UG/KG	8.6	9.9 U	7.9 U	7.9 U
NITROBENZENE	UG/KG	9.5	11 U	8.7 U	8.8 U
N-NITROSODI-N-PROPYLAMINE	UG/KG	2.7	3.1 U	2.5 U	2.5 U
N-NITROSODIPHENYLAMINE	UG/KG	10.5	12 U	9.7 U	9.7 U
PENTACHLOROPHENOL	UG/KG	10.2	12 U	9.3 U	9.4 U
PHENOL	UG/KG	2.7	**79**	**5.9 J**	2.5 U

There are no sediment quality guidelines for the general chemistry parameters

NOTES: Bold values represent detected concentrations.

MDL is reported for non-detected constituents.

MDL = average method detection limit

J (organic) = compound was detected, but below the reporting limit (value is estimated)

U = compound was analyzed, but not detected

TABLE 18. BUTYLTIN AND 2,3,7,8-TCDD CONCENTRATIONS (UG/KG) IN SEDIMENT

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

			CALVERT CLIFFS NUCLEAR POWER PLANT		
ANALYTE	UNITS	Average RL	CCU3-BAR-1/2-SED	CCU3-BAR-3/4-SED	CCU3-DIS-SED
DIBUTYLTIN	UG/KG	1.7	1.9 U	1.7 U	1.6 U
MONOBUTYLTIN	UG/KG	6.7	7.3 U	6.4 U	6.3 U
TETRABUTYLTIN	UG/KG	2.3	2.5 U	2.2 U	2.1 U
TRIBUTYLTIN	UG/KG	2.0	2.2 U	1.9 U	1.9 U
2,3,7,8-TCDD	PG/G	0.25	0.2 U	0.23 U	0.33 U

NOTES: RL is reported for non-detected constituents.

RL = average reporting limit

U = compound was analyzed, but not detected

TABLE 19. GENERAL CHEMISTRY CONCENTRATIONS IN SITE WATER AND STANDARD AND EFFLUENT ELUTRIATES

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

						Standard Elutriate			Effluent Elutriate		
ANALYTE	**UNITS**	**Average RL**	**USEPA ACUTE CRITERIA**	**USEPA CHRONIC CRITERIA**	**Site Water**	**CCU3-BAR-1/2-SET**	**CCU3-BAR-3/4-SET**	**CCU3-DIS-SET**	**CCU3-BAR-1/2-EFF**	**CCU3-BAR-3/4-EFF**	**CCU3-DIS-EFF**
AMMONIA AS NITROGEN	MG/L	0.23	3	0.45	**3.7**	**26.4**	**5.5**	**4.9**	**17.4**	**3.1**	**2.9**
DISSOLVED CYANIDE	UG/L	10	---	---	10 U	10 U	10 U	10 U	10 U	10 U	10 U
DISSOLVED NITRATE/NITRITE	MG/L	0.10	---	---	**--**	**--**	**--**	**--**	**0.029 B J**	**1.8 J**	**0.22 J**
TOTAL NITRATE/NITRITE	MG/L	1.00	---	---	**0.025 B J**	**0.053 B J**	**3.1 J**	**1.9 J**	**--**	**--**	**--**
DISSOLVED ORGANIC CARBON	MG/L	1	---	---	**2.7**	**3.1**	**1.5**	**1.6**	**2.4**	**1.2**	**1.4**
DISSOLVED SULFIDE	MG/L	3	---	---	**--**	**--**	**--**	**--**	3 U	3 U	3 U
TOTAL SULFIDE	MG/L	3	---	---	3 U	3 U	3 U	3 U	**--**	**--**	**--**
TOTAL KJELDAHL NITROGEN	MG/L	3	---	---	**10.7**	**29.2 J**	**7.3 J**	**3.4 J**	**15.7 J**	**5.6 J**	**2.8 B J**
PHOSPHORUS AS ORTHOPHOSPHATE	MG/L	0.1	---	---	**--**	0.1 U	0.039 B	0.1 U	**--**	**--**	**--**
TOTAL PHOSPHORUS	MG/L	0.10	---	---	0.1 U	**--**	**--**	**--**	0.1 U	0.1 U	0.1 U
TPH (AS DIESEL)	UG/L	100	---	---	**200 B**	**230 B**	**55 J B**	**73 J B**	**61 J**	**78 J**	**54 J**
TPH (AS GASOLINE)	UG/L	100	---	---	100 U	100 U	100 U	100 U	100 U	100 U	100 U

Source : USEPA 2010. *National Recommended Water Quality Criteria*

NOTES: Bold values represent detected concentrations, shaded values exceed acute or chronic criteria.
RL is reported for non-detected constituents.

RL = average reporting limit

B (inorganic) = compound was detected, but below the reporting limit (value is estimated)

J (inorganic) = detected in the laboratory method blank

B (organic) = detected in the laboratory method blank

J (organic) = compound was detected, but below the reporting limit (value is estimated)

U = compound was analyzed, but not detected

TABLE 20. METAL CONCENTRATIONS (UG/L) IN SITE WATER AND STANDARD AND EFFLUENT ELUTRIATES

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

						Standard Elutriate			Effluent Elutriate		
ANALYTE	**UNITS**	**Average MDL**	**USEPA ACUTE CRITERIA**	**USEPA CHRONIC CRITERIA**	**Site Water**	**CCU3-BAR-1/2-SET**	**CCU3-BAR-3/4-SET**	**CCU3-DIS-SET**	**CCU3-BAR-1/2-EFF**	**CCU3-BAR-3/4-EFF**	**CCU3-DIS-EFF**
ALUMINUM	UG/L	12.8	---	---	2.6 U	12.8 U	12.8 U	12.8 U	**22 B**	12.8 U	12.8 U
ANTIMONY	UG/L	0.094	---	---	**0.1 B**	**3 B**	**0.92 B**	**1 B**	**1.1 B**	**0.9 B**	**0.7 B**
ARSENIC	UG/L	1.5	69	36	**4.1**	**5.3**	**5**	**6.5**	**6.2**	**7.2**	**8.5**
BARIUM	UG/L	0.49	---	---	**30.1**	**187**	**37.4 B**	**36.2 B**	**142**	**34.7 B**	**33.2 B**
BERYLLIUM	UG/L	0.18	---	---	0.037 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
CADMIUM	UG/L	0.57	40	8.8	0.11 U	0.57 U	0.57 U	0.57 U	0.57 U	0.57 U	0.57 U
CALCIUM	UG/L	14.2	---	---	**178,000 J**	**154,000**	**198,000**	**180,000**	**158,000**	**176,000**	**174,000**
CHROMIUM	UG/L	2.7	1100	50	**5.8**	**7.3 B**	**7.7 B**	**7.8 B**	**8.9 B J**	**7.5 B J**	**7.4 B J**
COBALT	UG/L	0.13	---	---	**0.83**	**0.88 B**	**0.8 B**	**0.83 B**	**0.74 B**	**0.62 B**	**0.84 B**
COPPER	UG/L	1.2	4.8	3.1	**2.6**	**2.7 B**	**9.7 B**	**3.7 B**	**3.2 B J**	**5.2 B J**	**4.5 B J**
IRON	UG/L	30.5	---	---	**87.5**	**116 B**	**67.9 B**	**60.5 B**	**70.4 B**	**77 B**	**63.3 B**
LEAD	UG/L	0.096	210	8.1	**0.44 B**	0.096 U	**0.2 B**	0.096 U	0.096 U	0.096 U	**0.24 B**
MAGNESIUM	UG/L	5.8	---	---	**480,000**	**495,000**	**506,000**	**493,000**	**492,000 J**	**486,000 J**	**485,000 J**
MANGANESE	UG/L	0.19	---	---	**50.3**	**52.9**	**4.2**	**9.5**	**18.2**	**1.9 B**	**5.7**
MERCURY	UG/L	0.038	1.8	0.94	0.038 U	0.038 U	0.038 U	0.038 U	0.038 U	0.038 U	0.038 U
NICKEL	UG/L	0.87	74	8.2	**1.3**	**5.5**	**6.4**	**9.7**	**4.9 B**	**4.3 B**	**7.1**
POTASSIUM	UG/L	29.1	---	---	**152,000**	**160,000 J**	**164,000 J**	**157,000 J**	**161,000 J**	**156,000 J**	**154,000 J**
SELENIUM	UG/L	2.1	290	71	**19.8**	**20.9 B**	**22.9 B**	**27.4**	**25**	**25.3**	**34.3**
SILVER	UG/L	0.18	1.9	---	0.036 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U	0.18 U
SODIUM	UG/L	191	---	---	**4,250,000**	**3,980,000 J**	**3,920,000 J**	**4,000,000 J**	**3,920,000 J**	**3,830,000 J**	**3,840,000 J**
THALLIUM	UG/L	0.076	---	---	**0.042 B J**	**0.14 B**	**0.09 B**	0.076 U	**0.74 B J**	0.076 U	**0.08 B J**
TIN	UG/L	7.5	---	---	1.5 U	7.5 U	7.5 U	7.5 U	**9.6 B**	7.5 U	7.5 U
VANADIUM	UG/L	0.41	---	---	**1.9 J**	**1.4 B**	0.41 U	0.41 U	0.41 U	**1.6 B**	**1.2 B**
ZINC	UG/L	4.8	90	81	**6**	**7 B**	**14.6 B**	**9.3 B**	**6.8 B**	**15.6 B**	**6.5 B**

Source: USEPA 2010. *National Recommended Water Quality Criteria*

NOTES: Bold values represent detected concentrations, shaded values exceed acute or chronic criteria.

MDL is reported for non-detected constituents.

MDL = average method detection limit

B (inorganic) = compound was detected, but below the reporting limit (value is estimated)

J (inorganic) = detected in the laboratory method blank

U = compound was analyzed, but not detected

TABLE 21. PAH CONCENTRATIONS (UG/L) IN SITE WATER AND STANDARD AND EFFLUENT ELUTRIATES

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

				Standard Elutriate			Effluent Elutriate		
ANALYTE	**UNITS**	**Average MDL**	**Site Water**	**CCU3-BAR-1/2-SET**	**CCU3-BAR-3/4-SET**	**CCU3-DIS-SET**	**CCU3-BAR-1/2-**	**CCU3-BAR-3/4-**	**CCU3-DIS-EFF**
2-METHYLNAPHTHALENE	UG/L	0.011	**0.023 J B**	**0.014 J**	0.011 U	0.011 U	**0.013 J**	0.011 U	0.012 U
ACENAPHTHENE	UG/L	0.014	**0.031 J**	0.014 U	0.014 U	0.014 U	**0.048 J**	0.014 U	0.014 U
ACENAPHTHYLENE	UG/L	0.014	0.014 U	0.014 U	0.014 U	0.014 U	0.014 U	0.014 U	0.014 U
ANTHRACENE	UG/L	0.014	0.014 U	0.014 U	0.014 U	0.014 U	0.014 U	0.014 U	0.015 U
BENZO(A)ANTHRACENE	UG/L	0.014	0.014 U	0.014 U	0.014 U	0.014 U	**0.18 J**	0.014 U	0.014 U
BENZO(A)PYRENE	UG/L	0.013	0.013 U	0.013 U	0.013 U	0.013 U	**0.12 J**	0.013 U	0.013 U
BENZO(B)FLUORANTHENE	UG/L	0.015	**0.015 J**	0.015 U	0.015 U	0.015 U	**0.16 J**	0.015 U	0.015 U
BENZO(GHI)PERYLENE	UG/L	0.014	0.014 U	0.014 U	0.014 U	0.014 U	**0.45**	0.014 U	0.014 U
BENZO(K)FLUORANTHENE	UG/L	0.051	0.051 U	0.051 U	0.051 U	0.051 U	**0.23**	0.051 U	0.052 U
CHRYSENE	UG/L	0.013	0.013 U	0.013 U	0.013 U	0.013 U	**0.26**	0.013 U	0.013 U
DIBENZ(A,H)ANTHRACENE	UG/L	0.015	0.015 U	0.015 U	0.015 U	0.015 U	**0.52**	0.015 U	0.015 U
FLUORANTHENE	UG/L	0.015	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U
FLUORENE	UG/L	0.020	**0.032 J B**	0.02 U	0.02 U	0.02 U	**0.027 J**	0.02 U	0.021 U
INDENO(1,2,3-CD)PYRENE	UG/L	0.019	0.019 U	0.019 U	0.019 U	0.019 U	**0.53**	0.019 U	0.019 U
NAPHTHALENE	UG/L	0.013	**0.036 J**	**0.018 J**	0.013 U	0.013 U	0.013 U	**0.019 J**	0.013 U
PHENANTHRENE	UG/L	0.040	**0.089 J B**	**0.061 J**	**0.042 J**	**0.044 J**	**0.058 J**	**0.054 J**	0.041 U
PYRENE	UG/L	0.015	0.015 U	0.015 U	0.015 U	0.015 U	**0.023 J**	0.015 U	0.015 U
TOTAL PAHS (ND=MDL)	UG/L	---	0.325	0.216	0.177	0.179	2.647	0.202	0.158

NOTES: There are no USEPA acute or chronic water quality criteria for PAHs

Bold values represent detected concentrations.

MDL is reported for non-detected constituents

MDL = average method detection limit

J (organic) = compound was detected, but below the reporting limit (value is estimated)

U = compound was analyzed, but not detected

TABLE 22. PCB CONGENER* CONCENTRATIONS (NG/L) IN SITE WATER AND STANDARD AND EFFLUENT ELUTRIATES

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

					Standard Elutriate			Effluent Elutriate		
ANALYTE	**UNITS**	**Average MDL**	**USEPA CHRONIC CRITERIA**	**Site Water**	**CCU3-BAR-1/2-SET**	**CCU3-BAR-3/4-SET**	**CCU3-DIS-SET**	**CCU3-BAR-1/2-EFF**	**CCU3-BAR-3/4-EFF**	**CCU3-DIS-EFF**
PCB 8 (BZ) [a] [b]	NG/L	0.36	---	0.41 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U	0.36 U
PCB 18 (BZ) [a] [b]	NG/L	0.36	---	0.45 U	**0.58 J PG**	**0.92 J PG**	0.36 U	0.36 U	0.36 U	0.36 U
PCB 28 (BZ) [a] [b]	NG/L	0.42	---	0.41 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
PCB 44 (BZ) [a] [b]	NG/L	0.43	---	0.41 U	**1.6 PG**	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U
PCB 49 (BZ) [a]	NG/L	0.26	---	0.42 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
PCB 52 (BZ) [a] [b]	NG/L	0.41	---	0.4 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U
PCB 66 (BZ) [a] [b]	NG/L	0.46	---	0.47 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U
PCB 77 (BZ) [a]	NG/L	0.45	---	0.41 U	**8**	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
PCB 87 (BZ) [a]	NG/L	0.41	---	0.38 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U
PCB 90 (BZ)	NG/L	0.42	---	0.73 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U	0.42 U
PCB 101 (BZ) [a] [b]	NG/L	0.45	---	0.39 U	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U
PCB 105 (BZ) [a] [b]	NG/L	0.44	---	0.36 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U
PCB 118 (BZ) [a] [b]	NG/L	0.46	---	0.5 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U
PCB 126 (BZ) [a]	NG/L	0.3	---	0.37 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
PCB 128 (BZ) [a] [b]	NG/L	0.47	---	0.33 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U
PCB 138 (BZ) [a] [b]	NG/L	0.46	---	0.32 U	0.46 U	0.46 U	0.46 U	**0.72 J**	0.46 U	0.46 U
PCB 153 (BZ) [a] [b]	NG/L	0.43	---	0.37 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U
PCB 156 (BZ) [a]	NG/L	0.41	---	0.35 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U
PCB 169 (BZ) [a]	NG/L	0.23	---	0.4 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U
PCB 170 (BZ) [a] [b]	NG/L	0.22	---	0.35 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U
PCB 180 (BZ) [a] [b]	NG/L	0.28	---	0.34 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U
PCB 183 (BZ) [a]	NG/L	0.47	---	0.35 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U
PCB 184 (BZ) [a]	NG/L	0.22	---	0.4 U	0.22 U	0.22 U	**0.67 J PG**	0.22 U	0.22 U	0.22 U
PCB 187 (BZ) [a] [b]	NG/L	0.46	---	0.37 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U
PCB 195 (BZ) [a] [b]	NG/L	0.27	---	0.37 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U
PCB 206 (BZ) [a] [b]	NG/L	0.29	---	0.36 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U	0.29 U
PCB 209 (BZ) [a] [b]	NG/L	0.25	---	0.41 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
TOTAL PCBs (ND=MDL)	NG/L	--	30	14.1	14.7	14.2	14.2	14.7	14.2	14.2

*PCB congeners used for Total PCB summation, as per Table 9-3 of the ITM (USEPA/USACE 1998)

Source : USEPA 2010. *National Recommended Water Quality Criteria*

NOTES: There are no USEPA acute water quality criteria for PCBs

Bold values represent detected concentrations, shaded values exceed chronic criteria.

MDL is reported for non-detected constituents

MDL = average method detection limit

U = compound was analyzed, but not detected

TABLE 23. PCB AROCLOR CONCENTRATIONS (UG/L) IN SITE WATER AND STANDARD AND EFFLUENT ELUTRIATES

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

ANALYTE	UNITS	Average MDL	Site Water	Standard Elutriate			Effluent Elutriate		
				CCU3-BAR-1/2-SET	CCU3-BAR-3/4-SET	CCU3-DIS-SET	CCU3-BAR-1/2-	CCU3-BAR-3/4-	CCU3-DIS-EFF
AROCLOR 1016	UG/L	0.10	0.095 U	0.096 U	0.096 U	0.096 U	0.36 U	0.36 U	0.36 U
AROCLOR 1221	UG/L	0.095	0.094 U	0.095 U	0.095 U	0.095 U	0.36 U	0.36 U	0.36 U
AROCLOR 1232	UG/L	0.11	0.11 U	0.11 U	0.11 U	0.11 U	0.42 U	0.42 U	0.42 U
AROCLOR 1242	UG/L	0.071	0.07 U	0.071 U	0.071 U	0.071 U	0.43 U	0.43 U	0.43 U
AROCLOR 1248	UG/L	0.086	0.085 U	0.086 U	0.086 U	0.086 U	0.26 U	0.26 U	0.26 U
AROCLOR 1254	UG/L	0.087	0.086 U	0.087 U	0.087 U	0.087 U	0.41 U	0.41 U	0.41 U
AROCLOR 1260	UG/L	0.051	0.051 U	0.051 U	0.051 U	0.051 U	0.46 U	0.46 U	0.46 U

NOTES: There are no USEPA acute or chronic water quality criteria for PCB Aroclors.

Bold values represent detected concentrations.

MDL is reported for non-detected constituents

MDL = average method detection limit

U = compound was analyzed, but not detected

TABLE 24. CHLORINATED PESTICIDE CONCENTRATIONS (UG/L) IN SITE WATER AND STANDARD AND EFFLUENT ELUTRIATES

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

						Standard Elutriate			Effluent Elutriate		
ANALYTE	**UNITS**	**Average MDL**	**USEPA ACUTE CRITERIA**	**USEPA CHRONIC CRITERIA**	**Site Water**	**CCU3-BAR-1/2-SET**	**CCU3-BAR-3/4-SET**	**CCU3-DIS-SET**	**CCU3-BAR-1/2-EFF**	**CCU3-BAR-3/4-EFF**	**CCU3-DIS-EFF**
4,4'-DDD	UG/L	0.026	---	---	0.025 U	0.026 U	0.026 U	0.026 U	0.0003 U	0.0003 U	0.0003 U
4,4'-DDE	UG/L	0.03	---	---	0.03 U	0.03 U	0.03 U	0.03 U	0.0013 U	0.0013 U	0.0013 U
4,4'-DDT	UG/L	0.028	0.13	0.001	0.028 U	0.028 U	0.028 U	0.028 U	0.0003 U	0.0003 U	0.0003 U
ALDRIN	UG/L	0.032	1.3	---	0.031 U	0.032 U	0.032 U	0.032 U	0.0015 U	0.0015 U	0.0015 U
ALPHA-BHC	UG/L	0.025	---	---	0.025 U	0.025 U	0.025 U	0.025 U	**0.00045 J PG**	0.00042 U	0.00042 U
ALPHA-CHLORDANE	UG/L	0.037	---	---	0.037 U	0.037 U	0.037 U	0.037 U	0.0014 U	0.0014 U	0.0014 U
BETA-BHC	UG/L	0.038	---	---	0.037 U	0.038 U	0.038 U	**0.15**	0.0016 U	0.0016 U	0.0016 U
CHLORDANE (TECHNICAL)	UG/L	0.063	---	---	0.062 U	0.063 U	0.063 U	0.063 U	**0.0018 J PG**	0.0013 U	0.0013 U
CHLOROBENSIDE	UG/L	0.056	---	---	0.056 U	0.056 U	0.056 U	0.056 U	**0.0067 PG**	**0.0048 PG**	**0.0063 PG**
DCPA	UG/L	0.013	---	---	0.013 U	0.013 U	0.013 U	0.013 U	0.0031 U	0.0031 U	0.0031 U
DELTA-BHC	UG/L	0.017	---	---	0.016 U	0.017 U	0.017 U	0.017 U	0.0028 U	0.0028 U	0.0028 U
DIELDRIN	UG/L	0.031	0.71	0.0019	0.031 U	0.031 U	0.031 U	0.031 U	0.00065 U	0.00065 U	0.00065 U
ENDOSULFAN I	UG/L	0.036	0.034	0.0087	0.035 U	0.036 U	0.036 U	0.036 U	0.00084 U	0.00084 U	0.00084 U
ENDOSULFAN II	UG/L	0.037	0.034	0.0087	0.037 U	0.037 U	0.037 U	0.037 U	0.0016 U	0.0016 U	0.0016 U
ENDOSULFAN SULFATE	UG/L	0.022	---	---	0.021 U	0.022 U	0.022 U	0.022 U	0.0018 U	0.0018 U	0.0018 U
ENDRIN	UG/L	0.037	0.037	0.0023	0.036 U	0.037 U	0.037 U	0.037 U	0.0019 U	0.0019 U	0.0019 U
ENDRIN ALDEHYDE	UG/L	0.034	---	---	0.034 U	0.034 U	0.034 U	0.034 U	0.0011 U	0.0011 U	0.0011 U
ENDRIN KETONE	UG/L	0.035	---	---	0.035 U	0.035 U	0.035 U	0.035 U	0.0018 U	0.0018 U	0.0018 U
GAMMA-BHC (LINDANE)	UG/L	0.03	0.16	---	0.03 U	0.03 U	0.03 U	0.03 U	0.0017 U	0.0017 U	0.0017 U
GAMMA-CHLORDANE	UG/L	0.037	---	---	0.036 U	0.037 U	0.037 U	0.037 U	**0.0025**	**0.0024 J**	**0.0016 J PG**
HEPTACHLOR	UG/L	0.038	0.053	0.0036	0.037 U	0.038 U	0.038 U	0.038 U	**0.0085**	**0.01**	**0.0083**
HEPTACHLOR EPOXIDE	UG/L	0.037	0.053	0.0036	0.037 U	0.037 U	0.037 U	0.037 U	0.0018 U	0.0018 U	0.0018 U
METHOXYCHLOR	UG/L	0.035	---	0.03	0.034 U	0.035 U	0.035 U	0.035 U	0.0017 U	0.0017 U	0.0017 U
MIREX	UG/L	0.018	---	0.001	0.018 U	0.018 U	0.018 U	0.018 U	0.00091 U	0.00091 U	0.00091 U
TOXAPHENE	UG/L	0.71	0.21	0.0002	0.7 U	0.71 U	0.71 U	0.71 U	0.0013 U	0.0013 U	0.0013 U

Source : USEPA 2010. *National Recommended Water Quality Criteria*

NOTES: Bold values represent detected concentrations, shaded values exceed acute or chronic criteria

MDL is reported for non-detected constituents

MDL = average method detection limit

J (organic) = compound was detected, but below the reporting limit (value is estimated)

PG = the percent difference between the original and confirmation analysis is greater than 40%

U = compound was analyzed, but not detected

TABLE 25. SVOC CONCENTRATIONS (UG/L) IN SITE WATER AND STANDARD AND EFFLUENT ELUTRIATES

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

						Standard Elutriate			Effluent Elutriate		
ANALYTE	**UNITS**	**Average MDL**	**USEPA ACUTE CRITERIA**	**USEPA CHRONIC CRITERIA**	**Site Water**	**CCU3-BAR-1/2-SET**	**CCU3-BAR-3/4-SET**	**CCU3-DIS-SET**	**CCU3-BAR-1/2-EFF**	**CCU3-BAR-3/4-EFF**	**CCU3-DIS-EFF**
1,2,4-TRICHLOROBENZENE	UG/L	0.067	---	---	0.067 U	0.067 U	0.067 U	0.067 U	0.067 U	0.067 U	0.068 U
1,2-DICHLOROBENZENE	UG/L	0.07	---	---	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.071 U
1,3-DICHLOROBENZENE	UG/L	0.07	---	---	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.071 U
1,4-DICHLOROBENZENE	UG/L	0.07	---	---	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.07 U	0.071 U
2,4,5-TRICHLOROPHENOL	UG/L	0.14	---	---	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U	0.15 U
2,4,6-TRICHLOROPHENOL	UG/L	0.16	---	---	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.17 U
2,4-DICHLOROPHENOL	UG/L	0.031	---	---	0.031 U	0.031 U	0.031 U	0.031 U	0.031 U	0.031 U	0.032 U
2,4-DIMETHYLPHENOL	UG/L	0.08	---	---	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.081 U
2,4-DINITROPHENOL	UG/L	0.58	---	---	0.58 U	0.58 U	0.58 U	0.58 U	0.58 U	0.58 U	0.58 U
2,4-DINITROTOLUENE	UG/L	0.05	---	---	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.051 U
2,6-DINITROTOLUENE	UG/L	0.075	---	---	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.075 U	0.076 U
2-CHLORONAPHTHALENE	UG/L	0.014	---	---	0.014 U	0.014 U	0.014 U	0.014 U	0.014 U	0.014 U	0.014 U
2-CHLOROPHENOL	UG/L	0.16	---	---	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
2-METHYLPHENOL	UG/L	0.081	---	---	0.081 U	0.081 U	0.081 U	0.081 U	0.081 U	0.081 U	0.082 U
2-NITROANILINE	UG/L	0.33	---	---	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U
2-NITROPHENOL	UG/L	0.16	---	---	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
3,3'-DICHLOROBENZIDINE	UG/L	0.11	---	---	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U	0.11 U
3-NITROANILINE	UG/L	0.3	---	---	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U	0.31 U
4,6-DINITRO-2-METHYLPHENOL	UG/L	0.21	---	---	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U	0.21 U
4-BROMOPHENYL PHENYL ETHER	UG/L	0.06	---	---	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.06 U
4-CHLORO-3-METHYLPHENOL	UG/L	0.071	---	---	0.071 U	0.071 U	0.071 U	0.071 U	0.071 U	0.071 U	0.072 U
4-CHLOROANILINE	UG/L	0.083	---	---	0.083 U	0.083 U	0.083 U	0.083 U	0.083 U	0.083 U	0.084 U
4-CHLOROPHENYL PHENYL ETHER	UG/L	0.047	---	---	0.047 U	0.047 U	0.047 U	0.047 U	0.047 U	0.047 U	0.048 U
4-METHYLPHENOL	UG/L	0.085	---	---	0.085 U	0.085 U	0.085 U	0.085 U	0.085 U	0.085 U	0.086 U
4-NITROANILINE	UG/L	0.16	---	---	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U	0.16 U
4-NITROPHENOL	UG/L	0.57	---	---	0.57 U	0.57 U	0.57 U	0.57 U	0.57 U	0.57 U	0.57 U
BIS(2-CHLOROETHOXY)METHANE	UG/L	0.055	---	---	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U
BIS(2-CHLOROETHYL) ETHER	UG/L	0.024	---	---	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U	0.024 U
BIS(2-CHLOROISOPROPYL) ETHER	UG/L	0.019	---	---	0.019 U	0.019 U	0.019 U	0.019 U	0.019 U	0.019 U	0.019 U
BIS(2-ETHYLHEXYL) PHTHALATE	UG/L	0.75	---	---	**1.5 J B**	0.75 U	**0.89 J**	0.75 U	**1.1**	**1.2**	0.76 U
BUTYL BENZYL PHTHALATE	UG/L	0.13	---	---	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.14 U
CARBAZOLE	UG/L	0.015	---	---	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U
DIBENZOFURAN	UG/L	0.058	---	---	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.058 U	0.059 U
DIETHYL PHTHALATE	UG/L	0.14	---	---	0.14 U	**0.15 J**	0.14 U	0.14 U	0.14 U	0.14 U	0.14 U
DIMETHYL PHTHALATE	UG/L	0.072	---	---	0.072 U	0.072 U	0.072 U	0.072 U	0.072 U	0.072 U	0.073 U
DI-N-BUTYL PHTHALATE	UG/L	0.12	---	---	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U	0.12 U
DI-N-OCTYL PHTHALATE	UG/L	0.19	---	---	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.2 U
HEXACHLOROBENZENE	UG/L	0.017	---	---	0.017 U	0.017 U	0.017 U	0.017 U	0.017 U	0.017 U	0.017 U
HEXACHLOROBUTADIENE	UG/L	0.016	---	---	0.016 U	0.016 U	0.016 U	0.016 U	0.016 U	0.016 U	0.016 U
HEXACHLOROCYCLOPENTADIENE	UG/L	0.049	---	---	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U	0.049 U
HEXACHLOROETHANE	UG/L	0.059	---	---	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.059 U	0.06 U
ISOPHORONE	UG/L	0.061	---	---	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U	0.061 U
NITROBENZENE	UG/L	0.079	---	---	0.079 U	0.079 U	0.079 U	0.079 U	0.079 U	0.079 U	0.08 U
N-NITROSODI-N-PROPYLAMINE	UG/L	0.029	---	---	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U	0.029 U
N-NITROSODIPHENYLAMINE	UG/L	0.08	---	---	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.08 U	0.081 U
PENTACHLOROPHENOL	UG/L	0.062	13	7.9	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.062 U	0.063 U
PHENOL	UG/L	0.0550	---	---	0.055 U	**7.8**	0.055 U	0.055 U	0.055 U	0.055 U	0.055 U

Source : USEPA 2010. *National Recommended Water Quality Criteria*

NOTES: Bold values represent detected concentrations, shaded values exceed acute or chronic criteria.
MDL is reported for non-detected constituents.

MDL = average method detection limit

B (organic) = detected in the laboratory method blank

J (organic) = compound was detected, but below the reporting limit (value is estimated)

U = compound was analyzed, but not detected

TABLE 26. BUTYLTIN CONCENTRATIONS (UG/L) IN SITE WATER AND STANDARD AND EFFLUENT ELUTRIATES

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

				Standard Elutriate			Effluent Elutriate		
ANALYTE	**UNITS**	**Average RL**	**Site Water**	**CCU3-BAR-1/2-SET**	**CCU3-BAR-3/4-SET**	**CCU3-DIS-SET**	**CCU3-BAR-1/2-**	**CCU3-BAR-3/4-**	**CCU3-DIS-EFF**
DIBUTYLTIN	UG/L	0.05	0.01 U	---	---	---	---	---	---
MONOBUTYLTIN	UG/L	0.01	0.05 U	---	---	---	---	---	---
TETRABUTYLTIN	UG/L	0.012	0.0086 U	---	---	---	---	---	---
TRIBUTYLTIN	UG/L	0.0086	0.012 U	---	---	---	---	---	---
2,3,7,8-TCDD	PG/L	2.8	4.8 U	2.8 U	3.3 U	2.2 U	3.4 U	1.7 U	3.8 U

NOTES: RL is reported for non-detected constituents.

RL = average reporting limit

U = compound was analyzed, but not detected

TABLE 27. TCLP IN SEDIMENT

CALVERT CLIFFS NUCLEAR POWER PLANT, LUSBY, MARYLAND (JULY 2010)

ANALYTE	UNITS	Average RL	TCLP	CALVERT CLIFFS NUCLEAR POWER PLANT		
				CCU3-BAR-1/2-SED	CCU3-BAR-3/4-SED	CCU3-DIS-SED
HERBICIDES						
2,4,5-TP (SILVEX)	MG/L	0.0	1.0	0.0011 U	0.0011 U	0.0011 U
2,4-D	MG/L	0.0	10.0	0.0045 U	0.0045 U	0.0045 U
METALS						
ARSENIC	MG/L	0.0	5.0	**0.005 B**	0.0022 U	0.0022 U
BARIUM	MG/L	0.0	100	**0.18 B**	**0.087 B**	**0.22**
CADMIUM	MG/L	0.0	1.0	0.00024 U	**0.00031 B**	**0.00048 B**
CHROMIUM	MG/L	0.0	5.0	0.00084 U	0.00084 U	0.00084 U
LEAD	MG/L	0.0	5.0	0.0014 U	0.0014 U	0.0014 U
MERCURY	MG/L	0.0	0.2	**0.00008 B**	**0.000054 B**	0.000038 U
SELENIUM	MG/L	0.0	1.0	**0.0063 B**	**0.0057 B**	**0.0095 B**
SILVER	MG/L	0.0	5.0	0.00058 U	0.00058 U	0.00058 U
PESTICIDES						
CHLORDANE (TECHNICAL)	MG/L	0.0	0.03	0.00066 U	0.00066 U	0.00066 U
ENDRIN	MG/L	0.0	0.02	0.00039 U	0.00039 U	0.00039 U
GAMMA-BHC (LINDANE)	MG/L	0.0	0.4	0.00032 U	0.00032 U	0.00032 U
HEPTACHLOR	MG/L	0.0	0.01	0.0004 U	0.0004 U	0.0004 U
HEPTACHLOR EPOXIDE	MG/L	0.0	0.01	0.00039 U	0.00039 U	0.00039 U
METHOXYCHLOR	MG/L	0.0	10.0	0.00037 U	0.00037 U	0.00037 U
TOXAPHENE	MG/L	0.0	0.5	0.0074 U	0.0074 U	0.0074 U
SEMI-VOLATILES						
1,4-DICHLOROBENZENE	MG/L	0.0	7.5	0.0037 U	0.0037 U	0.0037 U
2,4,5-TRICHLOROPHENOL	MG/L	0.0	400	0.0076 U	0.0076 U	0.0076 U
2,4,6-TRICHLOROPHENOL	MG/L	0.0	2.0	0.0087 U	0.0087 U	0.0087 U
2,4-DINITROTOLUENE	MG/L	0.0	0.1	0.0027 U	0.0027 U	0.0027 U
CRESOLS (TOTAL)	MG/L	0.0	200	0.0088 U	0.0088 U	0.0088 U
HEXACHLOROBENZENE	MG/L	0.0	0.1	0.00092 U	0.00092 U	0.00092 U
HEXACHLOROBUTADIENE	MG/L	0.0	0.5	0.00083 U	0.00083 U	0.00083 U
HEXACHLOROETHANE	MG/L	0.0	5.0	0.0031 U	0.0031 U	0.0031 U
NITROBENZENE	MG/L	0.0	2.0	0.0042 U	0.0042 U	0.0042 U
PENTACHLOROPHENOL	MG/L	0.0	100	0.0033 U	0.0033 U	0.0033 U
PYRIDINE	MG/L	0.0	5.0	0.0036 U	0.0036 U	0.0036 U
VOLATILES						
1,1-DICHLOROETHENE	MG/L	0.0	0.7	0.043 U	0.043 U	0.043 U
1,2-DICHLOROETHANE	MG/L	0.0	0.5	0.038 U	0.038 U	0.038 U
2-BUTANONE (MEK)	MG/L	0.0	200	0.043 U	0.043 U	0.043 U
BENZENE	MG/L	0.0	3.0	0.04 U	0.04 U	0.04 U
CARBON TETRACHLORIDE	MG/L	0.0	0.5	0.043 U	0.043 U	0.043 U
CHLOROBENZENE	MG/L	0.0	100	0.021 U	0.021 U	0.021 U
CHLOROFORM	MG/L	0.0	6.0	0.04 U	0.04 U	0.04 U
TETRACHLOROETHENE	MG/L	0.0	0.7	0.033 U	0.033 U	0.033 U
TRICHLOROETHENE	MG/L	0.032	0.5	0.032 U	0.032 U	0.032 U
VINYL CHLORIDE	MG/L	0.1	0.2	0.052 U	0.052 U	0.052 U

NOTES: Bold values represent detected concentrations.

RL is reported for non-detected constituents.

RL = average reporting limit

B (inorganic) = compound was detected, but below the reporting limit (value is estimated)

U = compound was analyzed, but not detected

APPENDIX A

OYSTER SURVEY REPORT

Calvert Cliffs Oyster Population and Bottom Survey

Submitted to EA Engineering, Science and Technology

August 13, 2010

The Laboratory of Kennedy Paynter

University of Maryland

College Park, MD 20742

Introduction

A survey was conducted on August 9th, 2010 at two sites in the waters offshore of the Calvert Cliffs nuclear power plant to determine the impact of plant construction on oyster bar habitat. Figure 1 outlines the two proposed sites: Discharge Pipe (0.82 acres) and Barge Slip (4.47 acres). The survey quantified bottom type (sand, shell, mud, rock or shell hash.), amount of shell on the bottom and oyster population dynamics (size, ratio of live to dead oysters, overall population) at the two sites.

Methods

A 25m x 25m grid was overlaid on each site using GIS software and one hydraulic patent tong (1.61 m^2) grab was taken in each 25m x 25m cell. Certain cells were in water that was too shallow for the survey boat to safely sample or were too close to the existing pier, and these cells were not sampled. Figure 2 shows the patent tong grids with the sampling points at the Discharge Pipe and Barge Slip sites. The bottom type and amount of shell at each grab was recorded (shell scores range from 0 = no shell to 5= tong full of shell). The number and size of all live and dead oysters in each grab was also recorded.

Results

A total of 48 individual patent tong grabs were taken at the Discharge Pipe and Barge Slip sites. Of these grabs, only one contained live oysters and only three individual oysters were found in that grab.

Bottom Type

The bottom type at the survey sites was either hard bottom (sandstone, rock or shell hash) or sand. Figure 3 shows the bottom type over the survey area as either hard bottom (blue) or sand (red).

Shell Coverage

Shell coverage was low, with only 21% of the sites sampled contained shell hash. Of those cells, a moderate amount of shell was found (1-3 on a 5 point scale). Figure 4 shows the shell coverage over the survey area.

Oyster Status, Counts, Size and Density

Three live oysters and no dead oysters (boxes or gapers) were collected during the survey and they were all found in a single grab in one of the cells furthest from shore. The average shell height of the oysters collected was 99.33mm at a density of 1.66 oysters/m^2. Figure 5 shows the oyster density over the survey area.

Conclusions

Although very few live oysters were found in the survey area, most of the bottom surveyed in the barge slip area (4.47) could serve as oyster habitat. The discharge pipe area was all sand, which is not considered oyster habitat.

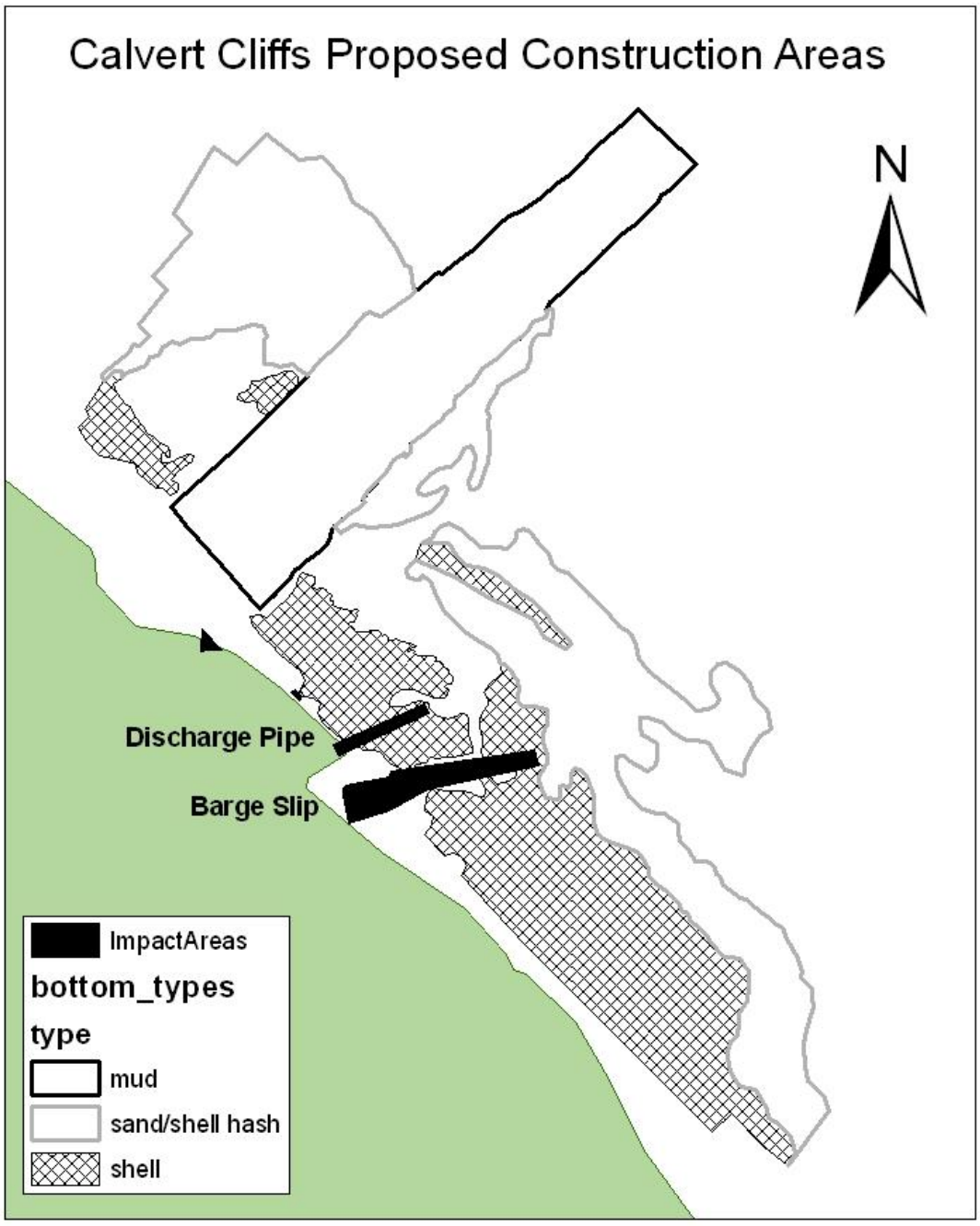


Figure 1. Areas of proposed construction at Calvert Cliffs (black polygons).

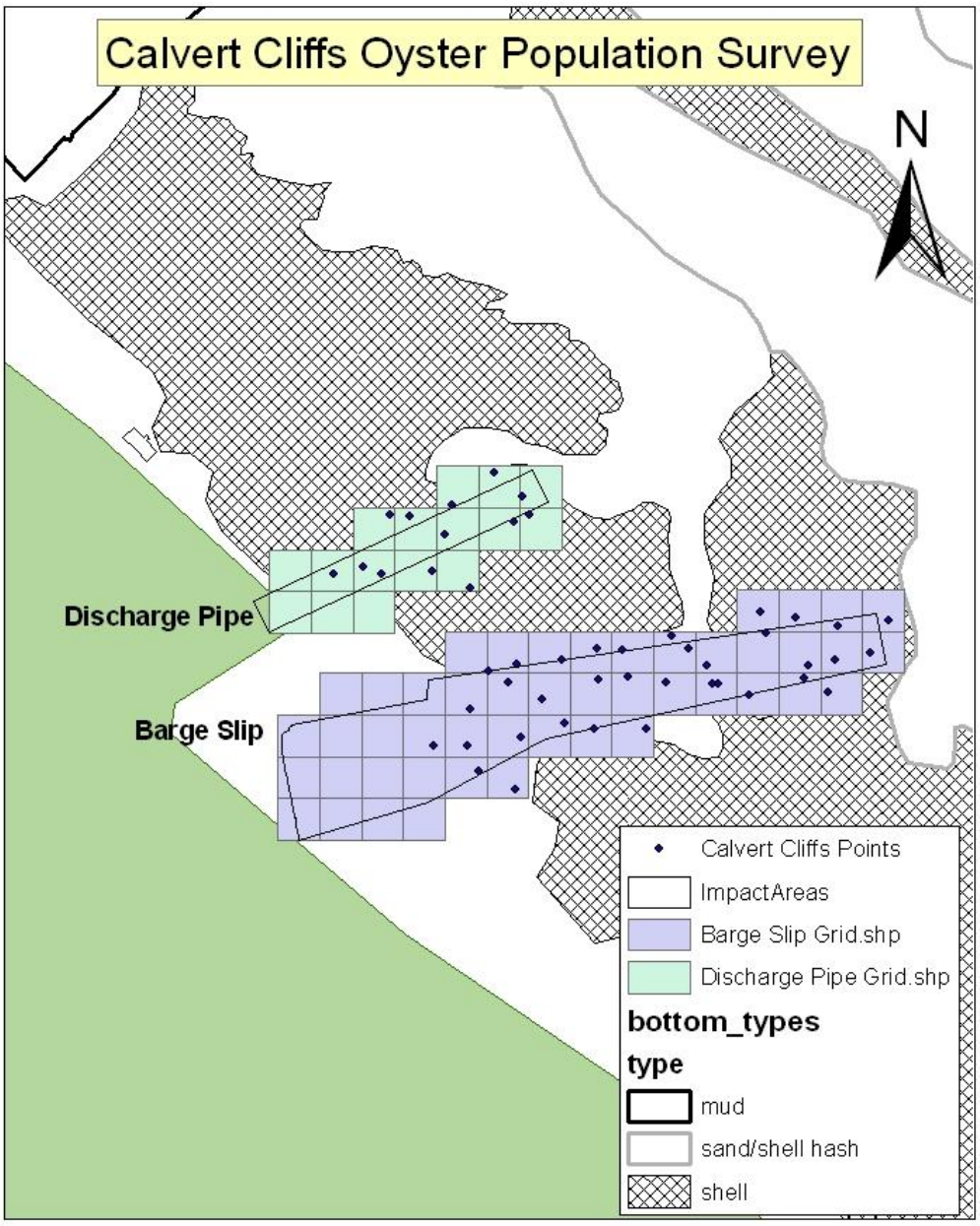


Figure 2. Patent tong survey points at Barge Slip and Discharge Pipe sites. One patent tong grab was taken at each point to quantify bottom type, shell coverage and oyster population dynamics at each proposed construction site.

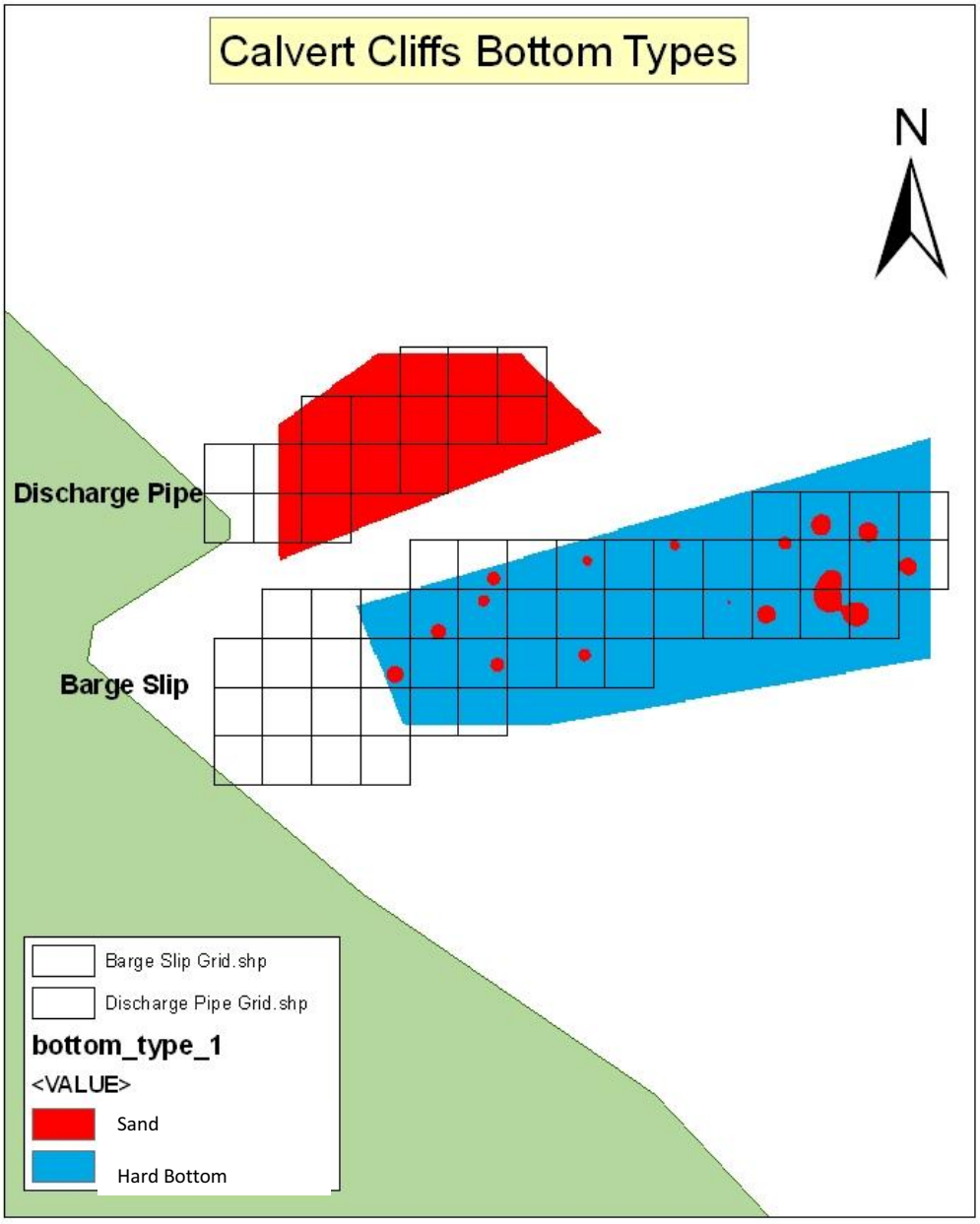


Figure 3. Bottom Type (hard bottom or sand) at Barge Slip and Discharge Pipe sites. The Discharge Pipe site was entirely sand while the barge slip site was mostly hard bottom.

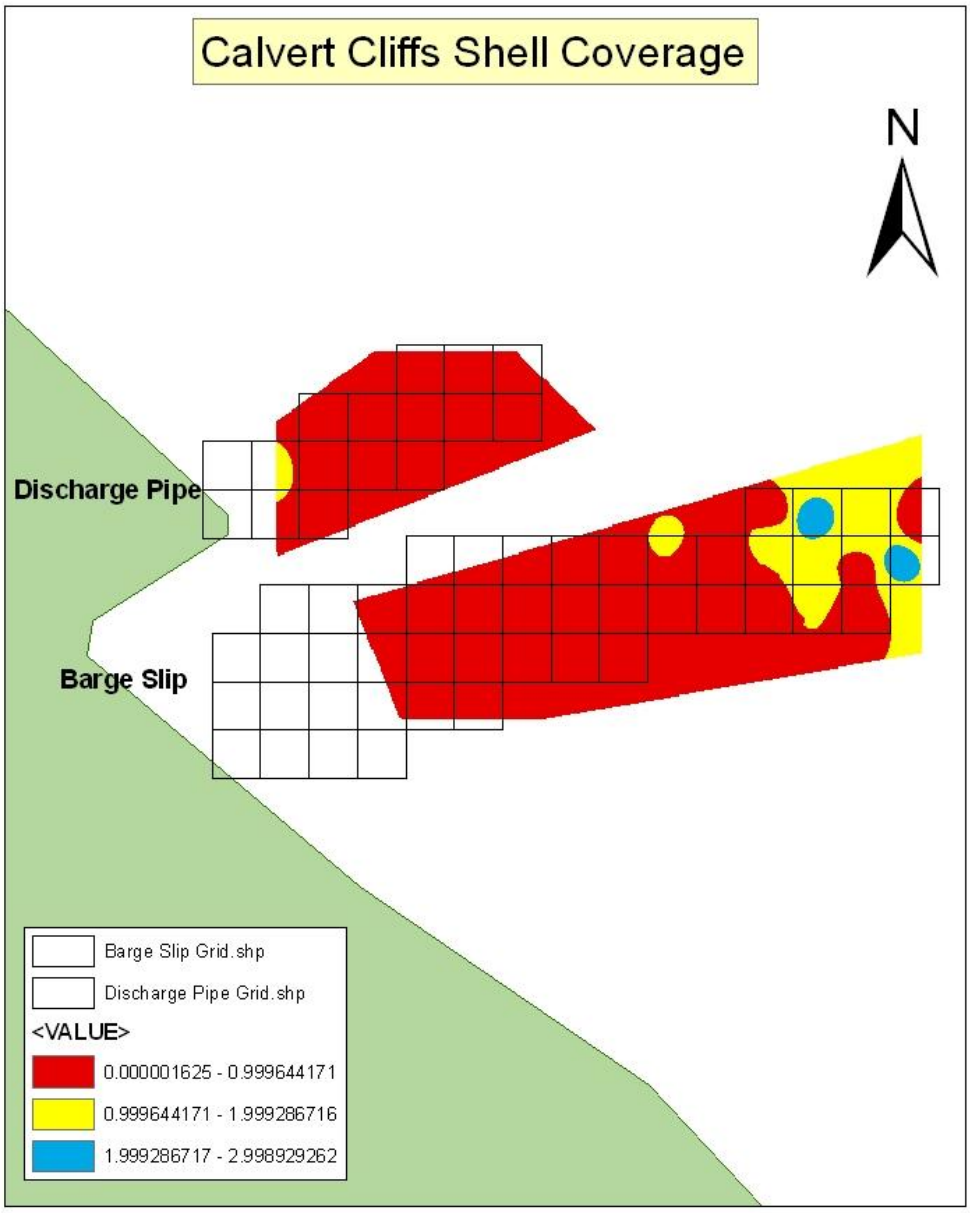


Figure 4. Shell coverage (1-5 scale with 5 being high shell coverage) at Barge Slip and Discharge Pipe sites. Almost no shell coverage was observed at the Discharge Pipe site while a moderate amount of shell coverage was observed at the northeast corner of the Barge Slip site.

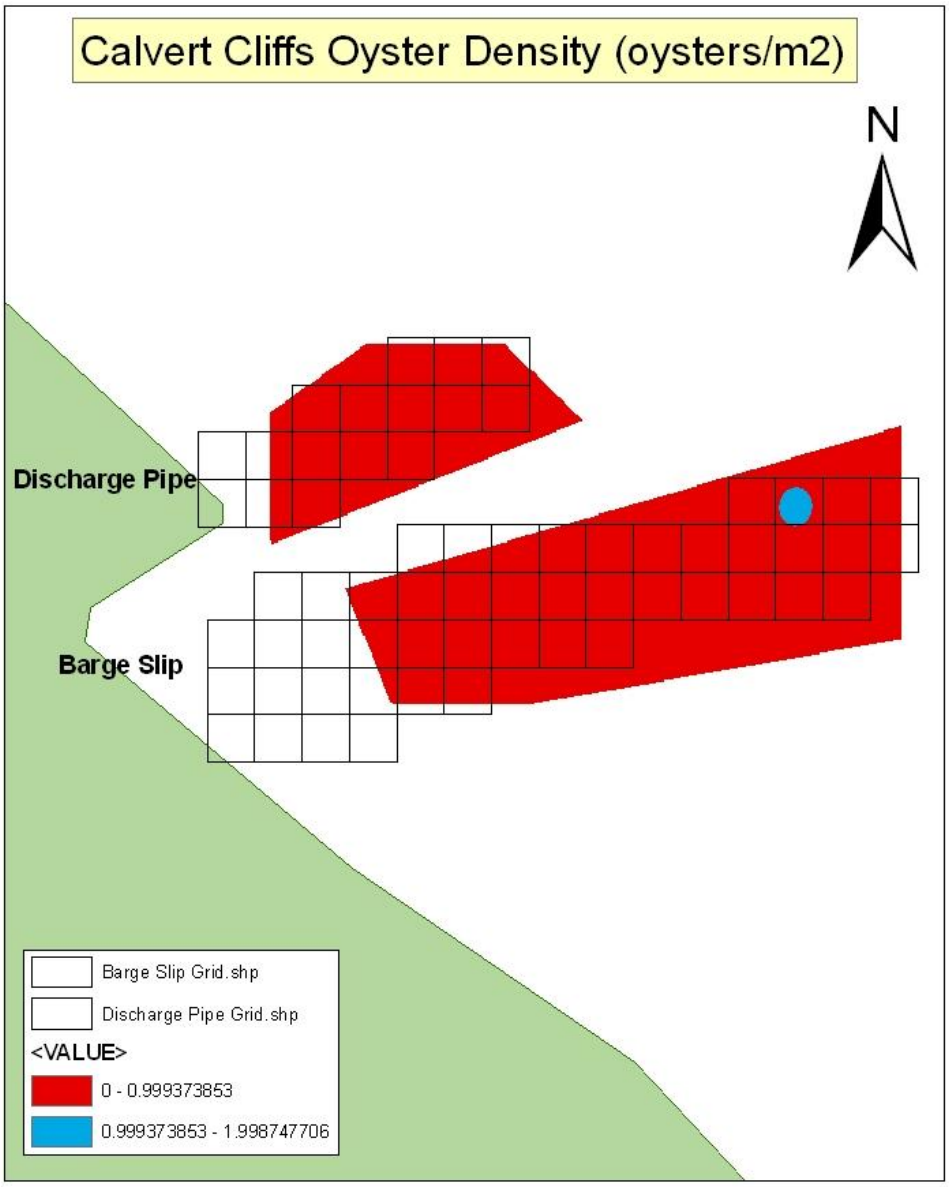


Figure 5. Oyster density (oysters/m^2) at Barge Slip and Discharge Pipe sites. Oysters were only observed in one grid cell in the northeast corner of the Barge Slip site, at a density of 1.657 oysters/m^2).

APPENDIX B

FIELD NOTES

Calvert Dredging 7/19/10

Proj. # 1462107

Meet @ Solomons Is. Comfort Inn

Palmer
Josh
Adam
} Athena Technologies

Mark Hunter > UNISTAR

Safety Briefing conducted by Mark Hunter

Dock @ Barge dock in bad weather

Call Mark when near site.

Meet in lobby @ 0600

7/20/10

Depart Solomons IS Boat Ramp @ 0700

Onboard: R. Bellantine (EA)
Palmer McClellan
Adam Freeze
Josh Burnett
} Athena Tech

Ran west side of bay up to CCNPP site

Weather: Clear, 75→95° winds SW <5 kts

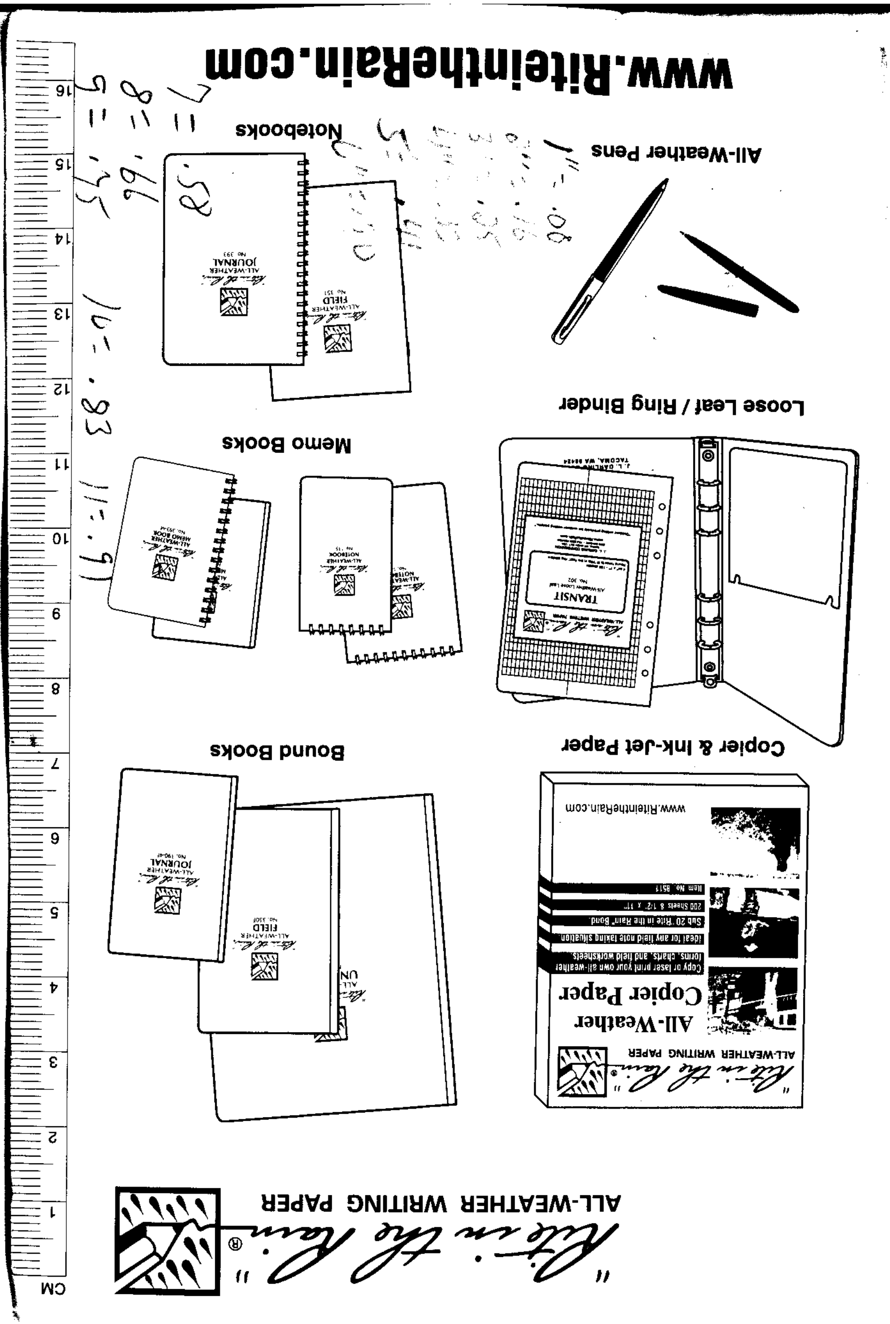
Waves - Flat

0820 Spud @ Barge-1

N 279440.79

E 1474090.46

Depth - 5'4"



7/20/10

Barge-1 Water Quality

	Temp	pH	DO	SP Cond.	Sal.	Turb.
Surf	27.8	7.86	5.01	23.68	14.28	1.8
Mid	27.9	7.89	4.91	23.75	14.33	1.8
Bot	27.9	7.90	4.82	23.81	14.37	3.0

1st Attempt - Refusal @ 7'
dump core & bathy

Barge-1 2nd Attempt - penetration = 11.5'
recovery = 7.5'

Barge1A 3rd Attempt - pen = 11.5'
recovery = 8.33'

Total recovery - 15.83'

Sed. descript. - dark sed (Black) Some clay @ bottom

Keep 2 cores total

0925 Spud @ Barge-2 Depth = 9.3'
N 279525.34
E 1474191.54

Barge-2 Water Quality

	Temp	pH	DO	Cond	Sal	Turb
Surf	28.1	7.98	5.39	23.52	14.18	1.2
Mid	28.1	7.96	5.29	23.55	14.20	1.1
Bot	28.1	7.93	5.06	23.71	14.29	1.6

7/20/10

Barge 2 (Continued)

Barge 2 Attempt #1 pen. 8.5' recov - 7.25'
Barge 2A Attempt #2 pen. 9.0' recov - 7.25'
Barge 2B Attempt #3 pen. 8.5' recov - 6.08'

3 cores total 20.58 total

Sediment description > Black sand & silt, Some clay @ bottom

1114 Spud @ Wedge
N 280347.59
E 1472953.99 depth = 19.58'

Could not get to targeted coordinate because of rip rap & sheet pile wall. May need to move to avoid rip rap & debris under water.
Spudded 10 feet from rip rap & 8' from sheet pile wall

Wedge - Water Quality

	Temp	pH	Do	Cond	Sal	Turb
Surf	28.42	7.93	5.44	23.77	14.34	1.6
Mid	28.34	7.92	5.30	23.78	14.34	1.6
Bot	28.16	7.85	4.77	23.81	14.36	3.0

Attempt #1 - hit rock rip rap
Move 2 15' respud depth = 21.41'
Made 6 location changes within the

7/20/10

wedge shaped pool area.
all locations up to 24' were large rip rap,
same as on shoreline (large boulders)
slope drops very quickly between rip rap
shoreline & jetty wall.
Unable to find a location shallower than
the pocket depth (16') to take a core sample.
- contacted Christie Agassiz to let her
know that we were unable to collect a
core sample at the wedge location.
See photo

1205 Spud @ Barge-3
N 279610.35
E 1474482.89 depth = 14.5'
Barge-3 Water Quality

	Temp	PH	DO	Cond	Sal	Turb
Surf	28.71	8.07	6.44	23.63	14.24	1.7
mid	28.56	8.00	5.89	23.77	14.33	1.4
BOT	28.39	7.86	4.84	23.80	14.35	2.2

Barge 3 ATTempt #1 pen = 3' (to refusal) recov. = 2.66'
Barge 3A ATTempt #2 pen. = 3.4' (to refusal) recov = 3.33
Barge 3B ATTempt #3 pen = 3.3' (to refusal) recov = 3.00
3 cores total total recovery = 8.99'

sediment description: blackish sand to greenish clay/mud

45

7/20/10

1310 Spud @ Barge-4
N 279639.62
E 1474605.19 depth = 15.83'
Barge-4 Water Quality

	Temp	PH	DO	Cond	Sal	Turb
Surf	28.93	8.11	6.85	23.31	14.03	2.2
mid	28.58	7.96	5.79	23.56	14.19	1.5
BOT	28.25	7.95	5.25	23.60	14.23	1.7

To refusal ATTempt #1 pen = 2.0' Recov = 1.91' Barge 4
To refusal ATTempt #2 pen = 2.33' Recov = 1.75' Barge 4A
To refusal ATTempt #3 pen = 2.0' (to refusal) Recov = 1.41' 4B
Barge 4C ATTempt #4 pen = 2.5' (to refusal) Recov = 1.16'
Broke core barrel @ check valve
Aim - record the check valve
re-barrel with cover water depth = 14.
Barge 4D ATTempt #5 pen = 2.8' (to refusal) Rec. = 2.16'
Barge 4E ATTempt #6 pen = 2.8' (to refusal) Rec = 2.5'
6 cores total total recovery = 10.89'
Sediment description = Blackish silt/sand
very thin clay/green mud on top

1535 Spud @ Discharge
N 279842.88
E 1473973.72 depth = 6.16'

44

7/20/10

Discharge - Water Quality

	Temp	pH	DO	Cond	Sal	Turb
Surf	29.54	8.37	8.00	23.43	14.09	3.6
mid	29.18	8.39	8.30	22.94	13.78	2.5
Bot	29.20	8.40	8.40	22.88	13.74	1.9

Discharge / Attempt #1 pen = 6.25' Rec. = 5.75'
Discharge A / Attempt #2 pen = 5.5' Rec. = 4.58'
Discharge B / Attempt #3 pen = No Recovery
Having Trouble keeping boat
Spudded due to SE wind.
Abandon location until Tomorrow
morning.
1650 - Return to dock
1810 - Arrive @ Solomons Ramp

20'

43

Calvert Dredging 7/21/10

Depart Solomons Is. Ramp @ 0700
Onboard: R. Ballentine (EA)
Palmer McClellan
Adam Freeze
Josh Bennett
> Athena Tech.

Weather: Overcast, 70-95° Winds S 4-5 kts
Waves Flat
Run West Side of bay to CCNPP site.

0805 Spud @ Discharge
N - 279847.23 depth = 7.41'
E - 1473970.30
Continue adjusting Spuds to get
appropriate Volume.
Attempt #4 pen - Bent Cone barrel
replace - re spud
Discharge B / Attempt #5 pen = 6' Rec. = 4.08'
Discharge C / Attempt #6 pen = 7.08' Rec. = 6.5'
4 Total Recovery = 20.91'
Sediment description = V+V light / white grey mixed
of Sand / Shell

1000 Complete Coring @ Site
Move to Barge 3 to collect Cores
N 279612.66
W 1474490.36 depth = 15'

7/21/10

Water Quality for Water Collection

	Temp	pH	DO	Cond	Sal	Turb.
Surf	28.14	8.11	6.43	22.75	13.67	1.4
Mid	27.73	8.02	5.59	22.87	13.75	1.1
Bot	28.30	7.88	4.49	23.49	14.14	1.0

1100 Collect Water For site water Samples
12 - 1L Amber CCW3-SW
2 - 500ml Sulfuric
1 - 500ml ~~NaOH~~ HNO3
1 - 250ml NaOH + AC
1 - 250ml NaOH
2 - 40ml H2SO4
2 - 40ml HCl
25 - 1 gallon elutriate preparation

1158 Return to Solomons Is Ramp
Finish up w/ Alma
Do Equipment blank w/ core barrel
& nose cone

~~1405~~ Arrive @ Solomons Ramp
1500 Collect Equipment Blank
Ice samples for transport back to EA
Ship Test America Samples via UPS

Calvert Dredging 7/22/10

1100 Core processing
R. Ballentine
T-Ward
M. LaMarca
Composite Samples & process @
EA warehouse in Cockeysville MD.
Ship Coolers to Test America
Hold ~~[illegible]~~ elutriation Samples in EA
walk-in until have delivery on Monday of bottles

APPENDIX C

CHAIN-OF-CUSTODY FORMS

C0G230498

Client:	Project Manager:
EA Engineering Science, and Technology, Inc.	**Karin Olsen**
15 Loveton Circle	**Phone: 410-329-5112**
Sparks, MD 21152	Field Contact: **Rob Ballantine**
	Phone: (410) 627-2731

Project Name: **Calvert Cliffs Sediment**

EA Project# 1462107, Task 0002 and 0007

Page 1 of 1

Date	Time	Water	Sediment	Tissue	Sample Identification	No. of Containers	Filtration/Preparation	Grainsize (ASTM)	TCLP (1311)	Total Solids	Metals and Mercury (6020/7471)	Ammonia & Nitrate+Nitrite (350.1 and 353.2)	Phosphorus & TKN (SM 4500)	TOC (Lloyd Khan)	Cyanide (9034)	Sulfide (9012)	PAHs (8270C LL)	Dioxins EPA 1613	Organotins (TA SOP)	TPH GRO (8015)	TPH DRO (8015)	CCE, PPA, Saturated paste pH and EC (conductivity)	Chlorinated Pesticides (8081)	PCB Aroclors (8082)	PCB Congeners (8082)	SVOCs (8270C LL)	Remarks
7/22/10	1300		X		CCU3-BAR-1/2-SED	14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	*Please fax or email signed COC
	1300		X		CCU3-BAR-1/2-SED MS	10		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	to Kaitlin McCormick
	1300		X		CCU3-BAR-1/2-SED MSD	10		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	fax: 410-771-4204
																											email: kmccormick@eaest.com
	1345		X		CCU3-BAR-3/4-SED	14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
	1430		X		CCU3-DIS-SED	14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	*Extra volume provided for sediment
							RB																				MS/MSD analysis on CCU3-BAR-1/2

Chain of Custody Record

Laboratory:
TestAmerica-Pittsburgh
301 Alpha Drive
Pittsburgh, PA 15238

phone: 412-963-7058
Attn: Carrie Gamber

Sampled by: (Signature)	Date/Time 7/22/10 1800	Relinquished by: (Signature)	23 JUL 10
Relinquished by: (Signature)	Date/Time 7/22/10 1800	Received by Laboratory: (Signature)	7/23/10 935

11

(1 - 284)

C0G230454

Client:	Project Manager:
EA Engineering Science, and Technology, Inc. **15 Loveton Circle** **Sparks, MD 21152**	**Karin Olsen** Phone: **410-329-5112** Field Contact: **Rob Ballantine** Phone: (410) 627-2731

Project Name: **Calvert Cliffs Sediment**

EA Project# 1462107, Task 0002 and 0007

Page 1 of 1

Date	Time	Water	Sediment	Tissue	Sample Identification	No. of Containers	Elutriate Preparation	Chlorinated Pesticides (8081A)	PCB Aroclors (8082)	PCB Congeners (8082	Metals and Mercury (6020/7470A)	Ammonia & Nitrate+Nitrite (350.1 and 353.2)	Phosphorus & TKN (SM 4500)	TOC (415.2)	Cyanide (9012)	Sulfide (9034)	SVOC (8270C LL)	Dioxins EPA 1613	Organotins (TA SOP)	TPH GRO (8015)	TPH DRO (8015)	CCE, PPA, Saturated paste pH and EC (conductivity)	PAHs (8270C LL)	Remarks
7/22/10	1300		X		CCU3-BAR-1/2-SED	4	X																	*Please fax or email signed COC
7/21/10	1100	X			CCU3-SW	24	X																	to Kaitlin McCormick
					CCU3-BAR-1/2-SET	0	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	fax: 410-771-4204
																								email: kmccormick@eaest.com
7/22/10	1345		X		CCU3-BAR-3/4-SED	4	X																	
7/21/10	1100	X			CCU3-SW	24	X																	
					CCU3-BAR-3/4-SET	0	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
																								SEE SCOPE OF WORK: CREATE
7/22/10	1450		X		CCU3-DIS-SED	4	X																	ELUTRIATES USING CCU3-SW
7/21/10	1600	X			CCU3-SW	24	X																	
					CCU3-DIS-SET	0		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Chain of Custody Record

Laboratory:
TestAmerica-Pittsburgh
301 Alpha Drive
Pittsburgh, PA 15238

phone: 412-963-7058
Attn: Carrie Gamber

Sampled by: (Signature)	Date/Time	Relinquished by: (Signature)	
	7/22/10 1300		23 Jul 10
Relinquished by: (Signature)	Date/Time	Received by Laboratory: (Signature)	
	7/22/10 1600		7/23/10 0935

10

(1 - 127)

C0G230469

Client:	Project Manager:
EA Engineering Science, and Technology, Inc. **15 Loveton Circle** **Sparks, MD 21152**	**Karin Olsen** Phone: **410-329-5112** Field Contact: **Rob Ballantine** Phone: (410) 627-2731

Project Name: **Calvert Cliffs Sediment**

EA Project# 1462107, Task 0002 and 0007

Page 1 of 1

Parameters/Method Numbers for Analysis

Chain of Custody Record

Date	Time	Water	Sediment	Tissue	Sample Identification	No. of Containers	Elutriate Preparation	Chlorinated Pesticides (8081A)	PCB Aroclors (8082)	PCB Congeners (8082	Metals and Mercury (6020/7470A)	Ammonia & Nitrate+Nitrite (350.1 and 353.2)	Phosphorus & TKN (SM 4500)	TOC (415.2)	Cyanide (9012)	Sulfide (9034)	SVOC (8270C LL)	Dioxins EPA 1613	Organotins (TA SOP)	TPH GRO (8015)	TPH DRO (8015)	CCE, PPA, Saturated paste pH and EC (conductivity)	PAHs (8270C LL)	Remarks
7/22/10	1300		X		CCU3-BAR-1/2-SED	4	X																	
7/21/10	1100	X			CCU3-SW	24	X																	
					CCU3-BAR-1/2-EFF	0		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
7/22/10	1345		X		CCU3-BAR-3/4-SED	4	X																	
7/21/10	1100	X			CCU3-SW	24	X																	
					CCU3-BAR-3/4-EFF	0		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
7/22/10	1430		X		CCU3-DIS-SED	4	X																	
7/21/10	1100	X			CCU3-SW	24	X																	
					CCU3-DIS-EFF	0		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

Laboratory:
TestAmerica-Pittsburgh
301 Alpha Drive
Pittsburgh, PA 15238

phone: 412-963-7058
Attn: Carrie Gamber

***Please fax or email signed COC to Kaitlin McCormick**
fax: 410-771-4204
email: kmccormick@eaest.com

SEE SCOPE OF WORK: CREATE ELUTRIATES USING CCU3-SW

Sampled by: (Signature)	Date/Time	Relinquished by: (Signature)	
	7/22/10 1300		23 JUL 10
Relinquished by: (Signature)	Date/Time	Received by Laboratory: (Signature)	
	7/22/10 1600		7/23/10 935

SAMPLE CONTAINS ELUTRIATE

C0G230469

10

(1 - 141)

2 Coolers Shipped
5 Coolers to be dropped on Friday by hand.

C0G220462

Client:	Project Manager:
EA Engineering Science, and Technology, Inc. **15 Loveton Circle** **Sparks, MD 21152**	**Christine Papageorgis, Ph.D.** Phone: **410-771-4950 X 5310** Field Contact: **Rob Ballantine** Phone: (410) 627-2731

Project Name: **Calvert Cliffs Sediment**

EA Project# 1462107, Task 0002 and 0007

Page 1 of 1

Date	Time	Water	Sediment	Tissue	Sample Identification	No. of Containers	Metals and Mercury	Ammonia & Nitrate+Nitrite	Phosphorus & TKN	TOC	Cyanide	Sulfide	Organics (Pesticides, PCB Aroclors, SVOCs, PCB Congeners)	Dioxins	Organotins	TPH GRO	TPH DRO	*Elutriate Preparation	Remarks
7/21/10	1100	X			CCU3-SW	21	X	X	X	X	X	X	X	X	X	X	X		*Please fax or email signed COC
7/21/10	1140	X			CCU3-SW	24 Elutriate prep water													to Kaitlin McCormick
						45													fax: 410-771-4204
																			email: kmccormick@eaest.com
																			**Elutriate prep water will arrive
																			will sediment samples via hand delivery

Chain of Custody Record

Laboratory:
TestAmerica-Pittsburgh
301 Alpha Drive
Pittsburgh, PA 15238

phone: 412-963-7058
Attn: Carrie Gamber

Sampled by: (Signature)	Date/Time 7/21/10 1200
Relinquished by: (Signature)	Date/Time 7/21/10 1445
Relinquished by: (Signature)	
Received by Laboratory: (Signature)	7-22-10 0950

11

(1 - 184)

C0G220462

2 - Coolers for EQB Blank

Client:	Project Manager:	Parameters/Method Numbers for Analysis	Chain of Custody Record
EA Engineering Science, and Technology, Inc. **15 Loveton Circle** **Sparks, MD 21152**	**Christine Papageorgis, Ph.D.** Phone: **410-771-4950 X 5310** Field Contact: **Rob Ballantine** Phone: (410) 627-2731		Laboratory: **TestAmerica-Pittsburgh** **301 Alpha Drive** **Pittsburgh, PA 15238** **phone: 412-963-7058** **Attn: Carrie Gamber**
Project Name: **Calvert Cliffs Sediment** EA Project# 1462107, Task 0002 and 0007 Page 1 of 1			

Date	Time	Water	Sediment	Tissue	Sample Identification	No. of Containers	Metals and Mercury	Ammonia & Nitrate+Nitrite	Phosphorus & TKN	TOC	Cyanide	Sulfide	Organics (Pesticides, PCB Aroclors, SVOCs, PCB Congeners)	Dioxins	Organotins	TPH GRO	TPH DRO		Remarks
7/21/10	1500	X			CCU3-EQB	21	X	X	X	X	X	X	X	X	X	X	X		*Please fax or email signed COC
																			to Kaitlin McCormick
																			fax: 410-771-4204
																			email: kmccormick@eaest.com

Sampled by: (Signature)	Date/Time	Relinquished by: (Signature)	
	7/21/10 1500		
Relinquished by: (Signature)	Date/Time	Received by Laboratory: (Signature)	
	7/21/10 1600	7.22.10 0950	

APPENDIX D

PROJECT LIMITS

TABLE C-1. PROJECT LIMITS FOR SEDIMENT SAMPLES
Calvert Cliffs Sediment Characterization (2010)

Analyte	Units	Laboratory Reporting Limit	Recommended Target Detection Limit
Metals, ITM (SW846 6020)			
Aluminum	mg/kg	2	50
Antimony	mg/kg	2	2.5
Arsenic	mg/kg	2	5.0
Barium	mg/kg	1	700[1]
Beryllium	mg/kg	0.5	2.5
Cadmium	mg/kg	0.5	0.3
Calcium	mg/kg	10	NA[1]
Chromium	mg/kg	1.0	5.0
Cobalt	mg/kg	5.0	0.1
Copper	mg/kg	2.5	5.0
Iron	mg/kg	10	50
Lead	mg/kg	2	5.0
Magnesium	mg/kg	10	NA[1]
Manganese	mg/kg	1.5	5.0
Mercury	mg/kg	0.033	0.2
Nickel	mg/kg	4.0	5.0
Potassium	mg/kg	10	NA[1]
Selenium	mg/kg	2.0	1.0
Silver	mg/kg	1.0	0.2
Sodium	mg/kg	10	NA[1]
Thallium	mg/kg	1.0	0.2
Tin	mg/kg	5.0	0.5
Vanadium	mg/kg	0.1	370[1]
Zinc	mg/kg	2.0	15
Wet Chemistry			
Ammonia	mg/kg	2.4	0.1--
Nitrate+Nitrite	mg/kg	20.0	--
Total Kjeldahl Nitrogen	mg/kg	20.0	--
Sulfide	mg/kg	4.0	0.1
Total Phosphorus	mg/kg	2.5	--
TOC (Lloyd Kahn)	mg/kg	500	1000
Total Petroleum Hydrocarbons (TPH)			
Diesel Range Organics (DRO)	mg/kg	10	0.24
Gas Range Organics (GRO)	µg/kg	100	28
Chlorinated Pesticides			
Aldrin	µg/kg	1.3	10
alpha-BHC	µg/kg	1.3	--
beta-BHC	µg/kg	1.3	--
delta-BHC	µg/kg	1.3	--
gamma-BHC (Lindane)	µg/kg	1.3	10
Chlordane (Technical)	µg/kg	33	10
Dachtal	µg/kg	TBD	2
4,4'-DDD	µg/kg	1.3	10

Analyte	Units	Laboratory Reporting Limit	Recommended Target Detection Limit
4,4'-DDE	µg/kg	1.3	10
4,4'-DDT	µg/kg	1.3	10
Dieldrin	µg/kg	1.3	10
Endosulfan I	µg/kg	1.3	10
Endosulfan II	µg/kg	1.3	10
Endosulfan sulfate	µg/kg	1.3	10
Endrin	µg/kg	1.3	5
Endrin aldehyde	µg/kg	1.3	5
Heptachlor	µg/kg	1.3	10
Heptachlor epoxide	µg/kg	1.3	10
Methoxychlor	µg/kg	3.3	10
Mirex	µg/kg	1.3	--
Toxaphene	µg/kg	16.5	50
Polychlorinated Biphenyl (PCB) Congeners			
2,4'-Dichlorobiphenyl (BZ # 8)	µg/kg	0.17	1
2,2',5-Trichlorobiphenyl (BZ # 18)	µg/kg	0.17	1
2,4,4'-Trichlorobiphenyl (BZ # 28)	µg/kg	0.17	1
2,2',3,5'-Tetrachlorobiphenyl (BZ # 44)	µg/kg	0.17	1
2,2',4,5'-Tetrachlorobiphenyl (BZ # 49)	µg/kg	0.17	1
2,2',5,5'-Tetrachlorobiphenyl (BZ # 52)	µg/kg	0.17	1
2,3',4,4'-Tetrachlorobiphenyl (BZ # 66)	µg/kg	0.17	1
3,3',4,4'-Tetrachlorobiphenyl (BZ # 77)	µg/kg	0.17	1
2,2',3,4,5'-Pentachlorobiphenyl (BZ # 87)	µg/kg	0.17	1
2,2',4,5,5'-Pentachlorobiphenyl (BZ # 101)	µg/kg	0.17	1
2,3,3',4,4'-Pentachlorobiphenyl (BZ # 105)	µg/kg	0.17	1
2,3',4,4',5-Pentachlorobiphenyl (BZ # 118)	µg/kg	0.17	1
3,3',4,4',5-Pentachlorobiphenyl (BZ # 126)	µg/kg	0.17	1
2,2',3,3',4,4'-Hexachlorobiphenyl (BZ # 128)	µg/kg	0.17	1
2,2',3,4,4',5'-Hexachlorobiphenyl (BZ # 138)	µg/kg	0.17	1
2,2',4,4',5,5'-Hexachlorobiphenyl (BZ # 153)	µg/kg	0.17	1
2,3,3',4,4',5-Hexachlorobiphenyl (BZ # 156)	µg/kg	0.17	1
3,3',4,4',5,5'-Hexachlorobiphenyl (BZ # 169)	µg/kg	0.17	1
2,2',3,3',4,4',5-Heptachlorobiphenyl (BZ # 170)	µg/kg	0.17	1
2,2',3,4,4',5,5'-Heptachlorobiphenyl (BZ # 180)	µg/kg	0.17	1
2,2',3,4,4',5',6-Heptachlorobiphenyl (BZ # 183)	µg/kg	0.17	1
2,2',3,4,4',6,6'-Heptachlorobiphenyl (BZ # 184)	µg/kg	0.17	1
2,2',3,4',5,5',6-Heptachlorobiphenyl (BZ # 187)	µg/kg	0.17	1
2,2',3,3',4,4',5,6-Octachlorobiphenyl (BZ # 195)	µg/kg	0.17	1
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (BZ # 206)	µg/kg	0.17	1
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl (BZ # 209)	µg/kg	0.17	1
Polychlorinated Biphenyl (PCB) Aroclors			
Aroclor 1016	ug/kg	33	--
Aroclor 1221	ug/kg	33	--
Aroclor 1232	ug/kg	33	--
Aroclor 1242	ug/kg	33	--
Aroclor 1248	ug/kg	33	--
Aroclor 1254	ug/kg	33	--

Analyte	Units	Laboratory Reporting Limit	Recommended Target Detection Limit
Aroclor 1260	ug/kg	33	--
Polynuclear Aromatic Hydrocarbons (PAHs)			
Acenaphthene	µg/kg	6.7	20
Acenaphthylene	µg/kg	6.7	20
Anthracene	µg/kg	6.7	20
Benzo(a)anthracene	µg/kg	6.7	20
Benzo(b)fluoranthene	µg/kg	6.7	20
Benzo(k)fluoranthene	µg/kg	6.7	20
Benzo(ghi)perylene	µg/kg	6.7	20
Benzo(a)pyrene	µg/kg	6.7	20
Chrysene	µg/kg	6.7	20
Dibenzo(a,h)anthracene	µg/kg	6.7	20
Fluoranthene	µg/kg	6.7	20
Fluorene	µg/kg	6.7	20
Indeno(1,2,3-cd)pyrene	µg/kg	6.7	20
2-Methylnaphthalene	µg/kg	6.7	20
1-Methylnaphthalene	µg/kg	6.7	20
Naphthalene	µg/kg	6.7	20
Phenanthrene	µg/kg	6.7	20
Pyrene	µg/kg	6.7	20
Dioxins			
2,3,7,8-TCDD	µg/kg	1	1
Butyltins			
Dibutyiltin	µg/kg	10.0	10
Monobutyltin	µg/kg	10.0	10
Tetrabutyltin	µg/kg	10.0	10
Tributyltin	µg/kg	10.0	10

[1] Analytes added for Shirley Plantation screening. Target detection limit is based on the Shirley Plantation Screening Criteria. NA values are values for which Shirley Plantation has not provided a screening value.

TABLE C-2. PROJECT LIMITS FOR TOXICITY CHARACTERISTIC LEACHING PROCEDURE (TCLP) SAMPLES
Calvert Cliffs Sediment Characterization (2010)

Analyte	Units	Laboratory Reporting Limit	Target Detection Limit
Volatiles, TCLP (SW846 1311/8260B)			
Benzene	µg/L	0.050	0.50
2-Butanone	µg/L	0.050	200
Carbon tetrachloride	µg/L	0.050	0.50
Chlorobenzene	µg/L	0.050	100
Chloroform	µg/L	0.050	6.0
1,2-Dichloroethane	µg/L	0.050	0.50
1,1-Dichloroethene	µg/L	0.050	0.70
Tetrachloroethene	µg/L	0.050	0.50
Trichloroethene	µg/L	0.050	0.70
Vinyl chloride	µg/L	0.050	0.20
Semivolatiles, TCLP (SW846 1311/8270C)			
Cresols (total)	µg/L	0.050	200
1,4-Dichlorobenzene	µg/L	0.010	7.5
2,4-Dinitrotoluene	µg/L	0.050	0.13
Hexachlorobenzene	µg/L	0.010	0.13
Hexachlorobutadiene	µg/L	0.01	0.50
Hexachloroethane	µg/L	0.050	3.0
3-Methylphenol & 4-Methylphenol	µg/L		
Nitrobenzene	µg/L	0.01	2.0
Pentachlorophenol	µg/L	0.05	100
Pyridine	µg/L	0.05	5.0
2,4,5-Trichlorophenol	µg/L	0.050	400
2,4,6-Trichlorophenol	µg/L	0.050	2.0
Pesticides, TCLP (SW846 8081A)			
Gamma- BHC (Lindane)	µg/L	0.0005	0.40
Chlordane (technical)	µg/L	0.005	0.030
Endrin	µg/L	0.0005	0.20
Heptachlor	µg/L	0.0005	0.0080
Heptachlor epoxide	µg/L	0.0005	0.0080
Methoxychlor	µg/L	0.001	10
Toxaphene	µg/L	0.02	0.50
Herbicides, TCLP (SW846 1311/8151A)			
2,4-D	µg/L	0.04	10
2,4,5-TP (Silvex)	µg/L	0.01	1.0
Metals, TCLP (SW846 6010B/7470A)			
Arsenic	µg/L	0.50	5.0
Barium	µg/L	10	100
Cadmium	µg/L	0.10	1.0
Chromium	µg/L	0.50	5.0
Lead	µg/L	0.5	5.0
Mercury	µg/L	0.0002	0.2
Selenium	µg/L	0.25	1.0
Silver	µg/L	0.25	5.0

TABLE C-3. PROJECT LIMITS FOR SITE WATER AND ELUTRIATE SAMPLES
Calvert Cliffs Sediment Characterization (2010)

Analyte	Units	Laboratory Reporting Limit	Recommended Target Detection Limit
Metals, ITM (SW846 6020)			
Aluminum	µg/L	100	40
Antimony	µg/L	4.0	3
Arsenic	µg/L	2.0	1
Barium	µg/L	10	NA[1]
Beryllium	µg/L	2.0	0.2
Cadmium	µg/L	2.0	1
Calcium	µg/L	100	NA[1]
Chromium	µg/L	10.0	1
Cobalt	µg/L	2.0	4
Copper	µg/L	10.0	1
Iron	µg/L	100	10
Lead	µg/L	1.0	1
Magnesium	µg/L	100	NA[1]
Manganese	µg/L	2.0	1
Mercury	µg/L	0.2	0.2
Nickel	µg/L	10.0	1
Potassium	µg/L	100	NA[1]
Selenium	µg/L	10.0	1
Silver	µg/L	10.0	1
Sodium	µg/L	100	NA[1]
Thallium	µg/L	1.0	1
Tin	µg/L	10.0	5
Vanadium	µg/L	1	NA[1]
Zinc	µg/L	10.0	1
Wet Chemistry			
Ammonia	mg/L	0.2	0.03
Nitrate+Nitrite	mg/L	0.1	--
Total Kjeldahl Nitrogen	mg/L	0.2	--
Sulfide	mg/L	0.2	--
Total Phosphorus	mg/L	0.050	--
TOC (Lloyd Kahn)	mg/L	1	0.1
Total Petroleum Hydrocarbons (THP)			
Diesel Range Organics (DRO)	µg/L	100	47
Gas Range Organics (GRO)	µg/L	100	28
Chlorinated Pesticides			
Aldrin	µg/L	0.02	0.04
alpha-BHC	µg/L	0.02	--
beta-BHC	µg/L	0.02	--
delta-BHC	µg/L	0.02	--
Gamma-BHC (Lindane)	µg/L	0.02	0.1
Chlordane (Technical)	µg/L	0.5	0.17

Analyte	Units	Laboratory Reporting Limit	Recommended Target Detection Limit
Dachtal	µg/L	TBD	0.03
4,4'-DDD	µg/L	0.02	0.01
4,4'-DDE	µg/L	0.02	0.01
4,4'-DDT	µg/L	0.02	0.01
Dieldrin	µg/L	0.02	0.02
Endosulfan I	µg/L	0.02	0.1
Endosulfan II	µg/L	0.02	0.1
Endosulfan sulfate	µg/L	0.02	0.1
Endrin	µg/L	0.02	0.1
Endrin aldehyde	µg/L	0.02	0.1
Heptachlor	µg/L	0.02	0.1
Heptachlor epoxide	µg/L	0.02	0.1
Methoxychlor	µg/L	0.05	0.5
Mirex	µg/L	0.02	--
Toxaphene	µg/L	0.25	0.5
Polychlorinated Biphenyl (PCB) Congeners			
2,4'-Dichlorobiphenyl (BZ # 8)	ng/L	10	8.272
2,2',5-Trichlorobiphenyl (BZ # 18)	ng/L	1	0.48
2,4,4'-Trichlorobiphenyl (BZ # 28)	ng/L	1	0.432
2,2',3,5'-Tetrachlorobiphenyl (BZ # 44)	ng/L	1	0.436
2,2',4,5'-Tetrachlorobiphenyl (BZ # 49)	ng/L	1	0.449
2,2',5,5'-Tetrachlorobiphenyl (BZ # 52)	ng/L	1	0.431
2,3',4,4'-Tetrachlorobiphenyl (BZ # 66)	ng/L	1	0.505
3,3',4,4'-Tetrachlorobiphenyl (BZ # 77)	ng/L	1	0.441
2,2',3,4,5'-Pentachlorobiphenyl (BZ # 87)	ng/L	1	0.407
2,2',4,5,5'-Pentachlorobiphenyl (BZ # 101)	ng/L	1	0.413
2,3,3',4,4'-Pentachlorobiphenyl (BZ # 105)	ng/L	1	0.383
2,3',4,4',5-Pentachlorobiphenyl (BZ # 118)	ng/L	1	0.532
3,3',4,4',5-Pentachlorobiphenyl (BZ # 126)	ng/L	1	0.393
2,2',3,3',4,4'-Hexachlorobiphenyl (BZ # 128)	ng/L	1	0.356
2,2',3,4,4',5'-Hexachlorobiphenyl (BZ # 138)	ng/L	1	0.338
2,2',4,4',5,5'-Hexachlorobiphenyl (BZ # 153)	ng/L	1	0.392
2,3,3',4,4',5-Hexachlorobiphenyl (BZ # 156)	ng/L	1	0.374
3,3',4,4',5,5'-Hexachlorobiphenyl (BZ # 169)	ng/L	1	0.429
2,2',3,3',4,4',5-Heptachlorobiphenyl (BZ # 170)	ng/L	1	0.368
2,2',3,4,4',5,5'-Heptachlorobiphenyl (BZ # 180)	ng/L	1	0.364
2,2',3,4,4',5',6-Heptachlorobiphenyl (BZ # 183)	ng/L	1	0.372
2,2',3,4,4',6,6'-Heptachlorobiphenyl (BZ # 184)	ng/L	1	0.423
2,2',3,4',5,5',6-Heptachlorobiphenyl (BZ # 187)	ng/L	1	0.394
2,2',3,3',4,4',5,6-Octachlorobiphenyl (BZ # 195)	ng/L	1	0.393
2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl (BZ # 206)	ng/L	1	0.383
2,2',3,3',4,4',5,5',6,6'-Decachlorobiphenyl (BZ # 209)	ng/L	1	0.438

Polychlorinated Biphenyl (PCB) Aroclors			
Aroclor 1016	µg/L	1	--
Aroclor 1221	µg/L	1	--
Aroclor 1232	µg/L	1	--
Aroclor 1242	µg/L	1	--
Aroclor 1248	µg/L	1	--
Aroclor 1254	µg/L	1	--
Aroclor 1260	µg/L	1	--
Polynuclear Aromatic Hydrocarbons (PAHs)			
Acenaphthene	µg/L	0.2	10
Acenaphthylene	µg/L	0.2	10
Anthracene	µg/L	0.2	10
Benzo(a)anthracene	µg/L	0.2	10
Benzo(b)fluoranthene	µg/L	0.2	10
Benzo(k)fluoranthene	µg/L	0.2	10
Benzo(ghi)perylene	µg/L	0.2	10
Benzo(a)pyrene	µg/L	0.2	10
Chrysene	µg/L	0.2	10
Dibenzo(a,h)anthracene	µg/L	0.2	10
Fluoranthene	µg/L	0.2	10
Fluorene	µg/L	0.2	10
Indeno(1,2,3-cd)pyrene	µg/L	0.2	10
2-Methylnaphthalene	µg/L	0.2	10
1-Methylnaphthalene	µg/L	0.2	10
Naphthalene	µg/L	0.2	10
Phenanthrene	µg/L	0.2	10
Pyrene	µg/L	0.2	10
Dioxins			
2,3,7,8-TCDD	µg/L	10	10

[1] Analytes added to metals listed based on Shirley Plantation Screening Table, which does not use aqueous results.